City of Bellevue
Development Services Department
Land Use Staff Report

Proposal Name:	City of Bellevue Utilities Department SE 30th Street/Sunset Creek Flood Improvement Project
Proposal Address:	Sunset Creek - vicinity of 13200 SE 30th Street
Proposal Description:	Application for a Critical Areas Land Use permit to replace an existing twin barrel 42-inch diameter culvert on Sunset Creek at SE 30th Street with an integrated fish-passable culvert and sediment capture structure. Installation of the new structure will require modifications of the stream channel upstream and downstream of SE 30th. The purpose of the project is flood control and sediment management.
File Number:	**08-128529 LO**
Applicant:	Brian Ward, City of Bellevue Utilities Department
Decisions Included:	Critical Areas Land Use Permit (Process II. LUC 20.30P)
Planner:	**Heidi M. Bedwell**, Planner
State Environmental Policy Act Threshold Determination:	**Determination of Non-Significance** Michael N. Paris for Carol V. Helland, Environmental Coordinator Development Services Department
Director's Decision:	**Approval with Conditions** Michael N. Paris for Carol V. Helland, Land Use Director Development Services Department

Application Date:	July 30, 2008
Notice of Application Publication Date:	September 11, 2008
Decision Publication Date:	March 12, 2009
Project/SEPA Appeal Deadline:	March 26, 2009

For information on how to appeal a proposal, visit Development Services Center at City Hall or call (425) 452-6800. Comments on State Environmental Policy Act (SEPA) Determinations can be made with or without appealing the proposal within the noted comment period for a SEPA Determination. Appeal of the Decision must be received in the City's Clerk's Office by 5 PM on the date noted for appeal of the decision.

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I. Proposal Description

The applicant requests a Critical Areas Land Use Permit approval to replace an existing twin barrel 42-inch diameter culvert on Sunset Creek at SE 30th Street with an integrated fish-passable culvert and sediment capture structure. Installation of the new structure will require modifications of the stream channel upstream and downstream of SE 30th. The purpose of the project is flood control and sediment management. The existing twin culverts are not currently passable to fish at all flows. Extensive sediment deposition in Sunset Creek downstream of these culverts presents a low flow barrier to fish passage, and sediment deposition upstream of SE 30th Street has created conditions that are a likely barrier to passage during high flow conditions. The proposed project would improve fish passage conditions in Sunset Creek at the SE 30th Street culvert and address barrier conditions in the channel both upstream and downstream of the structure.

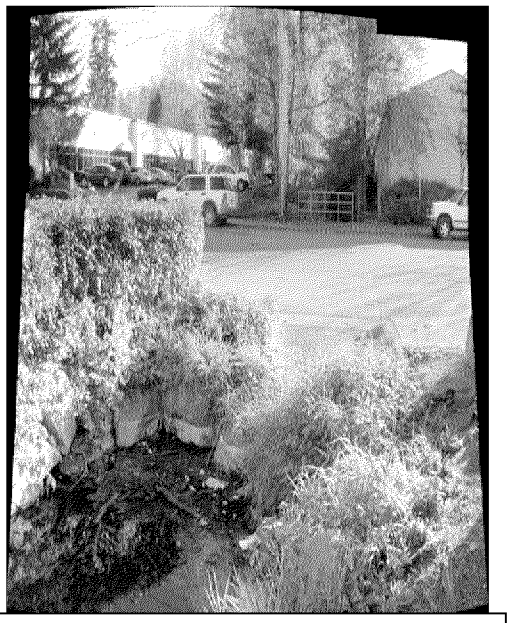
The replacement of the culvert, and associated restoration of the stream channel and restoration of the riparian corridor is allowed as a flood control measure with a Critical Areas Land Use Permit accompanied by a Critical Areas Report per Land Use Code (LUC) 20.25H.080.B.2 for modification of stream channel.

II. Site Description, Zoning, Land Use and Critical Areas

A. Site Description

The project site is on a portion of Sunset Creek, east of Richards Road. The project improvements are proposed to occur within existing city street right-of-way and adjacent privately-owned parcels. The culvert replacement site is located within the right-of-way of SE 30th Street along the same alignment as the existing twin 42-inch diameter culverts.

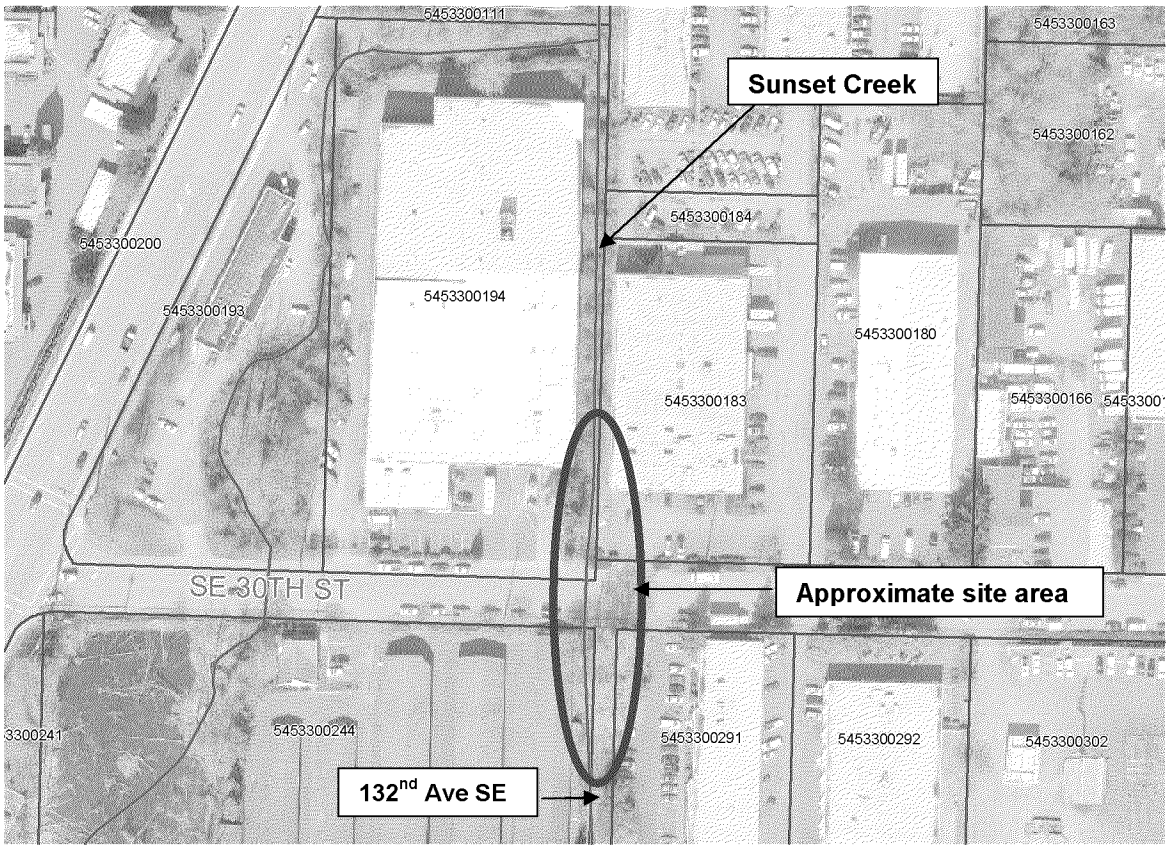
Historic development of the area prior to institution of critical areas protections has encroached upon the stream buffer. Buildings, roadways, and paved parking lots limit the existing and potential riparian zone to an average width of 10 to 30 feet. Upstream channel modifications are to occur primarily within an existing city right-of-way for 132nd Avenue SE, which was never constructed in this location.



Downstream of SE 30th-Sunset Creek

Upstream of SE 30th- Sunset Creek

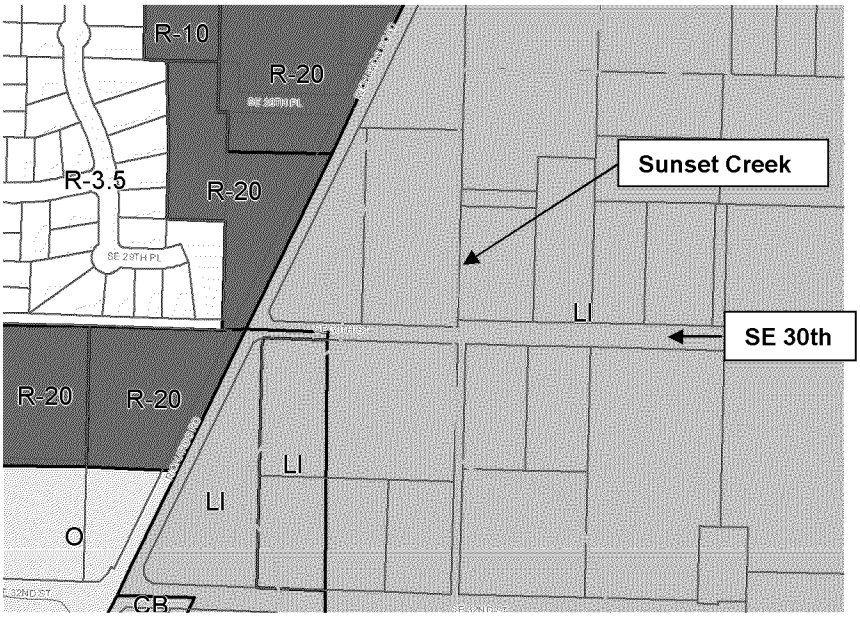
Some channel modification, site access and revegetation activities associated with upstream channel modifications will occur on private parcels (tax parcel numbers 5453300244 and 5453300291). Downstream channel modifications are proposed on private parcels (tax parcel numbers 5453300194 and 5453300183).



B. Zoning and Uses

The proposed activities would be conducted on properties zoned Light-Industrial (LI). The general dimensional standards in LUC 20.20.010 do not apply, because there is no structural development proposed. The existing uses on the affected properties are permitted and there is no proposed change in use of the properties.

The project site and surrounding properties are designated light-industrial in the Comprehensive Plan and are developed with light industrial and warehouse uses.



C. Critical Areas Functions and Values

1. Streams and Riparian Areas

Riparian vegetation along stream banks mitigates the impacts of urbanization and support healthy stream conditions. Riparian vegetation affects water temperature by providing shade to reduce solar exposure and regulate high ambient air temperatures, slowing or preventing increases in water temperature.

Upland and wetland riparian areas retain sediments, nutrients, pesticides, pathogens, and other pollutants that may be present in runoff, protecting water quality in streams. The roots of riparian plants also hold soil and prevent erosion and sedimentation that may affect spawning success or other behaviors, such as feeding.

Both upland and wetland riparian areas reduce the effects of flood flows. Riparian areas and wetlands reduce and desynchronize peak crests and flow rates of floods. Upland and wetland areas can infiltrate flood flows, which in turn, are released to the stream as base flow.

Stream riparian areas, or buffers, can be a significant factor in determining the quality of wildlife habitat. For example, buffers comprised of native vegetation with multi-canopy structure, snags, and down logs provide habitat for the greatest range of wildlife species. Vegetated riparian areas also provide a source of large woody debris that helps create and maintain diverse in-stream habitat, as well as create woody debris jams that store sediments and moderate flood velocities.

Sparsely vegetated or vegetated buffers with non-native species may not perform the needed functions of stream buffers. In cases where the buffer is not well vegetated, it is necessary to either increase the buffer width or require that the standard buffer width be restored or revegetated. Until the newly planted buffer is established the near term goals for buffer functions may not be attained.

Riparian areas often have shallow groundwater tables, as well as areas where groundwater and surface waters interact. Groundwater flows out of riparian wetlands, seeps, and springs to support stream baseflows. Surface water that flows in to riparian areas during floods or as direct precipitation infiltrates into groundwater in riparian areas and is stored for later discharge to the stream.

2. Floodplains

The value of floodplains can be described in terms of both the hydrologic and ecological functions that they provide. Flooding occurs when either runoff exceeds the capacity of rivers and streams to convey water within their banks, or when engineered stormwater systems become overwhelmed. Studies have linked urbanization with increased peak discharge and channel degradation (Dunne and Leopold 1978; Booth and Jackson 1997; Konrad 2000). Floodplains diminish the effects of urbanization by temporarily storing water and mediating flow to downstream reaches. The capacity of a floodplain to buffer upstream fluctuations in discharge may vary according to valley confinement, gradient, local relief, and flow resistance provided by vegetation. Development within the floodplain can dramatically affect the storage capacity of a floodplain, impact the hydrologic regime of a basin and present a risk to public health and safety and to property and infrastructure.

III. Consistency with Land Use Code Requirements

A. Zoning District Dimensional Requirements

The subject area is zoned Light-Industrial (LI). The general dimensional standards in LUC 20.20.010 do not apply, because there are no structural development proposed which would be subject to these standards.

B. Critical Areas Requirements LUC 20.25H

1. Analysis of Technical Feasibility for New or Expanded Allowed Uses

a. New or expanded facilities and systems are allowed within the critical area or critical area buffer only where no technically feasible alternative with less impact on the critical area or critical area buffer exists. A determination of technically feasible alternatives will consider:
   i. The location of existing infrastructure;
   ii. The function or objective of the proposed new or expanded facility or system;
   iii. Demonstration that no alternative location or configuration outside of the critical area or critical area buffer achieves the stated function or objective, including construction of new or expanded facilities or systems outside of the critical area;
   iv. Whether the cost of avoiding disturbance is substantially disproportionate as compared to the environmental impact of proposed disturbance; and
   v. The ability of both permanent and temporary disturbance to be mitigated.

b. If the applicant demonstrates that no technically feasible alternative with less impact on the critical area or critical area buffer exists, then the applicant shall comply with the following:

i. Location and design shall result in the least impacts on the critical area or critical area buffer;
ii. Disturbance of the critical area and critical area buffer, including disturbance of vegetation and soils, shall be minimized;
iii. Disturbance shall not occur in habitat used for salmonid rearing or spawning or by any species of local importance unless no other technically feasible location exists;
iv. Any crossing over of a wetland or stream shall be designed to minimize critical area and critical area buffer coverage and critical area and critical area buffer disturbance, for example by use of bridge, boring, or open cut and perpendicular crossings, and shall be the minimum width necessary to accommodate the intended function or objective; provided, that the Director may require that the facility be designed to accommodate additional facilities where the likelihood of additional facilities exists, and one consolidated corridor would result in fewer impacts to the critical area or critical area buffer than multiple intrusions into the critical area or critical area buffer;
v. All work shall be consistent with applicable City of Bellevue codes and standards;
vi. The facility or system shall not have a significant adverse impact on overall aquatic area flow peaks, duration or volume or flood storage capacity, or hydroperiod;
vii. Associated parking and other support functions, including, for example, mechanical equipment and maintenance sheds, must be located outside critical area or critical area buffer except where no feasible alternative exists; and
viii. Areas of new permanent disturbance and all areas of temporary disturbance shall be mitigated and/or restored pursuant to a mitigation and restoration plan meeting the requirements of LUC 20.25H.210.

Response: The Richards Creek, Sunset Creek, and East Creek channel network in the vicinity of SE 30th Street and Kamber Road has been directly impacted by channel realignment, channel confinement, and increased rates of sediment production associated with land development both local to the project area and in the upper watershed. These impacts include recurrent flooding and sedimentation problems, channel instability, and degraded habitat conditions. The proposed project includes the replacement of an existing twin barrel 42-inch diameter culvert on Sunset Creek at SE 30th Street with an integrated fish-passable culvert and sediment capture structure. This project is part one of a four-phased Flood Control and Sedimentation Plan developed by the City to address the impacts to this stream system. Phases I and II are funded and Phase II is anticipated to be constructed in 2010. Phases III and IV are dependent upon additional CIP funding.

Installation of the new structure will require modification of the stream channel upstream and downstream of SE 30th Street. These modifications will include eight grade control structures upstream and two grade control structures downstream of the culvert, riprap removal and replacement with bioengineered bank protection structures, and stream and riparian habitat

enhancement. Channel and riparian modifications will take place over a segment of Sunset Creek extending from approximately 110 feet upstream to approximately 60 feet downstream of SE 30th Street.

The culvert replacement project is designed to address chronic flooding of Sunset Creek at SE 30th Street and adjacent businesses, and provide the ability to adaptively manage habitat conditions and flood conveyance capacity. Based on the engineering done in support of this project and contained in the Critical Areas Report Attachment 2, the integrated sediment trap will capture the majority of sediments transported to this reach of Sunset Creek in most years. This will allow for maintenance dredging to be conducted within the enclosed structure rather than the active channel. Sediment removal will be managed to optimize sediment delivery rates to the channel segment downstream of the structure, maintaining flood conveyance capacity and desirable habitat conditions for fish by providing a fish passable culvert.

The sediment storage capacity of the sediment retention (sedimentation) structure portion of the replacement culvert is designed to accommodate approximately 50 cubic yards of sediment. This volume was determined primarily through a consideration of estimated historical, existing, and potential future sediment delivery and transport rates, combined with practical sediment removal frequency for City of Bellevue maintenance crews. Additional secondary considerations included site constraints, cost implications and environmental impact associated with operations and maintenance activities. Current maintenance practice to remove sediments in the vicinity of the SE 30th culvert involve dredging materials directly from the stream channel on an up to yearly basis. Compared to the current maintenance practice, the proposed culvert maintenance will allow sediment to be removed within the culvert structure and will not involve modification to the stream channel. This will result is fewer environmental impacts to the critical areas.

The Critical Areas Report discusses in detail the rate of sediment delivery and reasons for the amount of sediment in the stream system. Sediment delivery rates are highly variable and episodic by nature. To accommodate for annual variability in sediment delivery, the capacity of the sedimentation structure is designed to accommodate delivery rates up to two times the estimated current rate. Given this design volume, sediment removal activities are forecast to be required every two years on average. The report additionally defines protocols for structure maintenance based on actual deposition rates and channel. So long as these protocols for maintenance and monitoring are followed, the facility shall not have a significant impact on critical area function and should provide flood protection and habitat improvement in the long term as compared to existing conditions.

3. Performance Standards for Public Flood Protection Measures LUC 20.25H.055.C.3.c

New public flood protection measures and expansion of existing ones may be permitted only in accordance with a design prepared by a qualified professional.

Response: A Critical Areas Report consistent with LUC 20.25H.230 has been prepared by Herrera Environmental Consultants (See Attachment 2). A discussion of how the critical areas report satisfies the critical areas report decision criteria can be found below.

4. **Performance Standards for New or Expanded Bridges and Culverts.** New culverts shall be designed in accordance with the Washington State Department of Fish and Wildlife "Design of Road Culverts for Fish Passage" now or as hereafter amended. Culvert expansions shall be considered new culverts and be required to be designed in accordance with "Design of Road Culverts for Fish Passage" now or as hereafter amended when the expansion is associated with a project increasing vehicular capacity and (i) there are fish present downstream; (ii) there is potential fish habitat upstream; and (iii) the benefits of so designing the culvert are substantial when compared to expanding the culvert based on its then-existing design.

   Response: Per the Critical Areas Report (Attachment 2) and the JARPA documentation, the proposal is designed in accordance with WDFW culvert design guidance (WDFW 2003), using the stream simulation method. The culvert replacement is intended to address flood control and sediment management issues at the existing road crossing. It will not change the traffic capacity of the existing roadway or otherwise facilitate new development however the design will provide improved fish passage over the existing culvert design.

5. **Consistency Critical Areas Performance Standards**

   The performance standards for the modification of a stream channel described in LUC 20.25H.080.B require the preparation of a critical areas report for a public flood control project that proposes to modify the stream channel, as allowed under LUC 20.25H.055. A critical areas report has been prepared by Herrera Environmental Consultants (See Attachment 2). A discussion of how the critical areas report satisfies the critical areas report decision criteria can be found below.

6. **Consistency with Critical Areas Report LUC 20.25.230.**

   The applicant supplied a complete critical areas report prepared by Herrera Environmental Consultants, a qualified professional. The report met the minimum requirements in LUC 20.25H.250 as determined by the Director. The critical areas report contained items discussed below.

   The critical areas report contained an accurate depiction of the critical areas on the site and those properties immediately adjacent to the site in a graphical format on the site plans. The critical areas report also includes a discussion of probable habitat and water quality impacts resulting from the proposed project.

The report was supplemented by materials provided to State and Federal permitting agencies including a Joint Aquatic Resources Permit Application and Biological Evaluation.

IV. Public Notice and Comment

Application Date:	July 30, 2008
Public Notice (500 feet):	September 11, 2008
Minimum Comment Period:	September 25, 2008

The Notice of Application for this project was published in the City of Bellevue weekly permit bulletin on September 11, 2008, which was advertised in Seattle Times on the same day. The weekly permit bulletin was mailed to property owners within 500 feet of the project site.

One comment letter was received regarding this project from Karen Walter with the Muckleshoot Indian Tribe Fisheries Division. See Attachment 5 for the full comment letter and applicant response. The following are a summary of the issues raised:

Comment *The proposed in-culvert sediment trap has the potential to starve downstream areas of Sunset Creek, Richards Creek and East Creek of spawning gravel necessary for successful spawning. The project should monitor downstream spawning areas to determine if there is a change in spawning gravel area and particle size distribution. Methods suggested.*

Response The objective of the proposed sediment trap is to reduce the delivery of sediment to the Sunset Creek channel downstream of SE 30th Street where the rate of sediment delivery has historically far exceeded the sediment transport capacity of the channel. Optimally, the trap would be sized to capture the sediment in excess of the downstream channel's sediment transport capacity, thereby maintaining a flux of gravel through the channel that would not result in net aggradation. Although the capacity of the trap is approximately 50 cubic yards, adaptive management of the trap, including documenting the amount of sediment captured by the trap, may determine that the optimal sediment removal volume is less than the capacity of the sediment trap. For example, if only 30 cubic yards of sediment are captured annually, the trap could be maintained with a storage capacity of 20 cubic yards so that that amount of sediment delivered in excess of this amount would be delivered to the downstream channel.

Currently, the City of Bellevue documents the condition of salmonid spawning in the Richards and Sunset Creek channels during the spawning season, generally from August to October. During this period City staff conduct surveys of Richards Creek from its confluence with Kelsey Creek to the project site every other week documenting spawning redds and counting fish carcasses. The frequency of surveys is adjusted to once per week if observations warrant the change. Salmon surveys are also conducted through the Salmon Watcher program, a program where volunteers go to designated locations each week to look for salmon. Richards and Sunset Creeks are part of that program.

These surveys will be complemented by the proposed channel monitoring protocol which will document changes in both channel geometry and substrate condition. The protocol for documenting substrate conditions will be guided by the protocols within the recommended document (TFW Monitoring Methods Manual for

Spawning Gravel Composition Surveys, TFW-AM9-99-006, 1999).

The protocol for documenting substrate conditions will include gathering bulk samples from areas representative of potential spawning habitat, such as riffle crests or gravel bar features at the proposed monitoring cross-sections. The samples will be gathered using a McNeil sampler. The information gathered will be suitable for:

❑ Evaluating the characteristics and composition of gravel within the sampling extent

❑ Estimating the percentage of fine sediment less than 0.85 mm in order to evaluate the potential impact of fine sediment on survival to emergence

❑ Comparing the composition of gravel from different locations within the sampling area and from other watersheds

❑ Monitoring trends in gravel composition over time.

At present there are very limited to no spawning areas located between the Richards Creek flow split and Kamber Road, therefore the proposed extent of the channel monitoring protocol is expected to capture the extent of the channel area containing potential spawning habitat that may be directly affected by an immediate reduction in bedload delivery.

Comment *Concerns regarding the monitoring plan and adaptive management strategy- lacks a numeric standard for the proposed gravel , the actual 'desirable habitat conditions to be maintained' for this project and the adaptive management protocols should be specifically identified, the monitoring plan should include standards regarding both adult and juvenile fish passage to ensure that the new culvert is passing all fish species and all life history stages.*

Response
See discussion in Section VII and conditions in Section IX requiring the Protocols for Channel Monitoring and Replacement Culvert Sedimentation Structure Maintenance to be prepared prior to the approval of the Clearing and Grading permit.

Comment *Phase I as currently proposed provides very little instream habitat diversity for salmonids. The proposed boulders and wood is such that the any pool habitat is likely to be minimal due to the type and orientation of these materials such that they will be resistant to scour necessary to create pool habitat. The design is for streambed and bank stabilization than instream habitat [sic]. The project should be modified by adding wood to additional upstream areas that is allowed to retain sediment and form pools with cover in a more natural manner than what is proposed.*

Response The project objective is for flood and sediment control. Instream habitat for salmonids is not the overall objective with the exception of fish passage at the culvert.

Comment *Removal of 8 trees that are 10 inches in diameter or greater. All of these trees should be used in the project to support the Phase I design or to create habitat for salmonids as recommended above. Otherwise, the project will result in*

an adverse impact to future wood recruitment (temporal loss) that could be avoided.

Response Of the 8 trees that may be removed during utility relocation and channel modification activities, 3 are conifers and 5 are deciduous. Due to the stability requirements of the proposed channel modifications, and the greater decay rates of deciduous trees relative to coniferous trees, only the 3 Douglas firs are potentially suitable for incorporation into the proposed channel modifications. These 3 trees will be incorporated into the project designs to the extent possible. Opportunities for placing the remaining deciduous trees at other locations in the channel network will be evaluated. The proposed design includes planting 107 native trees during Phase I including; 7 black cottonwood, 29 red alder, 23 Douglas fir, 42 Pacific willow, and 6 Western red cedar. The long-term benefits of these trees are expected to include improved riparian habitat and wood recruitment for Sunset Creek that far exceeds the functions of the 8 trees to be removed.

Comment *The removal of these trees may adversely affect water temperature. An analysis or discussion about the potential loss of shade due to removal of these trees or shrubs that may be providing shade is lacking. A shade analysis should be conducted, and if there is a potential increase in water temperature, then additional tree planting should be required.*

Response A temporary increase in water temperatures was identified as a possible effect of the proposed tree removal. Page 2 of the BA Addendum states: *"Current conditions for water temperatures in Sunset Creek are rated as **at risk**. The proposed action [tree removal] will temporarily degrade water temperatures by reducing available shade. However, these effects will be offset by the deeper and narrower channel profile produced by the planned channel modifications. This will reduce the surface area exposed to insolation, which will mitigate the temporary reduction in shade. As the planned site revegetation matures, shading of the stream channel will increase relative to the current environmental baseline. As a result, the proposed action will **improve** water temperature conditions over the long-term."*
The proposed planting plan incorporates four distinct plant communities based on the available light and proximity to the channel at different locations in the project area. In addition to the 107 trees that will be planted during Phase I (detailed above), the project design calls for removal of invasive species within the project area and additional planting of 256 shrubs, and 196 herbs during Phase I. This is an extensive planting plan relative to the size of the project.

<u>Phase I and Phase II concerns</u>
Comment *Per the documents that we reviewed, the Phase I project is not independent of the Phase II project and should be evaluated for its potential impacts to salmonids and their habitats concurrently. Phase II is needed so that the 30th Street SE [sic] culvert can pass the 100 year flood event with 1 foot of freeboard and meet Bellevue's engineering standards and likely those standards of FEMA and other agencies. The Phase II project is also needed to meet the project's purpose "to address chronic flooding of SE 30th Street and surrounding private property". As noted in the Biological Assessment (BA, page 7), the Phase II project primary purpose is to address the flooding of properties surrounding the project area and to "optimize the flood conveyance capacity of Sunset Creek from the downstream project extents of Alternative 1 to the confluence of Sunset Creek and Richards Creek through channel modifications and construction of a flood containment berm". Also, Phase II was analyzed for sediment transport with the Phase I improvements and compared against the existing conditions in the*

technical sections of the Flood Control and Sediment Plan for this project. Finally, the Flood Control and Sediment Plan clearly notes that there will continue to be a backwater condition in the new culvert and deposition in the area of the modified channel downstream of SE 30th Street until the high point in the channel downstream is lowered, either by Phase II channel modifications or due to geomorphic response of the channel to reduced sediment delivery.

Response to Comment

The Flood Control and Sediment Management Plan for the Richards Creek, Sunset Creek, and East Creek Confluence Area recommends a range of alternatives to address recurrent flooding and sedimentation problems, channel instability, and degraded habitat conditions. Phase I includes the culvert replacement at SE 30th Street and channel modifications upstream and downstream to provide a stable streambed transition to the culvert inlet and outlet. The specific objectives of Phase I are to address the recurrent flooding at SE 30th Street and the recurrent sedimentation upstream and downstream of the existing culverts that requires annual dredging within the active channel. Satisfaction of these objectives does not require Phase II. Phase II includes approximately 400 feet of channel modifications from the downstream end of Phase I to the confluence of Sunset Creek and Richards Creek. The specific objective of Phase II is to limit the extent of flooding into neighboring properties downstream of SE 30th Street and the Phase I project extents. Channel modifications under both phases include the following project components that will improve the aquatic habitat conditions of Sunset Creek:

- Construction of a two-stage channel
- Biostabilization of stream banks
- The removal of invasive species
- Replanting with native vegetation.

Due to the limited width of the channel corridor and the distinct change in channel slope at SE 30th Street, neither Phase I or Phase II can fully meet the City of Bellevue's engineering standard stating that culverts should pass the 100-year flow with one foot of freeboard.

Under the existing conditions, flows as small as the 1-year recurrence interval event are predicted to flood SE 30th Street. These modeled conditions are supported by observations of at least six flooding events at SE 30th Street since January 1, 2005. The replacement culvert and channel modifications proposed under Phase I will improve the flow conveyance capacity and keep the 100-year flow from flooding SE 30th Street, though the City's freeboard requirement in the culvert cannot be met. Immediately following the construction of Phase I, the replacement culvert is designed to pass the 2-year flow with a free water surface at the upstream culvert inlet (i.e., with freeboard through the culvert length). Following either downstream channel responses to reduced bedload delivery rates, or the construction of Phase II channel modifications, the replacement culvert is designed to pass the 25-year flow with a free water surface at the culvert inlet. Based on extensive hydraulic modeling, sediment transport analyses, and a detailed understanding of the geomorphic processes at the project site, it is anticipated that the downstream geomorphic responses to the Phase I culvert replacement and channel modifications would include the transport of sediments that have accumulated within the channel downstream of the Phase I project extents over the last 30 years. The exact timeframe of this response is difficult to predict, but the resulting hydraulic influences of this response to the downstream

channel would likely mimic those that will result from the channel modifications proposed under Phase II. Therefore, while Phase I could be implemented to reduce the recurrent flooding at SE 30th Street and the recurrent sedimentation upstream and downstream of the existing culverts without implementing Phase II, the benefits of constructing Phase II include limiting the extent of flooding into neighboring properties downstream of the Phase I extents while also extending the length of channel with improved aquatic habitat. Although Phase II would provide some control over the timing and character of channel modifications downstream of the Phase I project extents, it is not a required component of long-term flood control at SE 30th Street and is thus considered independent of Phase I.

Comment *Concern about potential Phase IV improvements.*

Response The City of Bellevue is only pursuing Phase I improvements with this application. Phases II-IV will be evaluated separately and are dependent upon CIP priorities and funding.

V. Summary of Technical Reviews

Clearing and Grading

The Clearing and Grading Division of the Development Services Department has reviewed the proposed site development for compliance with Clearing and Grading codes and standards. The Clearing and Grading staff found no issues with the proposed development.

VI. State Environmental Policy Act (SEPA)

The environmental review indicates no probability of significant adverse environmental impacts occurring as a result of the proposal. The Environmental Checklist submitted with the application adequately discloses expected environmental impacts associated with the project. The City codes and requirements, including the Clear and Grade Code, Utility Code, Land Use Code, Noise Ordinance, Building Code and other construction codes are expected to mitigate potential environmental impacts. Therefore, issuance of a Determination of Non-Significance (DNS) is the appropriate threshold determination under the State Environmental Policy Act (SEPA) requirements.

A. Earth and Water

A grading plan that includes temporary erosion and sedimentation control best management practices is included in the project plans, and addresses all requirements for restoring the site to a condition equal to or better than its existing condition. See Section IX for a related condition of approval.

B. Animals

The project site is part of type F stream and riparian area and is adjacent to larger natural areas that contains quality habitat for birds and mammals. Fisheries resources in Sunset Creek include anadromous and resident species. Sunset Creek is identified by the WDFW as containing priority resident fish presence two aquatic species listed under the Endangered Species Act (i.e., Puget Sound Chinook salmon [*Oncorhynchus tshawytscha*] and Puget Sound steelhead [*O. mykiss*]) In addition, coho salmon (*O. kisutch*) currently listed as a species of concern, may also occur within the action area.

The existing twin culverts at SE 30th Street are not currently passable to fish at all flows. Extensive sediment deposition in Sunset Creek downstream of these culverts presents a low flow barrier to fish passage, and sediment deposition upstream of SE 30th Street has created gradient and velocity conditions that are a likely barrier to passage during high flow conditions. The proposed project would improve fish passage conditions in Sunset Creek at the SE 30th Street culvert and address barrier conditions in the channel both upstream and downstream of the structure. The new culvert would provide for full fish passage for all species and life history stages likely to occur in this system during the flow conditions in which migratory and dispersal behavior is likely to take place. In addition, the grade control structures, culvert configuration, and sediment trap would prevent aggradation at the inlet and outlet of the culvert that currently limits fish passage.

The applicant will implement WSDOT Fish Exclusion Protocols and Standards to ensure fish resources in the project reach are protected. See Section IX for related conditions of approval.

C. Plants

The proposed project will remove approximately 600 square feet of riprap from the stream banks upstream and downstream of the SE 30th Street culvert and install bank protection structures. In addition 6,800 square feet of the stream bank will be replanted with native riparian vegetation appropriate for this site. There no rare or threatened plant species identified in or near the project area. Eight trees will be removed as part of the project because of conflicts with utility relocations. Of these eight trees, only three are Douglas Fir which would be suitable for incorporation into the project. The plan calls for removal of invasive species within the project area and the planting of 107 trees 256 shrubs, and 196 herbs. The proposed restoration plan, when satisfactorily completed and maintained will result in no adverse impact. See Section IX for related conditions of approval.

D. Noise

The site is adjacent to Light Industrial uses. The proposed project will produce short-term noise effects on the surrounding terrestrial environments. Construction noise will be limited by the City's Noise Ordinance (Chapter 9.18 BCC) which regulates construction hours and noise levels. See Section X for a related condition of approval.

VII. Decision Criteria

A. Critical Areas Report Decision Criteria- General Criteria LUC 20.25H.255

The Director may approve, or approve with modifications, the proposed modification where the applicant demonstrates:

1. The modifications and performance standards included in the proposal lead to levels of protection of critical area functions and values at least as protective as application of the regulations and standards of this code;

Finding: The proposed project is not proposing the modification of any of the

standards contained in the Land Use Code. The proposed project is expected to improve critical area functions and values in the segments of Sunset Creek. The expected improvements include the following:

- Reduced maintenance dredging frequency in the active channel, reducing habitat disturbance
- Simplified fish exclusion procedures and reduced need for fish capture and relocation during maintenance
- Replacement of 154 lineal feet of riprap bank protection with bioengineered structures and channel modifications and addition of 39 pieces of geomorphically functional large woody debris to the stream channel, resulting in increased hydraulic complexity and habitat diversity.
- Improved water quality.
- Improved fish passage under high and low flow conditions.
- Maintenance of desirable spawning habitat conditions.
- Restoration and enhancement of all areas disturbed by construction.
- Removal of invasive and ornamental riparian vegetation and replacement with site appropriate native species;
- Increased density and coverage of native vegetation, providing improved shade and cover, and increased recruitment of organic material and prey organisms (dense vegetation will also limit human access, reducing harrassment and disturbance of aquatic life).

These habitat improvements will be maintained over the anticipated life of the project, and will be further enhanced by the subsequent phases of the proposed comprehensive flood control and sediment management plan. This project will lead to a increased level of protection of the functions and values of this stream and riparian area.

2. Adequate resources to ensure completion of any required mitigation and monitoring efforts;

Finding: The City of Bellevue Utilities Department is initiating the project and has sufficient resources to complete the required mitigation and monitoring efforts.

3. The modifications and performance standards included in the proposal are not detrimental to the functions and values of critical area and critical area buffers off-site; and

Finding: The proposal does not include a modification of the prescribed buffers on the site. The proposed performance standards are consistent with those in the land use code. The proposed project will be beneficial to the functions and values of the critical area and critical area buffer off-site because it will increase the habitat structure by reducing flooding and sedimentation impacts.

4. The resulting development is compatible with other uses and development in the same land use district.

Finding: The proposal to replace an existing twin barrel 42-inch diameter culvert with an integrated fish-passable culvert and sediment capture structure, modification of the stream channel upstream and downstream of SE 30th and the restoration of the impacted area with native plantings is compatible with the light-industrial uses in the area.

B. Critical Areas Land Use Permit Decision Criteria 20.30P

The proposal, as conditioned below, meets the applicable regulations and decision criteria for a Critical Areas Land Use Permit pursuant to LUC Section 20.30P.

1. The proposal obtains all other permits required by the Land Use Code;

Finding: The proposed project will require a Clearing and Grading Permit from the City of Bellevue. No work on the project will be allowed to commence until the Clearing and Grading permit in addition to permits from other state and federal agencies are issued.

2. The proposal utilizes to the maximum extent possible the best available construction, design and development techniques which result in the least impact on the critical area and critical area buffer;

Finding: The culvert replacement project is designed to address chronic flooding of Sunset Creek at SE 30th Street and adjacent businesses, and provide the ability to adaptively manage habitat conditions and flood conveyance capacity. The integrated sediment trap will capture the majority of sediments transported to this reach of Sunset Creek in most years. This will allow for maintenance dredging to be conducted within the enclosed structure rather than the active channel. Sediment removal will be managed to optimize sediment delivery rates to the channel segment downstream of the structure, maintaining flood conveyance capacity and desirable habitat conditions. The applicant has provided a draft protocol for Channel Monitoring and Replacement Culvert Sedimentation Structure and shall provide a detailed plan with reporting to the Development Services Department on an annual basis for a minimum of 10 years. Construction will only occur during the allowed work windows as established by the Washington Department of Fish and Wildlife. The proposal utilizes the best available construction, design and development techniques which will result in the least impact to critical area functions.

3. The proposal incorporates the performance standards of Part 20.25H to the maximum extent applicable, and ;

Finding: As discussed above in Section II, the proposal does incorporate the applicable performance standards, which will be implemented and enforced as conditions of approval the underlying Clearing and Grading Permit.

4. The proposal will be served by adequate public facilities including street, fire protection, and utilities; and;

Finding: The property is currently served by adequate public facilities. The proposal

does not change the need for, or ability to serve the property.

5. The proposal includes a mitigation or restoration plan consistent with the requirements of LUC Section 20.25H.210; and

Finding: The installation of the culvert does not require the preparation of a mitigation plan. However, the proposal includes a restoration plan consistent with LUC 20.25H.210 for the restoration of disturbed areas within and adjacent to the stream channel.

With a condition that the restoration plan meet the standards for plant spacing and sizing found in Critical Areas Handbook and include performance standards and monitoring schedules for fish passage and plant establishment for a period of five years this criteria can be met.

6. The proposal complies with other applicable requirements of this code.

Finding: As discussed in Section IV & V of this report, the proposal complies with all other applicable requirements of the Land Use Code.

VIII. Conclusion and Decision

After conducting the various administrative reviews associated with this proposal, including Land Use Code consistency, SEPA, City Code and Standard compliance reviews, the Director of Planning and Community Development does hereby **approve with conditions** the proposal replace an existing twin barrel 42-inch diameter culvert on Sunset Creek at SE 30th Street with an integrated fish-passable culvert and sediment capture structure and associated modifications of the stream channel upstream and downstream of SE 30th for the purpose of flood control and sediment management.

Note- Expiration of Approval: In accordance with LUC 20.30P.150 a Critical Areas Land Use Permit automatically expires and is void if the applicant fails to file for a Clearing and Grading Permit or other necessary development permits within one year of the effective date of the approval.

IX. Conditions of Approval

The applicant shall comply with all applicable Bellevue City Codes and Ordinances including but not limited to:

Applicable Ordinances	Contact Person
Clearing and Grading Code- BCC 23.76	Tom McFarlane, 425-452-5207
Land Use Code- BCC 20.25H	Heidi M. Bedwell , 425-452-4862
Noise Control- BCC 9.18	Heidi M. Bedwell, 425-452-4862

The following conditions are imposed under the Bellevue City Code or SEPA authority referenced:

1. Restoration for Areas of Temporary Disturbance: A detailed restoration plan for all areas of temporary disturbance is required to be submitted for review and approval by the City of Bellevue prior to the issuance of the Clearing and Grading Permit. The plan shall include the documentation of existing site conditions and shall identify the restoration planting plan and include performance standards and monitoring schedules for fish passage and plant establishment for a period of five years. The restoration plan must contain native shrubs and trees and most conform to planting details, densities outlined in the City of Bellevue Critical Area Handbook where suggested densities do not match the standard. No permits shall be issued until the associated restoration plan has been approved by the City. Any modifications to this plan must be submitted for review and approval by the City prior to commencing any work.

Authority: Land Use Code 20.25H.220.H
Reviewer: Heidi M. Bedwell, Land Use Division

2. Rainy Season restrictions: Due to the proximity to Sunset Creek, a type F stream, no clearing and grading activity may occur during the rainy season, which is defined as November 1 through April 30 without written authorization of the Development Services Department. Should approval be granted for work during the rainy season , increased erosion and sedimentation measures, representing the best available technology must be implemented prior to beginning or resuming site work.

Authority: Bellevue City Code 23.76.093.A
Reviewer: Tom McFarlane, Development Services Department

3. Culvert Monitoring and Maintenance Prior to approval of the clearing and grading permit, the applicant shall prepare a detailed protocol for Channel Monitoring and Replacement Culvert Sedimentation Structure Maintenance. The report shall detail surveying protocol of the channel cross sections up stream and downstream of the culvert replacement and streambed sediment surveying for both pebble counts and subsurface bulk sampling and sieve analysis. Surveying and sampling shall be for a period of 5 years annually and semi-annually for the following 10 years. The report shall also detail measures to address sediment delivery rates which are different from predicted outcomes including but not limited to gravel nourishment and sediment removal. Reporting of the survey findings shall be given to the Development Services Department on an annual basis.

Authority: Land Use Code 20.25H.220.H
Reviewer: Heidi M. Bedwell, Land Use Division

4. Noise Control: Noise related to construction is exempt from the provisions of BCC 9.18 between the hours of 7 am to 6 pm Monday through Friday and 9 am to 6 pm on Saturdays, except for Federal holidays and as further defined by the Bellevue City Code. Noise emanating from construction is prohibited on Sundays or legal holidays unless expanded hours of operation are specifically authorized in advance. Requests for construction hour extension must be done in advance with submittal of a construction noise expanded exempt hours permit.

Authority: Bellevue City Code 9.18
Reviewer: Heidi M. Bedwell, Land Use Division

5. Temporary Erosion and Sedimentation Control Plan: Prior to approval of the underlying clearing and grading permit and initiation of any clearing or grading activities, a Temporary Erosion and Sedimentation Control Plan must be approved as part of a Clearing and Grading permit and all clearing limits and the location of temporary erosion and sedimentation control measures shall be field staked for approval by the on-site clearing and grading inspector's approval.

Authority: Bellevue City Code 23.76
Reviewer: Tom McFarlane, Development Services Department

6. Turbidity Monitoring Plan: Prior to approval of the underlying clearing and grading permit and initiation of any clearing and grading activities, a Turbidity Monitoring Plan must be approved as part of the Clearing and Grading Permit.

Authority: Bellevue City Code 23.76
Reviewer: Tom McFarlane, Development Services Department

7. Use of removed trees: Three Douglas fir trees removed as part of the proposed project shall be incorporated into the project designs to the extent possible.

Authority: Land Use Code 20.25H.180.C.2
Reviewer: Heidi M. Bedwell, Land Use Division

8. Applicable State and Federal Permits: Prior to approval of the underlying clearing and grading permit and before work can be allowed to proceed, all applicable state and federal permits must be presented to the Development Services Department.

Authority: Land Use Code 20.25H.180.C.2
Reviewer: Heidi M. Bedwell, Land Use Division

9. Fish protection measures: The applicant shall implement WSDOT Fish Exclusion Protocols and Standards to ensure fish resources in the project reach are protected during construction.

Authority: Land Use Code 20.25H.160
Reviewer: Heidi M. Bedwell, Land Use Division

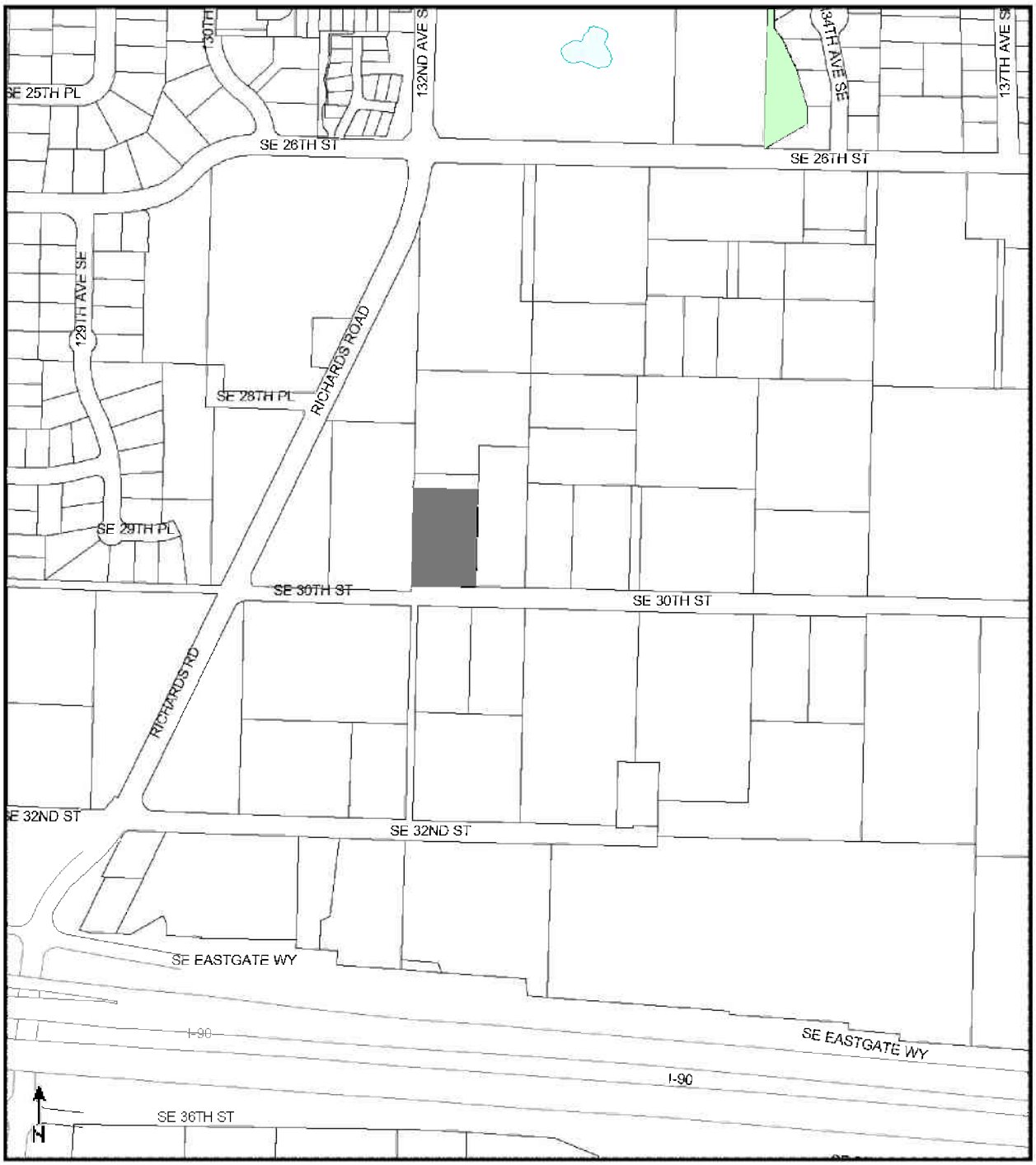
10. In-Water Work Window: Work in the active channel approved by the underlying Clearing and Grading Permit must be completed during an in-water work window of July 1 through August 31 or as allowed per the Washington Department of Fish and Wildlife, HPA conditions.

Authority: Land Use Code 20.25H.160
Reviewer: Heidi M. Bedwell, Land Use Division

Attachments

1. Vicinity Map
2. Critical Areas Report
3. Addendum to the Critical Areas Report
4. Environmental Checklist
5. Public Comment

Attachment 1
Vicinity Map



City of Bellevue
Information Technology
Geographic Information Services
August 27, 2008

Vicinity Map

08-128529 LO COB Sunset Creek Flood Improvement

This map is derived from the Bellevue Geographic Information System and designed for City staff use.
It is not guaranteed accurate.

If you have specific questions regarding this map, contact the department shown.

Site
Park
School

VICINITY MAP

Attachment 2

Critical Areas Report (Includes Development Plans and supplemental material provide to the State and Federal Permitting agencies- JARPA & BE)

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June 27, 2008

Heidi Bedwell
City of Bellevue
Department of Planning and Community Development
450 110th Avenue NE
P.O. Box 90012
Bellevue, WA 90009

Subject: SE 30th Street/Sunset Creek Flood Improvement Project – Phase 1: Abbreviated Critical Areas Report

Dear Heidi:

On behalf of Brian Ward of the City of Bellevue Utilities Department, Herrera Environmental Consultants has prepared an abbreviated report intended to satisfy Critical Areas Report requirements for the proposed SE 30th Street/Sunset Creek Flood Improvement Project. Per agreement between you and Brian, this report specifically identifies the components of existing permitting documentation that satisfy the Critical Areas Land Use Permit reporting requirements codified under LUC 20.25H.250.B. Where necessary, the report provides additional supporting information and interpretation to fully comply with these requirements.

The technical and permitting documents referenced in this report include:

- The Joint Aquatic Resources Permitting Application (JARPA) submitted to the Washington Department of Fish and Wildlife
- The Biological Assessment (BA) prepared to satisfy Endangered Species Act Consultation in conjunction with U.S. Army Corps of Engineers permitting requirements

Copies of these documents are included as appendices to the enclosed Abbreviated Critical Areas Report.

Please do not hesitate to contact Chase Barton or me if you have any questions or require additional information.

Sincerely,

Herrera Environmental Consultants, Inc.

Eric Doyle
Fisheries Biologist/Project Scientist

Enclosure: Abbreviated Critical Areas Report

cc: Brian Ward, Utilities

ABBREVIATED CRITICAL AREAS REPORT

SE 30th Street / Sunset Creek Flood Improvement Project

Prepared for

City of Bellevue
Utilities Department

June 27, 2008

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Appendix A Joint Aquatic Resources Permit Application
Appendix B Biological Assessment

1 Introduction

The City of Bellevue (the City) proposes to replace existing twin barrel 42-inch diameter culverts on Sunset Creek at SE 30th Street with an integrated fish-passable culvert and sediment capture structure. Installation of the new structure will require modification of the stream channel upstream and downstream of SE 30th Street. These modifications will include eight grade control structures upstream and two grade control structures downstream of the culvert, riprap removal and replacement with bioengineered bank protection structures, and stream and riparian habitat enhancement. Channel and riparian modifications will take place over a segment of Sunset Creek extending from approximately 110 feet upstream to approximately 60 feet downstream of SE 30th Street.

The culvert replacement project (hereafter referred to as the proposed action) is designed to address chronic flooding of Sunset Creek at SE 30th Street and adjacent businesses, and provide the ability to adaptively manage habitat conditions and flood conveyance capacity. The integrated sediment trap will capture the majority of sediments transported to this reach of Sunset Creek in most years. This will allow for maintenance dredging to be conducted within the enclosed structure rather than the active channel. Sediment removal will be managed to optimize sediment delivery rates to the channel segment downstream of the structure, maintaining flood conveyance capacity and desirable habitat conditions.

The proposed project is planned as Phase 1 of a multiple-phase Flood Control and Sediment Management Plan for Richards Creek, Sunset Creek, and East Creek that is currently in development. The intent of this multi-phase effort is to provide a comprehensive solution to ongoing sediment management and flooding challenges in these drainages, and produce a net improvement in habitat conditions. While considered part of this larger effort, Phase 1 has independent utility and is being implemented separately to address immediate needs.

Under Bellevue Land Use Code (LUC) 20.25H.250, project proponents are required to prepare a Critical Areas Report (CAR) when the action they propose might affect the ecological functions and values provided by designated critical areas. The CAR provides the information needed by the City's Department of Planning and Community Development (PCD) to evaluate consistency with these requirements and determine if proposed restoration and mitigation adequately compensate for affected critical area functions and values.

In lieu of preparing a full CAR, PCD staff indicated they will accept an abbreviated CAR supported by the other permitting documents prepared for the proposed action. An abbreviated CAR is acceptable, providing that it clearly identifies the elements of the existing technical and permitting documentation that satisfy CAR requirements detailed in LUC 20.25H.250.B. This report has been prepared in accordance with this agreement. It identifies the pertinent elements of permitting documents that address CAR requirements, and provides additional supporting information where necessary.

The existing technical and permitting documents referenced in this report include:

- The Joint Aquatic Resources Permit Application (JARPA) (Appendix A)
- The Biological Assessment (BA) prepared to satisfy Endangered Species Act Consultation in conjunction with U.S. Army Corps of Engineers permitting requirements (Appendix B)

The general location of the proposed action is shown on Figure 1 of the BA (see BA page 2). The construction limits for the proposed action are shown generally in BA Figure 2 (see BA page 15), and more specifically in the project plans (see BA, Appendix B and/or the JARPA). The extent of anticipated direct and indirect impacts associated with the proposed action are best represented by the aquatic component of the action area, as shown on BA Figure 3 (see BA page 39), and the clearing limits shown in plan sheet C-10 (see BA Appendix B). For the purpose of this report, these combined effect limits are referred to hereafter as the impact area. (The remaining component of the action area outlined in red represents short-term construction noise impacts which are not a CAR reporting requirement.) The majority of the impact area downstream of SE 30th Street represents anticipated gradual and long-term changes in habitat conditions expected to result from adaptive management of sediment delivery rates. The design of the proposed action, construction methods, impact avoidance and minimization measures, best management practices (BMPs), and mitigation and monitoring are described in detail in the BA.

2 Critical Areas Report

Consistent with LUC 20.25H.245, the supporting information upon which this report is based was developed by qualified professionals in the areas of hydrologic and hydraulic modeling, geomorphology, engineering and fisheries biology, using the best available science and guidance. This report relates the pertinent elements in existing documentation to CAR information needs specified in LUC 20.25H.250. For ease of reference, this information is presented following the stepwise listing of CAR reporting requirements provided in LUC 20.25H.250.B.

2.1 Identification and Classification of Critical Areas and Critical Area Buffers

This subsection addresses LUC 20.25H.250.B. subsections 1 and 2. Identified critical areas and critical area buffers within and adjacent to the impact area include the following:

Streams and stream buffers: The proposed action will be constructed in and/or have direct and indirect effects on the lower Sunset Creek and upper Richards Creek stream channels identified in BA Figures 2 and 3 (see BA pages 12 and 37). Under the definitions provided in LUC 20.25H.075.B, subsection 2, both stream systems are classified as Type F (fish bearing) waterbodies. Under LUC 20.25H.075.C, subsection 1.a.ii, streams of this class have a designated buffer width of 50 feet. Historic development of the area prior to institution of critical areas protections has encroached upon the stream buffer. Buildings, roadways, and paved parking lots limit the existing and potential riparian zone to an average width of 10 to 30 feet.

Vegetation and channel conditions within these critical areas are described in the BA (see BA pages 5-8).

Habitats associated with species of local importance: Richards Creek and Sunset Creek are known and/or presumed habitat for Chinook and coho salmon, both of which are identified as species of local importance under LUC 20.25H.150.A. Chinook salmon are currently listed as threatened under the Endangered Species Act (ESA) (64 CFR 14308-14328). The buffers defined for fish bearing streams also apply to this critical area type. Additional detail on habitat use by these species, as well as other species of importance, is provided in Section 2.3.2 of this report.

No amphibian, avian, or mammal species of local importance were observed in the impact area during site surveys. Habitat conditions are generally not suitable for these species due to natural characteristics or the degraded condition of the stream buffer. Large trees that could serve as perch areas for raptors and woodpeckers are a possible exception, but these habitat elements will remain protected. There are no wetlands (LUC 20.25H.095) or geologic hazard areas (LUC

20.25H.120) within the impact area, or on adjacent properties. Neither Richards nor Sunset Creek are designated as shoreline critical areas under LUC 20.25H.115. Critical areas adjacent to the site include the Richards Creek stream channel and associated buffer upstream of the Sunset Creek confluence (existing buffer conditions are similar to those described above for Sunset Creek).

2.2 Regulations and Codes Proposed for Modification

The proposed action is classified as an allowable use under LUC 20.25H.055.B (new or expanded culverts and bridges). Under LUC 20.25H.055.C, subsection 2, this type of use is allowed providing certain performance standards are met. Consistent with the CAR guidance, relevant performance standards are discussed in detail in Section 7 of this report.

2.3 Habitat Assessment Report

This subsection identifies the elements of existing documentation that satisfy Habitat Assessment Report (HAR) requirements specified under LUC 20.25H.165.A.

2.3.1 Vegetation on and Adjacent to the Site

Vegetation conditions in the stream's buffer are described in the BA, under Vegetation and Wetlands (see BA page 5).

2.3.2 Species of Local Importance with Primary Habitat Association

Chinook salmon use of the impact area is described in detail in the BA (see BA page 40). Coho spawning and rearing has been documented in the Richards and Sunset Creek channels up to and immediately upstream of SE 30th Street (Paulsen 2007; WDFW 2004, 2007a, 2007b). Neither species has been documented in the impact area in recent years, as a result of two factors: depressed population abundance; and partial barriers to fish passage created by beaver activity in downstream areas of Richards Creek (Paulsen 2007).

While not currently considered a species of local importance, steelhead trout are listed as threatened under the ESA (72 FR 26722-26735) and are of special concern from a state and federal permitting perspective. This species has been historically documented in the Kelsey Creek system and could potentially occur in the impact area. Potential habitat use is described in the BA (see BA page 42).

The streams and associated stream buffers within the impact area described in the previous subsections comprise the primary habitats utilized by these species of local importance.

2.3.3 Federal, State, or Local Management Recommendations

No specific federal or state level management recommendations have been developed for Sunset Creek and Richards Creek. However, area biologists with WDFW and the Muckleshoot Tribe have both expressed a strong sentiment toward the maintenance and improvement of riparian functions and the protection of spawning habitat provided by Sunset Creek within the impact area (Fisher 2007; Walter 2007). Lead City of Bellevue biologists have expressed similar concerns (Paulsen 2007).

Sediment accumulation and chronic flooding in this area have been ongoing management concerns at the local level for several years. The City has invested considerably in infrastructure to address sediment delivery from upstream source areas (i.e., the high-flow bypass system in upper Sunset Creek), and in comprehensive planning to address these issues (e.g., the Richards Creek Basin Plan [Entranco 1999], and the ongoing comprehensive flooding and sediment management planning effort discussed in Section 1 of this report). The proposed action is consistent with these other city efforts.

2.3.4 Direct and Indirect Impacts

The anticipated direct and indirect impacts of the proposed action are described in detail in the BA (see BA pages 27-34). The discussion includes consideration of the indirect effects of ongoing sediment management activities in the impact area on channel conditions, and the habitat benefits expected to result from the proposed action.

2.3.5 Impact Avoidance, Minimization, and Mitigation Measures

The proposed action incorporates two general categories of impact avoidance and minimization measures:

1. Conceptual planning for the project based on the best available science and appropriate guidance

2. Standard BMPs employed to avoid and minimize short-term, construction related direct effects.

The conceptual planning element is discussed under Applicable Performance Standards (Section 2.6). Construction BMPs and long-term maintenance related measures are discussed in the BA (see BA pages 20-22).

With regard to mitigation requirements, the proposed project is considered to be self-mitigating because it will result in a net-increase in critical area functions and values. Supporting information for this position is provided in Section 2.7.

2.3.6 Ongoing Management Practices for Habitat Protection

The proposed project includes a long-term monitoring and adaptive management plan to ensure that desired habitat conditions in the project impact area are maintained. This component, which is critical to achieving the desired net improvement in critical areas functions and values, is detailed in the BA (see BA pages 22-24).

2.4 Probable Cumulative Impacts

With regard to cumulative impacts, the long-term indirect effects, effects of interrelated and interdependent actions, and project benefits described in the BA (see BA pages 29-34) provide the best measure of long-term anticipated project effects. As noted in the introduction, the proposed action is considered to be Phase 1 of a broader plan to comprehensively address sediment loading, chronic flooding, and habitat conditions in the Sunset Creek/Richards Creek/East Creek confluence area. The intent of the broader plan is to develop a comprehensive solution to sediment accumulation and flooding problems in this area while enhancing aquatic and riparian habitat conditions. The combined cumulative effects of these actions are expected to be beneficial on balance, as they will: 1) reduce the need for routine maintenance dredging of the active channel; 2) decrease the frequency of flooding of adjacent impervious surfaces that contribute pulses of non-point source pollution during storm events, and 3) incorporate extensive channel and riparian habitat enhancements. These combined elements should result in a net improvement in chronic flooding, a reduction in maintenance-related habitat disturbance, and improved habitat conditions.

The proposed action is not expected to lead to additional cumulative effects. It will not increase the traffic capacity of SE 30th Street, nor will it facilitate future development. Therefore, there are no effects associated with land use changes that can be ascribed to the action.

2.5 Critical Areas Functions and Values Protection Assessment

This component of the CAR requires a pre- and post-project assessment of the level of protection afforded to critical area functions and values by the regulations and standards in the LUC. This assessment must include the following components:

- Existing functions and values provided by critical areas and critical area buffers
- Projected future functions and values should the project be permitted
- Projected future functions and values should the project not be permitted.

These assessment elements are addressed in the following sections.

2.5.1 Existing Functions and Values Provided by Affected Critical Areas

Existing conditions in the Sunset Creek/Richards Creek impact area are degraded. The surrounding area was developed for commercial and light industrial uses during the 1960s and 1970s, prior to the establishment of critical areas protections. To accommodate this development, much of the existing channel network was relocated, straightened, and contained within riprap armored channels. Property development was allowed to encroach upon the streams, limiting the effective riparian buffer to less than 20 feet on either side of the stream in most circumstances. The remaining riparian buffer is composed of a sparse mix of ornamental, invasive, and native vegetation.

Before historic hydromodification, stream channels within the project area would have naturally aggraded and shifted location across an alluvial fan, occupying the course of least resistance. Development related hydromodification halted the natural process of channel migration and restricted the natural process of sediment deposition to the established channel corridors. Concurrent development of headwater areas of the drainage proceeded without adequate stormwater detention, resulting in an increased sediment supply rate that has proven difficult to mitigate. Sediment aggradation in the project vicinity currently exceeds transport capacity, resulting in chronic sediment deposition that reduces channel capacity and promotes flooding. As a consequence, the City must dredge the active channel annually to maintain flood conveyance. While considered an allowable use under LUC 20.25H.055.B, this activity nonetheless contributes to chronic disturbance of the channel and channel buffer.

The functions and values provided by the area proposed for modification are mixed. Under natural conditions, this alluvial fan reach likely provided prime spawning habitat for resident and migratory fish, including salmon and steelhead. Even in its current degraded state, the aggraded stream reach immediately downstream of SE 30th Street continues to provide important spawning habitat. However, the inability of the channel to migrate in response to sediment deposition has created an overly wide and shallow channel condition that limits the quality and quantity of useable spawning habitat and presents a low flow passage barrier.

Protecting and enhancing remaining spawning habitat in the Kelsey Creek watershed is considered a central objective of critical areas management by the City. This system is spawning habitat limited (Paulsen 2007), meaning that salmonid productivity in the system is constrained by the amount of available habitat suitable for spawning. Preserving existing spawning habitat and increasing its function will directly benefit species of local interest.

2.5.2 Projected Future Conditions: Proposed Action Permitted

The proposed action is expected to improve critical area functions and values in the segments of Sunset Creek and Richards Creek within the impact area. The expected improvements include the following, by critical area and critical area buffer category:

- Streams and habitats used by species of local interest:

- Reduced maintenance dredging frequency in the active channel, reducing habitat disturbance
- Simplified fish exclusion procedures and reduced need for fish capture and relocation during maintenance
- Replacement of 154 lineal feet of riprap bank protection with bioengineered structures and channel modifications and addition of 39 pieces of geomorphically functional large woody debris to the stream channel, resulting in increased hydraulic complexity and habitat diversity (see BA page 32)
- Improved water quality (see BA pages 34, 43-53)
- Improved fish passage under high and low flow conditions (see BA pages 33-34)
- Maintenance of desirable spawning habitat conditions (see BA pages 43-53).

- Stream buffers, and buffers for habitats used by species of local interest (see BA, Appendix B, Drawings P1-P3):
  - Restoration and enhancement of all areas disturbed by construction;
  - Removal of invasive and ornamental riparian vegetation and replacement with site appropriate native species;
  - Increased density and coverage of native vegetation, providing improved shade and cover, and increased recruitment of organic material and prey organisms (dense vegetation will also limit human access, reducing harrassment and disturbance of aquatic life).

These habitat improvements will be maintained over the anticipated life of the project, and will be further enhanced by the subsequent phases of the proposed comprehensive flood control and sediment management plan for this portion of the Richards Creek drainage discussed elsewhere in this report.

2.5.3 Projected Future Conditions: Proposed Action Denied

Should the proposed action not go forward, the protections afforded by existing critical areas regulations would be expected to maintain habitat conditions in a degraded state. Routine annual

maintenance dredging of the active channel would continue, resulting in episodic habitat disturbance, including fish capture and handling during work area dewatering. Chronic sediment aggradation upstream and downstream of the SE 30th Street culvert would continue to pose high flow and low flow barriers to fish passage. Periodic water quality degradation associated with overland flooding of adjacent impervious surfaces would continue unabated. Riparian vegetation would likely remain in its current degraded state, dominated by sparse ornamental and invasive species.

2.6 Applicable Performance Standards

Pertinent performance standards for culvert replacement are specified under LUC 20.25H.055.C. These standards require demonstration that the proposed action is the most technically feasible and appropriate solution to the problem at hand, and that the solution is designed consistent with applicable best available science and guidance.

The proposed action presents the most technically feasible solution to sediment accumulation and flooding issues that characterize the SE 30th Street crossing of Sunset Creek. As described in the BA summary of hydraulic and geomorphic characteristics (see BA pages 6-8), historic hydromodification of this channel segment has created a condition in which sediment deposition rates exceed transport capacity. This causes chronic aggradation inside the culvert and immediately upstream and downstream that in turn contributes to chronic flooding. The City has invested considerable resources in infrastructure to address sediment delivery from upstream source areas. However, a detailed analysis of current and projected future conditions (currently in preparation) has indicated that sediment delivery rates will exceed transport capacity for the foreseeable future even if additional source control measures are implemented. This will contribute to ongoing sediment deposition in the SE 30th Street vicinity, poor culvert performance, and continued chronic flooding. Annual maintenance dredging required to minimize this flooding will maintain aquatic habitat conditions in a degraded state (LUC 20.25H.055.C, subsection 2.a.v.).

The proposed action will address these issues by increasing the hydraulic capacity of the culvert and adjacent channel and improving sediment management capability. In combination with the improved habitat conditions provided by riparian enhancement and addition of instream wood structures, the ability to adaptively manage sediment delivery rates to the downstream channel will result in improved habitat conditions. The channel will be allowed to gradually erode the existing sediment deposit until a more suitable width/depth ratio is reached. Substrate conditions will be monitored to ensure desirable spawning habitat attributes are maintained. As such, the long-term impacts of the proposed action are anticipated to be beneficial. While short-term construction related impacts will occur, the BMPs and impact avoidance and minimization measures incorporated into the design will limit their duration and extent. The site will be fully restored following project completion and riparian vegetation in stream buffer areas will be enhanced relative to current conditions (LUC 20.25H.055.C, subsections 2.b.i, ii, and viii).

Per the requirements of LUC 20.25H.055.C, subsection 3, the culvert replacement structure and related stream modifications have been designed by qualified professionals consistent with the best available science and the appropriate guidance. As stated in the BA (see BA pages 24-25) the entire design is based on a comprehensive assessment of watershed, reach, and site specific hydrologic, hydraulic, and geomorphic conditions. This approach is consistent with the Integrated Streambank Protection Guidelines prepared by the Washington State Aquatic Habitat Guidelines Program (WSAHGP 2003). As discussed in the JARPA (see JARPA page 10), the culvert replacement structure has been designed in accordance with WDFW culvert design guidance (WDFW 2003), using the stream simulation method. The culvert replacement is strictly intended to address flood control and sediment management issues at the existing road crossing. It will not change the traffic capacity of the existing roadway or otherwise facilitate new development.

2.7 Restoration and Mitigation Requirements

Mitigation and restoration requirements associated with this type of project are defined based on the type of critical area affected. As discussed, the proposed project will result in two categories of functional effects: short-term construction related effects on the stream buffer; and long-term beneficial effects on the stream buffer and stream habitat conditions, including habitats used by species of local importance.

With regard to short-term effects, all areas disturbed during construction of the proposed action will be fully restored and enhanced. The construction plans incorporate measures to protect existing trees, avoid native vegetation, and concentrate disturbance in areas dominated by invasive or ornamental vegetation. All disturbed areas will be replanted with site appropriate native species. Existing invasive and ornamental vegetation will be removed. The site revegetation plan, prepared in accordance with City requirements, is provided in Appendix B of the BA (see Drawings P1-P3).

Per LUC 20.25H.085.A, mitigation is specifically intended to replace loss or degradation of critical area and buffer values and functions caused by a proposed action. Mitigation requirements specific to streams and stream buffers include the following in the stated order of preference:

1. On-site, through replacement of lost critical area buffer

2. On-site, through enhancement of the functions and values of remaining critical area buffer

3. Off-site, through replacement or enhancement, in the same sub-drainage basin

4. Off-site, through replacement or enhancement, out of the sub-drainage basin but in the same drainage basin.

Per LUC 20.25H.085.B, lost values and functions shall be mitigated with a one-to-one ratio.

Based on these requirements, the proposed action is considered to be self-mitigating. No further mitigation should be required because: 1) the project will result in an immediate and long-term net-improvement in critical area values and functions, and 2) the project incorporates long-term monitoring and adaptive management to ensure that desirable conditions are maintained overtime. Because no loss of critical area functions and values will result from the proposed action, no further mitigation measures should be required.

3 References

Entranco. 1999. Richards Creek Basin Plan. Prepared for the City of Bellevue by Entranco, Bellevue, Washington. July 26, 1999.

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Paulsen, Kit. 2007. Personal communication (field meeting with Eric Doyle, Herrera Environmental Consultants, Inc., Seattle, Washington, regarding proposed SE 30th Street/Sunset Creek Culvert Replacement Project). City of Bellevue habitat biologist. August 20, 2007.

Walter, Karen. 2007. Personal communication (comment made during field meeting with Eric Doyle, Herrera Environmental Consultants, Inc., Seattle, Washington, regarding proposed SE 30th Street/Sunset Creek Culvert Replacement Project). Regional biologist, Muckleshoot Indian Tribe. August 20, 2007.

WDFW. 2003. Design of Road Culverts for Fish Passage. Washington Department of Fish and Wildlife, Habitat Program, Environmental Engineering Subsection, Olympia, Washington.

WDFW. 2004. Salmonid Stock Inventory, WRIA 8. Washington Department of Fish and Wildlife. Obtained on November 12, 2007 from agency website: <http://wdfw.wa.gov/cgi-bin/database/sasi_search_new_db.cgi?keyword=08&field=4&search_sort=sort&srchtype=within&job=search&wria=wria>.

WDFW. 2007a. Salmonscape Database. Washington Department of Fish and Wildlife. Obtained August 10, 2007 from agency website: <http://wdfw.wa.gov/mapping/salmonscape/index.html>.

WDFW. 2007b. Priority Habitats and Species database information for S9/S10T24NR05E. Data request dated August 9, 2007; data received September 1, 2007.

WSAHGP. 2003. Integrated Streambank Protection Guidelines. Washington State Aquatic Habitat Guidelines Program, Washington Department of Fish and Wildlife, Washington Department of Ecology, Washington State Department of Transportation. April 2003.

APPENDIX A

Joint Aquatic Resources Permit Application

AGENCY USE ONLY	JARPA FORM LAST UPDATED: March 19, 2007
Agency Reference #:	Date Received:
Circulated by:	(local govt. or agency)
Project Tracking Number:	

Washington State **JOINT AQUATIC RESOURCES PERMIT APPLICATION (JARPA)** Form

Step 1: Get Ready	Step 2: Complete Form		Step 3: Check Work	Step 4: Copy and Send In
Go to www.epermitting.org for **correct form** and **instructions**.	Use **black ink**. Check correct permit boxes.	Use internet **"Help" buttons** to answer questions completely.	Use final review checklist at www.epermitting.org .	See **JARPA Contacts** at www.epermitting.org for correct mailing addresses.

☐ Fish Habitat Enhancement Projects per RCW 77.55.181. You must submit copy of completed JARPA form and Fish Habitat Enhancement JARPA Addition to your Local Government Planning Dep't and WA Dep't of Fish and Wildlife (WDFW) Area Habitat Biologist on same day. Note for Local Governments: You must submit comments to WDFW within 15 working days.

Based on instructions at www.epermitting.org, I am sending copies of this application to the following: *(check all that apply)*

☒ Local Government for Shoreline: ☐ Substantial Development ☐ Conditional Use ☐ Variance ☐ Exemption ☐ Revision ☒ Floodplain Management ☒ Critical Areas Ordinance

☒ Washington Department of Fish and Wildlife for Hydraulic Project Approval (Submit 2 copies to WDFW Region)

☒ Washington Department of Ecology for 401 Water Quality Certification (to Regional Office-Federal Permit Unit)

☐ Washington Department of Natural Resources for Aquatic Resources Use Authorization Notification

☒ Corps of Engineers for: ☒ Section 404 permit ☐ Section 10 permit

☐ Coast Guard for: ☐ General Bridge Act Permit ☐ Private Aids to Navigation (for non-bridge projects)

☐ For Department of Transportation projects only: This project will be designed to meet conditions of the most current Ecology/Department of Transportation Water Quality Implementing Agreement

PROJECT TITLE: SE 30th Street / Sunset Creek Culvert Replacement

PROJECT DESCRIPTION:

The City of Bellevue proposes to replace existing twin 42-inch diameter corrugated metal pipe culverts on Sunset Creek at SE 30th Street with a stream simulation and sedimentation structure, and modify the Sunset Creek channel upstream and downstream to match the culvert replacement structure invert elevations. Proposed channel modifications include removing existing riprap along the channel banks and culvert headwalls, modifying the streambed grade, installing grade control and bank stabilization structures made primarily of boulders and large woody debris, and revegetating disturbed streambanks. The culvert replacement project is designed to reduce ongoing flooding of SE 30th Street and adjacent properties and manage sediment transported in Sunset Creek to eliminate the need for annual dredging in the active channel upstream and downstream of the culvert openings. The replacement culvert project is designed to transmit the 100-year flood without allowing flow to overtop SE 30th Street, store approximately 50 cubic yards of sediment within the culvert structure, and provide improved aquatic habitat and fish passage conditions.

SECTION A - Use for all permits covered by this application. Be sure to ALSO complete Section C (Signature Block) for all permit applications.

help 1. APPLICANT
City of Bellevue Utilities, Brian Ward (Project Manager)

MAILING ADDRESS
450 110th Ave NE, 5th Floor, Bellevue, WA 98004

WORK PHONE	E-MAIL ADDRESS	HOME PHONE	FAX #
425-452-5206	**bward@bellevuewa.gov**	**206-334-1500**	**425-452-5286**

If an agent is acting for the applicant during the permit process, complete #2. Be sure agent signs Section C (Signature Block) for all permit applications

help 2. AUTHORIZED AGENT
Herrera Environmental Consultants, Inc. (Chase Barton, Project Manager)

MAILING ADDRESS
2200 Sixth Avenue, Suite 1100, Seattle, Washington 98121

WORK PHONE	E-MAIL ADDRESS	HOME PHONE	FAX #
206-441-9080	**cbarton@herrerainc.com**	**206-910-4403**	**206-441-9108**

help 3. Relationship of applicant to property: ☒ OWNER ☐ PURCHASER ☐ LESSEE ☐ _____

help 4. Name, address and phone number of property owner(s) if other than applicant:
E.S. Harrington, 13120 SE 30th Street, Bellevue, Washington 98005
Stead Building Partnership, 13200 SE 30th Street, Bellevue, Washington 98005
SLC Investment LLC, 13201 SE 30th Street, Bellevue, Washington 98005
SCC Property Holdings, 13111 SE 30th Street, Bellevue, Washington 98005

help 5. Location (street address, including city, county and zip code, where proposed activity exists or will occur)
SE 30th Street, approximately 500 feet east of Richards Road SE, Bellevue, King County, Washington 98005

help Local government with jurisdiction (city or county) **City of Bellevue**

help Waterbody you are working in	**Sunset Creek**				help Tributary of **Richards Creek**	help WRIA # **8**
help Is this waterbody on the 303(d) List ☐ YES ☒ NO If **YES**, what parameter(s)?					help Shoreline designation	**N/A**
					help Zoning designation	**Light Industrial**
¼ Section	Section **9 and 10**	Township **24 North**	Range **5 East**	Government Lot	help DNR stream type if known	**Type F**
help Latitude and Longitude:		**47⁰35'01"N, 122⁰09'52"W**			Tax Parcel Number	**5453300194, 5453300183, 5453300244, 5458300291**

help 6. Describe (a) the current use of the property, (b) structures existing on the property, and (c) existing environmental conditions.
Have you completed any portion of the proposed activity on this property? ☐ YES ☒ NO
For any portion of the proposed activity already completed on this property, indicate month and year of completion.

a & b) The project improvements are proposed to occur within existing city street right-of-way and adjacent privately owned parcels. The culvert replacement site is located within the right-of-way of SE 30th Street along the same alignment as the existing twin 42-inch diameter culverts. Upstream channel modifications are to occur primarily within an existing city right-of-way for 132nd Avenue SE, which was never completed in this location. Some channel modification, site access and revegetation activities associated with upstream channel modifications may also occur on private parcels (tax parcel numbers 5453300244, 5453300291). Downstream channel modifications are proposed on private parcels (tax parcel numbers 5453300194 and 5453300183). The taxpayers, property name, property type and present use of the private parcels associated with the proposed project activities are presented in Table 1. Initial discussions have been initiated with private parcel owners by the City of Bellevue, and there is no indication of any opposition to the proposed project activities.

Table 1. Property characteristics for private parcels associated with proposed project activities.

Tax Parcel Number	Taxpayer	Property Name	Property Type	Present Use
5453300244	SCC Property Holdings	Shurgard Mini Storage	Commercial	Mini Warehouse
5453300291	SLC Investment LLC	Printed Circuits Assembly Corp.	Commercial	Industrial Park
5453300194	Emmett S. Harrington	Shurgard Mini Storage	Commercial	Mini Warehouse
5453300183	Stead Building Partnership	Stead Building	Commercial	Warehouse

c) Sunset Creek is located in the Kelsey Creek subarea of WRIA 8. Approximately 400 feet downstream of the proposed culvert replacement location, Sunset Creek joins Richards Creek. Approximately 850 feet downstream of the confluence of Sunset Creek and Richards Creek, Richards Creek is joined by East Creek. From this confluence, Richards Creek flows north towards Kelsey Creek. Upstream of the proposed project site, Sunset Creek originates from a highly developed watershed approximately one square mile in area that lies primarily to the south of Interstate 90 and east of Interstate 405. Single family residential parcels dominate the watershed land use south of Interstate 90 and commercial properties are predominant in the vicinity of the proposed project site. Significant watershed development began prior to 1961. Presently, the effective impervious area of the Sunset Creek watershed is approximately 44 percent. Sheet 1 shows the project vicinity map.

The physical changes made to a watershed during urbanization can significantly alter its hydrologic regime and sediment supply characteristics. In the Sunset Creek watershed, as has occurred in many other watersheds in the Puget Sound area, the addition of impervious surfaces associated with development resulted in increased peak flow magnitudes that in turn caused widespread adjustments in stream channel form, primarily in the form of channel incision and enlargement. Locally, these changes destabilized the toes of steep hillslopes and increased the rate of sediment supply to the channel from bank erosion and landslides. Although streambanks in many parts of the Sunset Creek channel network have been stabilized, bank erosion and slope instability continues in some reaches upstream of Interstate 90.

The Sunset Creek ravine located immediately upstream of Interstate 90 has been the most highly productive sediment supply reach in the Sunset Creek channel network. The City of Bellevue has completed multiple projects to address widespread landsliding within this reach. Channel spanning grade control structures were installed in the mid to late 1980s and a flow bypass, routing peak flow discharges around the most unstable and highly sediment productive portion of the reach, was completed in 1998. Although it is apparent that these projects have reduced the rate that sediment is delivered to the channel and transported downstream, considerable sediment is stored within the active channel network in the upper watershed. This mobile sediment continues to be routed downstream of Interstate 90 where steep and largely confined channel segments route the sediment to the proposed culvert replacement location at SE 30th Street.

Historical and recent channel survey data indicate that the bed elevation of Sunset Creek and Richards creeks has aggraded between three and four and a half feet within 1,000 feet of channel length downstream of SE 30th Street over the last 30 years. It is estimated that an average of approximately 40 cubic yards of gravel (with some sand) have accumulated annually in this reach of Sunset and Richards creeks in that 30-year period. It is likely that peak rates of sediment delivery to the SE 30th Street culverts and the channel network downstream occurred soon after widespread watershed development, and before efforts to reduce sediment production and transport from the upper watershed. However, ongoing sedimentation in the twin culverts beneath SE 30th Street and in the stream channel downstream requires regular dredging activity to maintain culvert openings and provide flow conveyance. Records of recent maintenance dredging completed by the City of Bellevue show that between 10 and 22 cubic yards of sediment have been removed annually between 2004 and 2007 (Table 2). Dredged areas typically aggrade following the first few storm events of the winter. The volume of accumulated and dredged sediment represents a

reasonable estimate of the bedload sediment volume that is delivered annually to Sunset Creek at and below SE 30th Street. The total sediment in transport past SE 30th Street, including suspended sediment in storm flows, is likely an order of magnitude higher.

Table 2. Records of recent maintenance dredging in Sunset Creek at SE 30th Street.

Year of Dredging	Volume of Sediment Removed Downstream of SE 30th Street Culverts (yds^3)	Volume of Sediment Removed Upstream of SE 30th Street Culverts (yds^3)
2004	15-20	–[a]
2005	20	1.5
2006	10	0.75
2007	15-20	–[a]

[a] Volume of sediment removal upstream of culverts not reported.

Ongoing aggradation at the proposed culvert replacement location at SE 30th Street, and within the Sunset, Richards, and East Creek channel network downstream, is a result of the site's position on a historical alluvial fan where steep confined channels from the upper watershed transition to less confined, lower gradient channels. Within this context, the proposed culvert replacement location at SE 30th Street coincides with a marked change in gradient. Upstream of SE 30th Street to Interstate 90 the average channel gradient of Sunset Creek exceeds 2.5 percent. Downstream of SE 30th Street the channel gradient decreases to 1.2 percent; with the gradient decreasing to less than 0.9 percent at the confluence with Richards Creek and approximately 0.3 percent north of Kamber Road. The significant decrease in channel gradient at the proposed culvert replacement location and within the channel network further downstream results in similar decreases in sediment transport capacity and drives the ongoing sediment aggradation that exacerbates flooding at SE 30th Street.

Between 1963 and 1970, Sunset Creek was relocated to its present day alignment at SE 30th Street as part of the development in the area. The current conditions of the Sunset Creek channel immediately upstream and downstream of SE 30th Street are largely controlled by the confined, channelized alignment, insufficient flow conveyance of the existing culverts, and high rates of sediment delivery. Downstream of SE 30th Street, abundant deposits of gravel and sand occupy the entire channel width between vertical riprap banks that were constructed when the stream was relocated from its historic location and channelized at the edge of developing properties. The relatively wide, shallow channel presents a fish passage barrier during low flow conditions in this area. Upstream of SE 30th Street, the channel is confined within constructed banks armored with riprap and protected with riprap toes. The substrate of the channel upstream of SE 30th Street is coarse and armored beyond the extent of backwater deposits associated with limited flow conveyance during moderate and high flow events. Both upstream and downstream of SE 30th Street, within the extent of proposed channel modifications associated with the proposed culvert replacement structure, the straight, plane-bed channel pattern provides little hydraulic or habitat complexity. A private habitat improvement project was completed in 2005 in Sunset Creek just upstream of the limits of the proposed channel modifications. That project included addition of large woody debris and modifications to the channel cross-section in an effort to provide a two-stage channel. The proposed upstream channel modifications associated with the culvert replacement project will transition into this previously completed project reach.

Despite the comprehensive channel modifications, limited riparian corridor and high rates of sediment delivery, resident and adfluvial trout (cutthroat) have been observed spawning in Sunset Creek downstream of the proposed culvert replacement location, and evidence of spring spawning was observed in April of this year. Chinook salmon and steelhead are also known to have used the Sunset Creek and Richards Creek systems with distribution of these species extending into Sunset Creek up to and possibly beyond SE 30th Street. These species have not been observed in Sunset Creek in recent years, potentially due to passage barriers imposed by extensive beaver dam complexes in downstream reaches.

help Is the property agricultural land? ☐ YES ☒ NO help Are you a USDA program participant? ☐ YES ☒ NO

help 7a. Describe the proposed work that needs aquatic permits: Complete plans and specifications should be provided for all work waterward of the ordinary high water mark or line, including types of equipment to be used. If applying for a shoreline permit, describe all work within and beyond 200 feet of the ordinary high water mark. If you have provided attached materials to describe your project, you still must summarize the proposed work here. Attach a separate sheet if additional space is needed.

The proposed project includes replacing existing twin 42-inch diameter corrugated metal pipe culverts with a box culvert designed to simulate natural streamflow conditions to the highest degree possible. The proposed box culvert design includes a sedimentation structure. Channel modifications will be necessary upstream and downstream of the replacement structure to create a stable transition of the existing streambed to the replacement culvert inlet and outlet invert elevations. Sheet 1 shows the project vicinity map. The principal work activities associated with the culvert replacement and channel modifications include:

1. **Site preparation**
2. **Preliminary excavation of roadway**
3. **Install temporary flow bypass**
4. **Conduct fish removal**
5. **Dewater construction area**
6. **Remove riprap from culvert inlet and outlet headwalls**
7. **Remove and replace existing culverts**
8. **Remove riprap from channel banks**

9. Channel grading, excavation and sediment removal
10. Install grade control structures and bank protection
11. Revegetate streambanks
12. Reintroduce flow to channel
13. Construct high flow and maintenance bypass culvert.

A detailed description of each of these work activities follows. Sheet 2 presents a schematic drawing of the proposed work area.

1. Site preparation

Site preparation activities include the contractor mobilizing to the project site, developing a staging area, establishing site access routes and traffic control, marking the work and clearing limits, and installing temporary erosion and sediment control (TESC) best management practices (BMPs). Space at the project site is limited and it is anticipated that the contractor will establish staging in the parking lot of a nearby business. The City of Bellevue is currently evaluating staging area alternatives. A staging area of approximately 100 feet by 100 feet is anticipated to be sufficient for the proposed project activities. Access to the project site will be along SE 30th Street.

2. Preliminary excavation of roadway

Preliminary excavation of SE 30th Street will include removal of the road surfacing and sidewalks in the area where the culvert will be replaced and excavation of the trench where the temporary flow bypass will be routed under SE 30th Street. The temporary flow bypass alignment is anticipated to be located immediately to the west of the replacement culvert adjacent to the future alignment of the maintenance bypass pipe. Preliminary excavation may also include temporary relocations or realignments of utilities at the project site.

3. Conduct fish removal

Fish removal will be conducted by isolating the work area, removing as many fish as possible, then gradually dewatering the work area while continuing to remove any fish observed. The work area will be isolated by installing block nets upstream and downstream of all work activities including the intake and discharge location for the temporary flow bypass. If conditions allow, the upstream block net shall be placed first. The downstream block net will then be used as a seine to herd fish from the upstream block net location downstream to the point selected for the downstream block net installation. The site will be then be dewatered slowly enough to allow for continued removal of all fish species to avoid strandings. Fish removal methods during dewatering will likely include dip netting and hand removal. Fish handling will be kept to the minimum necessary to remove fish from the work site. All fish and aquatic life removed from the project site will be released downstream of the downstream block net.

4. Install temporary flow bypass

In conjunction with fish removal activities, Sunset Creek will be diverted into a flow bypass pipe and routed past the work area for the duration of culvert replacement and channel modification work. A coffer dam will be constructed approximately 250 feet upstream of SE 30th Street and stream flow will be routed into a flexible pipe to be secured to the west of the channel. The bypass pipe will be 36 inches in diameter and capable of conveying flows up to 95 cubic feet per second (cfs). This bypass conveyance capacity exceeds the 2-year recurrence interval flow in Sunset Creek (79 cfs). The temporary bypass pipe will be routed beneath SE 30th Street and will extend for a distance of approximately 150 feet downstream of SE 30th Street where flows will be discharged to a temporary energy dissipater. All coffer dam and energy dissipater materials will be completely removed from the site when the flow bypass is removed.

5. Dewater construction area

Following the installation of the temporary flow bypass any water remaining in the active channel or existing culverts will be pumped from the work area in accordance with permit requirements for discharge water quality. Turbidity control BMPs will be implemented as necessary before this pumped water is released to Sunset Creek and/or its riparian corridor. The culvert excavation will be dewatered as necessary based on the groundwater conditions encountered at the time of construction. Groundwater was encountered from 5 to 8 feet below the road surface during geotechnical borings advanced in April 2007.

6. Remove riprap from culvert inlet and outlet headwalls and channel banks

Riprap will be removed from the culvert inlet and outlet headwalls to facilitate further excavation and culvert replacement. Riprap will also be removed from the banks of Sunset Creek within 110 feet upstream and 60 feet downstream of the replacement culvert. Riprap will be removed using an excavator and will be hauled from the site to a licensed disposal or material reuse facility. Quantities and linear extents of riprap removal are presented in Table 3.

Table 3. Riprap removal quantities.

Location	Bank Length (ft)	Bank Area (ft^2)
Upstream		
Left Bank	10	30
Above Culvert	14	42
Downstream		
Left Bank	60	240
Right Bank	60	240
Above Culvert	10	50
Totals	154	602

7. Remove and replace existing culverts

Removal of the existing twin 42-inch diameter corrugated metal pipe culverts and installation of the replacement culvert structure will require additional excavation in the SE 30th Street corridor. Excavation, culvert removal, and replacement will require traffic control, as only one lane of SE 30th Street will typically be closed at any given time. All excavated material will be hauled from the project site to a licensed disposal or material reuse facility, or stockpiled onsite for use as backfill following installation of the replacement culvert structure. The replacement culvert structure will be installed in approximately the same location as the existing culverts. The replacement culvert will be constructed using precast concrete structures. All replacement culvert construction activities will be constructed in the dry to minimize water quality impacts. Construction of the replacement culvert will be coordinated with utility relocation in the SE 30th Street right-of-way. Sheet 3 shows a profile of the existing and replacement culverts. Sheet 5 shows plan and profile views of the replacement culvert design. Sheet 6 presents cross section views of the proposed culvert design in the upper stream simulation section and in the lower sediment trap section.

8. Channel grading, excavation and sediment removal

The Sunset Creek channel will be modified to provide smooth and stable transitions from the existing streambed to the inlet and outlet invert elevations of the replacement culvert. Upstream of the replacement culvert, the finished channel bed will be lowered an average of approximately 1.4 feet, and up to 2.5 feet locally, over a length of 110 feet and an average channel width of 7 feet. The streambed will be overexcavated an additional 2 feet for the placement of streambed material, boulders, and large woody debris. Sheet 3 shows the extents of proposed channel grading upstream of SE 30th Street. Streambed and bank material will be removed from the channel using an excavator. Streambed material from the channel upstream of the replacement culvert may be reused as stable channel bed material after grade control structures are constructed if deemed suitable by the project engineer. Bank materials and any streambed material deemed unsuitable for reuse by the project engineer will be hauled from the site to a licensed disposal or material reuse facility.

Downstream of the replacement culvert, the full width of the channel bed, at an average width of 10 feet, will be lowered up to 2.5 feet for a distance of 60 feet downstream of the replacement culvert. Sheet 3 shows the extents of proposed channel grading downstream of SE 30th Street. As upstream, the streambed will be overexcavated an additional 2 feet for the placement of streambed material, boulders, and large woody debris. Bed material from this part of the channel will be removed with an excavator. A portion of this material may be suitable for use as stable channel bed material if deemed so by the project engineer during construction. Additional streambed material will be removed from the channel between 60 and 100 feet downstream of the replacement culvert. This material will be removed from the center 4 to 5 feet of the channel using a suction dredge without disturbing existing streambanks or riparian vegetation.

Stream channel bank and bed material removal and fill quantities within the ordinary high water line associated with channel modifications during construction are presented in Table 4. Sheet 4 shows a typical cross section of the proposed channel modifications as well as the plan view extents of grade control structures on the upstream side of SE 30th Street. Sheet 7 shows a typical cross section of the proposed channel modifications as well as the plan view extents of grade control structures on the downstream side of SE 30th Street.

Table 4. Sediment removal and fill quantities within the ordinary high water line.

Impact	Upstream of Culvert	Downstream of Culvert
Volume of excavation within existing OHWM (cy) [a]	111	145
Volume of fill within existing OHWM (cy) [b]	58	47
Area of fill within existing OHWM (arce)	0.02	0.02

[a] Includes streambed material and riprap.
[b] Includes streambed material and boulders.

9. Install grade control structures, bank protection, and substrate material

Grade control and bank protection structures will be constructed in order to create a stable transition of the existing streambed to the replacement culvert inlet and outlet invert elevations. Grade control and bank protection structures will be primarily constructed using large woody debris and rounded to subrounded river boulders; large woody debris will be imbedded in the streambed and banks and surcharged with boulders as necessary to resist lateral drag and buoyant forces and provide a high factor of safety for channel stability. One structure, the large woody debris grade control structure downstream of the replacement culvert outlet, will incorporate ecology blocks buried within the streambanks. Here, where the channel corridor is narrow relative to the channel width, the large woody debris will be attached to the ecology blocks buried within the banks and located outside of the OHWM. Typical dimensions for large woody debris are diameters of 18 to 24-inches and lengths of 15 to 25-feet. Typical boulder diameters are 12 to 18-inches.

Eight grade control structures will be installed upstream of the replacement culvert. The average gradient of Sunset Creek upstream of SE 30th Street is 2.5 percent. Within 15 feet of SE 30th Street on the upstream side, however, the existing channel gradient is up to 30 percent. The design grade of the channel for a distance of 110 feet upstream of the replacement culvert is 4 percent, with no sections to exceed 5 percent between grade control structures and no vertical drops in excess of 4 inches to promote fish passage. Sheet 8 shows plan and section design details of the proposed grade control structures upstream of SE 30th Street.

Downstream of the replacement culvert one large woody debris grade control structure and one boulder grade control structure will be constructed. The large woody debris grade control structure will be constructed 20 feet downstream of the replacement culvert and the boulder grade control structure will be located another 20 feet further downstream. Sheet 9 shows plan and section design details of the proposed grade control structures downstream of SE 30th Street.

Two types of streambed material will be placed in areas where the channel is modified upstream and downstream of the replacement culvert. The streambed surface will be composed of a 12-inch thick layer of streambed habitat gravel. Below this layer, a 12-inch thick layer of cobble and gravel sized to resist scour and downstream transport will be used to maintain design channel elevations between grade control structures. These materials will likely be placed by excavator with finish placement requiring hand grading.

10. Revegetate streambanks

All streambanks disturbed during channel modification will be revegetated with an appropriate range of native species. Typical species that may be used to revegetated streambanks are presented in Table 5. Replanting plans will be consistent with planting guidelines presented in the City of Bellevue's Critical Areas Handbook (2007).

Table 5. Typical species that may be used to revegetated Sunset Creek streambanks following channel modification.

Vegetation Type	Common Name	Latin Name
Trees		
	Oregon ash	***Fraxinus latifolia***
	Pacific Willow	***Salix lasiandra***
	Paper birch	***Betula papyifera***
	Red alder	***Alnus rubra***
Shrubs		
	Vine maple	***Acer circinatum***
	Red-osier dogwood	***Cornus sericea***
	Salmonberry	***Rubus spectablis***
	Pacific ninebark	***Physocarpus capitatus***
Groundcover		
	Lady fern	***Athyrium filix-femina***
	Sword fern	***Polystichum munitum***
Emergent		
	Small-fruited bulrush	***Scirpus microcarpus***

11. Reintroduce flow to channel

Following completion of the culvert replacement and channel bed modifications, Sunset Creek flows will be reintroduced to the channel. The timing of reintroduction will be coordinated with construction of the high flow and maintenance bypass culvert and outfall and completion of bank protection in the outfall location at the downstream end of the replacement culvert.

12. Construct maintenance bypass culvert

A 24-inch diameter maintenance bypass culvert will be constructed to the west of the replacement culvert structure. The maintenance bypass culvert will provide a means to bypass streamflows during maintenance of the sedimentation structure. The inlet of the maintenance bypass culvert at the upstream end will be in the wall of the replacement culvert. The outlet of the high flow and maintenance bypass culvert will discharge to an energy dissipation structure composed of large woody debris built into the left bank of the stream channel downstream of the replacement culvert. Both the inlet and outlet of the culvert will be screened to preclude fish passage.

PREPARATION OF DRAWINGS: See sample drawings and guidance for completing the drawings. ***ONE SET OF ORIGINAL OR GOOD QUALITY REPRODUCIBLE DRAWINGS MUST BE ATTACHED.*** NOTE: Applicants are encouraged to submit photographs of the project site, but these DO NOT substitute for drawings. ***THE CORPS OF ENGINEERS AND COAST GUARD REQUIRE DRAWINGS ON 8-1/2 X 11 INCH SHEETS. LARGER DRAWINGS MAY BE REQUIRED BY OTHER AGENCIES.***

help 7b. Describe the purpose of the proposed work and why you want or need to perform it at the site. Please explain any specific needs that have influenced the design.

The purpose of the proposed culvert replacement project is to improve flow conveyance and reduce flooding at SE 30th Street, manage sediment delivery to Sunset Creek north of SE 30th Street, and improve fish passage conditions at the culvert location. Flood control and sediment management alternatives at the project site are limited both by the highly confined channel corridor and the site's location at a natural deposition zone in a watershed that generates and transports considerable sediment from upstream. The proposed culvert replacement project is designed to address immediate, ongoing, and future conditions at the project location as well as complement flooding, sedimentation, and aquatic habitat resource management objectives in channels downstream.

Since January 1, 2006 Sunset Creek has flooded at SE 30th Street at least six times, most recently on December 3, 2007. Flooding at SE 30th Street directly impacts neighboring businesses and restricts neighborhood access. Sediment deposition at the project site reduces the conveyance capacity of the twin culverts beneath SE 30th Street, further exacerbating flooding. Recurring sediment deposition requires regular dredging of the active channel by the city. Deposition of sediment that is transmitted downstream of SE 30th Street contributes to channel aggradation and aggravates flooding in other locations of the Sunset, Richards, and East Creek channel networks. Under existing conditions, the sediment that accumulates upstream, downstream, and within the twin 42-inch diameter culverts at SE 30th Street inhibits fish passage by contributing to pressure flow conditions during flows as low as 10 cfs (equivalent to the 10 percent exceedance flow for January).

Design of the proposed culvert replacement structure incorporates an understanding of the geomorphic, hydraulic, and

ecological conditions at the watershed and project-site scales. Design of the replacement culvert followed a watershed and project reach assessment of geomorphic conditions, including a thorough evaluation of sediment delivery and transport at the project site, and was supported by a detailed hydraulic analysis of the Sunset Creek, Richards Creek, and East Creek system from SE 32nd Street to downstream of Kamber Road (SE 26th Street). The design of the proposed culvert replacement structure and channel modifications considers the natural variability in sediment delivery to the project site and the potential channel responses to changes in sediment transport downstream of SE 30th Street. The proposed culvert replacement structure will be supported by a monitoring and adaptive operations and maintenance plan that will be implemented by the City of Bellevue following project construction. Detailed descriptions of replacement culvert design components and the monitoring and adaptive operations and maintenance plan are provided below.

1. Replacement Culvert and Channel Modification Design

The replacement culvert structure is designed to transmit the 100-year flood flow without allowing flow to overtop SE 30th Street, provide improved aquatic habitat and fish passage conditions compared to exiting conditions, and store approximately 50 cubic yards of sediment in a structure that can be maintained with minimal detrimental impacts to aquatic habitat. Performance criteria for flow conveyance, fish passage, and sediment transport conditions were used to evaluate replacement structure designs.

City of Bellevue design standards require culverts to pass the 100-year flood with an additional foot of freeboard. Due to physical constraints at the project site, including the downstream channel width and road surface elevation, these design criteria could not be met. The proposed geometry of the structure maximizes flow conveyance beneath SE 30th Street given the physical constraints of the downstream channel and the sediment transport and fish passage performance criteria discussed below. The hydraulic opening of the replacement culvert is designed to be 13 feet wide and approximately 4.5 feet high.

Fish passage criteria for the proposed replacement culvert are met by using a combination backwater and stream simulation culvert. The dimensions of the main culvert opening maintain the width of the bank-full channel upstream of the culvert, consistent with design parameters for stream simulation culverts in confined channels (WDFW 2003). The design slope of the stream simulation portion of the culvert is 3 percent, which is 1.2 times the average upstream channel gradient. This satisfies part of the stream simulation culvert design criteria (WDFW 2003). The bed of the stream simulation structure will be composed of a layer of streambed sediment that will likely be in flux over time from the upstream channel towards the sediment structure. Stable boulders will protrude through the design streambed surface to provide hydraulic complexity.

The sedimentation structure was designed to accommodate storage of 50 cubic yards of sediment. This volume was derived based on analysis of sediment delivery to the project site and ongoing dredging that the city has performed in recent years to maintain flow conveyance. Sediment has accumulated in the channel downstream of SE 30th Street at an average rate of approximately 40 cubic yards annually in the past 30 years. The current average annual accumulation rate is likely less than what it was 10 or 20 years ago due to upstream efforts to reduce sediment production and delivery. Still, regular dredging of 10 to 20 cubic yards of sediment is required on an almost annual basis to maintain flow conveyance. The design sediment storage volume is intended to capture the majority of bedload sediment that is delivered to the project site in an average year with additional storage capacity for infrequent storms during which a greater volume of sediment is transported.

The performance of the replacement culvert will be influenced by the streambed elevation of the downstream channel. It is anticipated that some channel bed lowering will naturally occur downstream of SE 30th Street once bedload delivery is reduced by up to 50 cubic yards per year. As a result, the replacement culvert is designed to achieve performance criteria in terms of flow conveyance, sedimentation, and fish passage under not only as-built conditions but anticipated future conditions as well.

Following construction, the replacement culvert will be backwatered by the relatively high channel bed elevation downstream of the project area. If the downstream channel degrades sufficiently to no longer backwater the replacement culvert, the fish passable conditions will be maintained by backwater through the sedimentation structure caused by the large woody debris grade control structure downstream of the culvert outlet and the stream simulation culvert design in the upstream half of the replacement culvert. The channel modifications downstream of the replacement culvert are further designed to accommodate potential channel responses by incorporating a deformable porous boulder weir downstream of the large woody debris grade control structure. Should the downstream channel degrade, the boulder weir will deform somewhat but will maintain fish passage to and past the large woody debris grade control structure and through the replacement culvert structure.

2. Monitoring and Adaptive Operations and Maintenance Plan

Installing a sedimentation structure into Sunset Creek at SE 30th Street will require active monitoring of the channel downstream of SE 30th Street and a commitment to operation and maintenance of the sedimentation structure. The City of Bellevue will lead these activities to ensure proper function of the sedimentation structure and avoid impacts to aquatic habitat downstream of SE 30th Street.

The following monitoring protocols will be implemented to identify the onset of geomorphic changes to the Sunset and Richards Creek channels downstream of SE 30th Street resulting from the altered dynamics of sediment delivery resulting from the sedimentation structure. These protocols are intended to document geomorphic characteristics of the downstream channels and inform the City of Bellevue if modifications to the operations and maintenance schedule or more aggressive actions, such as gravel supplementation, are necessary to maintain substrate conditions that are beneficial for aquatic habitat.

A channel monitoring protocol will be initiated by establishing four to five permanent monitoring locations approximately every 200 to 250 feet beginning 100 feet downstream of the replacement culvert. At each monitoring section:

1. **Channel cross-sectional geometry will be surveyed.**
2. **The composition of streambed sediment will be monitored at established locations downstream of SE 30th Street using**

a combination of surface pebble counts and subsurface bulk sampling and sieve analysis.

Channel surveying and streambed sediment sampling will be performed annually for a period of 5 years and semi-annually for the following 10 years. At that time future monitoring needs can be reevaluated.

Baseline sedimentation structure monitoring protocols will consist of the following:

1. **Scheduled visual inspections of sedimentation structure capacity and additional inspections following significant storm events.**
2. **Documentation of the timing and quantity of all sediment removed from the structure.**
3. **Bulk sieve analysis of sediment removed to document grain size distribution of captured sediment.**

Based on the patterns and rates of sediment delivery to the site and the channel response downstream of SE 30th Street an adaptive policy for determining when sediment removal is necessary can be developed. Current rates of deposition at SE 30th Street indicate that annual to semi-annual sediment removal should be expected in the near future. As sediment production and delivery from the upstream watershed decrease as a result of additional channel stabilization and sediment reduction measures the frequency of sediment removal may decrease. Should sediment production in the upper watershed reduce to a level such that maintenance of the sedimentation structure is no longer necessary, the sedimentation structure is designed to function as a stream simulation culvert without need for modifications.

Removal of sediment from the sedimentation structure will be conducted so as to minimize impacts to aquatic species and downstream water quality. During maintenance activities flow will be diverted through the maintenance bypass pipe by use of an adjustable gate at the upstream end of the sedimentation structure. Sheet 2 shows the alignment of the bypass pipe on the west side of the replacement culvert structure. Once flows are completely routed into the bypass pipe, fish will be excluded from the sedimentation structure using a seine that will then be installed as a downstream block net at the downstream end of the replacement culvert. Dip netting will likely be used to complement the seining fish removal. Once fish have been removed from the sedimentation cell to the downstream block net, sediment will be removed from the structure through use of a suction dredge operated from the street above and disposed of at an appropriate upland location. Upon completion of sediment removal activities, the downstream block net will be removed and the gate at the upstream end of the culvert will be reopened to allow Sunset Creek to once again flow through the replacement culvert structure. Sediment removal will not require heavy equipment operations within the stream channel.

help 7c. Describe the potential impacts to characteristic uses of the water body. These uses may include fish and aquatic life, water quality, water supply, recreation and aesthetics. Identify proposed actions to avoid, minimize, and mitigate detrimental impacts and provide proper protection of fish and aquatic life. Identify which guidance documents you have used. Attach a separate sheet if additional space is needed.

The proposed project involves the replacement of an existing culvert structure with an improved culvert structure combined with an integrated sediment trap. Placement of this structure will require modification of the stream channel bed and bank modifications for grade control purposes.

Primary impacts of concern associated with the proposed project include the following:

- **Construction related impacts on aquatic species and water quality**
- **Culvert management effects on aquatic species and water quality**
- **Effects on stream habitat conditions**
- **Effects on fish passage.**

The proposed project has been planned and designed to avoid, minimize and mitigate these potential impacts to the greatest extent possible, and will result in a net improvement in existing habitat and water quality conditions. Discussion of methods and guidance used to avoid and minimize impacts are described below.

1. Construction related impacts on aquatic species and water quality

The proposed project has the potential to cause construction-related impacts on water quality, principally in the form of increased suspended sediment loading from channel bed and bank disturbance. The project plans include several BMPs and construction monitoring protocols designed to limit sediment loading and water quality impacts to the greatest extent possible. All channel and bank work will be conducted within a dewatered exclusion area, during the mid to late summer months when streamflow should be at its lowest. Groundwater and stormwater pumped from the construction site will be filtered prior to discharge back to surface waters, or delivered to the sanitary sewer system for treatment. Once construction is completed, the exclusion area will be rewatered slowly to limit the suspension of sediments from disturbed areas. Turbidity levels will be monitored in Sunset Creek downstream of SE 30th Street throughout construction to ensure BMP effectiveness.

Dewatering of the exclusion area will require the capture and relocation of fish and other aquatic organisms. These activities will be conducted consistent with current Washington State Department of Transportation protocols for this practice, which are designed to minimize adverse effects.

All machinery operating within the stream channel will utilize hydraulic fluid that is certified as non-toxic to aquatic life. Throughout construction a spill control and prevention plan will be in place to avoid and manage any spills of potentially hazardous materials.

2. Post-construction related effects on aquatic species and water quality

The proposed project design includes a sediment trap integrated into the replacement culvert structure. Several long-term benefits for aquatic life and water quality are anticipated with the replacement culvert. The primary benefit provided by the sediment trap within the culvert structure is that it will allow for the majority of sediment removal activities to take place inside an enclosed structure, versus dredging of the active channel. Second, the trap will provide increased sediment storage capacity, which is expected to decrease the frequency and/or the extent of sediment removal activities. Currently, dredging of the active channel takes place on an annual basis, causing considerable habitat disturbance and related water quality impacts. While some dredging of the active channel may be required in the future, this will be limited to infrequent occasions when large sediment delivery events overwhelm trap capacity.

The proposed replacement culvert structure design incorporates several design features that will simplify fish exclusion and relocation during sediment removal activities. These features will promote the removal of fish from the sediment management area with less disturbance and handling, reducing stress and injury potential. Because the sediment trap within the culvert is designed to be smaller in areal extent than the segment of channel that is currently dredged, the amount of habitat that fish are denied access to during maintenance activities will be reduced.

Finally, the existing twin culverts that convey Sunset Creek across SE 30th Street provide insufficient flood conveyance capacity, contributing to routine flooding of adjacent roadways and parking lots. These floodwaters commonly overwhelm storm drains and flow overland back into the stream system. Because some of those local storm drains do not drain directly back to the stream system, this suggests that current flooding conditions contribute to elevated delivery of stormwater pollutants to Sunset Creek. By reducing the frequency of flooding that overtops the street, the proposed project is likely to result in a slight incremental improvement in local water quality conditions during and following flood events.

3. Effects on habitat conditions

The proposed project will result in improved habitat conditions in the project area. These improvements will occur because of increased habitat complexity provided by bioengineered grade control and bank stabilization structures, reduced frequency of sediment management activities in the active channel, and adaptive management of sediment delivery rates to downstream channels. These three factors that are expected to positively influence habitat are described in more detail below.

The bioengineered grade control and bank stabilization structures are necessary components of channel reconfiguration needed to support the culvert design. The current channel gradient conditions have been imposed by backwater conditions induced by the existing culvert and sediment deposition in the channel downstream of SE 30th Street that occurs because elevated sediment delivery rates in the Sunset Creek watershed are out of equilibrium with sediment transport capacity in the channel. The channel upstream and downstream of SE 30th Street must be returned to a more natural gradient to support fish passage and enhance sediment capture in the replacement culvert structure. The channel profile modification work will involve excavation of accumulated sediment from the channel bed and the installation of grade control structures, removal of riprap, and bank contouring and stabilization. Riprap will be removed from approximately 74 lineal feet of streambank and replaced with bioengineered bank protection structures composed primarily of LWD. The grade control structures will also be constructed using LWD.

The channel modification design is based on a comprehensive assessment of watershed, reach, and site specific hydrologic, hydraulic, and geomorphic conditions, and is consistent with WDFW Integrated Streambank Protection Guidelines. The grade control and bank stabilization structures are specifically designed to mimic the habitat forming processes and functions provided by LWD in natural stream environments, and will significantly increase habitat complexity and improve fish passage in the project reach of Sunset Creek. The proposed project is considered to be self-mitigating for these reasons.

The Sunset Creek channel accumulates more sediment than it can effectively transport in its current hydromodified state. This promotes an overly wide and shallow channel environment with limited habitat complexity. These channel conditions provide poor flow conveyance, contributing to frequent flooding problems on SE 30th Street and adjacent businesses, and also contribute to low flow passage barrier conditions for adult salmonids and potentially for juvenile salmonids.

Sediment management to maintain flood flow conveyance capacity in this reach of Sunset Creek is accomplished by routine annual dredging of the active channel downstream of the SE 30th Street culvert. This requires regular disturbance of the active channel, interfering with the formation of beneficial habitat features. A key advantage of the integrated sediment trap in the replacement culvert structure is that it will allow for the majority of sediment removal activities to be conducted within the structure using equipment parked on the roadway atop the culvert, avoiding streambank and channel disturbance. Dredging of the active channel will only be required in rare circumstances when large sediment delivery events overwhelm sediment trap capacity.

The integrated sediment trap in the replacement culvert structure will allow for more flexible and adaptive management of sediment flux through the lower reach of Sunset Creek downstream of the culvert, which should produce habitat benefits over the long-term. The proposed project incorporates monitoring of bed elevations and substrate conditions in and downstream of the project reach in Sunset Creek, and an adaptive approach for metering sediment delivery rates to promote the formation of beneficial channel conditions. Specifically, controlled sediment delivery downstream of SE 30th Street will allow for the existing sediment plug in the channel between SE 30th Street and the confluence of Sunset Creek with Richards Creek to gradually erode. This in turn will increase flow conveyance capacity, and allow for the formation of a greater diversity of habitat features. The channel will be routinely monitored to ensure that substrate conditions desirable for salmonid spawning are maintained.

Collectively, these project elements should produce improved habitat conditions within the project reach that are beneficial to a range of aquatic species.

4. Effects on fish passage

The proposed project will result in improved conditions for fish passage in the project reach. Currently, fish passage conditions in Sunset Creek are impaired by sediment deposition upstream and downstream of the SE 30th Street twin culverts. The flatter gradient in the channel downstream of the culverts promotes the accumulation of a large plug of sediment that creates a low flow barrier to adult salmonid passage. This sediment plug may also hinder the movement of juvenile salmonids under certain flow conditions. This sediment plug extends beyond the limits of current dredging activities, meaning that this barrier condition will remain permanent without additional intervention. By allowing for greater control of sediment delivery rates to the downstream channel, it is expected that the sediment trap will permit the evolution of channel conditions that are beneficial to fish passage.

The existing twin culverts also limit fish passage upstream of SE 30th Street. The culverts lack sufficient hydraulic capacity to convey flood flows that transport large sediments. This creates a backwater effect upstream of the structure that promotes the accumulation of coarse bedload, increasing the channel gradient abruptly from approximately 2.5 percent to 10 percent approaching the upstream culvert entrance. During high flow conditions, the high flow velocity in the culvert barrels in combination with shallow, high velocity flow conditions in this over-steepened segment may create a partial barrier condition.

The proposed culvert integrates two fish passage components, a backwatered sediment trap at the downstream end, and a streambed simulation component at the upstream end. The streambed simulation segment has been designed in accordance with current WDFW culvert design guidance (WDFW 2003). This segment will mimic natural channel bed conditions at a more natural 2.5 percent channel slope. The backwatered sediment trap component will provide quiescent flow conditions that will allow for unhindered fish passage. The streambed simulation segment will provide for full fish passage for all species and life history stages likely to occur in this system during the flow conditions during which migratory and dispersal behavior is likely to take place.

Collectively, the proposed culvert design and stream channel modifications address high flow and low flow passage barriers, and are expected to provide improved fish passage conditions throughout this reach of Sunset Creek.

help 7d. For in-water construction work, will your project be in compliance with the State of Washington water quality standards for turbidity (WAC 173-201A-410)? [X] YES [ ] NO

help 8. Will the project be constructed in stages? [X] YES [ ] NO

Proposed starting date: **Summer of 2009**

Estimated duration of activity: **50 to 70 working days for construction with up to 10 additional days for mobilization and setup of temporary erosion and sediment control measures.**

help 9. Check if any temporary or permanent structures will be placed:

[X] Waterward of the ordinary high water mark or line for fresh or tidal waters AND/OR

[ ] Waterward of the mean higher high water for tidal waters?

help 10. Will fill material (rock, fill, bulkhead, or other material) be placed:

[X] Waterward of the ordinary high water mark or line for fresh waters?

If **YES**, VOLUME (cubic yards) **105** / AREA **0.04** (acres)

[ ] Waterward of the mean higher high water for tidal waters?

If **YES**, VOLUME (cubic yards) / AREA (acres)

help 11. Will material be placed in wetlands? [ ] YES [X] NO

If **YES**:

help A. Impacted area in acres:

help B. Has a delineation been completed? **If YES**, please submit with application. [ ] YES [ ] NO

help C. Has a wetland report been prepared? **If YES**, please submit with application [ ] YES [ ] NO

help D. Type and composition of fill material (e.g., sand, etc.)

help E. Material source:

help F. List all soil series (type of soil) located at the project site, and indicate if they are on the county's list of hydric soils. Soils information can be obtained from the natural Resources Conservation Service (NRCS).

help G. WILL PROPOSED ACTIVITY CAUSE FLOODING OR DRAINING OF WETLANDS? [ ] YES [X] NO

If **YES**, IMPACTED AREA IS ACRES OF DRAINED WETLANDS.

NOTE: If your project will impact greater than 1/10 of an acre of wetland, submit a mitigation plan to the Corps and Ecology for approval along with the JARPA form.
NOTE: A 401 water quality certification may be required from Ecology in addition to an approved mitigation plan if your project wetland impacts are greater than 1/10 acre in size. Please submit the JARPA form and mitigation plan to Ecology for 401 certification review.

help 12. Stormwater Compliance: This project is (or will be) designed to meet ecology's most current stormwater manual, or an Ecology approved local stormwater manual. [X] YES [ ] NO

If **YES** – Which manual will your project be designed to meet? **2005 Stormwater Management Manual for Western Washington**

help If **NO** – For Clean Water Act Section 401 and 404 permits only – Please submit to Ecology for approval, along with this JARPA application, documentation that demonstrates the stormwater runoff from your project or activity will comply with the water quality standards, WAC 173-201(A)

help 13. Will excavation or dredging be required in water or wetlands? [X] YES ☐ NO

If **YES**:

A. Volume: **256** (cubic yards) /area **0.04** (acre)

B. Composition of material to be removed: **Riprap and streambed material**

C. Disposal site for excavated material: **licensed disposal or reuse facility**

D. Method of dredging: **Excavator and suction dredge (sediment to be removed in the dry)**

help 14. Has the State Environmental Policy Act (SEPA) been completed ☐ YES [X] NO

SEPA Lead Agency: **City of Bellevue**

SEPA Decision: DNS, MDNS, EIS, Adoption, Exemption Decision Date (end of comment period)

SUBMIT A **COPY OF YOUR SEPA DECISION LETTER** TO WDFW AS REQUIRED FOR A COMPLETE APPLICATION

help 15. List other Applications, approvals or certifications from other federal, state or local agencies for any structures, construction discharges or other activities described in the application (i.e. preliminary plat approval, health district approval, building permit, SEPA review, federal energy regulatory commission license (FERC), Forest practices application, etc.). Also, indicate whether work has been completed and indicate all existing work on drawings. NOTE: For use with Corps Nationwide Permits, identify whether your project has or will need an NPDES permit for discharging wastewater and/or stormwater.

– Project does not require an NPDES permit.

TYPE OF APPROVAL	ISSUING AGENCY	IDENTIFICATION NO.	DATE OF APPLICATION	DATE APPROVED	COMPLETED?
Hydraulic Project Approval	**Washington Department of Fish and Wildlife**				
Clean Water Act Section 404	**U.S. Army Corps of Engineers**				
Section 401 Water Quality Certification	**Washington State Department of Ecology**				
SEPA review	**City of Bellevue**				
Critical Areas	**City of Bellevue**				

help 16. Has any agency denied approval for the activity you're applying for or for any activity directly related to the activity described herein?

☐ YES [X] NO

If **YES**, explain:

SECTION B - Use for Shoreline and Corps of Engineers permits only:

help 17a. Total cost of project. This means the fair market value of the project, including materials, labor, machine rentals, etc.

$995,000

help 17b. If a project or any portion of a project receives funding from a federal agency, that agency is responsible for ESA consultation. Please indicate if you will receive federal funds and what federal agency is providing those funds.

FEDERAL FUNDING ☐ YES [X] NO If **YES**, please list the federal agency.

help 18. Local government with jurisdiction: **City of Bellevue**

help 19. Provide names, addresses and telephone numbers of adjoining property owners, lessees, etc. ***Please note:*** *Shoreline Management Compliance may require additional notice – consult your local government.*

NAME	ADDRESS	PHONE NUMBER
E.S. Harrington	**13120 SE 30th Street, Bellevue, WA 98005**	
Stead Building Partnership	**13200 SE 30th Street, Bellevue, WA 98005**	
SLC Investment LLC	**13201 SE 30th Street, Bellevue, WA 98005**	
SCC Property Holdings	**13111 SE 30th Street, Bellevue, WA 98005**	

SECTION C - This section MUST be completed for any permit covered by this application

help 20. Application is hereby made for a permit or permits to authorize the activities described herein. I certify that I am familiar with the information contained in this application, and that to the best of my knowledge and belief, such information is true, complete, and accurate. I further certify that I possess the authority to undertake the proposed activities. I hereby grant to the agencies to which this application is made, the right to enter the above-described location to inspect the proposed, in-progress or completed work. I agree to start work **ONLY** after all necessary permits have been received.

Brian Ward SIGNATURE OF APPLICANT	DATE 6/26/08
SIGNATURE OF AUTHORIZED AGENT	DATE

I HEREBY DESIGNATE Chase Barton TO ACT AS MY AGENT IN MATTERS RELATED TO THIS APPLICATION FOR PERMIT(S). I UNDERSTAND THAT IF A FEDERAL PERMIT IS ISSUED, I MUST SIGN THE PERMIT.

Brian Ward — 6/26/08

SIGNATURE OF APPLICANT — DATE

SIGNATURE OF LANDOWNER (EXCEPT PUBLIC ENTITY LANDOWNERS, E.G. DNR)

THIS APPLICATION MUST BE SIGNED BY THE APPLICANT AND THE AGENT, IF AN AUTHORIZED AGENT IS DESIGNATED.

18 U.S.C §1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of the United States knowingly falsifies, conceals, or covers up by any trick, scheme, or device a material fact or makes any false, fictitious, or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious, or fraudulent statement or entry, shall be fined not more than $10,000 or imprisoned not more than 5 years or both.

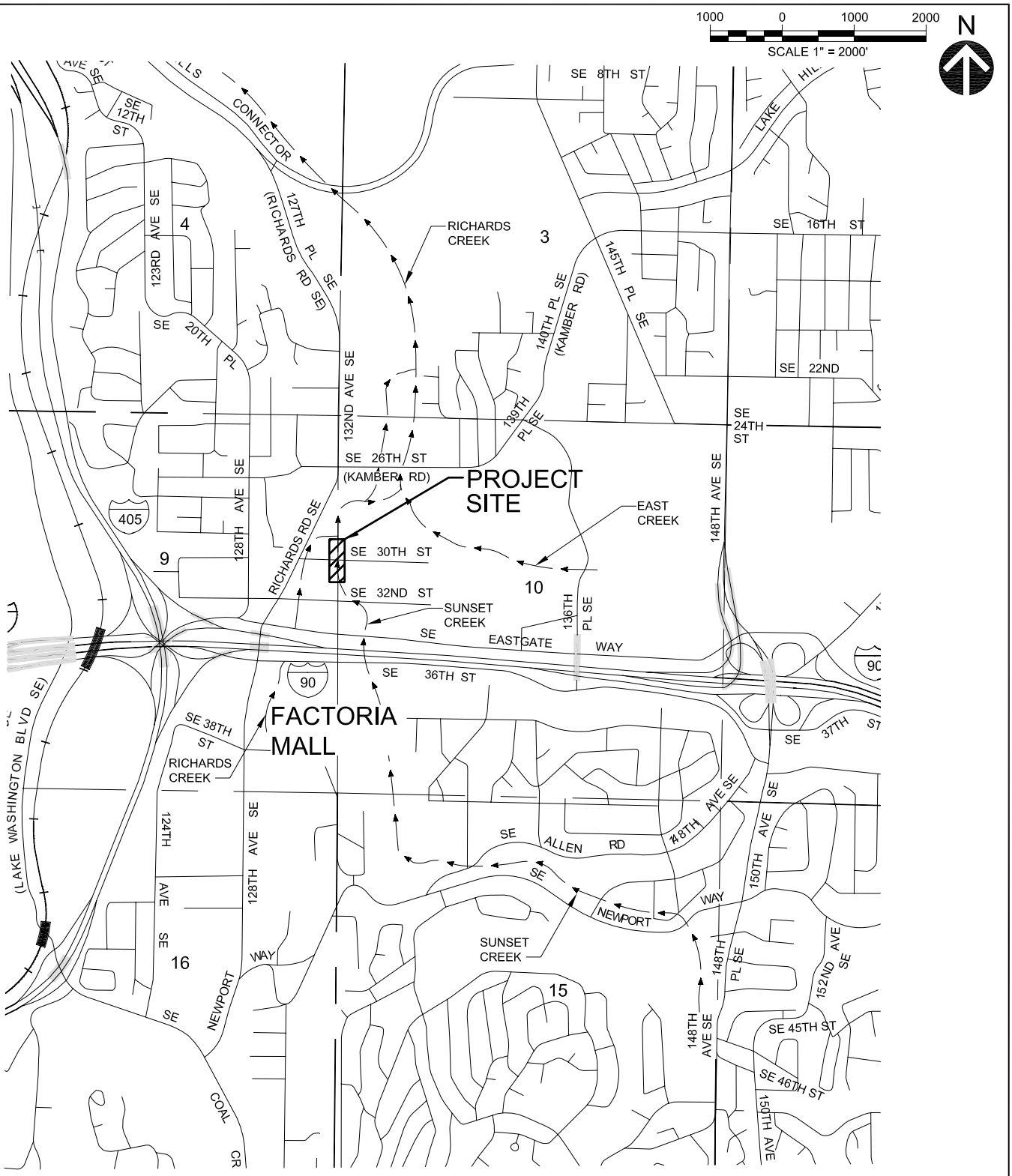
COMPLETED BY LOCAL OFFICIAL

A. Nature of the existing shoreline. (Describe type of shoreline, such as marine, stream, lake, lagoon, marsh, bog, swamp, flood plain, floodway, delta; type of beach, such as accretion, erosion, high bank, low bank, or dike; material such as sand, gravel, mud, clay, rock, riprap; and extent and type of bulkheading, if any)

B. In the event that any of the proposed buildings or structures will exceed a height of thirty-five feet above the average grade level, indicate the approximate location of and number of residential units, existing and potential, that will have an obstructed view:

C. If the application involves a conditional use or variance, set forth in full that portion of the master program which provides that the proposed use may be a conditional use, or, in the case of a variance, from which the variance is being sought:

These Agencies are Equal Opportunity and Affirmative Action employers.
For special accommodation needs, please contact the appropriate agency in the instructions



NOTE:
RICHARDS CREEK IS TRIBUTARY TO KELSEY CREEK.

PROJECT SITE COORDINATES:
NORTH 1/2, SEC. 10, TWP. 24 N., RGE 5 E., W.M.
LATITUDE: 47°35'01.91"N
LONGITUDE: 122°10'21.95"W

Prepared by: C. BARTON	VICINITY MAP	Applicant: CITY OF BELLEVUE
HERRERA ENVIRONMENTAL CONSULTANTS — 2200 Sixth Avenue, Suite 1100, Seattle, Washington 98121-1820; 206-441-9080; 206-441-9108 FAX; http://www.herrerainc.com	Application for: SE 30th / SUNSET CREEK CULVERT REPLACEMENT	Project Location: BELLEVUE, KING COUNTY, WASHINGTON
	Purpose: FLOW CONVEYANCE	SCALE AS NOTED
Date: JUNE 2008	Waterbody: SUNSET CREEK	SHEET 1 of 9

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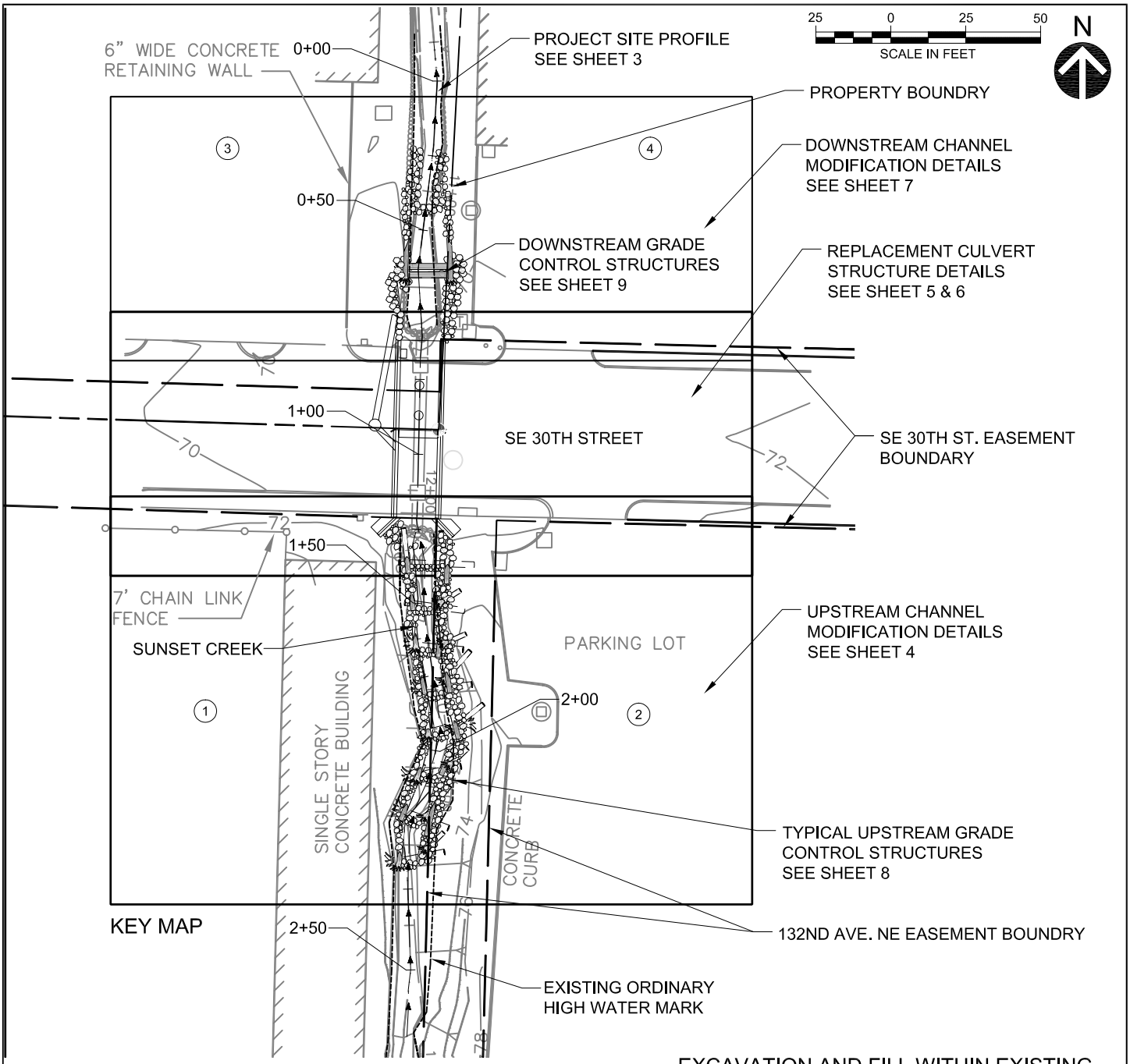

ADJACENT PROPERTY OWNERS:

1. SHURGARD MINI STORAGE (PARCEL #5453300244)
2. PRINTED CIRCUITS ASSEMBLY CORP. (PARCEL #5453300291)
3. SHURGARD MINI STORAGE (PARCEL #5453300194)
4. STEAD BUILDING (PARCEL #5453300183)

NOTE: BOUNDARIES FOR PROPERTIES ADJACENT TO PROJECT AREA DEFINED BY SE 30TH STREET ROAD RIGHT OF WAY. PROPERTIES 1 AND 2 SEPARATED BY 20' EASEMENT PARALLEL TO STREAM CORRIDOR. PROPERTIES 3 AND 4 SEPARATED BY PROPERTY BOUNDARY.

EXCAVATION AND FILL WITHIN EXISTING ORDINARY HIGH WATER MARK

QTY. OF EXCAVATION (CY)	256
QTY. OF FILL (CY)	104
AREA OF FILL (ACRE)	0.04

NOTE: EXCAVATED MATERIAL INCLUDES RIPRAP, NATIVE SOIL, AND STREAMBED SEDIMENT. TO BE DISPOSED OF AT LICENSED DISPOSAL OR REUSE FACILITY. FILL MATERIAL INCLUDES STREAMBED SEDIMENT AND BOULDERS.

Prepared by: C. BARTON

HERRERA ENVIRONMENTAL CONSULTANTS
2200 Sixth Avenue
Suite 1100
Seattle, Washington
98121-1820
206-441-9080
206-441-9108 FAX
http://www.herreralnc.com

Date: JUNE 2008

DETAILED SITE SCHEMATIC

Application for: SE 30th / SUNSET CREEK CULVERT REPLACEMENT

Purpose: FLOW CONVEYANCE

Waterbody: SUNSET CREEK

Applicant: CITY OF BELLEVUE

Project Location: BELLEVUE, KING COUNTY, WASHINGTON

SCALE AS NOTED

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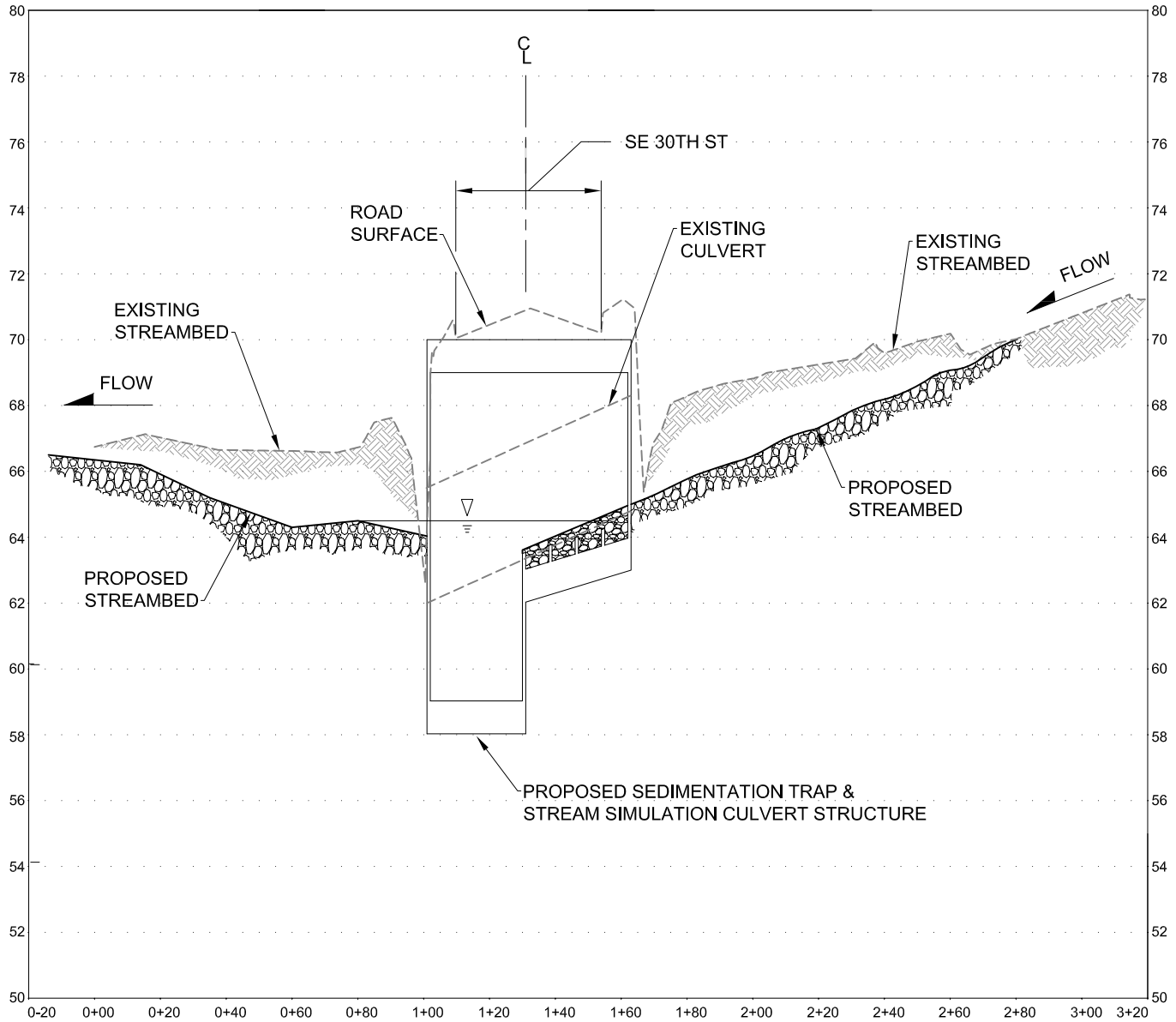

PROJECT PROFILE

HORIZ SCALE: 1"=50'
VERT SCALE: 1"=5'

NOTE:
VERTICAL DATUM NAVD 88

Prepared by: C. BARTON	PROJECT PROFILE	Applicant: CITY OF BELLEVUE
HERRERA ENVIRONMENTAL CONSULTANTS 2200 Sixth Avenue Suite 1100 Seattle, Washington 98121-1820 206-441-9080 206-441-9108 FAX http://www.herreralnc.com	Application for: SE 30th / SUNSET CREEK CULVERT REPLACEMENT	Project Location: BELLEVUE, KING COUNTY, WASHINGTON
	Purpose: FLOW CONVEYANCE	SCALE AS NOTED
Date: JUNE 2008	Waterbody: SUNSET CREEK	SHEET 3 of 9

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ADJACENT PROPERTY OWNERS:

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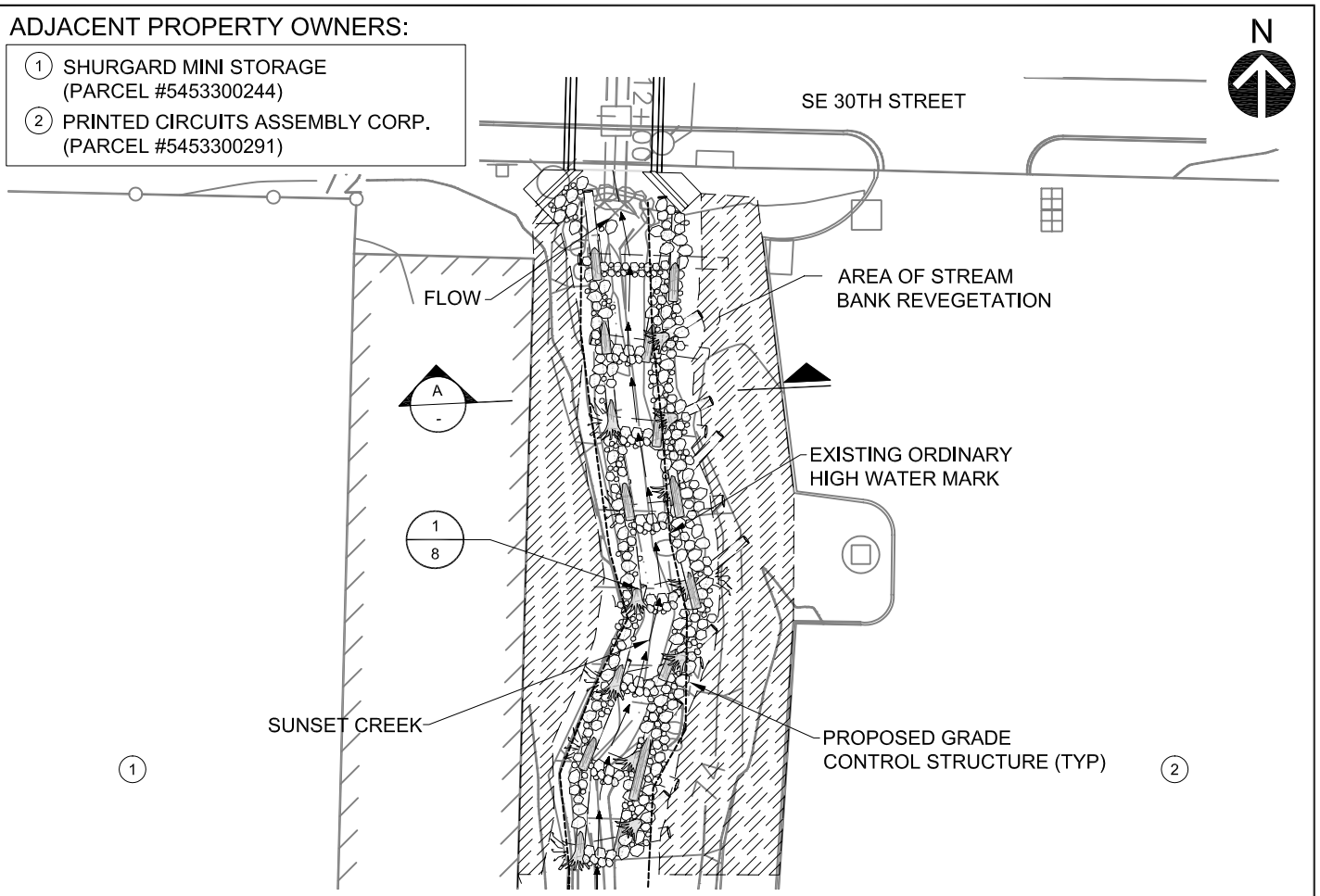
2. PRINTED CIRCUITS ASSEMBLY CORP. (PARCEL #5453300291)



PLAN VIEW - UPSTREAM CHANNEL MODIFICATION (-/2)

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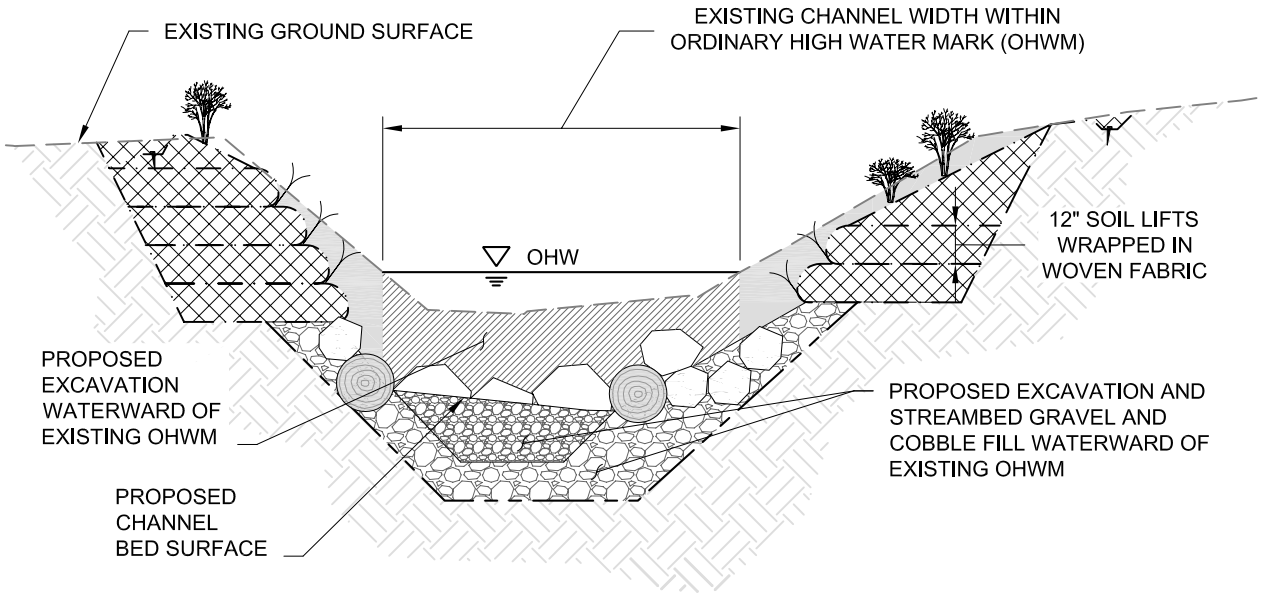

SECTION - TYPICAL STREAM CHANNEL SECTION (A/-)

SCALE: 1"=5'

Prepared by: C. BARTON HERRERA ENVIRONMENTAL CONSULTANTS 2200 Sixth Avenue Suite 1100 Seattle, Washington 98121-1820 206-441-9080 206-441-9108 FAX http://www.herreralnc.com	UPSTREAM CHANNEL MODIFICATION PLAN AND SECTION	Applicant: CITY OF BELLEVUE
	Application for: SE 30th / SUNSET CREEK CULVERT REPLACEMENT	Project Location: BELLEVUE, KING COUNTY, WASHINGTON
	Purpose: FLOW CONVEYANCE	SCALE AS NOTED
Date: JUNE 2008	Waterbody: SUNSET CREEK	SHEET 4 of 9

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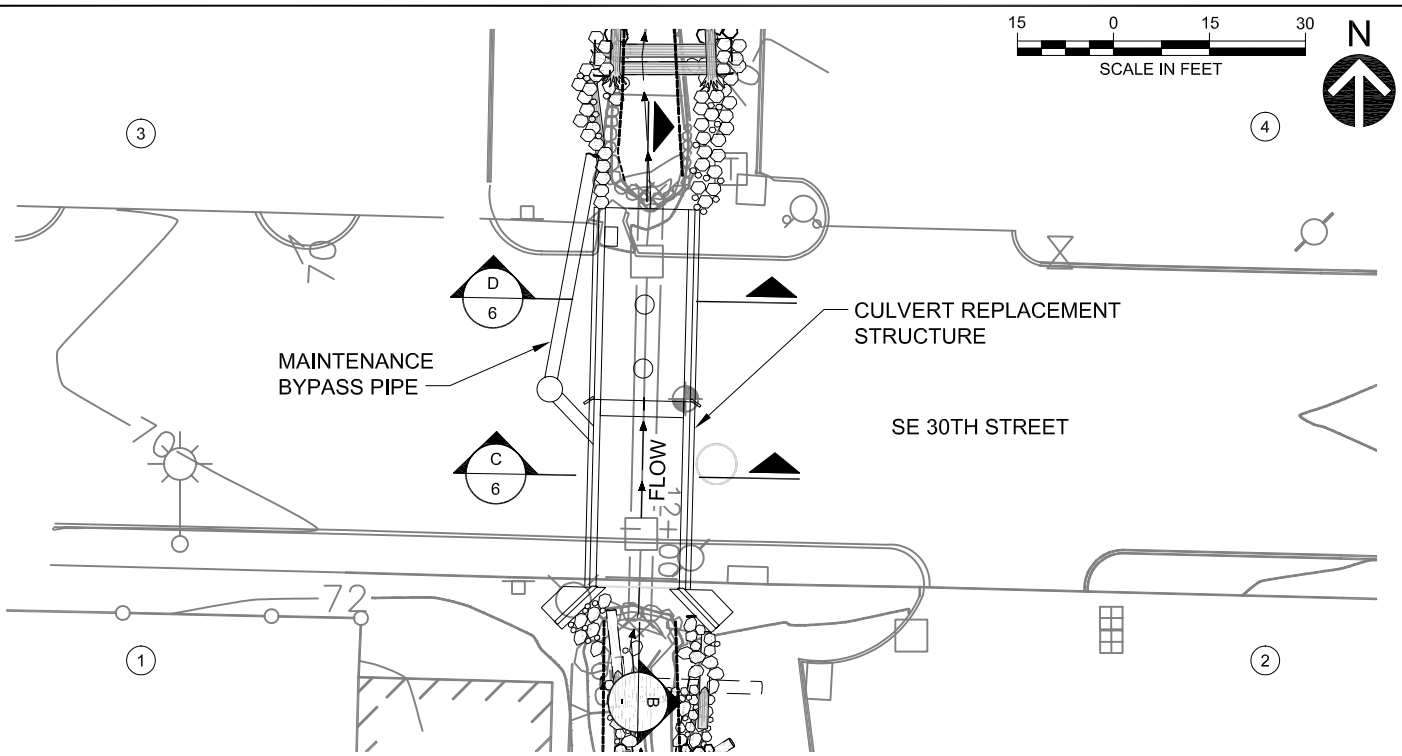

PLAN VIEW - REPLACEMENT CULVERT STRUCTURE (-/2)

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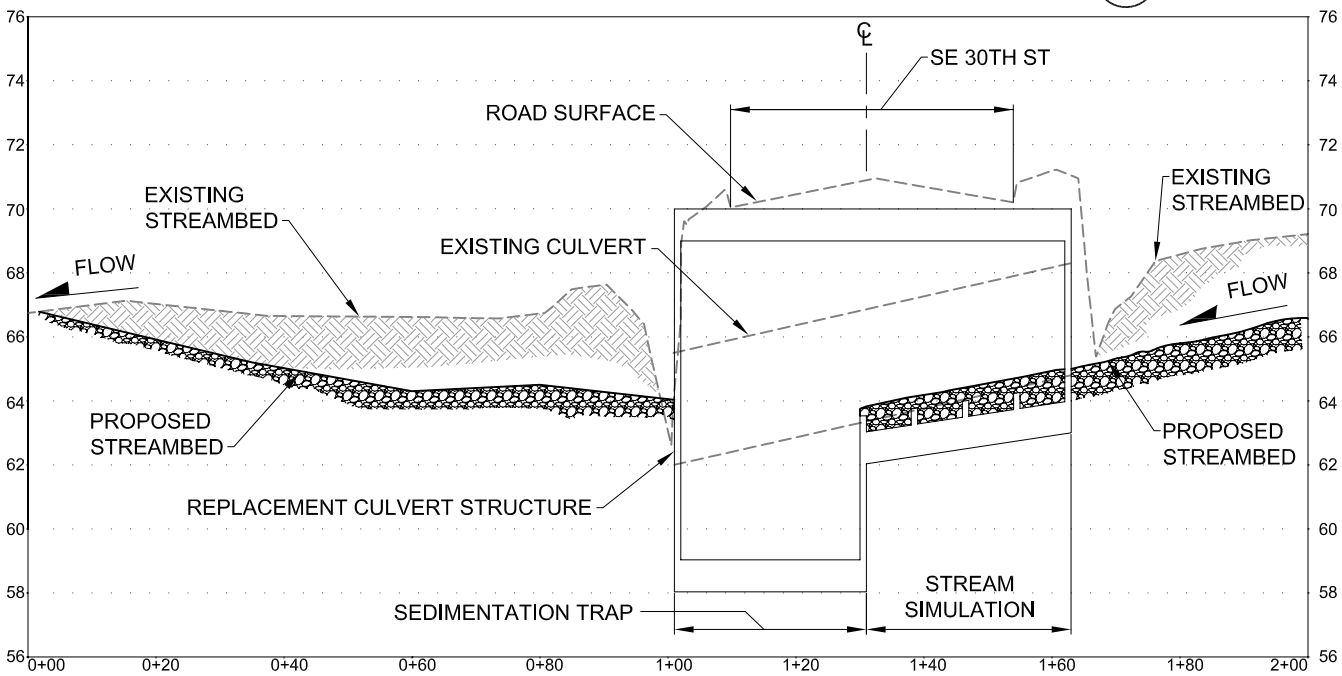

REPLACEMENT CULVERT STRUCTURE PROFILE (B/-)

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2. PRINTED CIRCUITS ASSEMBLY CORP. (PARCEL #5453300291)
3. SHURGARD MINI STORAGE (PARCEL #5453300194)
4. STEAD BUILDING (PARCEL #5453300183)

NOTE:
VERTICAL DATUM NAVD 88

Prepared by: C. BARTON	REPLACEMENT CULVERT STRUCTURE PLAN AND PROFILE VIEW	Applicant: CITY OF BELLEVUE
HERRERA ENVIRONMENTAL CONSULTANTS, 2200 Sixth Avenue, Suite 1100, Seattle, Washington 98121-1820, 206-441-9080, 206-441-9108 FAX, http://www.herrerainc.com	Application for: SE 30th / SUNSET CREEK CULVERT REPLACEMENT	Project Location: BELLEVUE, KING COUNTY, WASHINGTON
	Purpose: FLOW CONVEYANCE	SCALE AS NOTED
Date: JUNE 2008	Waterbody: SUNSET CREEK	SHEET 5 of 9

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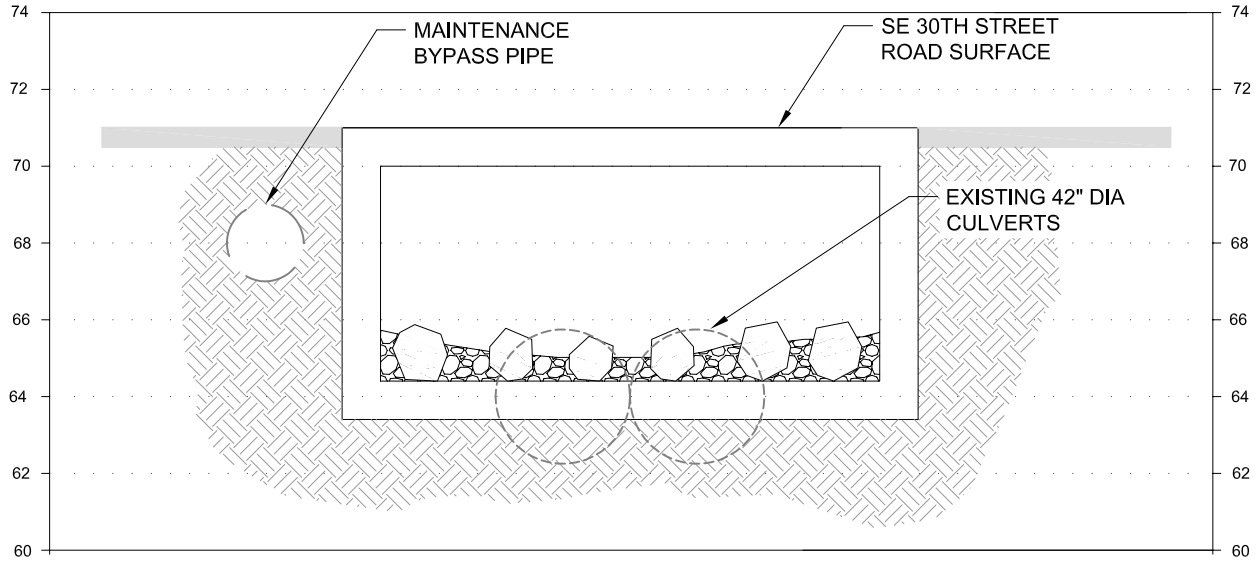

STREAM SIMULATION SECTION (C / 5)

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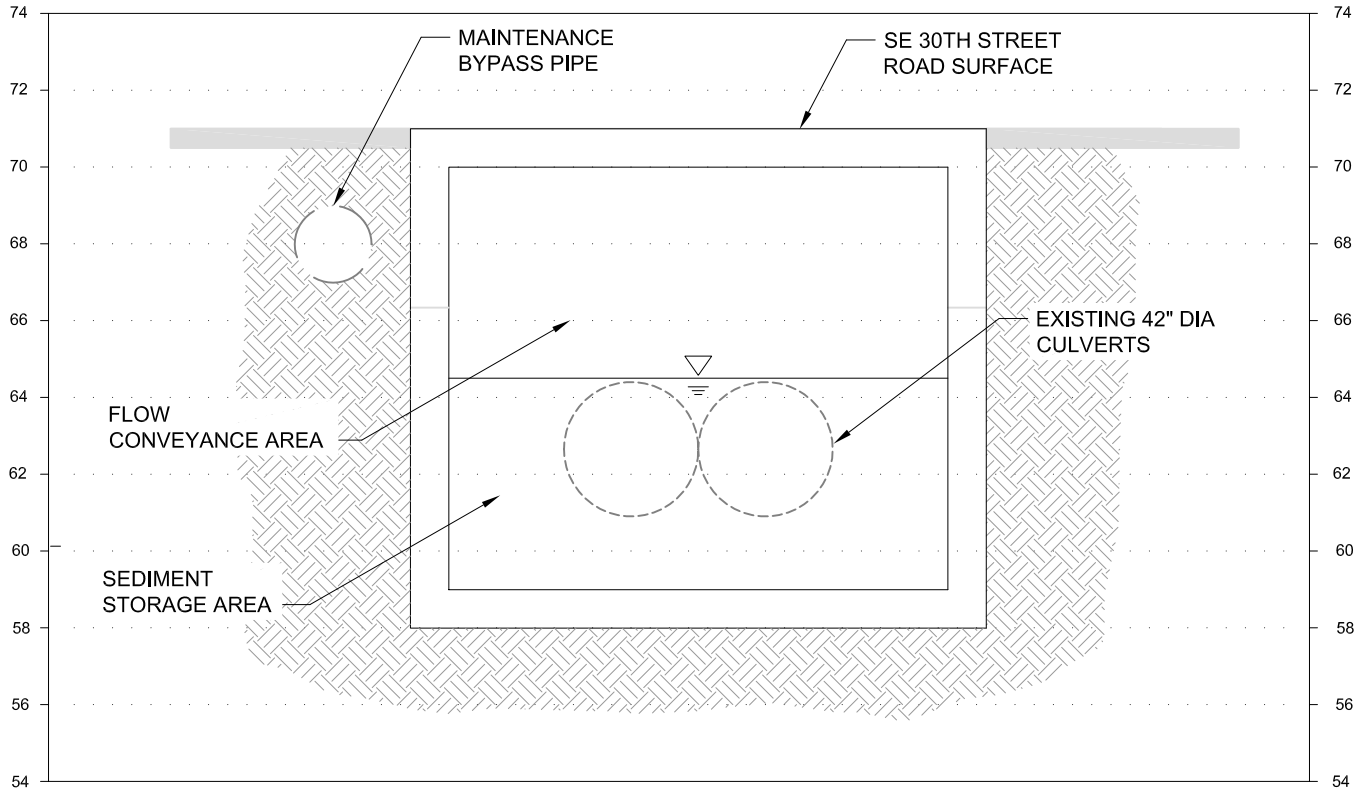

SEDIMENT TRAP SECTION (D / 5)

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NOTE:
VERTICAL DATUM NAVD 88

Prepared by: C. BARTON	REPLACEMENT CULVERT STRUCTURE SECTIONS VIEW	Applicant: CITY OF BELLEVUE
HERRERA ENVIRONMENTAL CONSULTANTS — 2200 Sixth Avenue, Suite 1100, Seattle, Washington 98121-1820; 206-441-9080; 206-441-9108 FAX; http://www.herrerainc.com	Application for: SE 30th / SUNSET CREEK CULVERT REPLACEMENT	Project Location: BELLEVUE, KING COUNTY, WASHINGTON
	Purpose: FLOW CONVEYANCE	SCALE AS NOTED
Date: JUNE 2008	Waterbody: SUNSET CREEK	SHEET 6 of 9

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4 STEAD BUILDING (PARCEL #5453300183)

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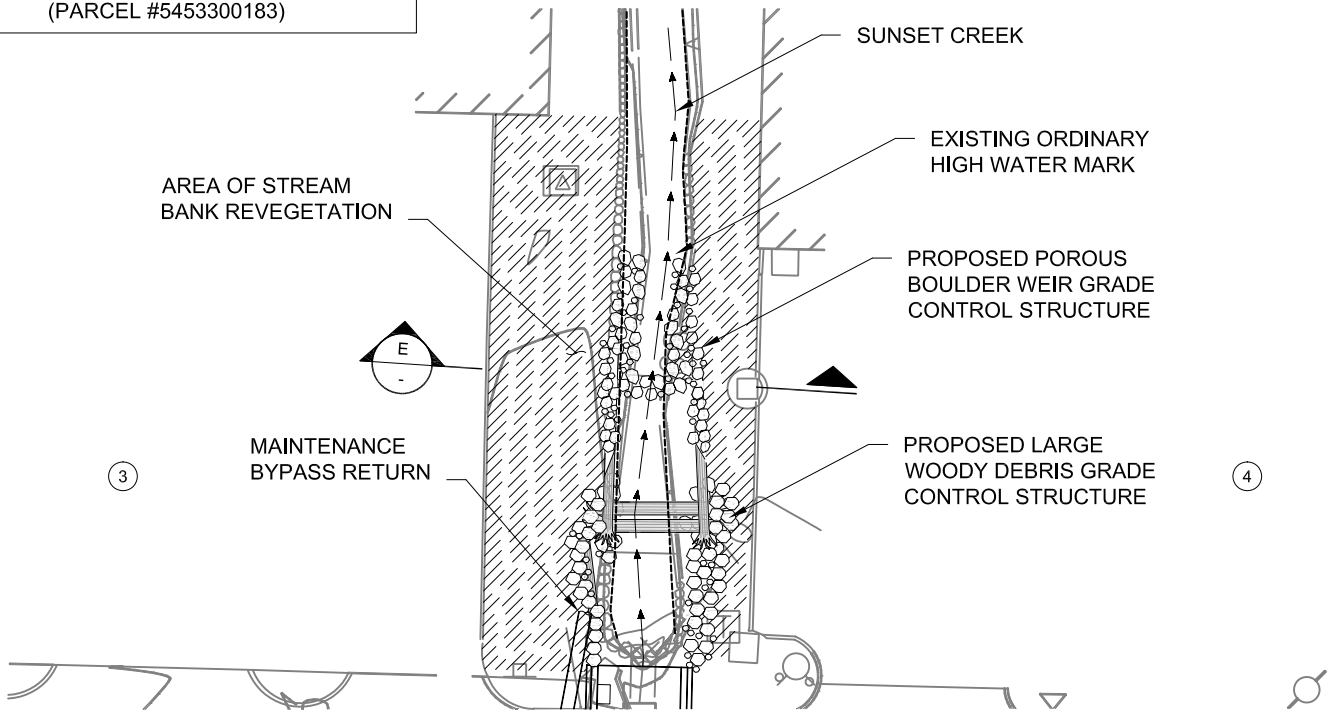

PLAN VIEW - DOWNSTREAM CHANNEL MODIFICATION (- / 2)

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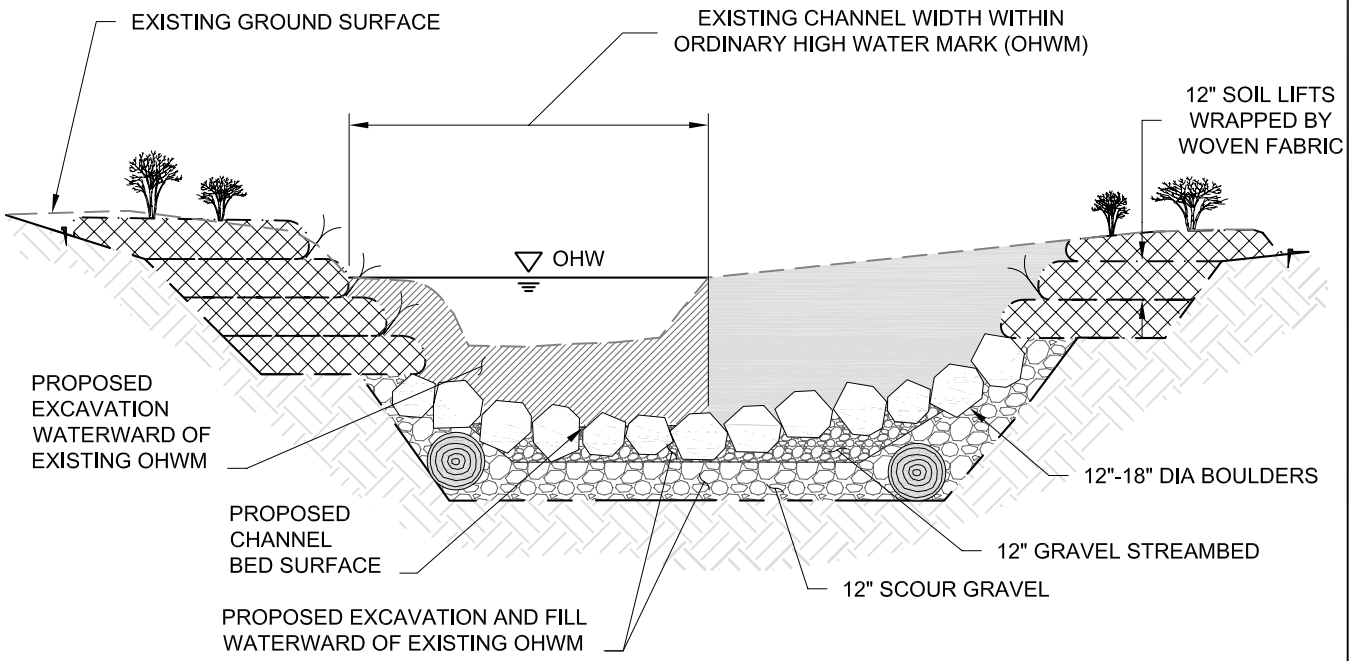

TYPICAL SECTION - DOWNSTREAM CHANNEL MODIFICATION (E / -)

SCALE: 1"=5'

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HERRERA ENVIRONMENTAL CONSULTANTS — 2200 Sixth Avenue, Suite 1100, Seattle, Washington 98121-1820; 206-441-9080; 206-441-9108 FAX; http://www.herrerainc.com	Application for: SE 30th / SUNSET CREEK CULVERT REPLACEMENT	Project Location: BELLEVUE, KING COUNTY, WASHINGTON
	Purpose: FLOW CONVEYANCE	SCALE AS NOTED
Date: JUNE 2008	Waterbody: SUNSET CREEK	SHEET 7 of 9

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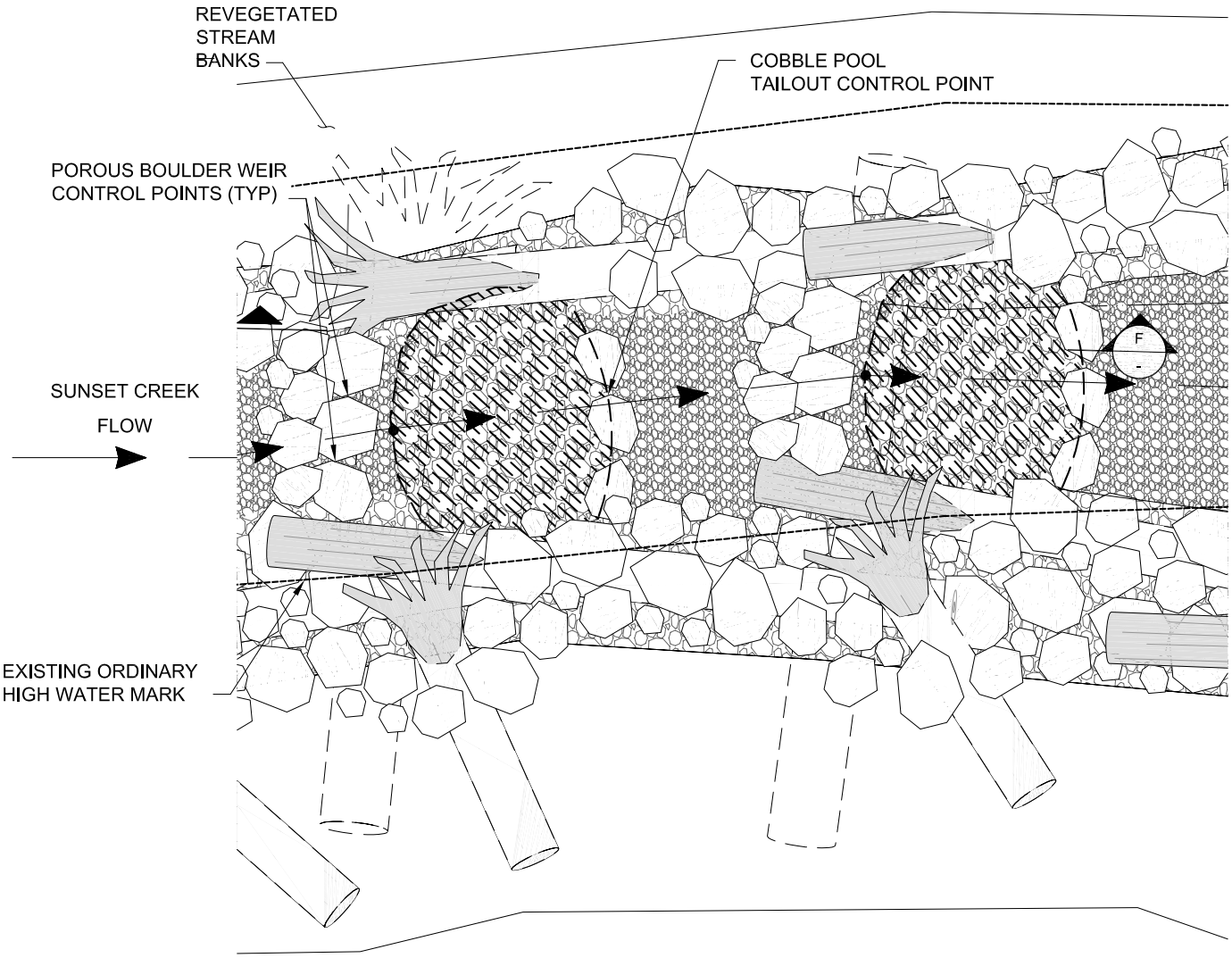

PLAN - TYPICAL UPSTREAM GRADE CONTROL (1 / -)

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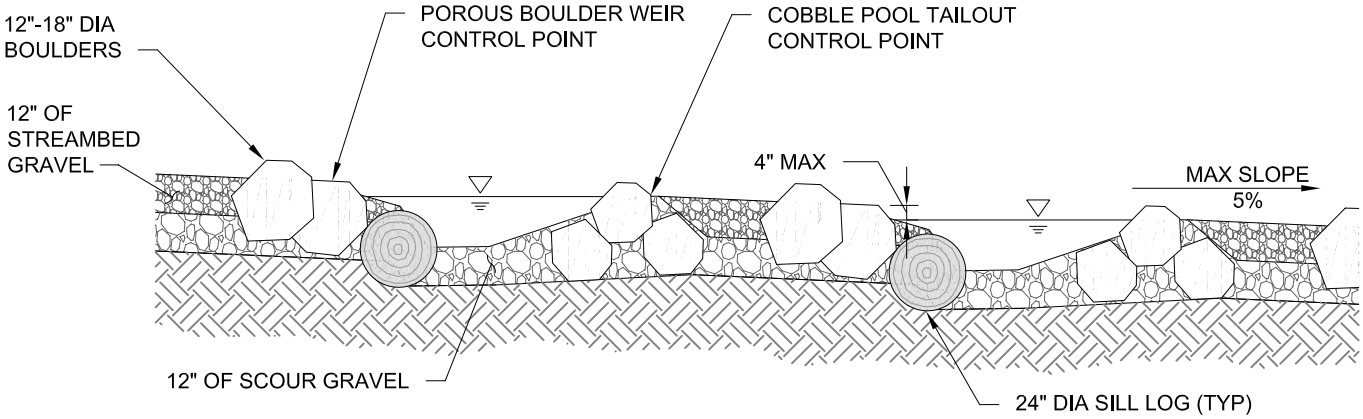

SECTION - TYPICAL UPSTREAM GRADE CONTROL (F / -)

SCALE: 1"=5'

Prepared by: C. BARTON	UPSTREAM GRADE CONTROL DETAILS PLAN AND SECTION	Applicant: CITY OF BELLEVUE
HERRERA ENVIRONMENTAL CONSULTANTS — 2200 Sixth Avenue, Suite 1100, Seattle, Washington 98121-1820; 206-441-9080; 206-441-9108 FAX; http://www.herreralnc.com	Application for: SE 30th / SUNSET CREEK CULVERT REPLACEMENT	Project Location: BELLEVUE, KING COUNTY, WASHINGTON
	Purpose: FLOW CONVEYANCE	SCALE AS NOTED
Date: JUNE 2008	Waterbody: SUNSET CREEK	SHEET 8 of 9

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ADJACENT PROPERTY OWNERS:

3 SHURGARD MINI STORAGE (PARCEL #5453300194)

4 STEAD BUILDING (PARCEL #5453300183)

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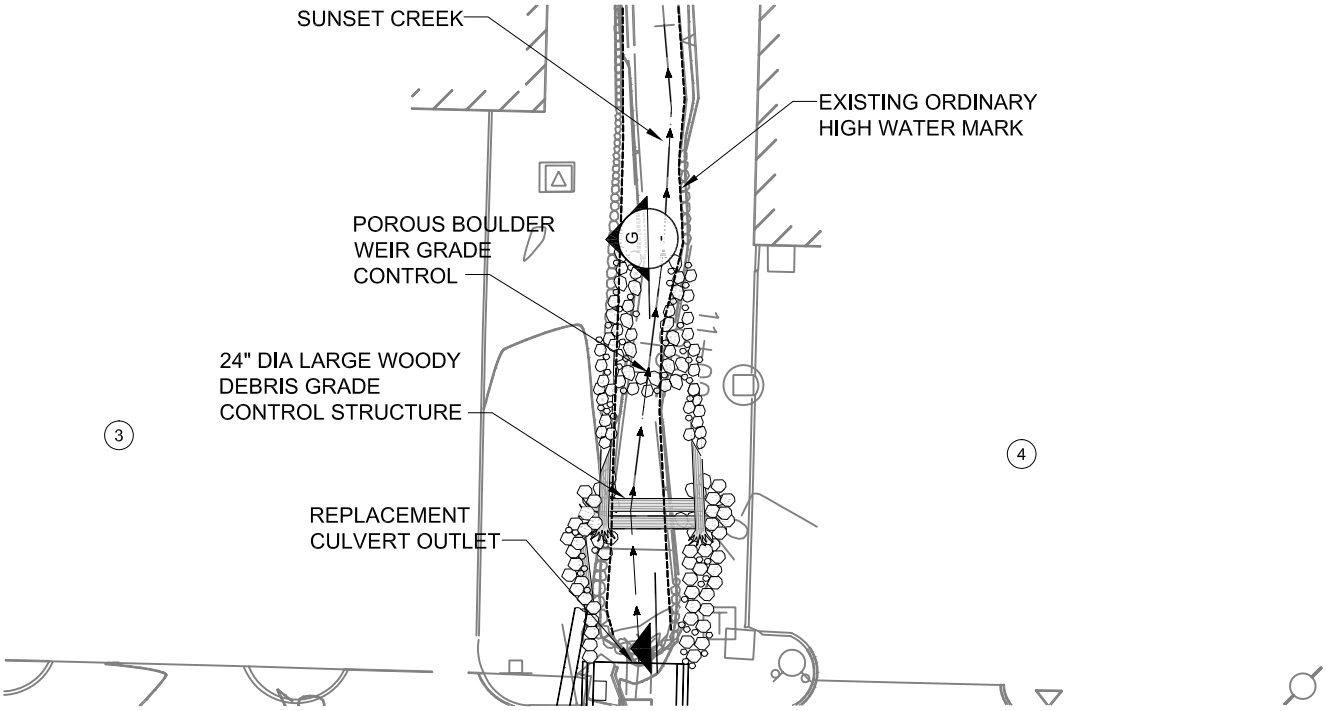
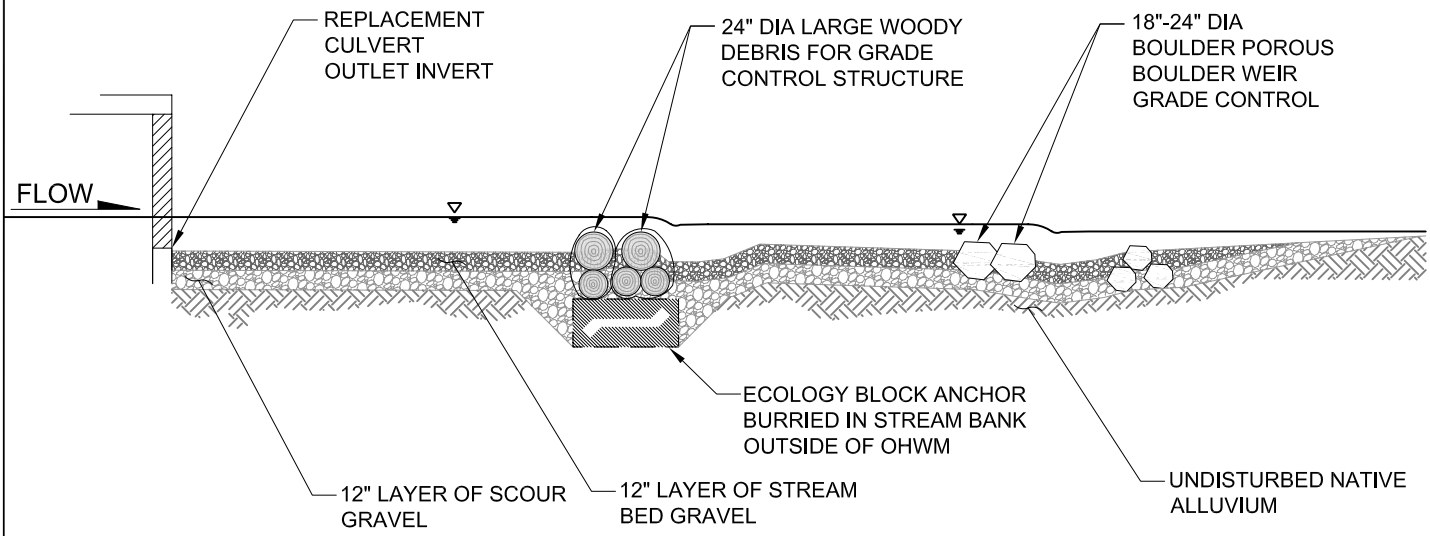


PLAN - DOWNSTREAM GRADE CONTROL STRUCTURES

SCALE: 1"=30'

- / 2



PROFILE - DOWNSTREAM GRADE CONTROL STRUCTURES

SCALE: 1"=10'

G / -

Prepared by: C. BARTON HERRERA ENVIRONMENTAL CONSULTANTS 2200 Sixth Avenue Suite 1100 Seattle, Washington 98121-1820 206-441-9080 206-441-9108 FAX http://www.herreralnc.com	DOWNSTREAM CHANNEL MODIFICATION PLAN AND PROFILE	Applicant: CITY OF BELLEVUE
	Application for: SE 30th / SUNSET CREEK CULVERT REPLACEMENT	Project Location: BELLEVUE, KING COUNTY, WASHINGTON
	Purpose: FLOW CONVEYANCE	SCALE AS NOTED
Date: JUNE 2008	Waterbody: SUNSET CREEK	SHEET 9 of 9

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APPENDIX B

Biological Assessment

BIOLOGICAL ASSESSMENT

SE 30th Street / Sunset Creek Flood Improvement Project

Prepared for

City of Bellevue
Utilities Department

June 2008

BIOLOGICAL ASSESSMENT

SE 30th Street / Sunset Creek Flood Improvement Project

Prepared for

City of Bellevue
Utilities Department
450 110th Avenue NE
P.O. Box 90012
Bellevue Washington 98009

Prepared by

Herrera Environmental Consultants, Inc.
2200 Sixth Avenue, Suite 1100
Seattle, Washington 98121
Telephone: 206/441-9080

June 25, 2008

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Executive Summary

The City of Bellevue proposes to replace the existing twin 42-inch diameter culverts on Sunset Creek at SE 30th Street with a natural-substrate bedded, fish-passable culvert and sediment trap. Related channel work includes the installation of ten rock and log grade control structures (eight upstream and two downstream of the culvert), channel reconfiguration for improved habitat conditions and flood conveyance, and removal and replacement of rip rap bank armoring with bioengineered bank stabilization.

This project is designed to address chronic flooding of Sunset Creek at SE 30th Street and aid control of sediment delivery to the channel downstream of SE 30th Street. Channel aggradation upstream and downstream of the culvert crossing contributes to chronic flooding of SE 30th Street and adjacent businesses, and requires annual dredging within the active channel upstream and downstream of the existing culverts. Dredging causes periodic habitat disturbance in the active channel and contributes to habitat simplification. The proposed project is planned as Phase 1 of a multiple phase Flood Control and Sediment Management Plan for Richards Creek, Sunset Creek, and East Creek that is currently in development. Planning for this combined effort included data collection, modeling, and analysis for a more comprehensive approach to sediment and flooding issues in the basin. While the proposed project addressed in this biological assessment is independent, it is being developed in anticipation of other complementary projects for flood control and sediment remediation in the area. While considered part of this larger effort, Phase 1 has independent utility and is being implemented to address immediate needs. Subsequent phases of this plan have yet to be designed, and if they are developed they will be permitted separately from the proposed action.

The proposed project will require a permit from the U.S. Army Corps of Engineers under Section 404 of the Clean Water Act for placement of fill material in navigable waterways of the United States. This project is being submitted for permitting under Nationwide Permit 3, which provides for the repair, rehabilitation, or replacement of any previously authorized, currently serviceable, structure or fill (including any currently serviceable structure or fill authorized by 33 CFR 330.3). The conditions of this nationwide permit require that the new structure or fill is not intended for uses differing from those specified or contemplated in the original permit or the most recently authorized modification. The proposed project satisfies these conditions.

The project action area is located in the City of Bellevue, in Section 9 and 10 of Township 24 North, Range 5 East, on SE 30th Street located just to the northeast of the Interstate 405 (I-405)/I-90 interchange. The project is located within the Kelsey Creek watershed, part of Water Resource Inventory Area (WRIA) 8. The project will be constructed primarily within City of Bellevue street right of way, with some components located on adjacent private property. The Washington State water resources stream catalog identifies Richards Creek as “South Tributary/Kelsey”, or stream # 08-0261. Sunset Creek is identified as stream # 08-0262.

Two aquatic species listed under the Endangered Species Act (i.e., Puget Sound Chinook salmon [*Oncorhynchus tshawytscha*] and Puget Sound steelhead [*O. mykiss*]) are known to occur in the

general vicinity of the proposed project, and may occur within the project action area. In addition, coho salmon (*O. kisutch*) currently listed as a species of concern, may also occur within the action area. The action area does not contain designated critical habitat for any listed species.

The proposed project will result in both immediate and long-term improvements in aquatic habitat conditions in the action area, and will significantly reduce the frequency of maintenance dredging in the active channel of Sunset Creek. Therefore, the proposed project is not expected to produce any long-term adverse effects on Chinook salmon or steelhead.

These species will be exposed to short-term construction related stressors with the potential to cause adverse effects. The proposed project is considered likely to adversely affect steelhead, because juveniles may be present during construction and could be exposed to disturbance during exclusion area placement, and capture, handling, and relocation related stressors. Both species may be exposed to short-term increases in suspended sediment concentrations, but this effect is not expected to produce stressors beyond the range of natural variability in the system. Therefore, the resulting effects are expected to be insignificant. Chinook salmon will not be present during construction, and will not be exposed to capture and handling related stressors. On this basis, Chinook salmon are not likely to be adversely affected by the proposed project. Effects determinations for the proposed project are summarized in Table E-1.

Table E-1. Summary of effect determinations for ESA-listed species for the SE 30th Street / Sunset Creek Flood Improvement project.

Species	ESA Status	Effect Determination
Chinook Salmon (Puget Sound ESU)	Threatened	May affect, not likely to adversely affect
Steelhead Trout (Puget Sound DPS)	Threatened	May affect, likely to adversely affect

ESU = evolutionarily significant unit
DPS = distinct population segment

Introduction

The City of Bellevue proposes to replace existing twin barrel 42-inch diameter culverts on Sunset Creek at SE 30th Street with an integrated natural-substrate bedded, fish-passable culvert and sediment capture structure. Installation of the new structure will require modification of the stream channel upstream and downstream of the structure. These modifications will include eight grade control structures upstream and two grade control structures downstream of the culvert, riprap removal and replacement with bioengineered bank protection structures, and stream and riparian habitat enhancement over a segment of Sunset Creek extending from approximately 110 feet upstream to approximately 60 feet downstream of the replacement culvert. The culvert replacement project is designed to reduce chronic flooding of Sunset Creek at SE 30th Street and adjacent businesses, and to improve management of sediment aggradation in the channel downstream of the culvert that contributes to chronic flooding. The proposed project is planned as Phase 1 of a multiple-phase Flood Control and Sediment Management Plan for Richards Creek, Sunset Creek, and East Creek that is currently in development. The intent of this effort is to provide a comprehensive solution for sediment management, flooding, and habitat enhancement in the confluence area of these drainages. While considered part of this larger effort, Phase 1 has independent utility and is being implemented separately to address immediate needs.

The project site is located on SE 30th Street in Bellevue, Washington at the Sunset Creek stream crossing, and in the Sunset Creek channel and riparian zone upstream and downstream of the crossing (Figure 1). Flooding and sediment aggradation are recurrent problems at SE 30th Street crossing. Since January 1, 2005, Sunset Creek has flooded at SE 30th Street at least six times. This flooding has impacted local businesses, restricted neighborhood access, and has resulting in negative impacts on water quality in Sunset Creek. Persistent sediment aggradation in the Sunset Creek aggravates the conditions that lead to flooding. Removal of sediment from the Sunset Creek channel immediately upstream and downstream of the twin culverts beneath SE 30th Street has been required annually to maintain the culvert hydraulic opening and flow capacity, yet this effort alone does not prevent flooding.

The proposed project will require a permit from the U.S. Army Corps of Engineers under Section 404 of the Clean Water Act for placement of fill material in navigable waterways of the United States. This project is being submitted for permitting under Section 404 Nationwide Permit 3, which provides for the repair, rehabilitation, or replacement of any previously authorized, currently serviceable, structure or fill (including any currently serviceable structure or fill authorized by 33 CFR 330.3). The conditions of this nationwide permit require that the new structure or fill is not intended for uses differing from those specified or contemplated in the original permit or the most recently authorized modification. The proposed project satisfies these conditions.

The potential for activities conducted under this permit to affect species listed or proposed for listing under the Endangered Species Act (ESA) constitutes a federal nexus, requiring conferencing and/or consultation as defined under Section 7(c) of the act. This biological assessment was prepared for the City of Bellevue in accordance with these requirements.

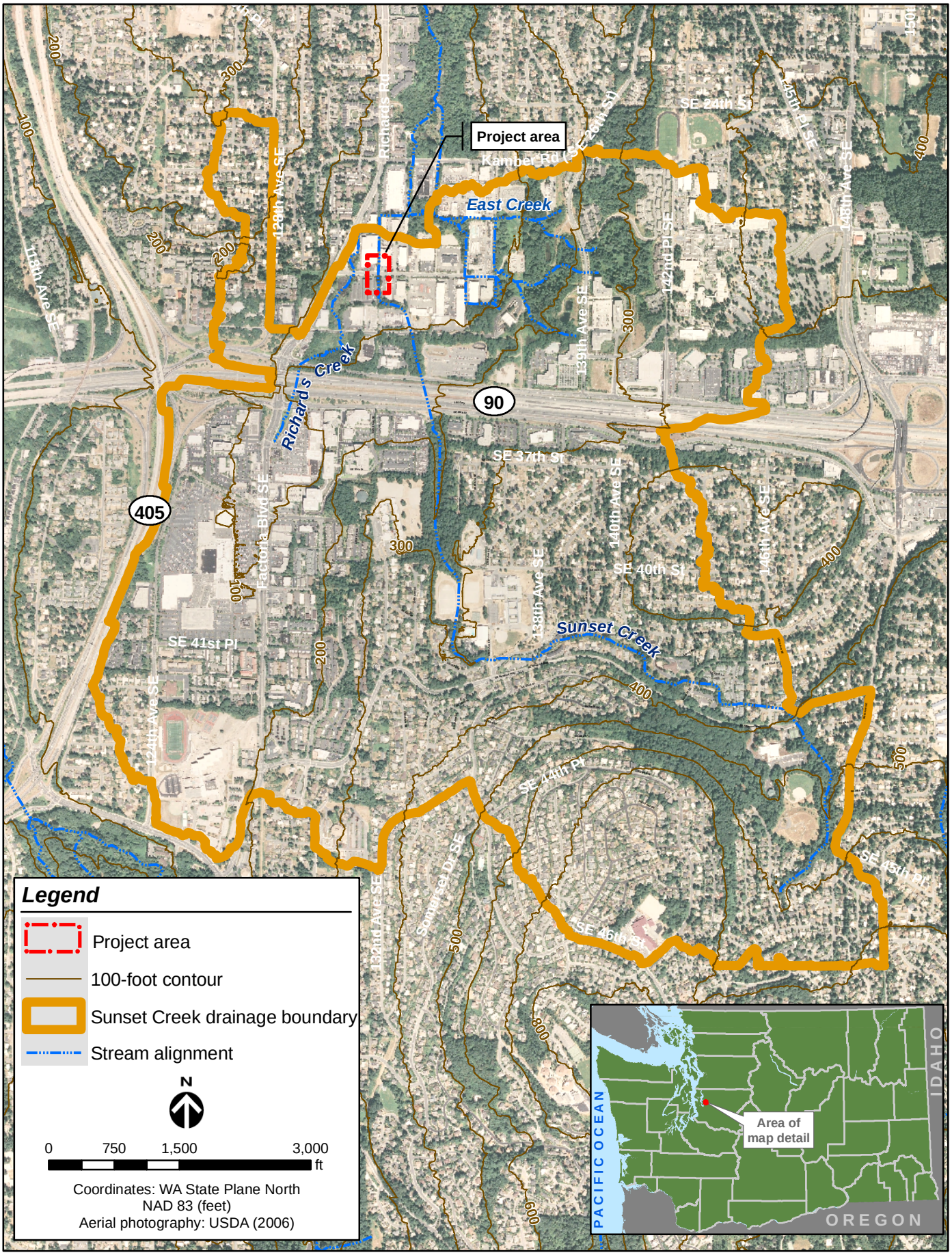

Figure 1. SE 30th Street/Sunset Creek Flood Improvement project vicinity.

Project Vicinity

The proposed project will be implemented within the Lake Washington/Cedar/Sammamish Watershed Water Resource Inventory Area (WRIA) 8. This watershed is located within the U.S. Geological Survey's sixth field hydrologic cataloging unit number 17110012. A map of the project vicinity is shown in Figure 1.

Project Location

The project area is located in the City of Bellevue, east of the I-405/I-90 interchange, in Section 9 and 10 of Township 24 North, Range 5 East. The site lies in the Kelsey Creek watershed, part of WRIA 8. The City of Bellevue has defined 26 "storm drainage" basins that further subdivide drainage areas within WRIA 8. The proposed project is located within a tributary watershed, the Sunset Creek drainage (City of Bellevue 2007). The Washington State water resources stream catalog identifies Richards Creek as "South Tributary/Kelsey", or stream # 08-0261. Sunset Creek is identified as stream # 08-0262 (Williams et al. 1975).

The project site overlaps City of Bellevue owned right of way on SE 30th Street and adjacent private property on the north and south sides of the street.

Project Setting and Land Use

The Kelsey Creek watershed contains more than 19 miles of streams including Mercer Slough, Sturtevant Creek, Kelsey Creek, Valley Creek, West Tributary, Goff Creek, Richards Creek, East Creek, and Sunset Creek (WSDOT 2004). These streams drain in a westerly direction before entering the East Channel of Lake Washington at I-90. The northern headwaters of Kelsey Creek originate in Valley Creek at an elevation of approximately 300 feet above mean sea level, draining an area north of State Highway 520. The southern headwaters are located in the steep Sunset Creek tributary at about 700 feet above mean sea level on the northern slopes of Cougar Mountain (Kerwin 2001). Land use in the Kelsey Creek watershed is predominantly single-family residential, particularly in the Sunset Creek, Valley Creek, and Goff Creek storm drainage basins (City of Bellevue 2007). The basin area is approximately 10,870 acres with the following land use: single family residential (37 percent), open space (22 percent), multifamily residential (13 percent), public roads (13 percent), commercial/office (8 percent), institutional/government (7 percent), industrial (less than 1 percent), and mixed use/other (2 percent). The Sunset Creek and Richards Creek drainages encompass approximately 890 acres and 910 acres, respectively (City of Bellevue 2007). The total impervious area in the Sunset Creek drainage is approximately 44 percent (Kerwin 2001).

The project area lies in the lowermost reach of the Sunset Creek drainage near its confluence with Richards Creek. Changes in land use and development have impacted channel conditions in these drainages for over half a century. By 1944 much of the upper Sunset Creek drainage had

been deforested and by 1960 most of this watershed was occupied by single family developments. By 1999 changes in land use had so significantly modified ground cover that the effective impervious area of the Sunset Creek drainage was estimated at 30 percent (Entranco 1999). Land use in the project vicinity is predominantly commercial and light industrial.

The project improvements are proposed to occur within existing city street right-of-way and adjacent privately owned parcels. The culvert replacement site is located within the right-of-way of SE 30th Street along the same alignment as the existing twin 42-inch diameter culverts. Upstream channel modifications are to occur primarily within an existing city right-of-way for 132nd Avenue SE, which was never constructed in this location. Some channel modification, site access and revegetation activities associated with upstream channel modifications may also occur on private parcels (tax parcel numbers 5453300244 and 5453300291). Downstream channel modifications are proposed on private parcels (tax parcel numbers 5453300194 and 5453300183). The taxpayers, property name, property type and present use of the private parcels associated with the proposed project activities are presented in Table 1.

Table 1. Property characteristics for private parcels associated with proposed project activities.

Tax Parcel No.	Taxpayer	Property Name	Property Type	Present Use
5453300244	SCC Property Holdings	Shurgard Mini Storage	Commercial	Mini Warehouse
5453300291	SLC Investment LLC	Printed Circuits Assembly Corp.	Commercial	Industrial Park
5453300194	Emmett S. Harrington	Shurgard Mini Storage	Commercial	Mini Warehouse
5453300183	Stead Building Partnership	Stead Building	Commercial	Warehouse

Geologic and Soil Conditions

Glacial outwash deposits cover 34 percent of the Kelsey Creek watershed. Impervious surfaces now cover 45 percent of these important groundwater recharge areas (WSDOT 2004). According to U.S. Department of Agriculture, Natural Resource and Conservation Service (NRCS) (formerly the Soil Conservation Service) 1972 Soils Maps, glacial deposits (Alderwood gravelly sandy loam) predominate, with large inclusions of mucky peat (Seattle muck), up to 20 feet in depth, dominating the Phantom/Larsen Lake regions (Kerwin 2001).

The surficial geology of the Sunset Creek drainage consists primarily of glacial deposits resulting from the most recent glacial period in the Puget Lowland. This period is known as the Vashon stade of the Fraser glaciation and occurred between 17,000 and 13,500 years ago (Booth 1987). The glacial units exposed in the Sunset Creek drainage include glacial till (Vashon Till) and outwash. In addition to the glacial units, outcrops the Blakely Formation are found in the upper watershed, consisting primarily of medium to coarse grained sandstone. Thin, recent deposits of colluvium (sediment deposits associated with hillslope processes) and alluvium (sediment deposits associated with streamflows) are also present locally throughout the basin.

The characteristics of the geologic units found within the Sunset Creek drainage influence the hillslope and fluvial processes that occur within and adjacent to the channel network. Glacial till and glacial outwash are the two predominant geologic units in the drainage. The glacial till in the Sunset Creek drainage is a poorly sorted mixture of sand, silt, gravel, and clay, with occasional cobbles and boulders. It is very dense and relatively impermeable. Glacial till, like the outwash soils, is overconsolidated as a result of being overridden by up to 3,000 feet of glacial ice (Thorson 1989). As a result of the overconsolidation and its density, glacial till can sustain near vertical outcroppings, with local exposures reaching heights of 40 feet. Glacial outwash in the Sunset Creek drainage consists primarily of sand and gravel with some cobbles. Because it contains less fine grained sediment than glacial till, outwash is not as dense or resistant to erosion. Sediment from these glacial units comprises the majority of material that ultimately becomes entrained in Sunset Creek streamflows and transported downstream to the project area.

Vegetation and Wetlands

Prior to European settlement, wetlands within the Kelsey Creek watershed covered approximately 1,330 acres. Wetlands that are currently present on the landscape cover 820 acres. Of these wetlands, 395 acres are "properly functioning" and 425 acres have degraded functions caused by some degree of hydrologic and/or vegetative alteration (WSDOT 2004). Urban development has encroached upon most riparian corridors in this watershed, but there are still significant forested riparian areas. The riparian zone remains 49 percent forested (705 total forested riparian acres), though road crossings have disconnected many of these areas (WSDOT 2004).

Riparian conditions in the project area have been extensively modified. Vegetation is currently limited to a narrow strip ranging from 0 to approximately 30 feet in width on either side of the Sunset Creek channel, with encroachment by buildings and paved parking lots. This vegetation is composed of native tree species including black cottonwood (*Populus trichocarpa*), Douglas fir (*Pseudotsuga menziesii*), Pacific willow (*Salix lucida*), and bigleaf maple (*Acer macrophyllum*), and ornamental and invasive trees, shrubs, and grasses including English ivy (*Hedera helix*), reed canary grass (*Phalaris arundinacea*), and Japanese knotweed (*Polygonum cuspidatum*).

The project area is located in what was historically an extensive alluvial fan wetland. Much of the wetland habitat in the vicinity has been hydromodified or eliminated by fill. While some remaining fragmented wetlands still remain in the vicinity, the project area contains no existing wetland habitat.

Photographic documentation of riparian vegetation conditions in the project vicinity are provided in Appendix A.

Hydraulic and Geomorphic Characteristics

The project area at SE 30th Street is located at what would naturally be an alluvial fan at a significant break in grade between the upper watershed and the lower gradient channels downstream of Kamber Road (SE 26th Street) to the confluence of Richards Creek with Kelsey Creek. The break in grade causes a significant decline in sediment transport capacity within the project area. Before development, stream channels within the project area would have naturally aggraded and shifted location across the alluvial fan to occupy the course of least resistance. In the early 1970s the Sunset Creek and Richards Creek stream channels were relocated from their natural position at the time to alignments along property boundaries for development purposes. This halted the historical process of channel migration and restricted the limits of stream-borne sediment deposition to these established channel corridors. Ongoing sediment deposition within these corridors now contributes to recurrent flooding.

Sunset Creek flows through residential neighborhoods and the commercialized I-90 corridor before entering the project area where it joins Richards Creek. The gradients in Sunset Creek range from 2 percent to 7.5 percent, with the highest gradients located in the middle reaches. Four major culverts with a combined length of over 2,000 feet limit fish passage. Overall, Sunset Creek exhibits a moderate amount of channel and flow modification with over 20 percent of the stream contained in culverts (City of Bellevue 2007). The lowermost reach within the project area is entirely channelized with extensive riprap bank armoring and little functional large woody debris (LWD).

Upstream of SE 30th Street the average Sunset Creek channel gradient is approximately 2.5 percent. The predominantly cobble-bedded channel is confined by constructed banks armored with riprap and installed LWD features. A short segment of the channel immediately upstream of SE 30th Street coarse cobble and gravel substrate that has aggraded due to backwater conditions induced by the culvert. This channel segment approaches 10 percent gradient, creating velocity and turbulence conditions through the SE 30th Street culvert inlet that impede upstream fish passage. This likely presents a passage barrier under high flow conditions limiting upstream migration of both adult and juvenile salmonids.

The segment of Sunset Creek between SE 30th Street and the confluence with Richards Creek downstream is predominantly gravel bedded and confined within rockery walls. The channel is straight with a gradient averaging 1.4 percent and a typical top width of approximately 12 feet. Historical and recent channel survey data indicate that the bed elevation of Sunset Creek and Richards Creeks has aggraded between 3 and 4.5 feet over the last 30 years along 1,000 feet of channel length downstream of SE 30th Street. The straight, plane-bed channel pattern provides little hydraulic or habitat complexity. During low flow conditions, the wide, shallow channel presents a barrier to fish passage. This passage barrier is likely to be particularly problematic for passage of adult Chinook salmon, as maximum depths through this segment are typically less than six inches under baseflow conditions during their migratory period in August and September. High flow channels in the confined floodplain run adjacent to building foundations

in numerous locations. Mixed-age deciduous vegetation in the narrow riparian corridor provides moderate cover but little potential for the recruitment of large woody debris.

It is estimated that an average of approximately 40 cubic yards of gravel (with some sand) have accumulated annually in this reach of Sunset and Richards Creeks over the last 30 years. It is likely that peak rates of sediment delivery to the SE 30th Street culverts and the channel network downstream occurred soon after widespread development in the basin, and before efforts to reduce sediment production and transport from the upper basin. However, ongoing sedimentation in the twin culverts beneath SE 30th Street and in the stream channel downstream requires regular dredging activity to maintain culvert hydraulic openings and provide flow conveyance. Records of recent maintenance dredging completed by the City of Bellevue show that between 10 and 22 cubic yards of sediment have been removed annually between 2004 and 2007 (Table 2). The volume of accumulated and dredged sediment represents a reasonable estimate of the bedload sediment volume that is delivered annually to Sunset Creek at and below SE 30th Street. Because bedload sediment is thought to generally constitute approximately 5 to 20 percent of the total sediment transported through the channel network, the total sediment in transport past SE 30th Street, including suspended sediment in storm flows, is likely an order of magnitude higher than the amounts recently dredged (Dietrich and Dunne 1978; Hicks and Gomez 2003). An observed sedimentation rate of 200 cubic yards of sand per year at Kamber Road between November 2005 and April 2007 supports this assertion.

Table 2. Records of recent maintenance dredging in Sunset Creek at SE 30th Street.

Year of Dredging	Volume of Sediment Removed Downstream of SE 30th Street Culverts (cubic yards)	Volume of Sediment Removed Upstream of SE 30th Street Culverts (cubic yards))
2004	15-20	--[a]
2005	20	1.5
2006	10	0.75
2007	15-20	--[a]

Notes:
--[a] volume of sediment removal upstream of culverts not reported.

The City of Bellevue has undertaken significant capitol improvement projects costing millions of dollars to address sediment production and downstream transport from the most unstable reaches in the upper watershed, particularly from the ravine reach directly upstream of I-90 where numerous historical and active landslides continue to deliver sediment to the channel. These projects have included installing bank protection and channel bed grade control structures and a flow bypass system that reroutes the majority of flood flows past the ravine reach. It is likely that these efforts have reduced the rate of sediment delivery to the project reach. Despite these efforts, the level of sediment delivery to the project area continues to exacerbate flooding conditions.

Flooding of properties surrounding the project area is a significant concern and a primary driver for the proposed project. The existing twin culverts beneath SE 30th Street are compromised by

sediment aggradation and lack the hydraulic capacity to convey the flood flows of this urbanized drainage. Sunset Creek has overtopped SE 30th Street during storm flow conditions six times since November 2005, causing damage to adjacent commercial properties and interfering with normal roadway operations.

Photographic documentation of sediment accumulation upstream and downstream of the SE 30th Street culvert and a typical flooding event is provided in Appendix A.

Project Description

The proposed project involves replacing the existing twin 42-inch diameter culverts on Sunset Creek at SE 30th Street with a natural-substrate bedded, fish-passable culvert and an integrated sediment capture structure. The purpose of the intended structure is twofold:

1. To provide the capacity necessary to convey storm flows up to the 100-year recurrence interval event

2. To capture the stream channel bedload sediment within an integrated sediment trap, allowing for sediment removal to be conducted from atop the roadway rather than via equipment working in the open stream channel.

Improving flow capacity is necessary to address chronic flooding of SE 30th Street and surrounding private property. The integrated sediment trap will allow for improved management of sediment which naturally aggrades at this site. Currently, approximately 20 cubic yards of sediment ranging from sand to cobble size in diameter is dredged from the channel downstream of SE 30th Street annually. Incorporating a sediment trap into the footprint of the existing structure will limit the need to dredge the active channel, reducing adverse effects on aquatic species and habitats, and allowing for adaptive management of sediment supply and transport conditions within and downstream of the project area.

A description of the proposed replacement culvert and related channel modifications is provided in the following sections. This discussion is supported by design drawings for the proposed project, which are provided in Appendix B.

Description of the Replacement Culvert

The proposed replacement culvert has an upstream opening that is 13 feet wide and approximately 4.5 feet in height, for a total invert area of 58.5 square feet. The invert area of the existing twin-barrel 42-inch corrugated metal pipe (CMP) culverts is 19.2 square feet in the design condition (i.e., when not plugged with sediment). The new structure will be 60 feet in length, which is approximately 4 feet shorter than the existing culverts. The upstream half of the replacement culvert structure has been designed following the streambed simulation option defined in Washington Department of Fish and Wildlife (WDFW) culvert design guidance (Bates et al. 2003). The downstream half of the structure has been designed to function as a sediment trap with sediment storage capacity of approximately 50 cubic yards. The sediment trap component will be backwatered by a grade control structure located in the stream channel approximately 20 feet downstream of the culvert structure. Consistent with the WDFW guidance, the structure is designed to provide passage for all fish species over all life history stages and flow conditions during which migratory or dispersal behavior is likely to occur (Bates et al. 2003).

Streambed simulation is referred to as a "geomorphic design" that provides for relatively unimpeded transport of sediment, woody debris, and organic material, as well as flood conveyance. Because the structure is designed to support natural channel bed conditions, it provides for unimpeded passage of fish and other aquatic organisms. Exceptions to this include flood and debris conveyance at flow exceeding the 25-year recurrence interval. At flows of this magnitude and greater, hydraulic modeling predicts that flows will begin to backwater against the structure entrance and there will no longer be a free surface on the flow through the culvert structure. This may result in impediments to debris conveyance during these high magnitude flow events.

The culvert design requires some modification of the channel upstream and downstream of the structure. These modifications include the installation of 10 grade control structures (eight upstream and two downstream of the replacement culvert) composed primarily of LWD and rounded river boulders, riprap removal, and riparian habitat enhancements. Riprap removal and riparian enhancement will extend from approximately 100 feet upstream to 100 feet downstream of SE 30th Street.

Operation of the proposed project will involve extraction of sediments from the sediment trap on an annual basis, or less often depending on future rates of sediment accumulation. The structure has been designed to facilitate this process by providing a set of hatches that can be used to access the trap from the street surface, and an integrated fish exclusion and flow bypass system. Because the sediment delivery rate is naturally variable and the capture and removal of sediments from the system is likely to affect geomorphic responses and habitat conditions in downstream reaches, the proposed project includes post-construction monitoring and an adaptive management strategy. This strategy will be used to monitor channel responses and adjust management of the sediment trap as necessary to maintain desirable habitat conditions.

A 24-inch diameter maintenance flow bypass culvert will be installed west of and parallel to the main structure and will be used to route the streamflow around the sediment trap during sediment removal activities. The bypass intake will be located at the downstream end of the streambed simulation half of the structure. The maintenance flow bypass will discharge downstream of the main structure outlet to an energy dissipater constructed of logs and boulders built into the left bank of the stream channel.

Project Construction – Elements and Sequencing

The project is scheduled to be completed in the summer of 2008. All in-stream work will be conducted during the in-water work window established by the WDFW (July 1 to August 31). All in-stream work is expected to be conducted during one in-water work window. A total of 50 to 70 working days are estimated to be needed to complete construction. Up to 10 additional days may be needed for mobilization and set up of temporary erosion and sediment control measures.

The project consists of the following elements (exact sequencing may vary and some elements will occur concurrently):

1. Site preparation and staging
2. Preliminary excavation of roadway
3. Install temporary flow bypass, fish removal and relocation, dewater construction area
4. Remove and replace existing culverts
5. Riprap removal
6. Channel grading, excavation, and excess sediment removal
7. Install grade control structures and bank protection
8. Revegetate stream banks
9. Reintroduce flow to channel
10. Construct maintenance bypass culvert.

Each of these elements is described in more detail in the following sections.

Site Preparation and Staging

Site preparation activities include the contractor mobilizing to the project site, developing a staging area, establishing site access routes and traffic control, marking the work and clearing limits, and installing temporary erosion and sediment control (TESC) best management practices (BMPs). Space at the project site is limited and it is anticipated that the contractor will establish staging in the parking lot of a nearby business. A staging area of approximately 10,000 square feet is anticipated to be sufficient for the proposed project activities. The staging area currently under evaluation by the City of Bellevue is shown on Figure 2.

Access to the project area will occur via SE 30th Street, and parking lots adjacent to the stream channel on private property to the north and south of the street. The street will be partially closed throughout much of the construction period, with one lane remaining open while construction activities take place in the opposite lane.

Vegetation removal will be limited to areas necessary to regrade the stream bank and provide access to the channel as necessary to install grade control structures and remove riprap upstream and downstream of the culvert. The majority of riparian vegetation that will be affected consists of invasive and non-native ornamental species such as English ivy (*Hedera helix*) and reed canary grass (*Phalaris arundinacea*). A total of approximately 0.16 acres (6,800 square feet) will be affected. The estimated clearing limits are shown on Drawing C-10 (Appendix B).

Figure 2. SE 30th Steet/Sunset Creek Flood Improvement project area.

Roadway Excavation

The existing roadway and fill material will need to be excavated to provide access to the existing culvert barrels. The overlying asphalt, concrete, and earthen fill will be removed using a jackhammer and an excavator. The excavated material will be transported to a permitted commercial disposal facility by heavy truck.

The total area of roadway surface to be removed and replaced will total approximately 1,625 square feet, not including the adjacent sidewalk on the south side of the street. Total excavation volumes associated with this aspect of the proposed project are shown in Table 3. The amount of material that will be removed and placed below the ordinary high water mark (OHWM) is summarized in Table 4. Except for excavated backfill, all fill material used in this project will be imported. All excavated material not suitable for reuse will be disposed of at a permitted commercial site. The limits of roadway excavation and paving are shown on Drawing C-5 (Appendix B).

Table 3. Total excavation and fill quantities for the SE 30th Street/Sunset Creek Flood Improvement project.

Construction Activity	Material Type	Total Volume (cubic yards)	Total Volume within OHWM (cubic yards)
Excavation			
Culvert removal	Asphalt road surface	20	-
	Earth and Fill	450	-
	Concrete	2	-
Channel Grading	Stream substrate	220	200
	Bank material	160	-
Riprap Removal	Riprap	56	56
Fill			
Culvert replacement	Asphalt road surface	11	-
	Earth and Rock	120	-
	Concrete	145	45[a]
Channel back fill	Stream substrate	82	82
	Bank material	120	-
Grade control and bank protection structures	Structural logs	143	22
	Boulders	67	23

[a] Includes bottom surface and submerged walls of the replacement culvert and sediment trap structure.

Table 4. Sediment removal and fill quantities within the ordinary high water mark.

Impact	Upstream of Culvert	Downstream of Culvert
Volume of excavation below existing OHWM (cy)	104	96
Volume of fill below existing OHWM (cy)	43	39
Area of fill below existing OHWM (acre)	0.02	0.02

Some materials (e.g., riprap, washed gravels) may be retained by the City of Bellevue property for use in future projects. Once the roadway has been excavated, temporary metal plates will be installed over the active traffic lane during construction to maintain access to area business.

Install Bypass, Fish Removal and Relocation, Construction Site Dewatering

Construction work below the OHWM will be required for removal and installation of the new culvert at SE 30th Street, requiring dewatering of the work area. Once excavation of the bypass pipe trench is complete, a temporary flow bypass pipe will be installed adjacent to the existing culvert. This activity will proceed as described below.

Two coffer dams and a gravity fed bypass pipe will be used to create the dewatered exclusion area. The first dam will be constructed approximately 250 feet upstream of SE 30th Street and stream flow will be routed into a pipe to be secured to the west side of the channel. The dam will backwater flows into the gravity fed bypass pipe. The second dam will be constructed approximately 150 feet downstream of SE 30th Street. Both coffer dams will be constructed using sandbags and plastic barrier sheeting installed manually. The bypass pipe will be 36 inches in diameter and capable of conveying flows up to 95 cubic feet per second (cfs). This bypass conveyance capacity exceeds the 2-year recurrence interval flow in Sunset Creek (79 cfs). The temporary bypass pipe will be routed through SE 30th Street in a trench constructed next to the culvert work area. The pipe will discharge to a temporary energy dissipater downstream of the coffer dam.

Concurrent with the installation of the bypass and dewatering of the channel, all fish and amphibians within the exclusion area will be captured and removed. Dewatering and fish relocation will be conducted following an accepted protocol developed for this activity by the Washington State Department of Transportation (WSDOT) (see Appendix C). The site will be allowed to drain to the limits of passive dewatering to facilitate fish removal. The remaining water within the exclusion area will either be pumped to the sanitary sewer system, or will be filtered using appropriate BMPs prior to return to the stream channel (see the *Best Management Practices* section of this report for further discussion).

To reduce the number of fish potentially affected by this activity, dewatering and fish relocation will be conducted as close to July 1 (the beginning of the in-water work window) as possible. The channel will remain dewatered and inaccessible to fish until construction is complete. Dewatering is expected to require capture and handling of fish, and relocation to downstream habitats below the project area.

The bypass pipe will be screened at the upstream end to prevent fish and other organisms from being entrained. The screening net will be situated for low pass-through velocity to avoid risk of impingement. The pipe is not expected to be passable to upstream movement, meaning the exclusion area will impose a partial barrier to fish passage during the estimated 50 day in-water construction period. The coffer dams, bypass pipe, energy dissipater, and all related materials will be completely removed from the site when the project is completed. Removal of the coffer

dam and fish exclusion features and rewatering of the channel will proceed consistent with WSDOT standard practices (Appendix C).

Culvert Removal and Replacement

The existing twin 42-inch diameter CMP culverts on Sunset Creek at SE 30th Street will be removed and replaced with the natural-substrate bedded, fish-passable culvert and sediment trap structure described in the introduction to this section.

Removal of the existing twin 42-inch diameter corrugated metal pipe culverts and installation of the replacement culvert structure will require additional excavation in the SE 30th Street corridor. These activities will be conducted using an excavator or similar construction equipment appropriate for the site conditions. Excavation, culvert removal, and replacement will require traffic control, as only one lane of SE 30th Street will typically be closed at any given time. All excavated material will be hauled from the project site to a licensed disposal or material reuse facility, or stockpiled onsite for use as backfill following installation of the replacement culvert structure. The replacement culvert structure will be installed in approximately the same location as the existing culverts. The replacement culvert will be constructed using precast concrete structures. All replacement culvert construction activities will be constructed "in the dry" to minimize water quality impacts. Construction of the replacement culvert will be coordinated with utility relocation in the SE 30th Street right-of-way. Drawings C-7 through C-9 (Appendix B) show plan views, cross sections, profiles, and details of the planned replacement culvert.

Once the culvert is in place, new roadway surface will be installed over the streambed simulation component of the structure. The sediment trap section of the culvert structure will be accessed for maintenance through removable hatches integrated in the roadway surface.

Riprap Removal

Riprap forms the banks of Sunset Creek upstream and downstream of SE 30th Street and the headwalls surrounding the existing culvert inlet and outlet. Riprap armoring will be removed in the project area concurrent with the installation of the new culvert and grade control structures, extending between 110 feet upstream and 60 feet downstream of the replacement culvert. Due to its location in the channel, much of this riprap removal work will take place within the OHWM. Riprap removal will be conducted in the dry after the streamflow bypass is in place and the project site is dewatered. Upstream of the culvert replacement structure approximately 7 cubic yards of rip rap will be removed. Upstream of the culvert, riprap will be removed from the left bank and above the culvert openings. No riprap is currently present immediately upstream of the culvert at the right bank. Downstream of the culvert replacement structure approximately 50 cubic yards of riprap will be removed from both the left and right banks immediately adjacent to the culvert and extending approximately 20 feet downstream. Quantities and linear extents of riprap removal are presented in Table 5.

Table 5. Riprap removal quantities.

Location	Bank Length (ft)	Bank Area (ft^2)
Upstream		
Left Bank	10	30
Above Culvert	14	42
Downstream		
Left Bank	60	240
Right Bank	60	240
Above Culvert	10	50
Totals	74	282

Riprap will be removed with an excavator or other heavy equipment as appropriate for the site conditions. The riprap will either be stored on City property for use in future permitted projects, or will be delivered to a permitted commercial facility for reuse.

Channel Grading, Grade Control Structures and Bank Protection Structures

The Sunset Creek channel will be modified to provide smooth and stable transitions from the existing streambed to the inlet and outlet invert elevations of the replacement culvert. Channel modifications will involve re-grading the stream channel, removing excess sediments, removing existing riprap bank armoring, and constructing grade control and bank stabilization structures.

Upstream of the replacement culvert the channel bed will be lowered an average of approximately 1.4 feet, and up to 2.5 feet locally, over a length of 110 feet and an average channel width of 7 feet. Drawing C-10 (Appendix B) shows the extents of proposed channel grading upstream of SE 30th Street. Streambed and bank material will be removed from the channel using an excavator. Streambed material from the channel upstream of the replacement culvert may be reused for channel bed material where consistent with the approved project design and desired habitat characteristics. Unused streambed and bank materials will be hauled to a licensed disposal or material recycling facility. Volumes of excavation and fill below the OHWM for culvert replacement, channel grading, and installation of grade control and bank protection structures are summarized in Table 4.

Downstream of the replacement culvert, the full width of the channel bed, at an average width of 10 feet, will be lowered up to 2.5 feet for a distance of 60 feet downstream of the replacement culvert. Drawing C-10 (Appendix B) shows the extents of proposed channel grading downstream of SE 30th Street. Bed material from this part of the channel will be removed with an excavator. A portion of this material may be suitable for use as stable channel bed material if deemed so by the project engineer during construction. Additional streambed material will be removed from the channel between 60 and 100 feet downstream of the replacement culvert. This material will be removed from the center 4 to 5 feet of the channel using a suction dredge without disturbing existing streambanks or riparian vegetation.

Grade control and bank protection structures will be primarily constructed using large woody debris and rounded to subrounded river boulders. Large wood will be imbedded in the stream bed and banks and surcharged with boulders as necessary to resist lateral drag and buoyant forces and provide a high factor of safety for channel stability. One structure, the large wood grade control structure downstream of the replacement culvert outlet, will incorporate concrete ecology blocks for additional ballast because the narrow channel corridor relative to the active channel width prevents adequate anchoring of the wood using only earth and rock. At this structure location, the wood will be attached to ecology blocks for additional ballast. The ecology blocks will be buried below grade within the stream banks and located outside of the OHWM. Typical dimensions for large wood pieces used in grade control and bank protection structures are diameters of 18 to 24 inches and lengths of 15 to 25 feet. Typical boulder diameters are 12 to 18 inches.

Eight grade control structures will be installed upstream of the replacement culvert. The average gradient of Sunset Creek upstream of SE 30th Street is 2.5 percent. Within 15 feet of SE 30th Street on the upstream side, however, the existing channel gradient is up to 30 percent. The design grade of the channel for a distance of 110 feet upstream of the replacement culvert is 4 percent, with no sections to exceed 5 percent between grade control structures and no vertical drops in excess of 4 inches to promote fish passage. Drawing C-11 (Appendix B) shows a profile and plan view of the grade control structures proposed on the upstream side of SE 30th Street. Drawing C-13 (Appendix B) shows typical profile and cross section views for an upstream grade control structure.

The channel spanning logs shown in the drawing details for the porous boulder weirs are buried below grade, and act as a sill anchoring the upstream boulders in place. This serves two purposes. First, this section of Sunset Creek actively transports cobble and boulder sized substrate that would rapidly abrade exposed logs in the channel bed and shorten their life span. Second, horizontal spanning weirs create pools that tend to accumulate gravel sized substrates in a shallow, plane bed configuration. This creates undesirable conditions that limit fish passage and rearing habitat use. Using the buried logs to support the river boulders will provide durable grade control and sufficient hydraulic complexity to avoid these undesirable effects.

Downstream of the replacement culvert one large woody debris grade control structure and one boulder grade control structure will be constructed. The large woody debris grade control structure, ballasted by ecology blocks below grade outside the OHWM, in addition to boulders, will be constructed 20 feet downstream of the replacement culvert, and the boulder grade control structure will be located another 20 feet further downstream. Drawing C-12 (Appendix B) shows a plan view and cross section of the proposed channel modifications and the two grade control structures on the downstream side of SE 30th Street.

Two layers of streambed material will be placed in areas where the channel is modified. The upper layer will be composed of 12 inches of streambed habitat gravel (0.5 to 3 inch diameter). A 12-inch thick base layer of cobbles sized to resist scour will underlie the surface gravel layer. This base layer will maintain channel design elevations between grade control structures.

All channel grading and construction activities will be conducted using an excavator, with finish placement activities conducted using hand tools. Excavation and fill quantities within the ordinary high water mark associated with these channel modifications are summarized in Table 4.

Stream Bank Revegetation

Stream banks and areas within the riparian corridor that have been disturbed during channel regrading and structure placement will be rebuilt and stabilized where they are disturbed. The disturbed area clearing limits are expected to extend from approximately 120 feet upstream to 60 feet downstream of the culvert replacement structure and covering an area of approximately. The area of bank and riparian habitat riparian that will be disturbed is estimated at approximately 4,300 ft^2 (0.1 acres) upstream of the structure and 2,500 ft^2 (0.06 acres) downstream of the structure, for a total of 6,800 ft^2 (0.16 acres).

Replanting plans are consistent with planting guidelines presented in the City of Bellevue's Critical Areas Handbook (City of Bellevue 2003). Bank toes will be protected from stream erosion using large woody debris and boulders that are buried into the stream bank and integrated into grade control structures. Higher portions of the bank that are disturbed will be stabilized with lifts of soil wrapped in woven and non-woven coir fabric. The coir fabric will be staked and the top layer will be secured with an anchor trench. Once the banks have been stabilized, all disturbed areas will be revegetated with an appropriate range of native species. Typical species that may be used to revegetated streambanks are presented in Table 6.

Table 6. Typical species that may be used to revegetated Sunset Creek streambanks following channel modification.

Vegetation Type	Common Name	Latin Name
Trees		
	Oregon ash	*Fraxinus latifolia*
	Pacific Willow	*Salix lasiandra*
	Paper birch	*Betula papyifera*
	Red alder	*Alnus rubra*
Shrubs		
	Vine maple	*Acer circinatum*
	Red-osier dogwood	*Cornus sericea*
	Salmonberry	*Rubus spectablis*
	Pacific ninebark	*Physocarpus capitatus*
Groundcover		
	Lady fern	*Athyrium filix-femina*
	Sword fern	*Polystichum munitum*
Emergent		
	Small-fruited bulrush	*Scirpus microcarpus*

The upstream and downstream planting areas have distinct conditions that will require different planting approaches. The upstream area is shaded by overhanging native trees, native shrub species, English ivy and blackberry, and is characterized by steep banked slopes. The downstream area is more exposed with limited shading from sparse ornamental trees along the west bank, contains extensive reed canary grass, and has a flatter bank profile. These variable conditions will require a different mix of species and different levels of maintenance at each site.

Performance standards for revegetation are presented below under Best Management Practices.

Reintroduce Flow

Following completion of the culvert replacement and channel bed modifications, the temporary coffer dam will be removed, flows will be re-established through the project area, and the temporary bypass pipe will be removed. This activity will be conducted consistently with the WSDOT standard protocol for this practice (Appendix C). The timing of flow reintroduction will be coordinated with construction of the permanent maintenance bypass culvert and its outfall, and completion of bank protection in the outfall location at the downstream end of the replacement culvert.

Construct Maintenance Bypass Culvert

A 24-inch diameter maintenance bypass culvert will be constructed on the west side of the replacement culvert structure (see Appendix B, Sheet C-20). The bypass will allow for stream flows to be routed from the downstream end of the streambed simulation section around the sediment trap during maintenance. The maintenance flow bypass will facilitate fish exclusion and avoid the need to dewater the active channel during maintenance activities.

The maintenance bypass culvert will have a multiple-gated inlet, oriented vertically along the culvert wall at the downstream end of the streambed simulation section (midway through the structure). The inlets will drain into a vertical cylindrical vault. Multiple openings at different elevations will allow maintenance crews to select the appropriate inlet elevation based on the level of sediment accumulation. The gated inlets will be closed during operation. These features will prevent sediment from entering the bypass and clogging the bypass vault.

The outlet of the maintenance bypass culvert will be submerged, and will discharge to an energy dissipation structure composed of large woody debris built into the left bank of the stream channel downstream of the main culvert outlet. The following design features and maintenance protocols will be employed to avoid fish injury during bypass operation:

- The bypass vault is submerged at the bottom end, and the bypass pipe will be set at low slope to minimize outlet flow velocity
- The bypass will be operated only during low flow conditions.

These combined features will result in low exit flow velocities from the bypass, avoiding the potential for turbulence and impingement related injury at the downstream energy dissipater.

Construction of the bypass culvert will require additional minor excavation using an excavator and hand tools to shape the trench as necessary and placement using an excavator. Once the culvert is in place, the trench will be backfilled with previously excavated soil or new backfill material and covered with new roadway surfacing materials.

Best Management Practices

Best management practices (BMPs) are components of the project designed and implemented to avoid or minimize construction impacts on water quality, plant and animal species, and the riparian environment. The following sections describe general and impact-specific BMPs that will be implemented as part of the proposed project.

General Requirements

The proposed project will implement BMPs to avoid or minimize construction impacts in accordance with regulatory requirements. The City of Bellevue will require its construction contractor to develop and implement BMPs for temporary erosion and sedimentation control (TESC). These BMPs will be consistent with the Washington State Department of Ecology 2005 *Stormwater Management Manual for Western Washington* (Ecology 2005) and are considered an integral part of the proposed project upon which the effect determinations made in this biological evaluation are based.

Construction Timing

All construction activities associated with stream channel grading, culvert replacement, streamflow bypass, and installation of channel grade control structures will take place during the approved in-water work window for the project area (July 1 to August 31). Activities likely to result in unavoidable short-term sediment releases to the stream will be scheduled to commence after July 1 to avoid adverse effects on sensitive fish life history stages.

Temporary Erosion and Sediment Control

TESC measures will be in place before work begins, and additional TESC measures will be implemented as work elements occur in different areas of the site. The TESC plan will include appropriate BMPs to be implemented throughout construction that will retain dust, soil, and stormwater runoff onsite and prevent pollutants and turbid discharges from entering Sunset Creek. TESC measures will be upgraded and added as necessary in response to unexpected storm events and changing site conditions (i.e., operation of additional pumps or relocation of silt fences).

The TESC plan will be maintained onsite and the recorded log of BMP implementation and TESC measure performance will be updated weekly. The plan and the log will be available onsite throughout the duration of the project. Documentation will include, at a minimum, records of all BMP implementation and performance monitoring by the TESC lead as appropriate for the site conditions experienced during construction.

Fueling and Lubrication

Fueling and use of lubricating oils and hydraulic fluids will be conducted offsite or at a designated staging area located at least 150 feet away from aquatic resources. All equipment working around aquatic resources that requires hydraulic fluids will use biodegradable hydraulic fluids.

The construction contractor will be required to develop a site-specific spill prevention, control, and countermeasures (SPCC) plan consistent with state law. The SPCC plan will address hazardous materials, fueling and maintenance of equipment, and spill containment and notification.

Removal of Best Management Practices

After the project is complete, all BMPs will be removed according to the following procedures:

- Evaluate the site to determine if the BMP is no longer needed (i.e., the area has been stabilized and the potential for sediment-laden water to exit the area has passed)
- Remove sediment buildup behind the BMP structures and dispose of sediments at an approved location offsite
- Remove the BMP materials for reuse or recycling, if applicable
- Revegetate disturbed areas where applicable.

Site Restoration and Revegetation

The boundaries of the clearing limits, shown in the design plans (see Appendix B, Drawing C-10), will be visibly flagged by a continuous tape or bright orange fencing before construction begins. All disturbed areas within the clearing limits will be replanted with native trees and shrubs appropriate to the site as described previously. Soil in stream access points and other areas that have been compacted by heavy machinery will be mechanically tilled prior to replanting to enhance restoration and encourage infiltration.

The proposed project will require a Hydraulic Project Approval (HPA) permit from the Washington Department of Fish and Wildlife. The conditions of this permit require a minimum monitoring period of 3 years, with site management as necessary to achieve 80 percent planting survival at the end of this period. The City of Bellevue Critical Areas Ordinance requires five years of monitoring and 80 percent planting survival.

The revegetation plan will include 5 years of annual post construction monitoring and maintenance in accordance with City of Bellevue requirements. The following performance standards are defined:

- Maintenance (irrigation and weeding) and mortality replacement as necessary for 100 percent survival by the end of year one
- Maintenance and mortality replacement as necessary for 80 percent survival by the end of year three
- No more than 15 percent coverage by non-native invasive species by the end of the 5-year monitoring period.

Culvert Maintenance

Culvert maintenance will be conducted as a separately permitted action from project construction. However, the structure design incorporates features specifically designed to reduce the potential effects of culvert maintenance on aquatic species and habitats. Therefore, this aspect of the design is pertinent to ESA consultation and is described here.

Removal of sediment from the sedimentation trap within the culvert will be conducted so as to minimize impacts to aquatic species and downstream water quality. During maintenance activities, the sediment trap will be accessed via a set of hatches covering the sediment trap portion of the culvert structure. An adjustable gate placed in the internal baffle at the upstream end of the sediment trap will be used to prevent streamflow from entering the sediment trap from the upstream side. Closing the gate will divert flow through the selected bypass opening in the side of the streambed simulation component of the culvert structure. The bypassed flows will drain into the submerged vault and then into the bypass culvert lying parallel to the main culvert structure (see Appendix B, Drawing C-7). Once flows are completely routed into the bypass culvert, fish will be manually removed from the sediment trap by walking a seine net through the structure. Once fish have been directed out of the structure, the seine will be secured at the downstream end of the culvert to act as a block net to prevent fish from entering the sediment trap from the downstream side. Dip netting and other methods will be used as necessary to complete fish removal. Once fish have been excluded, the structure will be closed off with a second gate at the downstream end and sediment will be removed from the structure using a suction dredge operated from the street. Upon completion of sediment removal, the downstream block net and gate will be removed, the upstream gate will be reopened, and the bypass gate will be closed.

All dredged materials will be transported to a permitted commercial facility for disposal or reuse, or will be reused in other permitted City of Bellevue projects as appropriate.

Adaptive Sediment Management

The sediment trap component of the proposed project will provide greater capacity and greater flexibility to manage the rate of sediment delivery and accumulation in Sunset Creek downstream of SE 30th Street. The proposed structure will have sufficient capacity to capture the majority of the bedload sediment in flux during typical years. The reduction of bedload sediment delivery downstream of SE 30th Street creates the potential for undesirable geomorphic impacts on downstream channel conditions. Specifically, sediment starvation of downstream reaches that results in loss of salmonid spawning opportunity must be avoided. The Kelsey Creek watershed is generally considered to be spawning limited, due to the relative lack of suitable spawning substrate that has not been impacted by fine sediment accumulation. The substrate distribution in lower Sunset Creek and at the Richards Creek confluence is suitable for salmonid spawning, but the channel configuration and substrate stability are undesirable. Maintaining suitable substrate conditions while improving the channel configuration to support a range of habitat functions is the desired outcome.

Accordingly, the proposed project includes an active monitoring and adaptive management component and a commitment to operate and maintain the structure in ways that ensure that desirable habitat conditions are maintained. Adaptive management tools incorporated into this plan include monitoring of channel configuration in downstream reaches, sediment removal protocols that are iterative with observed sediment delivery rates , and, if and when necessary, substrate augmentation. The adaptive management plan will also include monitoring and management of restored vegetation. The City of Bellevue Utilities Department Engineering Division will lead these activities to ensure proper function of the sediment trap and prevent adverse impacts to aquatic habitat downstream of SE 30th Street.

Active monitoring of channel responses to sediment management will be used to develop adaptive management protocols. These protocols will be used to respond to channel conditions should very low or high amounts of sediment delivery initiate excessive channel degradation or aggradation. The design volume of the sediment trap in the replacement culvert beneath SE 30th Street is based on calculations of particle mobility and estimates of sediment delivery to the project reach using long-term measurements of channel aggradation. The structure is not designed to trap all course sediment delivered to the project area. Rather, its design objective is to trap the largest sediments and the approximate volume that has caused ongoing channel aggradation downstream of SE 30th Street, while maintaining a sufficient flux of gravels as needed to provide desirable substrate conditions in the downstream channels. The maintenance protocol will need to be iteratively developed following installation of the structure as understanding of sediment delivery rates and channel response increases. If sediment delivery over a period of time is sufficiently lower or higher than estimates developed from long-term measurements, additional measures such as gravel nourishment or sediment removal from downstream locations may be warranted.

The monitoring protocol includes establishment of four to five permanent monitoring locations approximately every 200 to 250 feet along the channel length beginning 100 feet downstream of the replacement culvert. The following monitoring activities will be conducted at each location:

1. Channel cross-sectional geometry will be surveyed

2. The composition of streambed sediment will be surveyed using a combination of surface pebble counts and subsurface bulk sampling and sieve analysis.

Channel surveying and streambed sediment sampling will be performed annually for a period of five years and semi-annually for the following 10 years to establish management protocols. At that time future monitoring needs can be reevaluated.

Baseline sediment trap monitoring protocols will consist of the following:

1. Scheduled visual inspections of sediment trap capacity and additional inspections following significant storm events.

2. Documentation of the timing and quantity of all sediment removed from the structure.

3. Bulk sieve analysis of sediment removed to document grain size distribution of captured sediment.

Current rates of deposition at SE 30th Street indicate that annual to semi-annual sediment removal from the trap should be expected in the near term. As sediment production and delivery from the upstream basin decreases as a result of additional channel stabilization and sediment reduction measures, the frequency of sediment removal is expected to decrease. Should sediment production in the upper basin reduce to a level such that maintenance of the sediment trap is no longer necessary, the replacement culvert structure is designed to function as a stream simulation culvert without need for further modifications.

Impact Avoidance and Minimization Measures

The proposed project incorporates several features designed to minimize and avoid both immediate and long-term impacts on instream habitat conditions in the project area. The channel modification design is based on a comprehensive assessment of watershed, reach, and site specific hydrologic, hydraulic, and geomorphic conditions, and is consistent with the Integrated Streambank Protection Guidelines prepared by the Washington State Aquatic Habitat Guidelines Program (WSAHGP 2003). The grade control and bank stabilization structures are specifically designed to mimic the habitat forming processes and functions provided by LWD in natural stream environments. Only one of these structures will require anchoring with non-native

materials. By design and material selection, these structures will increase habitat complexity and improve fish passage in the project reach of Sunset Creek and will continue to perform in this manner as the system adjusts to adaptive sediment management over time.

The project design allows more active and informed adaptive management of sediment conditions in the stream channels downstream of SE 30th Street. Through careful management of sediment delivery, habitat conditions in the downstream channel can be optimized relative to their current degraded state. By relocating the majority of dredging activities from the active channel into the replacement culvert structure, habitat conditions will be allowed to stabilize under the anticipated channel conditions. These features will result in improved habitat conditions in Sunset Creek.

Effects of Project on the Environment

The proposed project will result in a number of potential direct and indirect effects on the surrounding environment. Direct effects are defined as the immediate effects of the project on the environment, including construction-related impacts. Indirect effects are defined as effects that will result from the proposed action later in time but are still reasonably certain to occur. These effects are defined further below.

There are no interrelated or interdependent actions associated with the proposed project and, therefore, no effects associated with these actions. The project is expected to result in beneficial changes in habitat conditions over time. Although discussed separately below, these are considered to be indirect effects for the purpose of this biological assessment.

Direct Effects

Direct effects are defined as those effects that are directly related to the proposed action and occur as a result of project construction and/or operation. The anticipated direct effects resulting from the proposed action and the magnitude and duration of these effects are described below.

Habitat Alteration and Disturbance

- **Extent:** Dewatering of approximately 460 feet of stream channel (250 feet upstream, 150 feet downstream, plus approximately 60 feet within the culvert. Direct disturbance of approximately 230 linear feet of channel (110 feet upstream and 60 feet downstream of the culvert and 60 feet within the culvert).

- **Duration:** 50 working days between July 1 and August 31.

Project construction will require the direct disturbance and modification of approximately 230 linear feet of stream channel (including approximately 60 feet within the existing roadway footprint). This work includes culvert replacement, channel grading, riprap removal, placement of grade control and bank protection structures, and revegetation. All activities will be conducted within a dewatered exclusion area extending approximately 250 feet upstream and 150 feet downstream of SE 30th Street.

The project will disturb approximately 6,800 ft^2 (0.16 acres) of riparian vegetation. Stream banks that have been disturbed during channel regrading and bank stabilization will be revegetated with native trees and shrubs, and nonnative species will be removed. Revegetation will occur in the riparian corridor within a distance of approximately 250 feet upstream and 150 feet downstream of the culvert replacement structure. Approximately 200 cubic yards of alluvial material and 56 yards of riprap will be excavated from the stream channel. The channel

will be reconstructed using 103 yards of regulated fill, including an estimated 80 cubic yards of streambed material and 23 yards of boulders. This total does not include 22 yards of large wood that will also be placed within the OHWM during channel reconstruction.

Aerial Construction Noise

- **Extent:** Between 90 and 102.3 dBA for heavy equipment use
- **Duration:** 50 to 70 working days between July 1 and August 31.

The proposed project will require the use of heavy equipment for materials transportation, staging, and construction. The associated aerial noise is considered to be a direct effect for the purpose of consultation related to the Endangered Species Act. The loudest construction-related activity is expected to be the use of heavy trucks, excavators, and dozers. Washington State Department of Transportation guidance for biological assessments states that the loudest noise levels associated with construction equipment likely to be used on this project will be 90 to 99 dBA for backhoes, heavy trucks, excavators, and jackhammers (WSDOT 2006). The maximum noise produced by the proposed project can be estimated by assuming that the three loudest pieces of construction equipment will be operating simultaneously (FHWA 2003; Magnoni 2006). Based on formulae provided by these sources, and assuming that the loudest three pieces of simultaneously operating equipment will produce 96, 97 and 99 dBA respectively, the maximum cumulative noise level produced by simultaneous equipment operation is estimated to be 102.3 dBA.

Dewatering and Fish Handling and Relocation

- **Extent:** Approximately 460 linear feet of channel (250 feet upstream and 150 feet downstream of the culvert and 60 feet within the culvert).

- **Duration:** 50 working days between July 1 and August 31.

The Sunset Creek channel will be dewatered over a 460 foot segment (including the culvert structure) for a period of 50 to 70 working days. Dewatering is required for construction purposes. It will also limit release of suspended sediments to downstream areas, and avoid direct construction related impacts on aquatic species during culvert removal and installation, and related channel work.

Dewatering will be conducted following WSDOT specifications for this activity as described in Appendix C. Coffer dams will be constructed by manual labor using sandbags and plastic barrier sheeting, and a gravity fed bypass pipe will be installed. Dewatering is likely to require fish handling and relocation, and will deny both juvenile and adult fish access to the upstream channel during the dewatering period. Fish will be removed from the project area by gradual flow reduction, seining, and netting. Electrofishing may be required, but will only be used as a last resort. Fish removed from the project area will be immediately transported to appropriate downstream habitats and released. To limit potential impacts on fish, the channel will be

dewatered at the beginning of the in-water work window and will remain dewatered and inaccessible to fish until construction is complete.

Construction Related Water Quality Effects

- **Extent:** Elevated suspended sediment concentrations in Sunset Creek downstream of SE 30th Street may occur during project construction. Elevated suspended sediment concentrations are also expected within the range of natural variability during project site dewatering and rewatering, and first exposure to storm flows.

- **Duration:** Potential intermittent periods of elevated suspended sediments during construction. Short-term pulses of elevated suspended sediment concentrations during establishment of project exclusion area and bypass pipe placement, and during "first flush" of the project area upon channel rewatering.

Project construction will involve the development of a temporary bypass and exclusion area, extensive in-channel work, and rewatering of the work area following construction. Dewatering and rewatering of the construction area is likely to produce short-term pulses of elevated suspended sediment concentrations. Additional suspended sediment pulses are likely to occur when the project site is exposed to the first storm flows following construction (the "first flush" effect), and if the temporary streamflow bypass system is overwhelmed by an extreme storm flow condition that exceeds the bypass design flow.

Water pumped from the exclusion area may be returned to the stream channel downstream of the project area. BMPs will be employed to filter suspended sediments before the water is returned to the stream channel. However, this activity presents the potential for elevated suspended sediment concentrations.

A "first flush" suspended sediment effect is likely to occur when the water exclusion area is rewatered and later in time coincident with the first storm flows following construction. It is expected that suspended sediments flushed from the site will consist mostly of native sandy soil particles.

The proposed project will neither increase or decrease impervious surface area within the project site. The project will require replacement of approximately 1,625 square feet of roadway surface. This total is below the 5,000 square foot threshold that triggers a requirement for retrofitting of stormwater treatment per City of Bellevue and Washington State stormwater management policy.

Indirect Effects

Indirect effects include effects resulting from the proposed action that do not occur as a direct result of the project and that manifest later in time, but are nonetheless likely to occur. Indirect

effects resulting from the proposed project are limited to the anticipated geomorphic responses of the Sunset Creek and Richards Creek stream channels to adaptive management of sediment delivery, and beneficial changes in water quality conditions resulting from decreased flooding of adjacent impervious surfaces. These indirect effects are described in the following sections.

The proposed project will not change the capacity or alignment of the existing road system, and will therefore not induce development or change traffic and land use patterns in the project vicinity.

Geomorphic Impacts

Following installation of the replacement culvert structure, sediment removal will be confined to the footprint of the sediment trap within the culvert structure in all but extreme cases. It is possible that during some years, the delivery of sediment in Sunset Creek to the crossing of SE 30th Street will exceed the capacity of the sediment trap. Under most circumstances this delivery of sediment in excess of 50 cubic yards should not be problematic. Following sediment removal from the sediment trap, subsequent peak flow events should transport the sediment deposited in the channel further downstream. Under extreme circumstances, where the capacity of the sediment trap is significantly overwhelmed in consecutive years, removal of sediment from the open channel may be considered. If necessary, these activities will be conducted under a separately permitted maintenance action.

Over time, the proposed project is expected to alter sediment transport and deposition through the action area, resulting in subsequent changes in channel morphology and habitat complexity. Long-term geomorphic affects downstream of the culvert replacement structure include downcutting of the bed surface and flattening of the channel gradient from the current 1.4 percent to approximately 1.1 percent. This change in gradient would result from decreased sediment delivery past SE 30th Street and the mobilization of sediment that has accumulated within the channel over the approximately 30 years. The extent of potential impacts could extend as far as 1,000 feet downstream of SE 30th Street.

Gradual coarsening of the channel substrate may also be associated with reduced coarse sediment delivery. As described previously, monitoring of channel cross sections and streambed surface and subsurface grain-size distributions within the area of potential impacts will be conducted to inform adaptive management strategies that have the objective of maintaining desirable habitat conditions. Gravel amendments to the reach downstream of SE 30th Street is a possible response to observed streambed coarsening that may compromise habitat or spawning conditions. Upstream geomorphic impacts will be limited to the project extents.

Water Quality

The proposed project will increase conveyance capacity of the culvert at SE 30th Street. The proposed improvements should alleviate reoccurring flooding of the adjacent properties. Currently, during flood events some inundation occurs in parking lot areas that do not normally

drain to the local stream system. This overland flow collects contaminants from these impervious surfaces and transports them directly to the stream system. While the water quality related effects of these occurrences have not been quantified, they are likely to result in short-term pulses of contamination that are detrimental to aquatic life. Decreased occurrence of overland flooding should help to reduce the incidence of these periodic, minor water quality effects.

Effects of Interrelated and Interdependent Actions

The effects of actions that are interrelated to or interdependent on the proposed project must also be considered when defining the action area for the proposed project and considering the potential effects on listed species and habitats.

Interdependent actions are defined as those actions that have no independent utility apart from the proposed action. Interrelated actions are those actions that are a part of the primary action and are dependent upon that action for their justification.

The proposed project has independent utility from any future projects associated with the proposed Flood Control and Sediment Management Plan for the Richards Creek, Sunset Creek, and East Creek, which is currently in development. The proposed project is designed to address a chronic flooding and sediment management project at this site by replacing the existing underperforming culvert with a new and improved integrated culvert and sediment management structure. This project is not dependent upon any future actions for performance. There are no currently funded or defined projects that are interrelated with or interdependent upon the proposed project. Therefore there are no planned actions that are interrelated to or interdependent with the proposed project, and there will be no related effects on the physical, chemical, and biological environment. Should future sediment management plan phases be implemented, these activities will be subject to ESA compliance as separately permitted actions.

Management of the sediment trap (i.e., periodic dredging) can also be considered an interrelated and interdependent action associated with the proposed project. The City of Bellevue currently conducts maintenance dredging in the active channel of Sunset Creek under existing permits with the Corps of Engineers and WDFW. This management activity and related effects from dewatering and fish handling and sediment removal have already undergone ESA consultation. Management of the new sediment trap will be conducted under these same permits. Adaptive management of sediment transport and deposition rates in the downstream channel is considered part of the proposed action, the effects of which are discussed under Indirect Effects in the previous section.

Project Benefits

In addition to providing flood relief, the proposed project is expected to provide multiple benefits for aquatic species and habitat conditions in the project vicinity. The project will reduce the severity of maintenance related impacts on aquatic species and on water quality, improve

instream habitat conditions, and improve fish passage. These project benefits are described in detail in the following sections.

Reduced Sediment Management Impacts

Several long-term benefits for aquatic life and water quality are anticipated with the replacement culvert. The primary benefit provided by the sediment trap within the culvert is that it will allow for the majority of future dredging activities to take place inside an enclosed structure. Second, the trap will provide increased sediment storage capacity, which is expected to decrease the frequency and/or the extent of sediment removal activities. Currently, dredging of the active channel takes place on an annual basis, causing considerable habitat disturbance and related water quality impacts. While some dredging of the active channel may be required in the future, this will be limited to infrequent occasions when large sediment delivery events overwhelm trap capacity and will be subject to separate permitting approval.

The proposed replacement culvert design incorporates several features that will simplify fish removal and exclusion during sediment maintenance. This will result in fewer disturbances and reduced handling stress on fish, thereby reducing the potential for injury and mortality. The sediment trap will also require a smaller fish exclusion area, reducing the amount of habitat that fish are denied access to during sediment removal activities.

Improved Habitat Conditions

The proposed project will result in improved habitat conditions in the project area. These improvements will occur because of increased habitat complexity provided by bioengineered grade control and bank stabilization structures, reduced frequency of sediment management activities in the active channel, and adaptive management of sediment delivery rates to downstream channels. These three factors are expected to positively influence habitat and are described in more detail below.

The bioengineered grade control and bank stabilization structures are necessary components of channel reconfiguration needed to support the replacement culvert design. The current channel gradient in close proximity to SE 30th Street has been imposed by backwater conditions induced by the existing undersized culverts and sediment deposition in the channel downstream of SE 30th Street. The sediment deposition occurs because elevated sediment delivery rates in the Sunset Creek drainage are out of equilibrium with sediment transport capacity in the channel. The channel upstream and downstream of SE 30th Street must be modified to increase flow conveyance, support fish passage, and enhance sediment transport in the channel and capture in the replacement culvert structure. The channel profile modification work will involve excavation of accumulated sediment from the channel bed, removal of riprap, installation of grade control structures, and bank contouring and stabilization. Riprap will be removed from approximately 154 lineal feet of streambank and replaced with bioengineered bank protection structures composed primarily of LWD and boulders. The grade control structures will also be constructed using approximately 40 large logs, including logs with rootwads, significantly increasing functional LWD density in this reach.

The channel modification design is based on a comprehensive assessment of watershed, reach, and site specific hydrologic, hydraulic, and geomorphic conditions, and is consistent with WDFW Integrated Streambank Protection Guidelines (WSAHGP 2003). The grade control and bank stabilization structures are specifically designed to mimic the habitat forming processes and functions provided by LWD in natural stream environments, and will significantly increase habitat complexity and improve fish passage in the project reach of Sunset Creek.

The Sunset Creek channel accumulates more sediment than it can effectively transport in its current modified state. This promotes a relatively featureless channel environment with limited habitat complexity. These channel conditions provide poor flow conveyance, contributing to frequent flooding problems on SE 30th Street and adjacent businesses, and also contribute to low flow passage barrier conditions for adult salmonids and potentially for juvenile salmonids.

Sediment management to maintain flood flow conveyance capacity in this reach of Sunset Creek is accomplished by routine annual dredging of the active channel downstream of the SE 30th Street twin culverts. This requires regular disturbance of the active channel, interfering with the formation of beneficial habitat features. A key advantage of the integrated sediment trap in the replacement culvert structure is that it will allow for the majority of sediment removal activities to be conducted within the structure using equipment parked on the roadway atop the culvert, avoiding stream bank and channel disturbance. Dredging of the active channel will only be required in rare circumstances when large sediment delivery events overwhelm sediment trap capacity, and will be subject to a separate permit approval process.

The integrated sediment trap in the replacement culvert structure will allow for more flexible and adaptive management of sediment flux through the lower reach of Sunset Creek downstream of the culvert, which should produce habitat benefits over the long-term. The proposed project incorporates monitoring of bed elevations and substrate conditions in and downstream of the project reach in Sunset Creek, and an adaptive approach for metering sediment delivery rates to promote the maintenance of beneficial channel conditions. Specifically, controlled sediment delivery downstream of SE 30th Street will allow for the existing sediment plug in the channel between SE 30th Street and the confluence of Sunset Creek with Richards Creek to gradually erode. This in turn will increase flow conveyance capacity, and allow for the formation of a greater diversity of habitat features. The channel will be routinely monitored to ensure that substrate conditions desirable for salmonid spawning are maintained.

Collectively, these project elements should produce improved habitat conditions within the project reach that are beneficial to a range of aquatic species.

Improved Fish Passage

The proposed project will result in improved conditions for fish passage in the project reach. Currently, fish passage conditions in Sunset Creek are impaired by sediment deposition upstream and downstream of the SE 30th Street twin culverts. The accumulation of sediment in the channel downstream of the culverts creates a low flow barrier to adult salmonid passage. This sediment may also hinder the movement of juvenile salmonids under certain flow conditions.

This sediment extends beyond the limits of current dredging activities, meaning that this barrier condition will remain permanent without additional intervention. By allowing for greater control of sediment delivery rates to the downstream channel, it is expected that the sediment trap will permit the evolution of channel conditions that are beneficial to fish passage.

The existing twin culverts also limit fish passage upstream of SE 30th Street. The culverts lack sufficient hydraulic capacity to convey flood flows that transport large sediments. This creates a backwater effect upstream of the structure that promotes the accumulation of coarse bedload, increasing the channel gradient abruptly from approximately 2.5 percent to 10 percent approaching the upstream culvert entrance. During high flow conditions, the high flow velocity in the culvert barrels in combination with shallow, high velocity flow conditions in this over-steepened channel segment may create a partial barrier condition.

The proposed culvert integrates two fish passage components, a backwatered sediment trap at the downstream end, and a streambed simulation component at the upstream end. The streambed simulation segment has been designed in accordance with current WDFW culvert design guidance (Bates et al. 2003). This segment will mimic natural channel bed conditions at a more natural 2.5 percent channel slope. The backwatered sediment trap component of the culvert structure will provide quiescent flow conditions that will allow for unhindered fish passage. The streambed simulation segment in the upstream half of the culvert structure will provide for full fish passage for all species and life history stages likely to occur in this system during the flow conditions in which migratory and dispersal behavior is likely to take place.

Collectively, the proposed culvert design and stream channel modifications address high flow and low flow passage barriers, and are expected to provide improved fish passage conditions throughout this reach of Sunset Creek.

Improved Water Quality

As noted previously, the proposed project will decrease the frequency of required instream sediment maintenance and simplify the process. This will reduce water quality impacts by reducing the frequency and duration of suspended sediment impacts associated with sediment maintenance activities. Broader water quality benefits are likely to result from the proposed project as well. The existing twin culverts that convey Sunset Creek across SE 30th Street provide insufficient flood conveyance capacity, contributing to routine flooding of adjacent roadways and parking lots. These floodwaters commonly overwhelm storm drains and flow overland back into the stream system. Some of the flooded areas do not normally drain to the stream system. This overland flow collects contaminants from these impervious surfaces and transports them directly to the stream system. While the water quality related effects of these occurrences have not been quantified, they are likely to result in short-term pulses of contamination that are detrimental to aquatic life. Decreased occurrence of overland flooding should help to reduce the incidence of these periodic, detrimental water quality effects.

Project Action Area

For the purpose of consultation related to the Endangered Species Act, the action area includes the project area and the extent of the surrounding environment that will be directly or indirectly affected by the proposed action, as well as interdependent or interrelated actions. The action area is defined by the practical limits of the physical, biological, and chemical influence of the proposed action. For the purpose of this biological assessment, the action area encompasses two components, the terrestrial and the aquatic.

The terrestrial component, or the extent of terrestrial impacts, is defined by the following:

- Aerial noise produced by heavy equipment during transportation, staging, and construction (direct effect)
- Habitat disturbance at the construction sites, staging area, and access points (direct effect)
- Physical changes to bank structure and riparian habitat caused by geomorphic responses to channel modifications (indirect effects).

The aquatic component, or the extent of aquatic impacts, is defined by the following:

- Habitat disturbance at the in-stream construction sites and access points (direct effects)
- Short-term pulses of suspended sediments produced by construction-related disturbance, site rewatering, and the “first flush” effect (direct effects)
- Changes in channel structure and habitat complexity caused by geomorphic responses to the project (indirect effects)
- Beneficial changes in water quality conditions resulting from reduced overland flooding of adjacent impervious surfaces (indirect effect).

The terrestrial component of the action area is defined by the extent of physical, visual, and noise related disturbance associated with the project. Aerial construction noise associated with heavy equipment use is expected to be the most extensive terrestrial impact. Based on reference data provided by Washington State Department of Transportation (WSDOT) guidance for biological assessment preparation (WSDOT 2006), maximum noise levels produced by construction equipment likely to be used in this project are as follows:

- Heavy trucks, up to 96 A-weighted decibels (dBA)
- Excavators, up to 97 dBA

- Backhoes, up to 90 dBA
- Jackhammers, up to 99 dBA.

The highest intensity noise is expected to occur when the three loudest pieces of construction equipment are operating simultaneously (Magnoni 2006). Assuming that the loudest three pieces of simultaneously operating equipment will produce 96, 97 and 99 dBA, the maximum cumulative noise level produced by simultaneous equipment operation is estimated to be 102.3 dBA based on formulae developed by the Federal Highway Administration and WSDOT (FHWA 2003; Magnoni 2006).

WSDOT guidance for biological assessment development provides background data and formulae for calculating the distance required to attenuate construction noise to background levels (WSDOT 2006). Urban environments with buildings, trees, and uneven terrain are considered to be "soft surfaces." Noise attenuates at -7.5 dBA per doubling of distance away from the source in soft surface environments. At this rate, construction noise would reach background noise levels of 80 dBA within 400 feet of the construction point. The construction points where heavy equipment will be used terminate at 110 feet upstream and 60 feet downstream of SE 30th Street. Noise calculations are presented in Appendix D.

The aquatic component of the action area is defined by the physical extent of habitat affected by the stream exclusion area, in-channel and riparian zone construction, and any indirect effects on system hydrology, hydraulics, or morphology induced by indirect effects resulting from the project. In this case, the aquatic component of the action area is defined by the exclusion area that defines the in-channel construction footprint, and the longer term geomorphic effects on the channel downstream of the project area. These effects are expected to result from active management of sediment delivery rates to the downstream channel. Site surveys and analyses performed in support of this project indicate that the geomorphic effects of the project could extend as far as 1,000 feet downstream of the project area. This point marks the beginning of a response reach between a divergent tributary channel and an incoming tributary stream (East Creek). This reach will continue to receive sediment eroded from the existing plug in the Sunset Creek channel, and is not expected to change form significantly in response to the project over time. Any suspended sediment effects are expected to become indistinguishable from the natural range of variability in the system within this boundary.

On this basis, the aquatic component of the action area is expected to extend from 250 feet upstream of the south side of SE 30th Street in the Sunset Creek channel, to the Richards Creek flow split channel, located approximately 850 feet downstream of the downstream limit of the project area (a total of approximately 1,000 feet downstream of SE 30th Street).

The extent of the action area, including the terrestrial and aquatic components, is shown in Figure 3. The expected beneficial effects of the proposed project on water quality should also be considered a component of the action area. However, these effects are not readily quantified. Therefore, for the purpose of this assessment they are assumed to be represented by the aquatic component of the action area as currently defined.

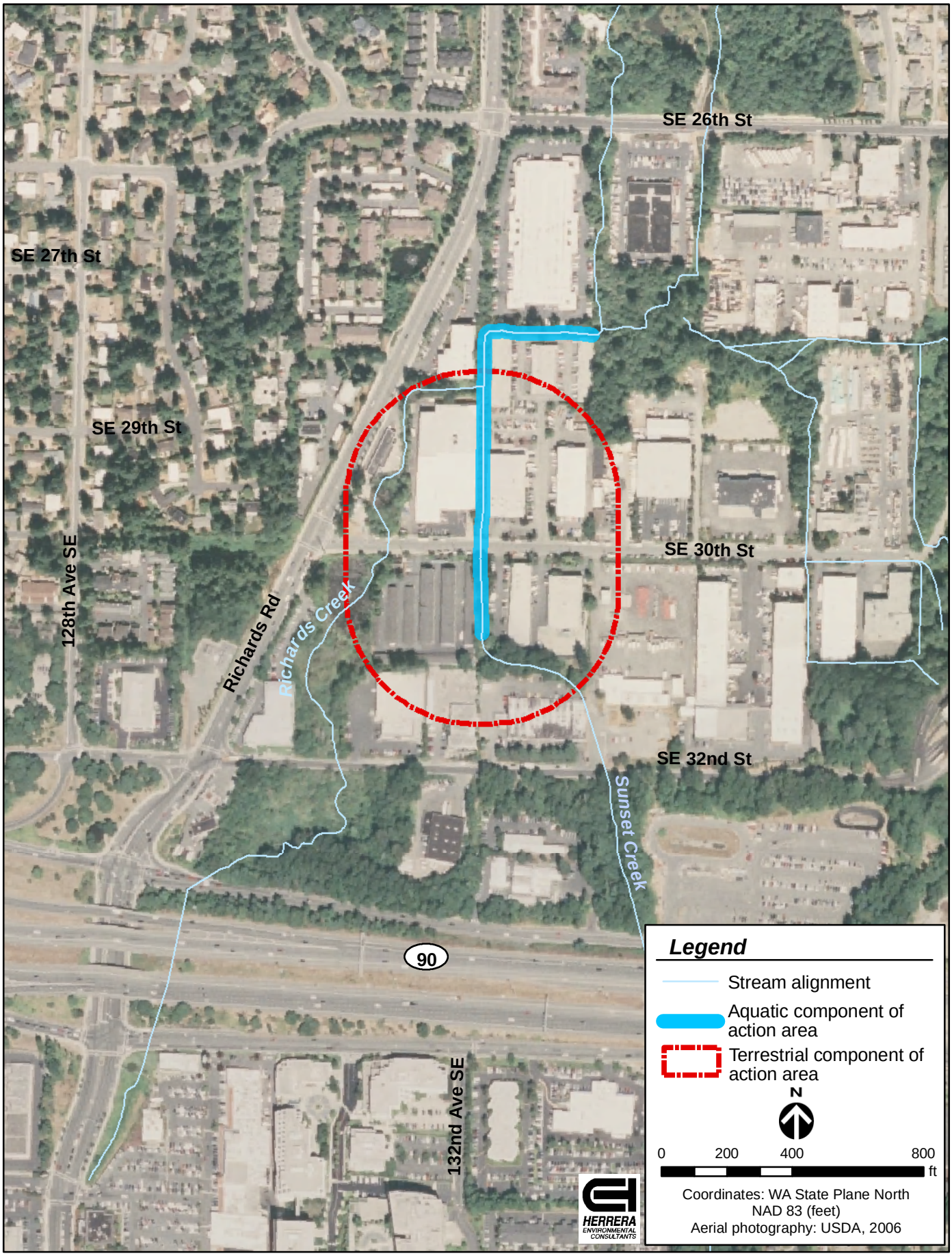

Figure 3. SE 30th Street/Sunset Creek Flood Improvement project action area.

Federally Listed and Proposed Species in Project Action Area

The U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) are the jurisdictional agencies responsible for maintaining current lists of ESA-listed species occurring in the vicinity of the action area. USFWS has jurisdiction over ESA-listed populations of terrestrial and aquatic plants, wildlife, resident fish and certain anadromous fish species (i.e., coastal bull trout). NMFS has jurisdiction over anadromous salmonid species, as well as other marine species (e.g., marine mammals) that are not relevant to this assessment. The status of ESA-listed species potentially occurring in the broad vicinity of the action area was obtained from general information resources provided by these agencies. If there is a reasonable potential for the species to occur in the action area, additional sources of information (detailed below) were consulted to determine the extent of occurrence and critical habitat within the action area.

The USFWS (2007) has identified the following threatened or endangered animal and plant species and critical habitats as occurring or potentially occurring in King County:

- Bull trout (*Salvelinus confluentus*): threatened species
- Bull trout critical habitat
- Marbled *murrelet* (*Brachyramphus marmoratus*): threatened species
- Marbled murrelet critical habitat
- Northern spotted owl (*Strix occidentalis caurina*): threatened species
- Northern spotted owl critical habitat
- Grizzly bear (*Ursus arctos horribilus*): threatened species
- Canada lynx (*Lynx canadensis*): threatened species
- Gray wolf (*Canis lupus*): endangered species
- Marsh sandwort (*Arenaria paludicola*): endangered species
- Golden paintbrush (*Castilleja levisecta*): threatened species.

None of these listed species are likely to occur in the action area, nor does the action area contain any currently designated critical habitat for these species.

Information obtained from NMFS (2007) and the other information sources listed above indicates that the following species and critical habitat under NMFS jurisdiction are known to occur or are likely to occur in the general vicinity, and thereby may occur in the action area:

- Puget Sound Chinook salmon (*Oncorhynchus tshawytscha*) evolutionarily significant unit (ESU): threatened species

- Critical habitat for Puget Sound Chinook salmon.

- Puget Sound steelhead (*O. mykiss*) distinct population segment (DPS): threatened species.

A summary of the status of these species and their likelihood of occurrence in the project action area is provided in Table 7. Pertinent information regarding the potential occurrence of Chinook salmon and steelhead in the action area is provided below.

Chinook Salmon

Species: *Oncorhynchus tshawytscha*
ESU: Puget Sound
Federal Status: Listed threatened
Critical Habitat: Critical habitat not designated within action area (70 FR 52630-52858)

Species Status

The action area for the proposed project is located within the range of the federally listed evolutionarily significant unit (ESU) Puget Sound Chinook salmon (64 CFR 14308-14328). Critical habitat has been designated in the Lake Washington/Cedar/Sammamish watershed and the Cedar River (70 CFR 52630-52858). The designated critical habitat for Puget Sound chinook does not include the Kelsey Creek watershed that encompasses the action area.

Presence in Project Action Area

Chinook salmon are known to have used this system historically, with distribution extending in Sunset Creek up to and perhaps beyond SE 30th Street. These species have not been observed in the project area in recent years, potentially due to passage barriers imposed by extensive beaver dam complexes in downstream reaches (Paulsen 2007). Chinook salmon use the lower reaches of Sunset Creek for migration and spawning (WDFW 2007a). Stream typing surveys in 2001 were confined to the headwaters, approximately 2 river miles upstream of the project area. No fish were detected (City of Bellevue 2007).

Spawning of the North Lake Washington population of Chinook, which includes those fish found in Kelsey Creek, generally occurs from mid-September through October (WDFW 2007d). Chinook salmon of the North Lake Washington population demonstrate a similar migration behavior to that seen in Bear Creek, with juveniles migrating into the Sammamish River or Lake Washington either as fry or fingerlings between February and June (WRIA 8 Steering Committee 2005). Research studies on juvenile salmonid outmigration timing from Bear Creek through Lake Washington support the contention that juvenile Chinook will not be present in the Kelsey Creek system when in-water work commences. Research on the migration timing of juvenile Chinook salmon and other salmonid species from Bear Creek and other Lake Washington tributaries has demonstrated that virtually all tagged outmigrant Chinook reached the Ballard Locks by no later than mid-June (Devries 2004; Seiler et al. 2003). This indicates that outmigration from tributaries occurs well before the onset of the in-water work window.

Additional background information on the life history and status of this species is provided in Appendix E.

Table 7. Federally listed, proposed, and candidate species occurring or potentially occurring in King County, Washington, and their occurrence in the project action area.

Common Name (Scientific Name)	Occurs or May Occur in Action Area	Basis	Timing of Occurrence	Federal Status
Species listed by the US Fish and Wildlife Service				
Bull trout (*Salvelinus confluentus*)	No	Streamnet	NA	Threatened species
Marbled murrelet (*Brachyramphus marmoratus*)	No	PHS maps	NA	Threatened species
Northern spotted owl (*Strix occidentalis caurina*)	No	PHS maps	NA	Threatened species
Grizzly bear (*Ursus arctos horribilus*)	No	PHS maps	NA	Threatened species
Canada lynx (*Lynx canadensis*)	No	PHS maps	NA	Threatened species
Gray wolf (*Canis lupus*)	No	PHS maps	NA	Endangered species
Species listed by the National Marine Fisheries Service				
Puget Sound Chinook salmon ESU (*Oncorhynchus tshawytscha*)	Yes	Salmonscape	May use action area for spawning and rearing. Not likely to be present during in-water work window	Threatened species
Critical habitat for Puget Sound Chinook salmon	No	70 FR 52630-52858	NA	Designated
Puget Sound steelhead trout DPS (*O. mykiss*)	Yes	Salmonscape	May use action area for spawning and rearing. Potentially present as rearing juveniles during in-water work window	Threatened species

DPS = distinct population segment.
ESU = evolutionarily significant unit.
NA = not applicable.
[a] Species is not known to occur in action area; however, potentially suitable habitat may be present.

Steelhead Trout

Species: *Oncorhynchus mykiss*
DPS: Puget Sound
Federal Status: Listed threatened
Critical Habitat: Not designated

Species Status

On May 7, 2007, NMFS listed the Puget Sound steelhead distinct population segment (DPS) as threatened (72 FR 26722-26735). Critical habitat for Puget Sound steelhead has not yet been designated.

Presence in Project Action Area

The Lake Washington system supports one native winter steelhead stock but not a summer steelhead stock (WDFW 2007c). The winter steelhead stock is currently listed in the WDFW salmon and steelhead inventory (SASI) as "depressed" but has recently shown some evidence of rebounding. A limited hatchery program utilizing the native winter steelhead stock was initiated in 1997 as a supplementation type program to assist in recovery of winter steelhead populations in the north Lake Washington tributaries. The sharp decline in Lake Washington winter steelhead was noted as a reason for concern by NMFS in its stock status review (Kerwin 2001).

Spawning of Lake Washington steelhead occurs from mid-December through early June (WDFW 2007c). Naturally produced juvenile winter steelhead can either migrate to sea or remain in freshwater as a resident rainbow trout. The vast majority of juvenile steelhead in the Lake Washington Basin smolt and migrate to saltwater. Lake Washington steelhead usually spend 1 to 3 years in freshwater, with the greatest proportion spending 2 years in freshwater (Busby et al. 1996). Because of this, juvenile steelhead rely heavily on the freshwater habitats that are present in streams all year long (Kerwin 2001).

Steelhead are known to have used the Sunset Creek system historically, with distribution extending in Sunset Creek up to and perhaps beyond SE 30th Street. This species has not been observed in the system in recent years, potentially due to passage barriers imposed by extensive beaver dam complexes in downstream reaches (Paulsen 2007). Surveys have produced no evidence of steelhead presence in recent years. However, juvenile Lake Washington steelhead are present in local streams all year long (Kerwin 2001). Given this life history pattern, it must be concluded that juvenile steelhead could be present in the action area during the in-water work window.

Additional background information on the life history and status of this species is provided in Appendix E.

Effects of Project on Environmental Baseline Conditions and Listed Species

The purpose of this section is to evaluate whether the direct and indirect effects associated with the proposed action will result in forms of disturbance or alterations to baseline environmental conditions within the action area that affect federally listed species and to determine whether these effects are of sufficient magnitude to constitute *take*.

The effects of the project on listed species and their habitats can be evaluated through two discrete pathways. The first considers whether direct effects from the project, such as construction activity and noise, short-term habitat disturbance, construction-related turbidity, and other direct results of project construction exceed established thresholds for disturbance or injury. The second considers whether the effect of the project on environmental baseline conditions adversely affect habitats within the action area, and/or elements of critical habitat if it occurs within the action area.

Effects on aquatic species and relevant environmental baseline conditions within the action area are evaluated in the following sections. A similar analysis of the effects of the project on essential fish habitat has also been completed. This analysis is presented in Appendix E.

Effects of the Proposed Action on the Environmental Baseline

Effects on the aquatic environmental baseline are evaluated using the National Marine Fisheries Service Matrix of Pathways and Indicators (NMFS 1996), defined explicitly for the purpose of evaluating the potential for adverse effects on federally listed salmonids resulting from project impacts on habitat and watershed conditions. Changes in these habitat indicators resulting from direct modification of habitat during construction, and subsequent changes in habitat resulting from the indirect effects of the project on geomorphic conditions in the action area are used as a basis for identifying potential adverse effects on listed species.

This assessment requires baseline data on the condition of habitat indicators in the action area and in the greater watershed. The WRIA 8 Technical Committee has developed an assessment of habitat conditions in the Kelsey Creek watershed useful for this purpose (King County 2002, WSDOT 2004).

Environmental baseline conditions for each habitat and watershed condition indicator and the projected effects of the proposed project on these indicators are summarized in Table 8. As shown, the proposed project will either maintain or improve the condition of all NMFS indicators. No indicators will be degraded as a result of the project, beyond short-term and localized impacts associated with construction.

Table 8. Matrix of pathways and indicators for documenting the potential effects of the proposed project on Chinook salmon and steelhead.

Pathways: Indicators	Current Condition	Environmental Baseline			Effects of the Action		
		Properly Functioning	At Risk	Not Properly Functioning	Improve	Maintain	Degrade
Water Quality							
Temperature	During synoptic summer temperature surveys conducted by staff from the University of Washington in 1998-1999 Richards Creek ranged between 55-61°F (CUWRM, 1999, as cited by Kerwin 2001). Based on these measured values, and the lack of riparian cover within the action area, conditions in Sunset Creek are considered to be "at risk."		X		X-		
Sediment/turbidity	The Richards Creek/Sunset Creek drainage area is considered to be in a "not properly functioning" condition for sediments and turbidity (WSDOT 2004).			X	X-		
Chemical contamination	Monitoring by King County found high phosphorus concentrations in the Kelsey Creek basin. In 1999, the USGS identified a variety of pesticides in stormwater in Sunset Creek and correlated these to retail sales at nearby home and garden stores (WSDOT 2004).		X		X		
Habitat Access							
Physical barriers	Four major culverts with a combined length of over 2,000 feet limit fish passage on Sunset Creek (documented in the Bellevue Critical Areas Update Streams Inventory [City of Bellevue 2003]). The existing culverts at SE 30th Street are not currently passable to fish at all flows due to sediment deposition at the upstream end of the structure and within the barrels. The sediment plug in the channel downstream of SE 30th Street is a low flow passage barrier.			X	X		
Habitat Elements							
Substrate	Ongoing aggradation has occurred in the project reach due to decreased sediment transport capacity in comparison to upstream reaches. Over the last 30 years, bed elevations in this reach of Sunset Creek have increased from 2 to 4 feet.		X			X	
Large woody debris	Habitat assessments have been conducted in Richards, East, Sunset, and parts of Kelsey, and Valley Creeks. Preliminary review of these data indicates a lack of large woody debris throughout the Kelsey Creek watershed (Kerwin 2001).			X	X		

Table 8 (continued). Matrix of pathways and indicators for documenting the potential effects of the proposed project on Chinook salmon and steelhead.

Pathways: Indicators	Current Condition	Environmental Baseline			Effects of the Action		
		Properly Functioning	At Risk	Not Properly Functioning	Improve	Maintain	Degrade
Habitat Elements (continued)							
Pool frequency/ quality	Preliminary review of habitat assessment data indicates a lack of pools throughout the basin (Kerwin 2001).			X	X		
Off-channel habitat	At the upstream extent of the project area, between SE 30th Street and the confluence of Richards Creek, Sunset Creek is confined within rockery walls that are believed to have been placed in the early 1970s.			X		X	
Refugia	The action area has been heavily modified for commercial development, and the portions of Sunset Creek and Richards Creek within the action area have been constrained within hydromodified channels between commercial buildings. There is very little effective off-channel habitat in the action area.			X		X	
Channel Conditions and Dynamics							
Width/depth ratio	Sunset and Richard creeks in the project area are experiencing aggradation. This aggradation is resulting in shallow, wide streams.				X		
Stream bank condition	Changes in land use have significantly modified the Sunset Creek drainage. Higher peak discharges in the Sunset Creek drainage have enlarged channels and destabilized adjacent hillslopes.			X	X		
Floodplain connectivity	There has been a reduction in hydrologic connectivity between off-channel, wetland, floodplain and riparian areas.		X			X	
Flow/Hydrology							
Peak/base flows	The total impervious area by basin, as determined by City of Bellevue multispectral analyses in 2000, is 44 percent in Sunset Creek (City of Bellevue Utilities 2000). Higher peak discharges have result from increased impervious surfaces.			X		X	
Drainage network increase	There has been a significant increase in drainage network due to roads.			X		X	
Disturbance history	The Sunset Creek drainage is fully built out and the channel network has been extensively hydromodified.		X			X	

Table 8 (continued). Matrix of pathways and indicators for documenting the potential effects of the proposed project on Chinook salmon and steelhead.

Pathways: Indicators	Current Condition	Environmental Baseline			Effects of the Action		
		Properly Functioning	At Risk	Not Properly Functioning	Improve	Maintain	Degrade
Watershed Level Indicators							
Road density and location	The Sunset Creek drainage is highly urbanized with many valley bottom roads and stream crossings.			X		X	
Riparian reserves	A 1996 study found less than 5 percent mature riparian forests remaining in the Kelsey Creek watershed (May 1996) (Kerwin 2001).			X		X	

[a] Impacts at a local level but not sufficient to alter the environmental baseline for the watershed are indicated using a "-" for temporary, localized, or minor impacts and a "+" for temporary or localized beneficial alterations.

Justification for these findings is presented in the following sections. This discussion is limited only to those indicators that will be affected in some way by the proposed project. These include temperature, sediment, chemical contamination/nutrients, substrate embeddedness, pool frequency and quality, large woody debris, stream bank condition, and riparian conservation areas. Discussion of the remaining indicators that would not be affected by the project is included in Appendix F.

Water Quality: Temperature

Documented temperatures in Richards Creek exceeded the state water quality standards in August 1999. Temperatures in Richards Creek ranged from 55°F to 57.6°F in 1998, and from 58.5°F to 61.2°F in 1999 (Bellevue Critical Areas Update Streams Inventory 2003). Sunset Creek and Richards Creek are not listed as impaired on the 2004 303(d) list (Ecology 2007). However, the shallow stream conditions and limited riparian cover within the project action area suggest that stream temperature conditions may be **at risk**.

The proposed project will result in a narrower, deeper channel under baseflow conditions that will help to moderate stream temperatures. Existing riparian vegetation will be disturbed during construction, potentially resulting in increased solar exposure in the short-term. All disturbed areas will be planted with native trees and shrubs, and once this vegetation is established the combined effects of increased shading and improved channel configuration will **improve** stream temperature conditions in the project action area.

Water Quality: Sediment/Turbidity

The effects of human land use on the natural delivery and routing of sediment within the Kelsey Creek watershed were characterized using percent bare soils, road density, and percent unstable slopes (WSDOT 2004). Results indicate that the Kelsey Creek watershed is predominantly in an "at risk" condition for the delivery and routing of sediment, with the Sunset Creek component of the Richards Creek drainage considered to be "not properly functioning" (WSDOT 2004). The portion of Sunset Creek within the action area is therefore considered to be **not properly functioning** for this indicator.

Sunset Creek is experiencing aggradation caused by increased inputs of sediment induced by changes in land use. The project could temporarily degrade suspended sediment and turbidity in the proposed action area during construction of grade control and bank protection structures, and due to pulses of suspended sediment following rewatering of the culvert replacement exclusion area. However, conservation measures will be implemented to minimize the potential for suspended sediment to enter Sunset Creek. Therefore, these effects are not likely to be significant.

The inclusion of a sediment trap as part of the new culvert will reduce sediment delivery downstream, but this will predominantly affect delivery of coarse sediment rather than fine grained material. The sediment trap will, however, reduce the need for annual maintenance

dredging and move this activity into a contained structure. This will avoid the need for annual in-channel dredging in Sunset Creek, which should reduce bank and bed disturbance that contributes to fine sediment loading. Following installation of the new culvert, annual maintenance will be confined to the footprint of the sediment trap within the culvert structure, except under extreme conditions. The proposed project is expected to **improve** sediment conditions in Sunset Creek in the long-term.

Water Quality: Chemical Contamination/Nutrients

Water quality in the Kelsey Creek watershed is impaired by low dissolved oxygen levels and high fecal coliform levels (Ecology 2004). Monitoring by King County found high phosphorus concentrations in the basin. The United State Geological Survey (USGS) National Water Quality Assessment Program (1998) measured high levels of polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs) and dichloro-diphenyl-trichloroethane (DDT) in sediments and fish tissues in the West Tributary of Kelsey Creek. In 1999, the USGS identified a variety of pesticides in stormwater runoff entering Sunset Creek and correlated these to retail pesticide sales at nearby home and garden stores (WSDOT 2004). In addition to these pollutants, stormwater runoff from adjacent impervious surfaces also affects Sunset Creek during flood events. On this basis, the segment of Sunset Creek within the action area is rated as **at risk** for this indicator.

The proposed project will not introduce chemical contaminants or alter nutrients levels in Sunset Creek. Accidental spills from construction equipment are one potential source of construction related contamination. The project incorporates adequate BMPs to ensure that these potential impacts will be avoided or minimized. Therefore, there the likelihood of adverse chemical contamination or nutrient impacts is considered discountable.

The proposed project will increase conveyance capacity of the culvert at SE 30th Street. The proposed improvements should alleviate reoccurring flooding of the adjacent properties. It is likely that flood waters in the existing condition collect contaminants from surrounding streets and parking lots prior to returning to the stream. Decreasing overland flood frequency in the project area is expected to incrementally improve water quality of Sunset Creek, but the extent of these effects is likely minor and has not been quantified.

On this basis it is concluded that the proposed project will **improve** the condition of this indicator in the action area.

Habitat Access: Physical Barriers

There are a number of potential physical barriers to fish passage in the Kelsey Creek watershed. Impassible barriers at culverts reduce distribution in some of the smaller tributaries, including Richards Creek (Kerwin 2001). Sunset Creek flows through the commercialized I-90 corridor and residential neighborhoods before entering Richards Creek. Four major culverts with a combined length of over 2,000 feet limit fish passage in Sunset Creek. Potential passage barriers

downstream of the project area are imposed by extensive beaver dam complexes on Richards Creek north of Kamber Road (Paulsen 2007). The existing twin culverts at SE 30th Street are not currently passable to fish at all flows. Extensive sediment deposition in Sunset Creek downstream of these culverts presents a low flow barrier to fish passage, and sediment deposition upstream of SE 30th Street has created gradient and velocity conditions that are a likely barrier to passage during high flow conditions. On this basis, Sunset Creek is rated as **not properly functioning** for this indicator.

The proposed project would improve fish passage conditions in Sunset Creek at the SE 30th Street culvert and address barrier conditions in the channel both upstream and downstream of the structure. The new culvert would provide for full fish passage for all species and life history stages likely to occur in this system during the flow conditions in which migratory and dispersal behavior is likely to take place. In addition, the grade control structures, culvert configuration, and sediment trap would prevent aggradation at the inlet and outlet of the culvert that currently limits fish passage. As such, the proposed project would **improve** the baseline for this indicator.

Habitat Elements: Substrate

Between SE 30th Street and the confluence with Richards Creek, Sunset Creek is predominantly gravel bedded and confined within rockery walls. Ongoing aggradation has occurred in this reach due to decreased sediment transport capacity in comparison to upstream reaches. Over the last 30 years, bed elevations in this reach of Sunset Creek have increased from 3 to 4.5 feet. At the SE 30th Street culverts, ongoing sediment deposition requires annual dredging to maintain conveyance. The action area is **at risk** for this indicator.

The inclusion of sediment trap as part of the new culvert structure will reduce sediment delivery downstream. The sediment trap will also help minimize annual in-channel dredging in Sunset Creek to clear gravels from above and below the existing culvert. Following installation of the new culvert, annual maintenance will be confined to the footprint of the sediment trap within the culvert structure, except in extreme circumstances. Potential long-term geomorphic effects downstream of the of the culvert replacement structure include degradation of the bed surface and bed coarsening. Because the natural processes influencing sediment delivery and transport are highly variable, the proposed project includes post-construction monitoring and adaptive management strategies as described in the *Project Description* section of this report. Adaptive management strategies will be used to develop sediment trap maintenance guidelines and to respond to channel conditions should very low or high amounts of sediment delivery initiate excessive channel degradation or aggradation. The proposed grade control structures in the Sunset Creek channel on both sides of SE 30th Street will increase hydraulic complexity and diversify channel substrate conditions. The proposed project is expected to **maintain** substrate conditions in the project action area in the long-term.

Habitat Elements: Large Woody Debris

Habitat assessments have been conducted in Richards Creel, East Creek, Sunset Creek, and parts of Kelsey and Valley creeks. Preliminary review of these data indicates a lack of large woody

debris and pools throughout the basin. However, analysis of the data has not been finalized (City of Bellevue, unpublished data; Kerwin 2001). Upstream portions of Richards Creek have been observed to lack woody debris (Bellevue 2003). Channel surveys conducted in support of the proposed project found no functional pieces of large woody debris in the project area, as measured using King County Level I protocols. The project area is **not properly functioning** for this indicator.

The proposed grade control structures will consist of wood and boulder materials that span the stream channel and will be keyed into the adjacent stream banks. In addition, LWD pieces will be incorporated in bank protection structures as part of the proposed project. The addition of approximately 40 pieces of functional LWD as part of the grade control and bank protection structures will **improve** the condition of this indicator within the project action area.

Habitat Elements: Pool Frequency/Pool Quality

Habitat assessments have been conducted in Richards Creek, East Creek, Sunset Creek, and parts of Kelsey and Valley creeks. Preliminary review of these data indicates a lack of large woody debris and pools throughout the basin (Kerwin 2001). Upstream portions of Richards Creek have been observed to lack woody debris and well formed pools (Bellevue 2003). Within the project action area, there are a limited number of low quality pools present, predominantly at the downstream end of the action area outside of the project area. On this basis, the action area is rated as **not properly functioning** for this indicator.

The proposed project will increase pool density and pool quality in the action area. The channel profile will be deepened, and the grade control structures will increase hydraulic complexity promoting pool formation. LWD with rootwads used in the grade control and bank protection structures will increase habitat complexity in these pools, and associated riparian enhancements will increase bankside cover. On this basis, the project will **improve** the baseline condition for pool quality in the project action area.

Habitat Elements: Off-Channel Habitat; Refugia

The portion of the Sunset Creek drainage within the project area has been heavily modified. Between SE 30th Street and the confluence of Richards Creek, Sunset Creek is confined within rockery walls that are believed to have been placed in the early 1970s. The straight, plane-bed channel pattern provides little hydraulic or habitat complexity and during low flow conditions, the wide, shallow channel presents a fish passage barrier. Downstream of the Sunset Creek and Richards Creek confluence, the channel widens briefly (to approximately 25 feet) as it flows north before again being confined within rockery walls installed when the stream was channelized. The project action area is rated as **not properly functioning** for this indicator.

The proposed project will not create or modify off-channel habitat or refugia within or outside the project action area, therefore the project will **maintain** the baseline condition for this indicator.

Channel Conditions and Dynamics: Width/Depth Ratio

Sunset Creek within the project action area has an unnatural width to depth ratio because it is a confined, artificial channel that is out of equilibrium with sediment delivery conditions. Between SE 30th Street and the confluence with Richards Creek, the Sunset Creek channel is predominantly gravel bedded and confined within rockery walls that are believed to have been placed in the early 1970s, at the time the stream was channelized and the adjacent properties were developed. The channel is straight, with a typical top width of approximately 12 feet. Ongoing aggradation in this reach has raised bed elevations by 3 to 4.5 feet since the 1970s. The straight, plane-bed channel pattern provides little hydraulic or habitat complexity, and during low flow conditions, the wide, shallow channel presents a partial fish passage barrier. High flow channels in the confined floodplain above the rockery walls run adjacent to building foundations in several locations downstream of SE 30th Street. Based on these existing conditions, Sunset Creek is considered to be **at risk** for this indicator within the project action area.

The inclusion of a sediment trap as part of the new culvert structure will reduce sediment delivery to channels downstream. Because the natural processes influencing sediment delivery and transport are highly variable, the proposed project includes post-construction monitoring and adaptive management strategies as described in the *Project Description* section of this report. Adaptive management strategies will be used to develop sediment trap maintenance guidelines and to respond to channel conditions should very high or low amounts of sediment delivery initiate excessive channel degradation or aggradation. By helping to control aggradation in the channel downstream of the replacement culvert the proposed project is expected to **improve** width/depth ratio conditions in Sunset Creek in the long-term.

Channel Conditions and Dynamics: Stream Bank Condition

Between SE 30th Street and the confluence with Richards Creek, Sunset Creek is predominantly gravel-bedded and confined within rockery walls that are believed to have been placed in the early 1970s, at the time the stream was channelized and the adjacent properties were developed. In the project area, riprap armoring has been placed along much of the existing Sunset Creek channel. As such, bank stability has been artificially modified in this segment. Sediment aggradation has locally filled the channel beyond the existing bank stabilization, leading to erosion of the surrounding overbank areas during high flow events. On this basis, Sunset Creek is rated as **not properly functioning** for this indicator.

The proposed project will remove approximately 600 square feet of riprap from the stream banks upstream and downstream of the SE 30th Street culvert and install bank protection structures. In addition 6,800 square feet of the stream bank will be replanted with native riparian vegetation appropriate for this site. Riprap removal, channel reconfiguration, and bioengineered bank stabilization will result in stable, more natural streambank conditions. On this basis, the proposed project is expected to **improve** stream bank conditions in the project action area.

Channel Conditions and Dynamics: Floodplain Connectivity

There has been a reduction in hydrologic connectivity between off-channel, wetland, floodplain and riparian areas. Wetlands and riparian vegetation has been significantly altered from pristine conditions and the existing floodplain consists of a built environment of buildings, parking lots, and road corridors. On this basis, the project action area is considered to be **not properly functioning** for this indicator.

The proposed project will alter the frequency and duration of overbank flooding in the project action area. Specifically, the replacement culvert at SE 30th Street and associated channel modifications will provide the flow capacity necessary to limit overtopping of the culvert to storms larger than the 100-year event. Over time, adaptive management of sediment delivery rates to Sunset Creek downstream of the culvert will allow for a gradual lowering of the channel profile and an increase in flow capacity. This will decrease the frequency of floodplain inundation in the action area downstream of the culvert. However, because the floodplain no longer provides natural floodplain functions this effect should not be viewed as degradation. Maintaining flood flows within the active channel is expected to increase sediment transport rates through the affected reach, presenting the potential for undesirable alteration of habitat conditions. As noted however, channel conditions will be monitored over time to ensure that an appropriate channel profile and desirable habitat conditions are being maintained. The targeted endpoint channel profile will allow for inundation of the adjacent riparian corridor will limiting overbank flooding of the surrounding parking lots and buildings. This managed condition will at least **maintain** and could arguably improve the condition of this indicator.

Flow/Hydrology: Change in Peak/Base Flows

Total impervious area in the 10 storm drainage basins in the Kelsey Creek watershed ranges from 30 to 68 percent; as a result, all basins rate moderate to poor for total impervious area (City of Bellevue 2003). Changes in land use and development have impacted channel conditions in the Sunset Creek drainage for over half a century. By 1944 much of the upper Sunset Creek drainage had been deforested and by 1960 most of this watershed was occupied by single family developments. By 1999 changes in land use had so significantly modified ground cover that the effective impervious area of the Sunset Creek drainage was 30 percent (Entranco 1999). The total impervious area by basin, as determined by City of Bellevue multispectral analyses in 2000, is 44 percent in Sunset Creek (Kerwin 2001). Higher peak discharges result from increased impervious surfaces and as a result, like in so many urbanized watersheds, channels in the Sunset Creek drainage increased in size and destabilized adjacent hillslopes. Overall, Sunset Creek has moderate levels of channel and flow modifications (Bellevue Critical Areas Report). On this basis, Sunset Creek is rated as **at risk** for this indicator.

The proposed project will not increase impervious surfaces and will therefore have no effect on peak or base flow conditions in Sunset Creek. However, flood waters will be contained within the existing channel more effectively. On this basis, the project is expected to **maintain** the condition of this indicator.

Flow/Hydrology: Increases in Drainage Network

There has been a significant increase in the drainage network of the Sunset Creek watershed due to extensive impervious surface development, and undetained stormwater drainage systems. The project action area is rated as **not properly functioning** for this indicator.

The proposed project will not increase or decrease the drainage network in the Sunset Creek action area. Therefore, the proposed project will **maintain** the baseline for this indicator.

Watershed Level Indicators: Road Density and Location, Disturbance History, Riparian Reserves

The Kelsey Creek watershed in general and the Sunset Creek drainage in particular are extensively urbanized. The Sunset Creek drainage is essentially completely built out and the channel network has been extensively modified to support historic development activities, indicating a considerable disturbance history and limited capacity for regeneration of fully functional habitat conditions. Extensive development flanks the stream throughout much of its length, and there are numerous stream crossings and valley bottom roads in the stream corridor. Riparian reserves are limited to a small area of the drainage upstream of the I-90 corridor, and remaining riparian habitat is highly fragmented and degraded. These indicators are rated as **not properly functioning** at the watershed scale.

The proposed project will not result in increased development or change the scale of existing development features. The project has been designed to improve habitat conditions, and to provide for improved management of sediment production induced by the results of prior development. The project will also result in minor localized improvements in riparian conditions within the action area, but these improvements will not significantly increase the extent of riparian reserves in the watershed. On this basis, the proposed project is expected to **maintain** the condition of all watershed level indicators.

Direct Effects of the Action on Listed Species

The proposed project has the potential to create both direct and indirect effects on the ESA-listed species occurring within the action area. In general, the potentially harmful direct effects would be limited to temporary suspended sediment and turbidity increases associated with the short-term construction-related impacts. Indirect effects resulting from the project include changes in habitat features and geomorphic processes. Elements of the proposed project that are likely to adversely affect Puget Sound steelhead trout and Puget Sound Chinook salmon are discussed together below.

All project-related direct effects on aquatic habitats will occur during the July 1 to August 31 in-water work window, which is specifically defined around periods when sensitive fish species are either not present or are relatively less vulnerable to disturbance-related impacts. Based on the

best available information, Puget Sound Chinook salmon and steelhead trout are the only federally listed salmonid species that could potentially occur in the project action area. Of these species, only rearing juvenile steelhead are likely to be present when construction occurs and thereby subject to direct construction related impacts.

Direct effects to juvenile steelhead could include: increases in turbidity and sedimentation during construction, potential take during dewatering and fish removal of the project area, changes to habitat conditions, water quality impacts, and long-term geomorphic impacts.

Insignificant and Discountable Effects

The proposed project will generate noise during construction; however, no significant underwater noise is anticipated because all construction work will take place within a dewatered exclusion area. The project will involve the placement of coffer dams, a bypass pipe, and a flow dissipater, but these activities will be conducted primarily using manual labor. While no specific data on underwater noise levels produced by these types of activities are available, they are expected to be well below noise levels associated with disturbance related effects on ESA-listed salmonid species.

The following information is used to substantiate this assertion. Monitoring of noise levels associated with construction work on the Friday Harbor ferry terminal determined that non-pile driving related construction activities (construction vessel use, materials placement, underwater tool use) produced underwater noise ranging from 133 dB_{peak} to 140 dB_{peak} (WSDOT 2005). These activities were conducted in relatively deep marine waters ideal for noise propagation. Because these construction activities were of far greater intensity than manual placement of coffer dam and bypass materials, and shallow water conditions present during the in-water work window will further limit noise levels produced (water depths of less than 3 feet limit sound propagation [Urick 1983]), it can reasonably be concluded that construction of the bypass has no potential to produce underwater noise in excess of 150 root mean square decibels (dB_{RMS}). This is the established threshold for disturbance of ESA-listed salmonids (Stadler 2007; Teachout 2007). Rough conversion of this threshold to peak decibel values produces an effect threshold of approximately 165 dB_{peak} (WSDOT 2006), which is well above underwater noise levels that could possibly be produced by the project. On this basis, the risk of noise related effects on steelhead are considered to be discountable. Chinook salmon will not be present in the vicinity when construction takes place; therefore there is no potential for noise related impacts.

Water Quality Effects

The primary water quality effect of concern expected to result from the proposed project is elevated suspended sediment levels produced during coffer dam and bypass placement and removal, and during and following exposure of the reconfigured channel and streambanks to the first significant storm event of the season. Elevated suspended sediments are also likely to occur during maintenance, but these activities will be conducted as a separately permitted action that has already been subject to ESA consultation. The proposed project is likely to produce elevated

suspended sediment during exclusion area placement and removal, and during the "first flush" of the project area during exposure to the first storm event following construction. Elevated suspended sediments are a potential source of take that must be considered during ESA consultation. To provide context for the level of effects expected from the proposed project, a summary of research on the effects of exposure to sediment related stressors is provided. The anticipated levels of sediment exposure expected to result from the project are described relative to levels shown to cause adverse effects.

While juveniles of many salmonid species thrive in rivers and estuaries with naturally high concentrations of suspended solids, studies have shown that suspended solids concentration (as well as the duration of exposure) can be important factors in assessing risks posed to salmonid populations (Newcombe and MacDonald 1991; McLeay et al. 1986; Servizi and Martens 1987). Lake and Hinch (1999) found that concentrations of suspended solids in excess of 40,000 parts per million (ppm) to elicit stress responses in juvenile coho salmon. Juvenile coho, Chinook, and sockeye (*O. nerka*) salmon exposed to natural Fraser River sediments experienced a 96-hour LC_{50} (the concentration at which 50 percent population mortality was observed) at concentrations ranging from 17,600 to 31,000 ppm. Suspended solids concentrations this high are unlikely to occur as a result of the proposed project, given the nature of the work planned and the proposed BMPs incorporated into the project plans. This suggests that the likelihood of direct mortality or injury resulting from sediment exposure is discountable.

Elevated suspended sediments can lead to sublethal and behavioral effects in the absence of mortality. Studies on a variety of salmonids, including sockeye and Chinook (Newcomb and Flagg 1983) and coho (Noggle 1978), attribute chronic and acute impacts from high suspended solids concentrations to reduced oxygen uptake (Wilber and Clarke 2001). Sigler et al. (1984) noted reduced growth rates in juvenile steelhead and coho salmon at suspended solids concentrations as low as 100 ppm, while Servizi and Martens (1992) noted increased cough frequency in juvenile coho at concentrations of approximately 240 ppm. Aksnes and Utne (1997), Mazur and Beauchamp (2003), and Vogel and Beauchamp (1999) all report that suspended solids at sublethal concentrations have been shown to alter territoriality, feeding, and homing behavior. However, it also appears that under certain circumstances, elevated suspended solids may actually benefit salmonids by providing cover (Gregory and Levings 1998) or triggering a sense of predation cover for salmonids (Gregory 1993). The studies of Gregory and Northcote (1993) indicated that when suspended solids concentrations exceeded 200 ppm, juvenile salmon increased their feeding rates while demonstrating pronounced behavioral changes in prey reaction and predator avoidance.

In studies of coho behavior in the presence of short-term pulses of suspended solids, Berg and Northcote (1985) demonstrated that elevated suspended sediments (measured as turbidity levels) can cause behavioral disruption and stress, as evidenced by gill flaring, and changes in territorial and feeding behaviors. Specifically, the social organization of juvenile salmonids broke down, and gill flaring indicative of stress occurred more frequently when fish were exposed to turbidity levels between 30 and 60 nephelometric turbidity units (NTU). Normal behaviors were observed at turbidity levels between 1 and 20 NTUs. Salmonids rapidly reestablish social organization

elevated turbidity conditions return to normal levels (Berge and Northcote 1985; Bisson and Bilby 1982).

The level of suspended sediment concentrations expected from the proposed project is not known, but given the nature of the work and the BMPs planned the likelihood of adverse effects is considered low. However, sediment levels produced may exceed thresholds associated with behavioral modification. The greatest potential for project related suspended sediment effects is expected to occur during exclusion area placement and removal, because these activities will occur during the in-water work window. This period is typically associated with low flow conditions when water clarity is highest, meaning that project related sediments could measurably alter the baseline condition. This suggests the potential for behavioral effects on salmonids present in the system. Because these effects will occur during the in-water work window, steelhead are the only species likely to experience exposure to this stressor.

The first flush effect will occur after the in-water work window, suggesting that both steelhead and Chinook salmon could be exposed to resulting elevated suspended sediment levels. The project area contains potential spawning habitat for Chinook salmon. Chinook salmon in this system spawn in September and October, indicating the potential for redd exposure to elevated suspended sediments during the first flush effect. However, it is important to note that the action area is effectively inaccessible to adult Chinook salmon during early fall low flow period. Access to the action area is blocked by numerous downstream beaver dams and within the action area the sediment plug in the Sunset Creek and Richards Creek channels is an effective low flow passage barrier. In effect, Chinook would not be able to access this spawning habitat until the first flush effect was already underway. This suggests that the potential for redd exposure to elevated suspended sediments resulting from the project is discountable, as the stressor will have subsided by the time that spawning behavior commences.

The intensity of the first flush related suspended sediment stressor is difficult to quantify; however, it is expected to be effectively indistinguishable from the natural suspended sediment load that occurs during storm events. All disturbed bank areas will be stabilized with bioengineered bank protection, meaning that there will be no exposed soils vulnerable to erosion. This indicates that the amount of fine sediments available for erosion will be limited. The contribution of first flush related suspended sediments to baseline levels of fine sediment loading from upstream areas of the drainage is expected to be unmeasurable, and therefore the effects on adult Chinook salmon and juvenile steelhead will be insignificant. Adult steelhead do not enter the Kelsey Creek watershed until December or January, long after the first flush effect will have occurred. Therefore, there is effectively no likelihood of sediment related effects on adult steelhead.

The proposed project is expected to result in minor long-term improvements in water quality. Currently, frequent flooding of adjacent impervious surfaces enhances transport of stormwater pollutants from nearby parking lot areas directly to the stream system. This is likely to adversely affect water quality in the action area. The proposed project will significantly decrease the frequency of this type of flooding, meaning that stormwater from some of these areas will be transported into drainage systems that carry the water away from the action area. While this

effect is likely to be minor relative to existing water quality conditions in the system, it will nonetheless produce a beneficial improvement.

Fish Handling and Relocation

The proposed project will require dewatering of approximately 460 feet of stream channel habitat during culvert replacement, installation of grade control and bank protection structures, and riprap removal below the OHWM. An exclusion area will be developed around the work area at the beginning of the in-water work window (July 1 to August 30).

Chinook salmon are not likely to be present in the stream in during the in-water work window. However, it must be concluded that juvenile steelhead could be present and exposed to capture, handling, and relocation related stressors. All fish handling will be conducted consistent with the WSDOT Fish Exclusion Protocols and standards, as described in Appendix C. While these protocols are designed to minimize the potential for injury to captured fish, injury and/or mortality may still occur. The act of fish handling (harassment) and the potential for injury constitute a take under the ESA.

Direct effects from fish capture, handling, and relocation include:

- Capture by netting, leading to direct mortality, injury, and stress
- Physical and thermal stress and possible trauma associated with handling and transfer during capture and transfer between temporary holding containers and release locations
- Direct mortality, injury, and stress from electrofishing (should this technique be necessary as a last resort)
- Stranding and asphyxiation
- Entrainment or impingement in block nets or bypass equipment
- Increased stress, predation exposure, and habitat competition once relocated
- Increased competition for aquatic species forced to compete with relocated animals.

Of the various methods used for dewatering and fish handling, the majority of research has been conducted on incidental mortality and injury rates associated with electrofishing. While the WSDOT protocol discourages the use of electrofishing, it allows for its use if other capture methods prove ineffective. Net-based capture will be used to the greatest extent possible. The possibility that electrofishing may prove necessary dictates consideration of the potential effects herein.

The relatively few studies that have been conducted on electrofishing effects on juvenile salmonids suggest that juvenile fish are susceptible to spinal injury from this technique, although at lower rates than adults. Injury rates are variable, reflecting factors such as fish size and sensitivity, individual site conditions, fish handling crew experience, and the type of equipment used (Ainslie et al. 1998; Dalbey et al. 1996; Dwyer and White 1997; McMichael et al. 1998; Sharber and Carothers 1988; Thompson et al. 1997). The WSDOT guidance identifies equipment types and settings associated with the lowest observed injury rates. Therefore, while injury and mortality may occur, these effects will be minimized to the greatest extent possible.

Even if electrofishing is not required, the act of capture and handling demonstrably increases physiological stress in fishes (Frisch and Anderson 2000). Primary contributing factors to handling-induced stress and death include exposure to large changes in water temperatures and dissolved oxygen concentrations (caused by large differences between the capture, holding, and release environments); duration of time held out of the water; and physical trauma (e.g., due to net abrasion, squeezing, and/or accidental dropping). Even in the absence of injury, stress induced by capture and handling can have a lingering effect on survival and productivity. One study found that handling stress impaired predator evasion in salmonids for up to 24 hours following release and caused other forms of mortality (Olla et al. 1995).

Failure to capture and remove fish from work areas may also lead to take. Fish left in the stream exclusion area would potentially be directly exposed to stranding and asphyxiation during dewatering. Many juvenile salmonids are cryptic and can avoid being detected even when using multiple pass electrofishing because they hide in cobble/boulder interstices (Peterson et al. 2004, 2005).

NMFS has estimated incidental take resulting from dewatering and fish handling associated with stream crossing projects. In calculating incidental take from these activities, the agency applied an estimated stranding rate of 8 percent for ESA-listed salmonids (which equates to 8 percent mortality) (NMFS 2006). These findings would appear to be applicable to this project.

Dewatering and fish relocation may produce additional effects on survival, growth, and fitness. Fish removed from the stream exclusion area will be relocated to habitats that may be occupied by other juvenile fish. This will lead to increased competition for prey and refuge habitat, which may affect the growth and fitness of affected individuals. In addition, dewatering within the exclusion area will lead to mortality of aquatic macroinvertebrates that serve as the primary prey resource. However, research on the effects of dewatering on aquatic insect communities has shown that affected habitats are quickly recolonized (Miller and Golladay 1996; Fowler 2004), so this effect will be short term in duration. Increased predation exposure is expected to have some effect on juvenile survival, but the extent of this effect is difficult to quantify.

Effect Determinations

This section presents the effect determinations for ESA-listed species known to occur or potentially present within the action area.

Puget Sound Chinook Salmon

On the basis of the analyses described in this biological assessment, it is determined that the proposed project **may affect** but is **not likely to adversely affect Puget Sound Chinook salmon**.

Considering the range of actions for the proposed project, the project **may affect** Chinook salmon because:

- The project will alter aquatic habitat conditions and water quality in the action area
- Adult Chinook salmon may be exposed to elevated suspended sediments during the "first flush" effect.

The proposed project is **not likely to adversely affect** Chinook salmon because:

- The effects of suspended sediment stressor exposure are expected to be unmeasurable and insignificant
- The proposed project will either maintain or improve the condition of all habitat indicators; no habitat indicators will be degraded
- The proposed project will result in an incremental improvement in water quality conditions in the action area.

The likelihood of this species being present in the action area during construction of the proposed project is considered negligible. Juvenile Chinook salmon are known to move out of the Lake Washington system by early May, and adult Chinook are typically not present in tributary streams prior to September. Therefore, the potential for exposure to direct construction related effects during the in-water work window is considered discountable. Adult Chinook salmon may experience exposure to elevated suspended sediments associated with the first flush of the project area in the first fall storm event, but stressor exposure is expected to be consistent with the natural range of suspended sediment conditions that occur in the system therefore the effects will be insignificant. Redd exposure to elevated suspended sediments is not expected to occur as storm flows would be required for adult Chinook salmon to access and spawn in the affected area, meaning that sediment effects will have subsided by the time that spawning commences.

The direct and indirect effects of the proposed project will result in improved fish passage and habitat conditions, as measured using established matrix of pathways and indicators (NMFS 1996). The proposed project will not result in significant or long-term degradation of any of these habitat indicators, and will improve the condition of several indicators. The resulting habitat improvements should benefit Puget Sound Chinook Salmon and all other salmonid species that occur or may occur in the action area.

The action area does not include any currently designated critical habitat. Therefore, the proposed project will have **no effect on critical habitat for Puget Sound Chinook Salmon**.

Puget Sound Steelhead Trout

On the basis of the analyses described in this biological assessment, it is determined that the proposed project **may affect** and is **likely to adversely affect steelhead trout**.

Considering the range of actions for the proposed project, the project **may affect** steelhead trout because:

- Steelhead trout may be present in Sunset Creek, including the action area, during construction
- Juvenile steelhead may be exposed to capture, handling, and relocation associated with development of the exclusion area and flow bypass
- The project will alter aquatic habitat conditions and water quality in the action area.

The project is **likely to adversely affect** steelhead trout because:

- Disturbance associated with stream exclusion area development may cause behavioral alteration and stress
- Fish capture, removal, and relocation has the potential to cause injury or mortality, and can induce non-lethal stressors potentially limiting to survival, growth, and fitness
- Exposure to elevated suspended sediments during stream exclusion area development and removal may cause behavioral alterations.

As noted, stressors associated with exclusion area creation, dewatering, and fish handling have the potential to result in take of steelhead in the form of disturbance, behavioral alteration, and possible injury and/or death from capture and handling. All other elements of the project would not be expected to adversely affect steelhead, based on the same rationale applied to Chinook salmon.

Critical habitat designation for Puget Sound Steelhead is currently in development. Therefore, the proposed project will have **no effect on critical habitat for steelhead**. Should future critical habitat designation include the action area before the project is completed, consultation will be reinitiated to address any potential effects.

Cumulative Effects

Cumulative effects are those effects of future state, local or private activities, not involving federal activities, that are reasonably certain to occur within the action area of the federal action subject to consultation.

The foreseeable effects of future state, local and private actions are not likely to further degrade conditions in the action area or larger watershed, as the surrounding area is fully developed. Future City of Bellevue actions may include projects designed to improve habitat conditions and address sediment management and flood conveyance challenges in this portion of the Kelsey Creek watershed. It is expected that adaptive management of sediment conditions in the Sunset Creek/Richards Creek stream system will be integrated with any future projects in this reach to ensure that desirable habitat conditions are maintained to the greatest extent practicable.

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APPENDIX A

Photographic Documentation

SE 30th Street/Sunset Creek Flood Improvement Project Photographic Log

Photo Number	Photo Description
1	Downstream end of SE 30th Street culvert crossing of Sunset Creek, facing southeast.
2	Upstream end of SE 30th Street culvert, facing north.
3	Same view as photo 2, showing coarse bedload accumulation at the culvert mouth, and constriction of invert opening.
4	Riparian vegetation upstream of SE 30th Street, edge of street facing southeast.
5	Riparian vegetation downstream of SE 30th Street in April 2007, standing on sediment plug in the channel immediately north of the culvert outlet facing north.
6	Typical sediment accumulation in Sunset Creek channel downstream of SE 30th Street, facing west. The visible sediment plug is composed predominantly of gravel sized material deposited over one fall and winter storm season. Note the riprap bank armoring on the west bank, which is typical throughout the project area.
7	Riparian vegetation downstream of SE 30th Street in April 2007, standing on sediment plug in the channel immediately north of the culvert outlet facing north.
8	Panoramic photo showing channel and riparian conditions in Sunset Creek upstream of SE 30th Street during November 2006 low flow conditions. Note building and parking lot encroachment. Edge of street facing southeast.
9	December 2007 flood event, south side of SE 30th Street at Sunset Creek crossing, facing northwest.
10	Same event, same aspect taken from further east on SE 30th Street.
11	Same event, from north side of SE 30th Street at Sunset Creek crossing facing southwest.
12	Same event, SE 30th Street culvert outlet, east side of Sunset Creek facing southwest.
13	Same event, same location as photo 12 facing north (downstream) along the Sunset Creek channel.
14	Same event, same aspect as photo 13, taken further downstream. Note floodwater encroachment on building foundations.
15	Same event, upstream end of SE 30th Street culvert, east side of Sunset Creek facing west.
16	Same event, same aspect as photo 15, slightly upstream. Note backwater effect induced by undersized culvert inverts.
17	Same event, Sunset Creek channel upstream of backwater effect induced by SE 30th Street culvert. East side of channel facing west.
18	Same event, same aspect taken further upstream. Note how the flood flows are contained within the channel. Rootwad and log bank protection are elements of a previously constructed channel modification project.
19	Sunset Creek channel at SE 30th Street culvert outlet facing southwest. Sediment accumulation visible at the outlet is part of the sediment plug that deposited over the course of one fall and winter storm season.

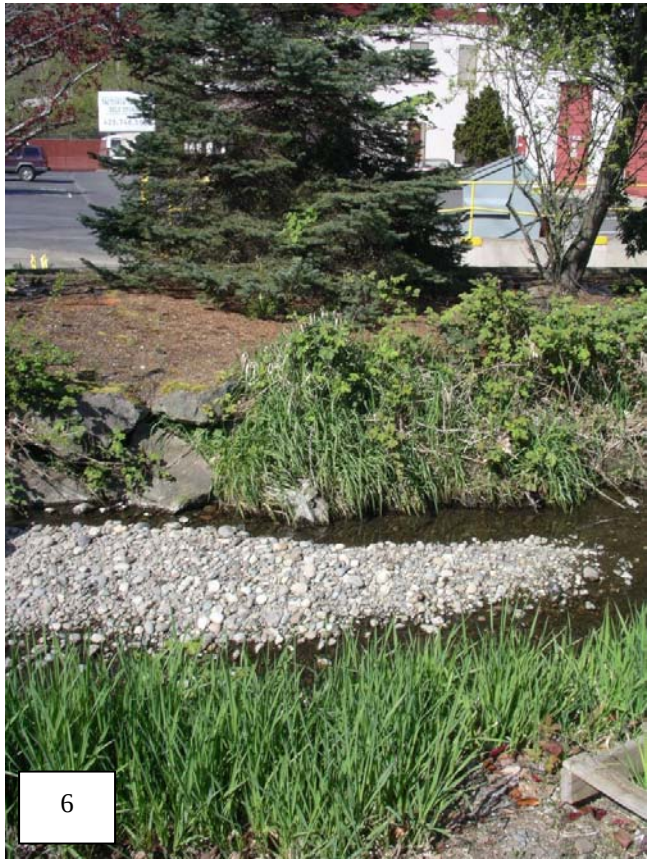
1

2

3

4

5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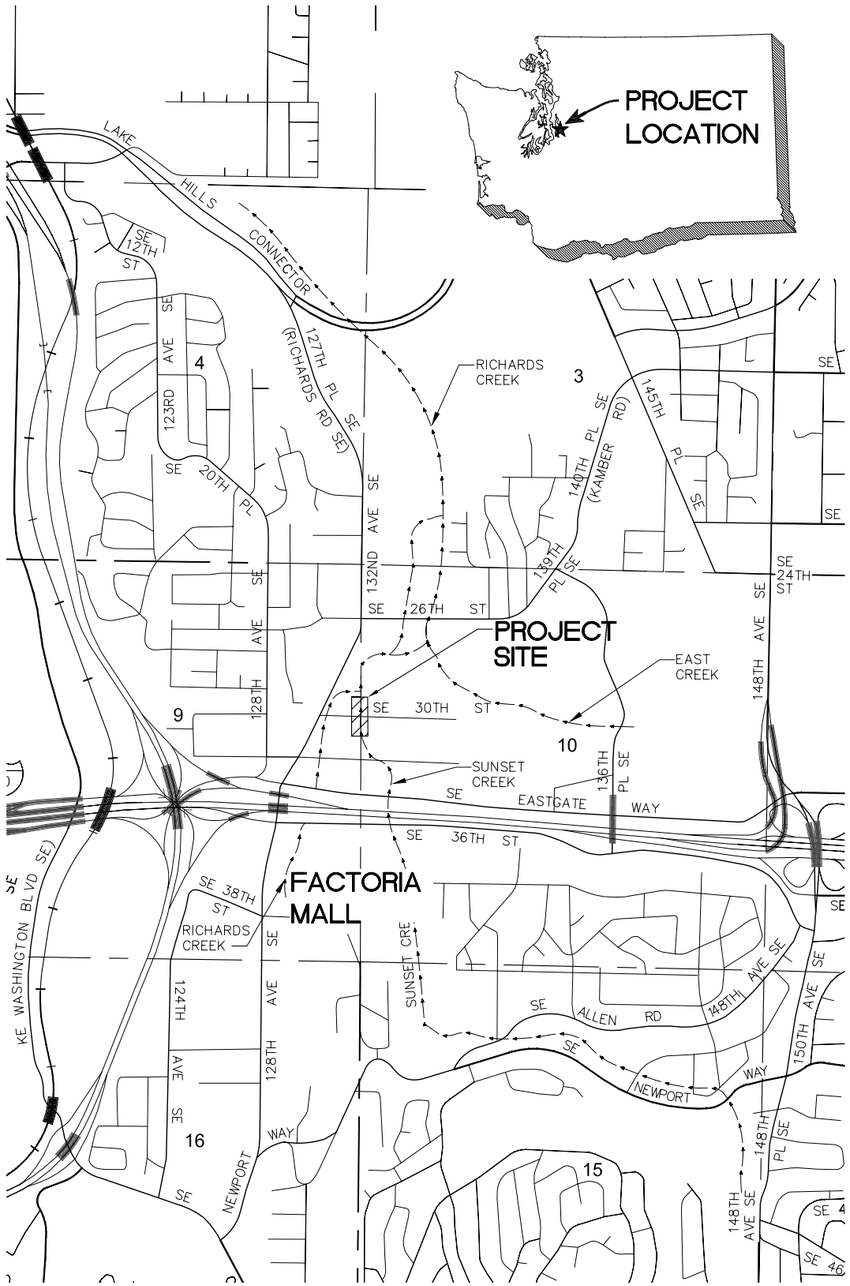
APPENDIX B

60% Design Drawings

CITY OF BELLEVUE
SE 30TH STREET/SUNSET CREEK
CULVERT REPLACEMENT PROJECT

BELLEVUE, WASHINGTON



VICINITY MAP
SCALE: 1"=1000'

SHEET INDEX		
SHT NO.	DWG NO.	SHEET DESCRIPTION
1	G-1	TITLE SHEET, INDEX, AND VICINITY MAP
2	G-2	GENERAL NOTES
3	G-3	ABBREVIATIONS AND LEGEND
4	G-4	SITE PLAN
5	C-1	ROADWAY CORRIDOR DEMOLITION PLAN
6	C-2	ROADWAY PHASING PLAN AND NOTES
7	C-3	UTILITIES PLAN
8	C-4	UTILITIES DETAILS
9	C-5	ROADWAY PLAN AND SECTION
10	C-6	ROADWAY PLAN AND SECTION
11	C-7	CULVERT REPLACEMENT PLAN AND NOTES
12	C-8	CULVERT REPLACEMENT PROFILE AND NOTES
13	C-9	CULVERT REPLACEMENT DETAILS
14	C-10	STREAM CORRIDOR SITE PREPARATION PLAN
15	C-11	UPPER STREAM CHANNEL MODIFICATIONS PLAN AND PROFILE
16	C-12	LOWER STREAM CHANNEL MODIFICATIONS PLAN AND PROFILE
17	C-13	STREAM CHANNEL MODIFICATIONS DETAILS
18	ESC-1	TEMPORARY EROSION AND SEDIMENT CONTROL PLAN
19	ESC-2	TESC DETAILS
20	WM-1	FLOW DIVERSION AND FISH EXCLUSION DETAILS
21	P-1	PLANTING PLAN
22	P-2	PLANTING DETAILS
23	P-3	PLANT MATERIAL LIST

1 / C-3 — DETAIL REFERENCE NUMBER / DRAWING ON WHICH DETAIL IS SHOWN

DETAIL
SCALE: NTS
1 / C-1 — DETAIL REFERENCE NUMBER / DRAWING FROM WHICH DETAIL WAS TAKEN

A / C-4 — SECTION REFERENCE LETTER / DRAWING ON WHICH SECTION IS SHOWN

SECTION
SCALE: NTS
A / C-2 — SECTION REFERENCE LETTER / DRAWING FROM WHICH SECTION WAS TAKEN

"–" INDICATES THAT THE DETAIL/SECTION IS SHOWN ON THE SAME SHEET

"TYP" INDICATES THAT THE DETAIL/SECTION IS UNIFORMLY TYPICAL THROUGHOUT PROJECT EXCEPT WHERE OTHERWISE NOTED

"VAR" SPECIFIES THAT DETAIL/SECTION WAS TAKEN FROM SEVERAL DRAWINGS

NOTE AND DETAIL/SECTION REFERENCING

MARK EWBANK — STATE OF WASHINGTON — 29434 — CIVIL ENGINEER — PROFESSIONAL ENGINEER

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NO	DATE	BY	APPR	REVISIONS

HERRERA ENVIRONMENTAL CONSULTANTS
2200 Sixth Avenue
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Seattle, Washington
98121-1820
206-441-9080
206-441-9108 FAX
http://www.herrerainc.com

SE 30TH STREET / SUNSET CREEK
CULVERT REPLACEMENT PROJECT

Approved By
DESIGN MANAGER DATE
PROJECT MANAGER DATE

C. BARTON	05/2008
DESIGNED BY	DATE
W. WESZCZECINSKI	06/2008
DRAWN BY	DATE
M. EWBANK	06/2008
CHECKED BY	DATE

City of Bellevue UTILITIES

TITLE SHEET, INDEX, AND VICINITY MAP

DRAWING G-1 SHT 1 OF 23

GENERAL NOTES:

1. MATERIAL SHALL NOT BE STORED OUTSIDE OF IDENTIFIED STAGING AREAS, UNLESS APPROVED BY OWNER OR ENGINEER.
2. ALL EQUIPMENT SHALL USE ONLY BIODEGRADABLE HYDRAULIC FLUIDS.
3. CONTRACTOR SHALL LIMIT MACHINERY MOVEMENT TO PROJECT LIMITS DEFINED ON SITE PLAN OR IDENTIFIED AS ACCEPTABLE BY ENGINEER.
4. CLEARING LIMITS FOR TEMPORARY ACCESS ROAD AND PROPOSED STRUCTURES SHALL BE LIMITED TO THE AREA REQUIRED FOR SAFE EQUIPMENT OPERATION. CLEARING LIMITS SHALL BE STAKED BY CONTRACTOR AND APPROVED BY ENGINEER AT LEAST 3 DAYS PRIOR TO CLEARING ACTIVITIES. CLEARING LIMITS SHALL BE STAKED TO MINIMIZE THE AREA OF DISTURBANCE.
5. SEE SPECIFICATIONS FOR LOG TYPE (SPECIES), DIAMETER AND LENGTH. EXCAVATIONS SHALL BE INSPECTED BY ENGINEER PRIOR TO PLACEMENT OF ANY WOOD.
6. LOG PLACEMENTS SHALL BE INSPECTED BY ENGINEER PRIOR TO BACKFILLING.
7. CONTRACTOR SHALL PROVIDE 24 HOURS ADVANCE NOTICE TO THE ENGINEER PRIOR TO ANY REQUIRED INSPECTION. CONTRACTOR SHALL SUBMIT A CONSTRUCTION SEQUENCE PLAN FOR APPROVAL AT LEAST 5 DAYS PRIOR TO SITE WORK.
8. APPROVED CONSTRUCTION SEQUENCE PLAN SHALL NOT BE ALTERED UNLESS APPROVED BY ENGINEER.
9. EQUIPMENT USED FOR THIS PROJECT SHALL BE FREE OF EXTERNAL PETROLEUM-BASED PRODUCTS WHILE WORKING AROUND THE STREAM. ACCUMULATION OF SOILS OR DEBRIS SHALL BE REMOVED FROM THE DRIVE MECHANISMS (WHEELS, TRACKS, TIRES, ETC.) AND UNDERCARRIAGE OF EQUIPMENT PRIOR TO ITS WORKING WITHIN THE CHANNEL.
10. EQUIPMENT SHALL BE CHECKED DAILY FOR LEAKS, AND ANY NECESSARY REPAIRS SHALL BE COMPLETED PRIOR TO COMMENCING WORK ACTIVITIES.
11. THE CONTRACTOR IS RESPONSIBLE TO ENSURE THAT NO PETROLEUM PRODUCTS, HYDRAULIC FLUID, SEDIMENTS, SEDIMENT-LADEN WATER, CHEMICALS, OR ANY OTHER TOXIC OR DELETERIOUS MATERIALS ARE ALLOWED TO ENTER OR LEACH INTO THE STREAM.
12. IF AT ANY TIME, AS A RESULT OF PROJECT ACTIVITIES, FISH ARE OBSERVED IN DISTRESS, A FISH KILL OCCURS, OR WATER QUALITY PROBLEMS DEVELOP (INCLUDING EQUIPMENT LEAKS OR SPILLS), OPERATIONS SHALL CEASE AND THE ENGINEER SHALL BE NOTIFIED IMMEDIATELY. WASHINGTON DEPARTMENT OF FISH AND WILDLIFE AND WASHINGTON DEPARTMENT OF ECOLOGY SHALL BE CONTACTED IMMEDIATELY BY THE ENGINEER OR BY HIS/HER DESIGNEE. WORK SHALL NOT RESUME UNTIL FURTHER APPROVAL BY OWNER'S REPRESENTATIVE.
13. EROSION CONTROL METHODS SHALL BE USED TO PREVENT SILT-LADEN WATER FROM ENTERING THE CREEK. INITIAL EROSION CONTROL MEASURES ARE SHOWN ON DRAWINGS ESC-1 AND ESC-2. THE CONTRACTOR SHALL SUBMIT A TEMPORARY EROSION AND SEDIMENT CONTROL PLAN SHOWING ADDITIONAL SITE SPECIFIC EROSION AND SEDIMENT CONTROL TECHNIQUES AND METHODS.
14. IF HIGH FLOW CONDITIONS THAT MAY CAUSE SILTATION OR EROSION ARE ENCOUNTERED DURING CONSTRUCTION, WORK SHALL STOP UNTIL THE FLOW SUBSIDES.
15. CONTRACTOR IS RESPONSIBLE FOR CALLING "ONE CALL" FOR UTILITY LOCATES PRIOR TO CONSTRUCTION. 1(800)424-5555 OR 811
16. THE EXISTING FEATURES AS SHOWN ON THE EXISTING CONDITIONS PLAN WERE PROVIDED BY THE CITY OF BELLEVUE AND FROM SUPPLEMENTAL FIELD WORK PERFORMED BY APS.

LOG NOTES:

1. DECKED LOGS SHALL BE ACCESSIBLE FOR INSPECTION.
2. LOG TYPE IDENTIFICATION SHALL BE PAINTED ON ALL LOGS IN A PLACE VISIBLE FOR INSPECTION PRIOR TO PLACEMENT WITH LEAD-FREE, BLAZE-ORANGE SURVEY MARKING PAINT.

UTILITIES AND AGENCIES

CITY OF BELLEVUE

BRIAN WARD – PROJECT MANAGER

450 110TH AVENUE NE
BELLEVUE, WA 98004
(425) 452-5206
(425) 452-7856

EMAIL: BWARD@BELLEVUEWA.GOV

KING COUNTY DEPARTMENT OF NATURAL RESOURCES, WTD

ERIC DAVISON

201 S. JACKSON ST, MAIL STOP
KSC-NR-0508
SEATTLE, WA 98104-3855

(206) 684-1707
FAX: (206) 684-1710
ERIC.DAVISON@KINGCOUNTY.GOV

BELLEVUE WATER DISTRICT #1

KIPP FOCKLER – OPERATING & WATER MAINTENANCE
(425) 452-2923

GREG KNIGHT
(425) 452-4493

BELLEVUE FIRE DEPARTMENT

NON-EMERGENCY GENERAL
(425) 452-6892

FIRE PREVENTION PLAN REVIEW DESK
(425) 452-4122

BELLEVUE POLICE DEPARTMENT

(425) 452-6917

CITY OF BELLEVUE – TRANSPORTATION DEPARTMENT

JON REGALIA

450 110TH AVENUE NE
BELLEVUE, WA 98004
(425) 452-4599

EMAIL: JREGALIA@BELLEVUEWA.GOV

CITY OF BELLEVUE – PERMIT CENTER

TRAVIS RIPLEY
(425) 452-6042

PUGET SOUND ENERGY (PSE CONSTRUCTION)

JEANNE COLEMAN – MUNICIPAL CONSTRUCTION PLANNER

P.O. BOX 97034
MAIL STOP: EST-11W
BELLEVUE, WA 98009-9734

(425) 462-3488
EMAIL: JEANNE.COLEMAN@PSE.COM

COMCAST (FORMERLY AT&T BROADBAND)

JILL LOOK

1525 75TH ST. SW, SUITE 200
EVERETT, WA 98203

(425) 263-5346
FAX: (425) 263-5352
MOBILE: (206) 396-6032
EMAIL: JILL_LOOK@CABLE.COMCAST.COM

QWEST (US WEST COMMUNICATIONS)

DAN RESSLER

1550 NEWPORT WAY NW, ROOM #2
ISSAQUAH, WA 98027

(206) 345-3809
EMAIL: JOSEPH.RESSLER@QWEST.COM

ONE CALL

UTILITY LOCATION
(800) 424-5555 OR 811

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MARK EWBANK STATE OF WASHINGTON 29434 CIVIL ENGINEER PROFESSIONAL ENGINEER

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NO	DATE	BY	APPR	REVISIONS

HERRERA ENVIRONMENTAL CONSULTANTS
2200 Sixth Avenue
Suite 1100
Seattle, Washington
98121-1820
206-441-9080
206-441-9108 FAX
http://www.herrerainc.com

SE 30TH STREET / SUNSET CREEK
CULVERT REPLACEMENT PROJECT

Approved By

DESIGN MANAGER DATE

PROJECT MANAGER DATE

C. BARTON	05/2008
DESIGNED BY	DATE
W. WIESZCZECINSKI	06/2008
DRAWN BY	DATE
M. EWBANK	06/2008
CHECKED BY	DATE

City of Bellevue
UTILITIES

GENERAL NOTES

DRAWING G-2 SHT 2 OF 23

Path: O:\proj\Y2006\06-03501-001\CAD\Dwgs\Phase I\G-2.dwg
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ABBREVIATIONS:

APPROX	APPROXIMATE(LY)
CB	CATCH BASIN
DBH	DIAMETER BREAST HEIGHT
DIA	DIAMETER
DWG	DRAWING
ESC	EROSION AND SEDIMENT CONTROL
EX	EXISTING
FAC	FACULTATIVE
FACU	FACULTATIVE UPLAND
FACW	FACULTATIVE WETLAND
FT	FEET
IN	INCHES
LWD	LARGE WOODY DEBRIS
MIN	MINIMUM
NI	NO INDICATOR
OHP	OVERHEAD POWER LINE
OHWM	ORDINARY HIGH WATER MARK
PSE	PUGET SOUND ENERGY
SDMH	STORM DRAIN MANHOLE
TEL	TELEPHONE
TYP	TYPICAL
UGP	UNDERGROUND POWER LINE
UGT	UNDERGROUND TELEPHONE LINE
UPL	OBLIGATE UPLAND

LEGEND:

- EXISTING BUILDING
- EXISTING CURB
- 72 — EXISTING CONTOURS
- EXISTING BANK SLOPE
- OHP — EXISTING OVERHEAD POWER LINE
- UGP — EXISTING UNDERGROUND POWER LINE
- W — EXISTING WATER LINE
- G — EXISTING GAS LINE
- EXISTING MANHOLE
- EXISTING CATCH BASIN
- EXISTING STORM DRAIN MANHOLE
- T — EXISTING TELEPHONE J-BOX
- P — EXISTING POWER VAULT
- EXISTING FIRE DEPT CONNECTION
- EXISTING POWER POLE
- EXISTING POWER TRANSFORMER
- CREEK FLOW LINE
- HIGH VISIBILITY FENCE
- SILT FENCE
- EXCAVATION LIMITS
- EXISTING GRADE
- DIVERTED FLOW LINE
- PROPOSED AVERAGE GRADE
- LIMITED DISTURBANCE AREA
- CLEAR AND GRUB AREA
- STREAMBED GRAVEL
- PLUNGE POOL
- SCOUR COBBLE
- EXISTING GROUND
- TEMPORARY STREAM ACCESS
- EXCAVATED ALLUVIUM
- STAGING AREA
- ECOLOGY BLOCKS
- BULK BAGS
- BOULDERS
- LOGS WITH ROOTWAD
- LOGS WITHOUT ROOTWAD
- LOGS WITH ROOTWAD BURIED
- LOGS WITHOUT ROOTWAD BURIED
- LOG SECTION
- VEGETATION
- # — LOG IDENTIFICATION #
- LOG CONTROL POINT
- 1+00 — STREAM PROFILE STATIONING (FT)

Know what's below. Call before you dig.

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MARK EWBANK STATE OF WASHINGTON 29434 CIVIL ENGINEER PROFESSIONAL ENGINEER

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NO	DATE	BY	APPR	REVISIONS

HERRERA ENVIRONMENTAL CONSULTANTS
2200 Sixth Avenue
Suite 1100
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206-441-9080
206-441-9108 FAX
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SE 30TH STREET / SUNSET CREEK CULVERT REPLACEMENT PROJECT

Approved By

DESIGN MANAGER — DATE

PROJECT MANAGER — DATE

C. BARTON	05/2008
DESIGNED BY	DATE
W. WIESZCZECINSKI	06/2008
DRAWN BY	DATE
M. EWBANK	06/2008
CHECKED BY	DATE

City of Bellevue UTILITIES

ABBREVIATIONS AND LEGEND

DRAWING G-3 — SHT 3 OF 23

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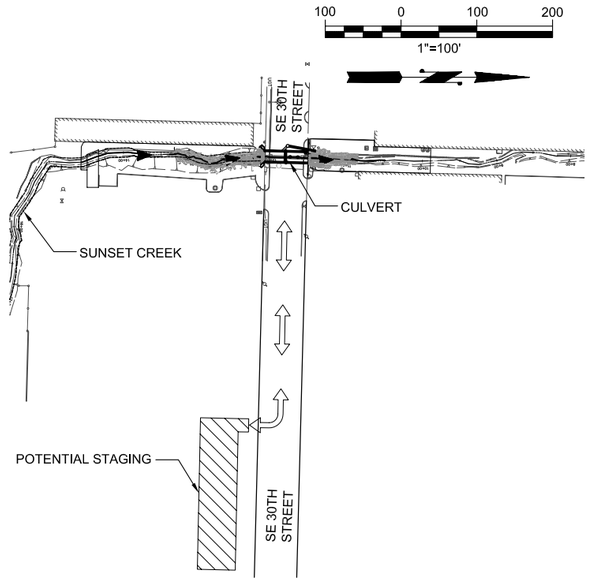
Cad User: Wojciech Wieszczecinski

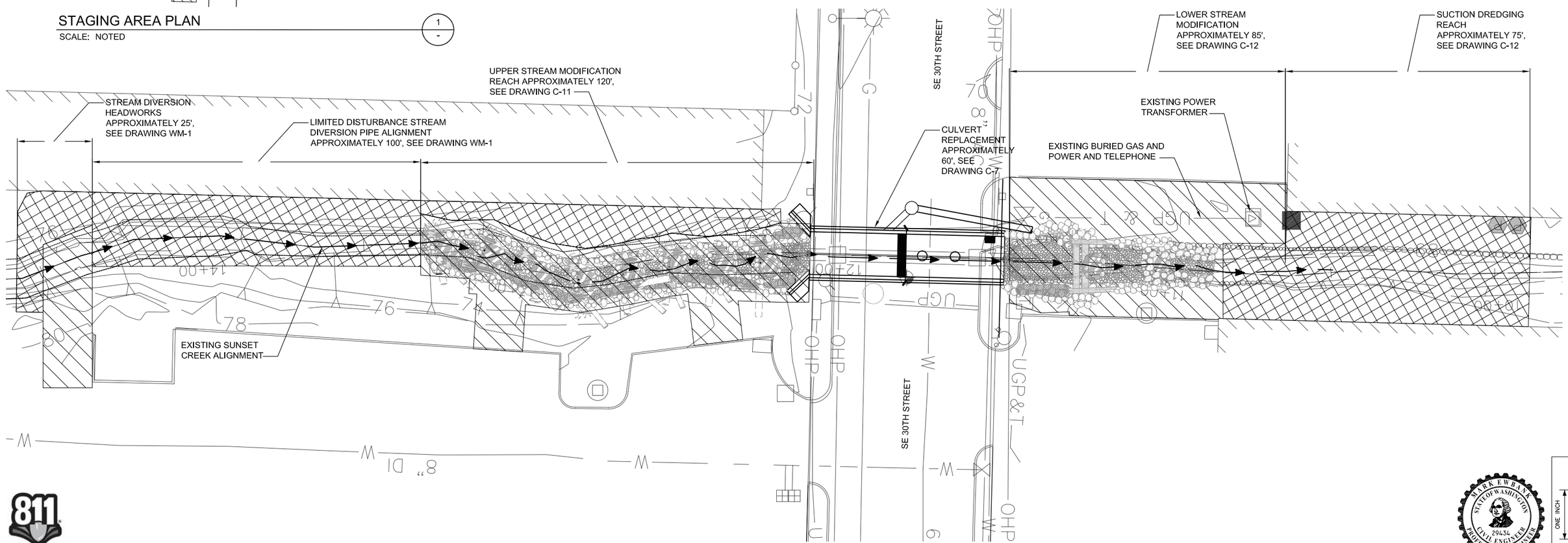
GENERAL NOTES:

1. FOR STREAM CORRIDOR SITE PREP DETAILS SEE DRAWING C-10
2. FOR SITE STAGING AREA SEE DETAIL 1 ON THIS SHEET



STAGING AREA PLAN (1 / -)

SCALE: NOTED



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HERRERA ENVIRONMENTAL CONSULTANTS

CIVILTECH ENGINEERING
10800 NE 8th Street Suite 820
Bellevue, WA 98004
Phone: 425.453.6488
Fax: 425.453.5848

SE 30TH STREET / SUNSET CREEK CULVERT REPLACEMENT PROJECT

Approved By

DESIGN MANAGER DATE

PROJECT MANAGER DATE

C. BARTON	05/2008
DESIGNED BY	DATE
W. WIESZCZECINSKI	06/2008
DRAWN BY	DATE
M. EWBANK	06/2008
CHECKED BY	DATE

City of Bellevue UTILITIES

SITE PLAN

DRAWING G-4

SHT 4 OF 23

MARK EWBANK STATE OF WASHINGTON 29434 CIVIL ENGINEER PROFESSIONAL ENGINEER

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REMOVAL NOTES:

1. REMOVE CONC CURB AND SIDEWALK
2. SAW CUTTING PAVEMENT
3. REMOVE ASPHALT CONC PAVEMENT
4. REMOVE CATCH BASIN
5. EXCAVATE AND REMOVE CMP CULVERTS
6. REMOVE SAFETY RAILING
7. REMOVE ROCKERY WALL AS NECESSARY TO FACILITATE CULVERT INSTALLATION. KEEP ROCK FOR CHANNEL MODIFICATIONS.

GENERAL NOTES:

1.) FOR REMOVAL, RELOCATION, AND ADJUSTMENT OF WATER VALVES, FIRE HYDRANTS, WATER METERS, AND OTHER FEATURES RELATED TO WATER MAIN, SEE UTILITY PLAN, SHEETS C3 AND C4.

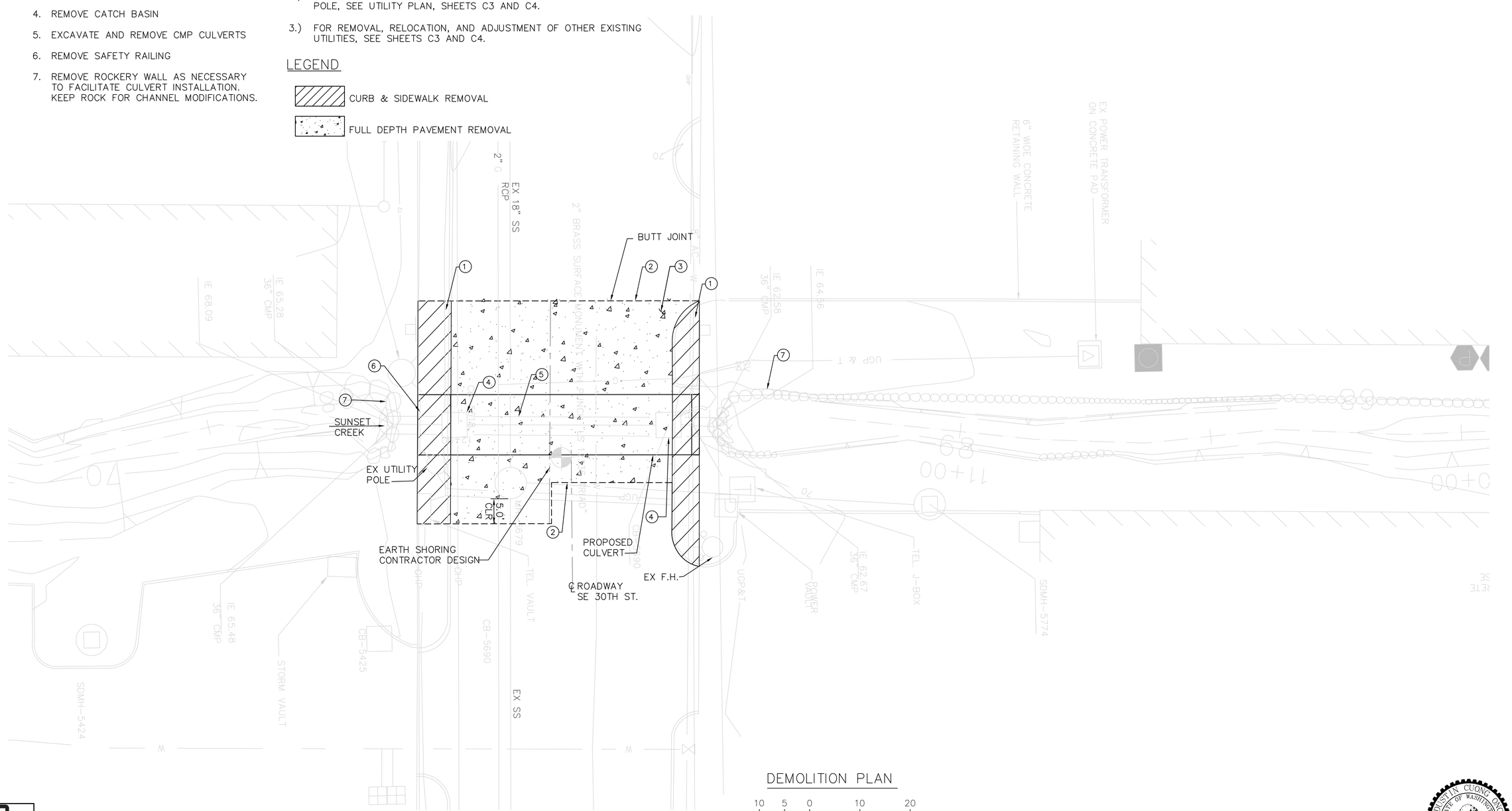
2.) FOR REMOVAL OR RELOCATION OF POWER POLE AND TELEPHONE POLE, SEE UTILITY PLAN, SHEETS C3 AND C4.

3.) FOR REMOVAL, RELOCATION, AND ADJUSTMENT OF OTHER EXISTING UTILITIES, SEE SHEETS C3 AND C4.

LEGEND

CURB & SIDEWALK REMOVAL

FULL DEPTH PAVEMENT REMOVAL



DEMOLITION PLAN

10 5 0 10 20

SCALE IN FEET

VERTICAL DATUM:
CITY OF BELLEVUE #140 NAVD'88 ELEV.=210.42
TOP NE CORNER 3'x3' CONCRETE FOOTING FOR 2'x2' BRICK PILLAR AT SW CORNER 128TH AVENUE SE AND SE 26TH PLACE.

60% DESIGN - NOT FOR CONSTRUCTION

NORTH 1/2, SEC. 10, TWP. 24 N., RGE 5 E., W.M.

DUSTIN CUONG ONG STATE OF WASHINGTON 35684 REGISTERED PROFESSIONAL ENGINEER

EXPIRES

ONE INCH — AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

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NO	DATE	BY	APPR	REVISIONS

HERRERA ENVIRONMENTAL CONSULTANTS

CIVILTECH ENGINEERING
10800 NE 8th Street Suite 820
Bellevue, WA 98004
Phone: 425.453.6488
Fax: 425.453.5848

SE 30TH STREET / SUNSET CREEK CULVERT REPLACEMENT PROJECT

Approved By

DESIGN MANAGER DATE

PROJECT MANAGER DATE

D.C. ONG	04/2008
DESIGNED BY	DATE
J. ROBERTS	04/2008
DRAWN BY	DATE
D.C. ONG	04/2008
CHECKED BY	DATE

City of Bellevue UTILITIES

ROADWAY CORRIDOR DEMOLITION PLAN

DRAWING C-1 SHT 5 OF 24

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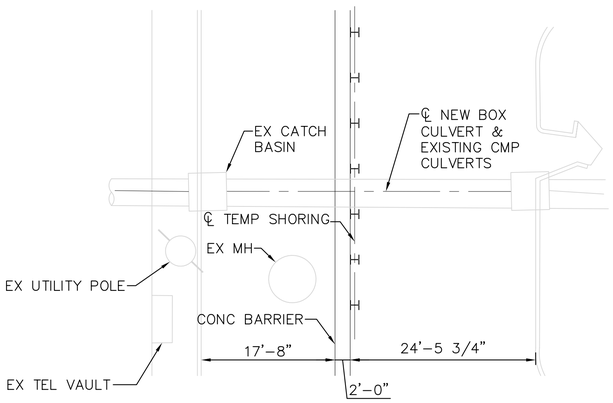
Plot Date: 6/10/2008 2:31 PM Cad User: Jeff Roberts

STAGE 1

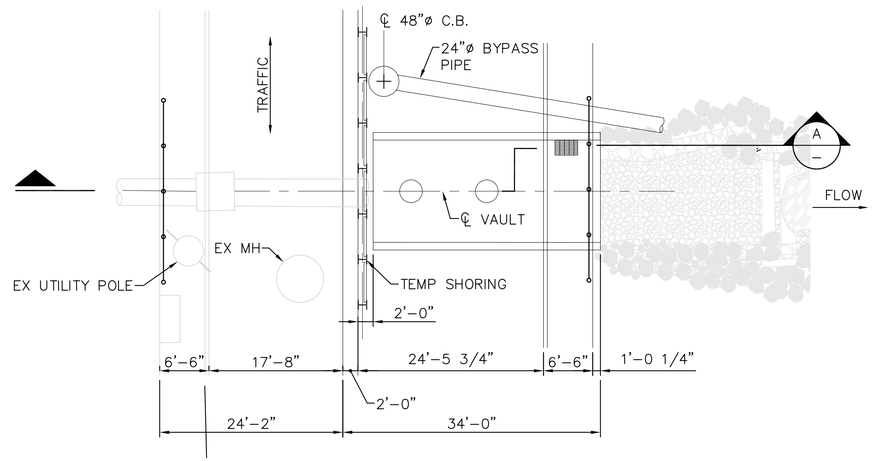
1. PREPARE ROAD CLOSURE AND PLACE CLOSURE SIGNS
2. REMOVE STRUCTURES AND OBSTRUCTIONS
3. INSTALL TEMPORARY SHORING (SOLDIER PILE SHOWN) AT LOCATIONS SHOWN.
4. INSTALL TEMPORARY TRAFFIC BARRIER



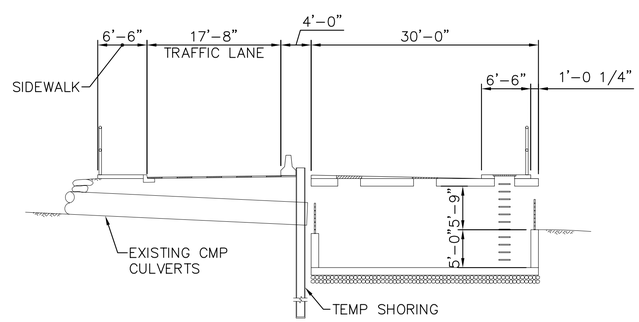
STAGE 1 (PLAN)
SCALE: 1"=10'

STAGE 2

1. CLOSE NORTH LANES. MAINTAIN ONE LANE OPEN AT ALL TIMES, ON SOUTH SIDE OF STREET.
2. INSTALL TEMPORARY PIPE TO DIVERT STREAM FLOW (NOT SHOWN)
3. START EXCAVATION AND REMOVE EXISTING ROCKERIES AND CMP CULVERT.
4. PREPARE FOUNDATION SOILS
5. INSTALL 3-SIDED BOXES, 48"ø TYPE 2 CB, AND 24"ø BYPASS PIPE
6. CONSTRUCT BAFFLE WALLS, REMOVABLE LIDS, AND LADDERS
7. CONSTRUCT DOWNSTREAM CHANNEL MODIFICATIONS



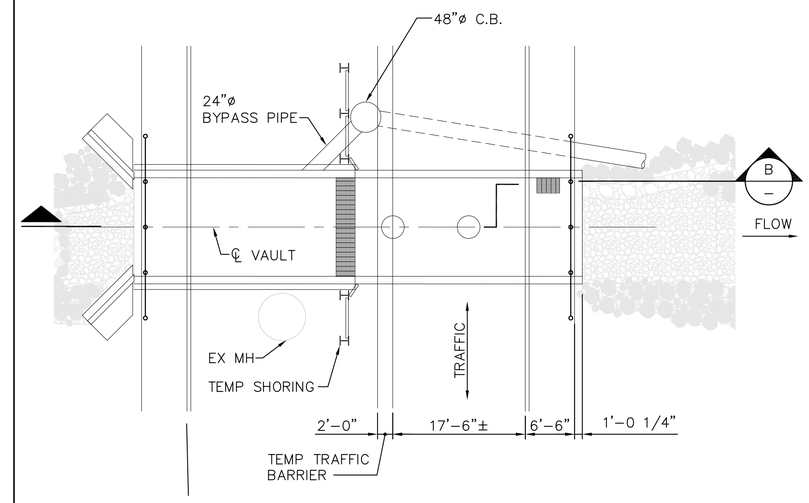
STAGE 2 (PLAN)
SCALE: 1"=10'



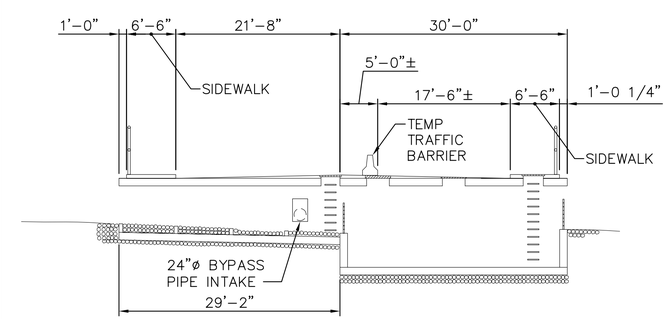
SECTION A
SCALE: 1"=10'

STAGE 3

1. RELOCATE TEMPORARY TRAFFIC BARRIER AT THE LOCATION SHOWN
2. OPEN NORTH LANE TO TRAFFIC, CLOSE SOUTH SIDE OF STREET
3. BEGIN EXCAVATION AND REMOVE EXISTING ROCKERIES AND REMAINING CMP CULVERT. REMOVE SOLDIER PILES THAT INTERFERE WITH NEW VAULT STRUCTURE. PROTECT EXISTING 5'ø MANHOLE DURING EXCAVATION.
4. PREPARE FOUNDATION SOILS
5. INSTALL 4-SIDED BOXES AND WING WALLS. CONSTRUCT 24"ø BYPASS CONNECTION TO 48"ø C.B., PIPE, AND BAFFLES
6. CONSTRUCT UPSTREAM CHANNEL MODIFICATIONS
7. CONSTRUCT SIDEWALKS AND CURBS, PLACE ROADWAY CONCRETE SURFACE OVER CULVERT, AND INSTALL HANDRAILS



STAGE 3 (PLAN)
SCALE: 1"=10'



SECTION B
SCALE: 1"=10'

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LINSHIN CUONG ONG
STATE OF WASHINGTON
35684
REGISTERED PROFESSIONAL ENGINEER
EXPIRES

ONE INCH
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NO	DATE	BY	APPR	REVISIONS

HERRERA ENVIRONMENTAL CONSULTANTS

CIVILTECH ENGINEERING
10800 NE 8th Street Suite 820
Bellevue, WA 98004
Phone: 425.453.6488
Fax: 425.453.5848

SE 30TH STREET / SUNSET CREEK CULVERT REPLACEMENT PROJECT

Approved By

DESIGN MANAGER DATE
PROJECT MANAGER DATE

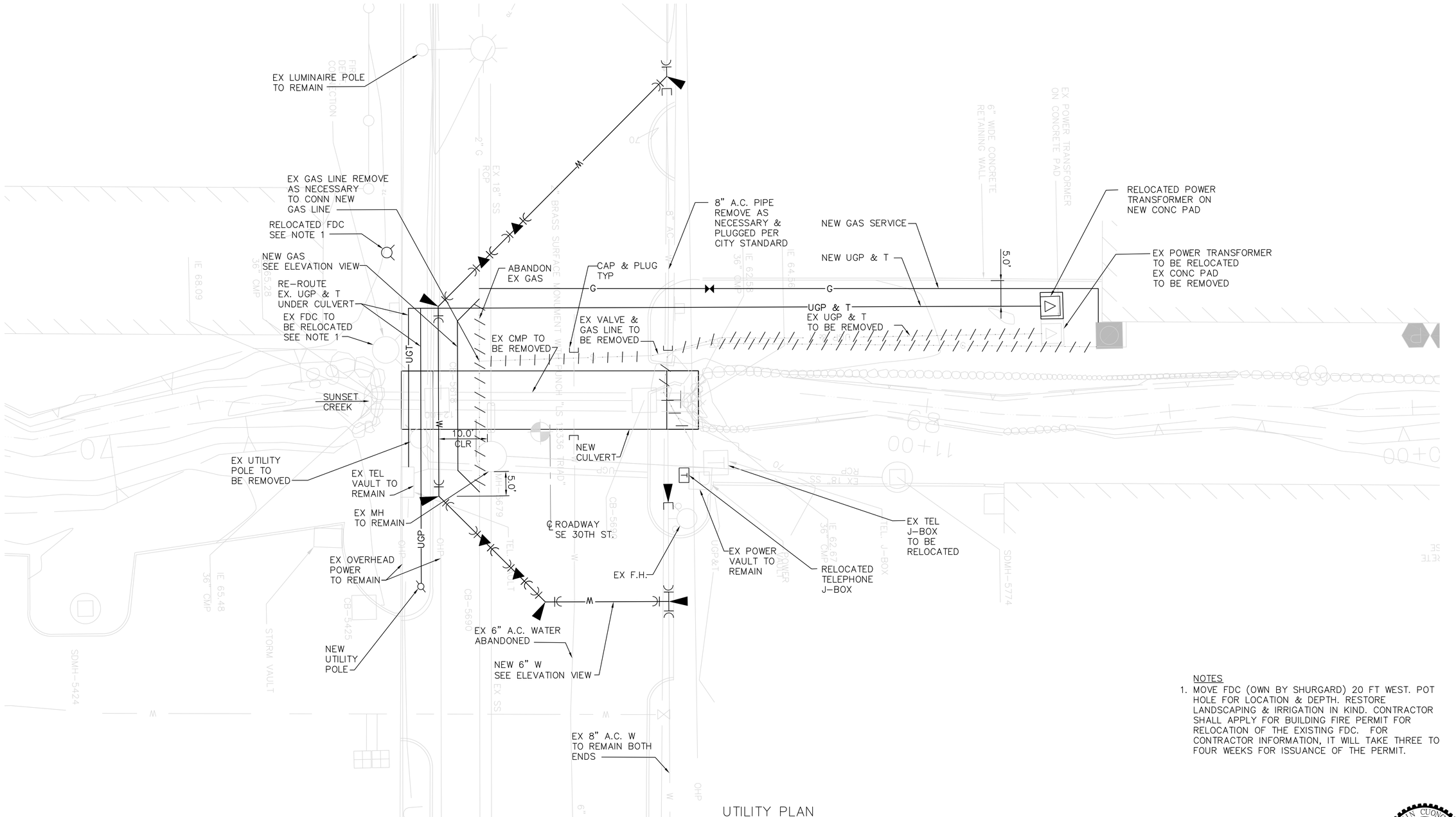
D.C. ONG	04/2008
DESIGNED BY	DATE
J. ROBERTS	04/2008
DRAWN BY	DATE
D.C. ONG	04/2008
CHECKED BY	DATE

City of Bellevue UTILITIES

ROADWAY PHASING PLAN AND NOTES

DRAWING C-2 SHT 6 OF 24

Path: P:\Structural\2007\27015 - SE 30 & Sunset Cr (Herrera)\Cad\Drawing\C-2.dwg
Plot Date: 6/10/2008 2:39 PM Cad User: Jeff Roberts



UTILITY PLAN

10 5 0 10 20

SCALE IN FEET

NOTES

1. MOVE FDC (OWN BY SHURGARD) 20 FT WEST. POT HOLE FOR LOCATION & DEPTH. RESTORE LANDSCAPING & IRRIGATION IN KIND. CONTRACTOR SHALL APPLY FOR BUILDING FIRE PERMIT FOR RELOCATION OF THE EXISTING FDC. FOR CONTRACTOR INFORMATION, IT WILL TAKE THREE TO FOUR WEEKS FOR ISSUANCE OF THE PERMIT.

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NORTH 1/2, SEC. 10, TWP. 24 N., RGE 5 E., W.M.

JUSTIN CUONG ONG — STATE OF WASHINGTON — 35684 — REGISTERED PROFESSIONAL ENGINEER

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Path: P:\Structural\2007\27015 - SE 30 & Sunset Cr (Herrera)\Cad\Drawing\C-3.dwg
Plot Date: 6/10/2008 2:39 PM Cad User: Jeff Roberts

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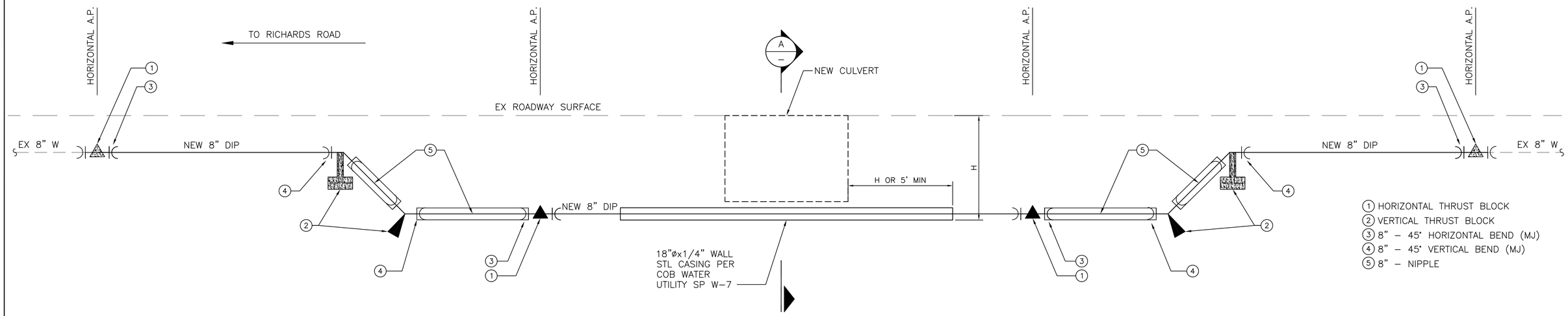
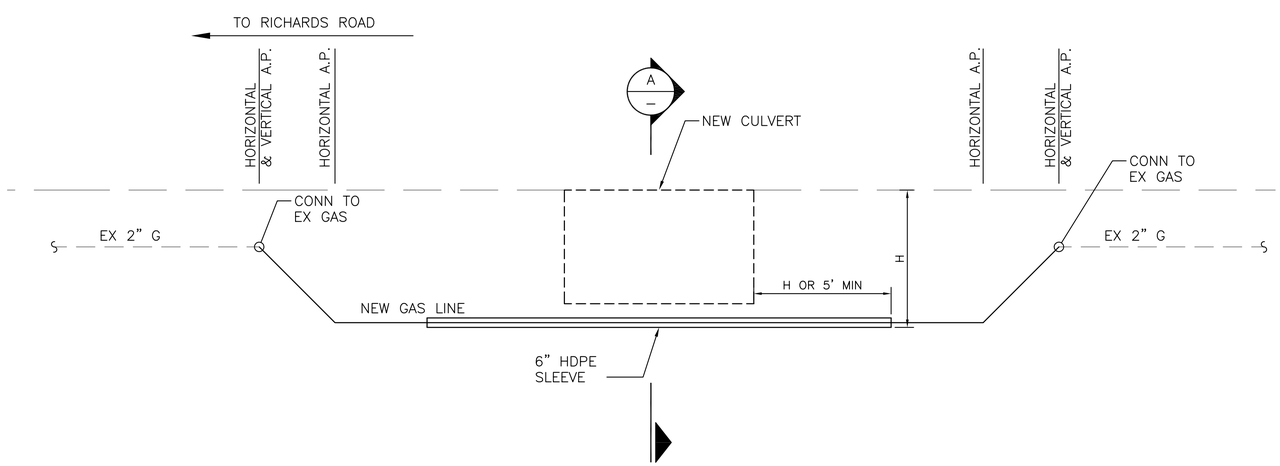
City of Bellevue UTILITIES

UTILITIES PLAN

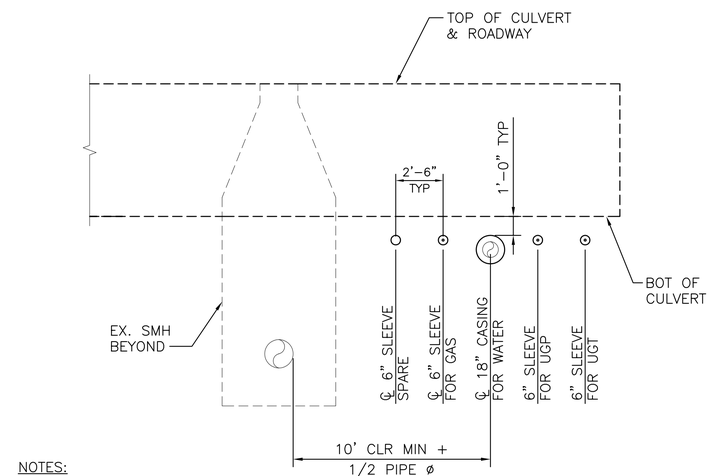
DRAWING C-3 SHT 7 OF 24



PROFILE 8" WATER LINE RE–ALIGNMENT



PROFILE GAS LINE RE–ALIGNMENT



NOTES:
1. 6" SLEEVE SHALL BE HDPE
2. 12" SLEEVE SHALL BE ASTM A53 GRADE B

SLEEVE DETAIL (A)
SCALE: NTS

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SE 30TH STREET / SUNSET CREEK CULVERT REPLACEMENT PROJECT

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City of Bellevue
UTILITIES

UTILITIES DETAILS

DRAWING C-4 SHT 8 OF 24

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Plot Date: 6/10/2008 2:40 PM Cad User: Jeff Roberts

ⓧ ROADWAY CONSTRUCTION NOTES:

1. CONSTRUCT CEMENT CONCRETE TRAFFIC CURB AND GUTTER PER CITY OF BELLEVUE STANDARD DETAIL TE–10.
2. CONSTRUCT CURBSIDE SIDEWALK PER CITY OF BELLEVUE STANDARD DETAIL TE–11.
3. CONSTRUCT DRIVEWAY APPROACH PER CITY OF BELLEVUE STANDARD DETAIL DEV–5.
4. PAVEMENT THICKNESS WILL BE 4 INCHES OF HOT MIX ASPHALT CLASS 1/2" PG 64–22
5. REPLACE CULVERT, SEE SHEET C–7.
6. INSTALL METAL SAFETY RAILING PER CITY OF BELLEVUE STANDARD DETAIL TE–34.
7. 4" CRUSHED SURFACING TOP COURSE.
8. COMPACT GRAVEL BORROW OR NATIVE SOIL TO 95% DRY DENSITY.
9. 6 INCHES OF COMMERCIAL HOT MIX ASPHALT CLASS 1" PG 64–22

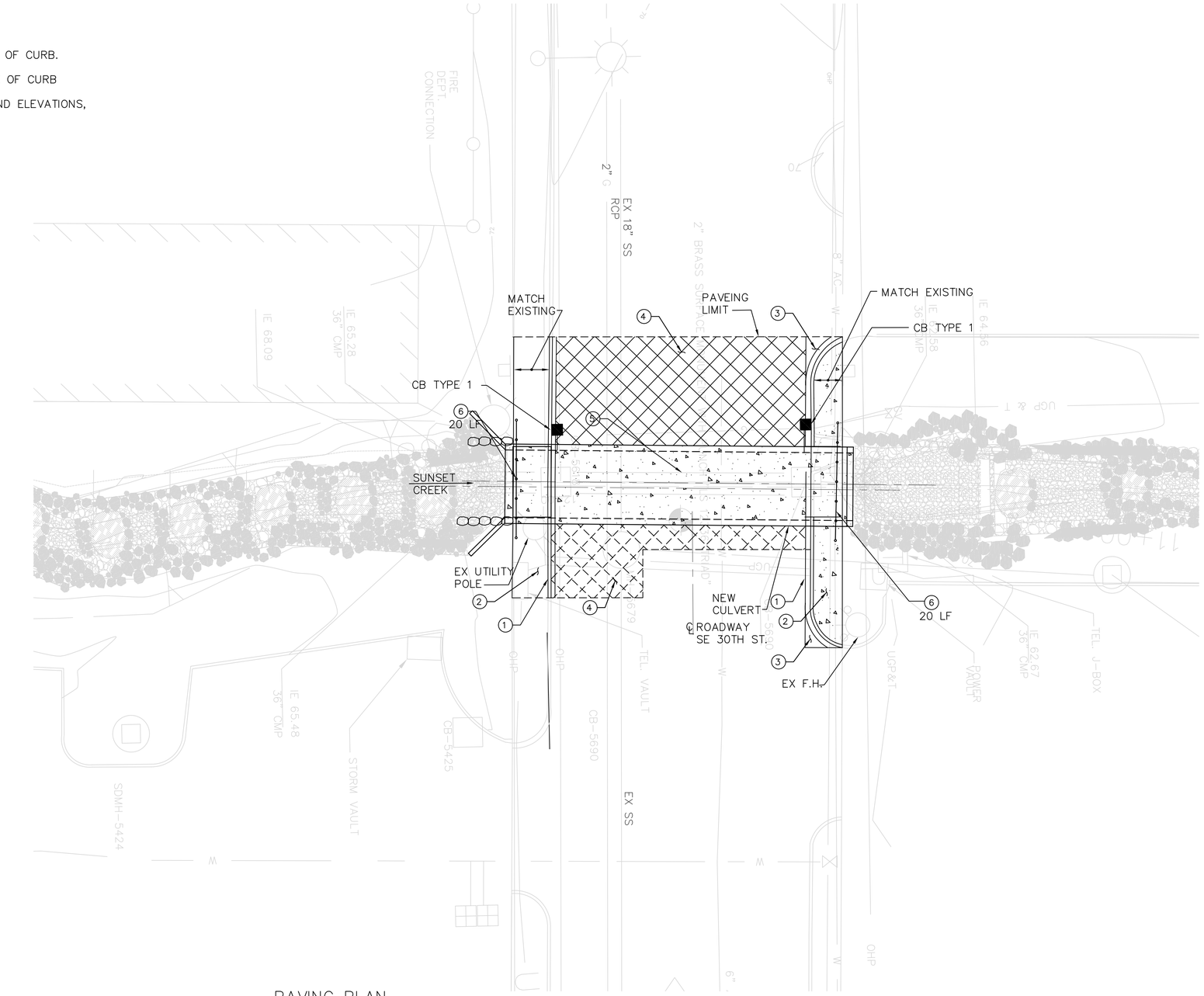
GENERAL NOTES:

1. ROADWAY DIMENSIONS ARE TO FACE OF CURB.
2. SIDEWALK DIMENSIONS ARE TO BACK OF CURB
3. FOR TOP OF CURB RETURN DATA AND ELEVATIONS, MATCH EXISTING

LEGEND

FULL DEPTH PAVEMENT

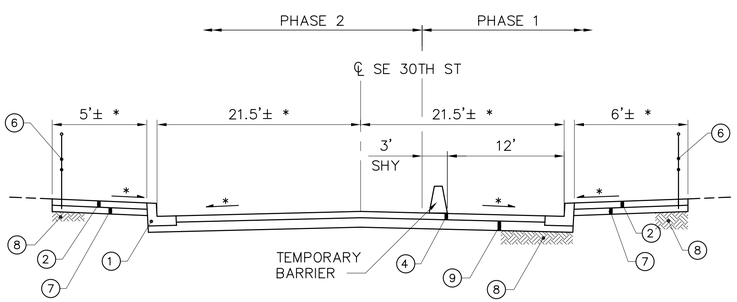
CEMENT CONCRETE



PAVING PLAN

10 5 0 10 20

SCALE IN FEET



TYPICAL ROADWAY SECTION

* VERIFY IN FIELD & MATCH EXISTING CONDITION FOR FIT–UP

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SE 30TH STREET / SUNSET CREEK CULVERT REPLACEMENT PROJECT

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PROJECT MANAGER — DATE

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D.C. ONG	04/2008
CHECKED BY	DATE

City of Bellevue UTILITIES

ROADWAY PLAN AND SECTION

DRAWING C–5 — SHT 9 OF 24

Path: P:\Structural\2007\27015 - SE 30 & Sunset Cr (Herrera)\Cad\Drawing\C-5.dwg
Plot Date: 6/10/2008 2:41 PM Cad User: Jeff Roberts

BLANK SHEET

Path: P:\Structural\2007\27015 - SE 30 & Sunset Cr (Herrera)\Cad\Drawing\C-6.dwg
Plot Date: 6/10/2008 2:41 PM Cad User: Jeff Roberts

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SE 30TH STREET / SUNSET CREEK
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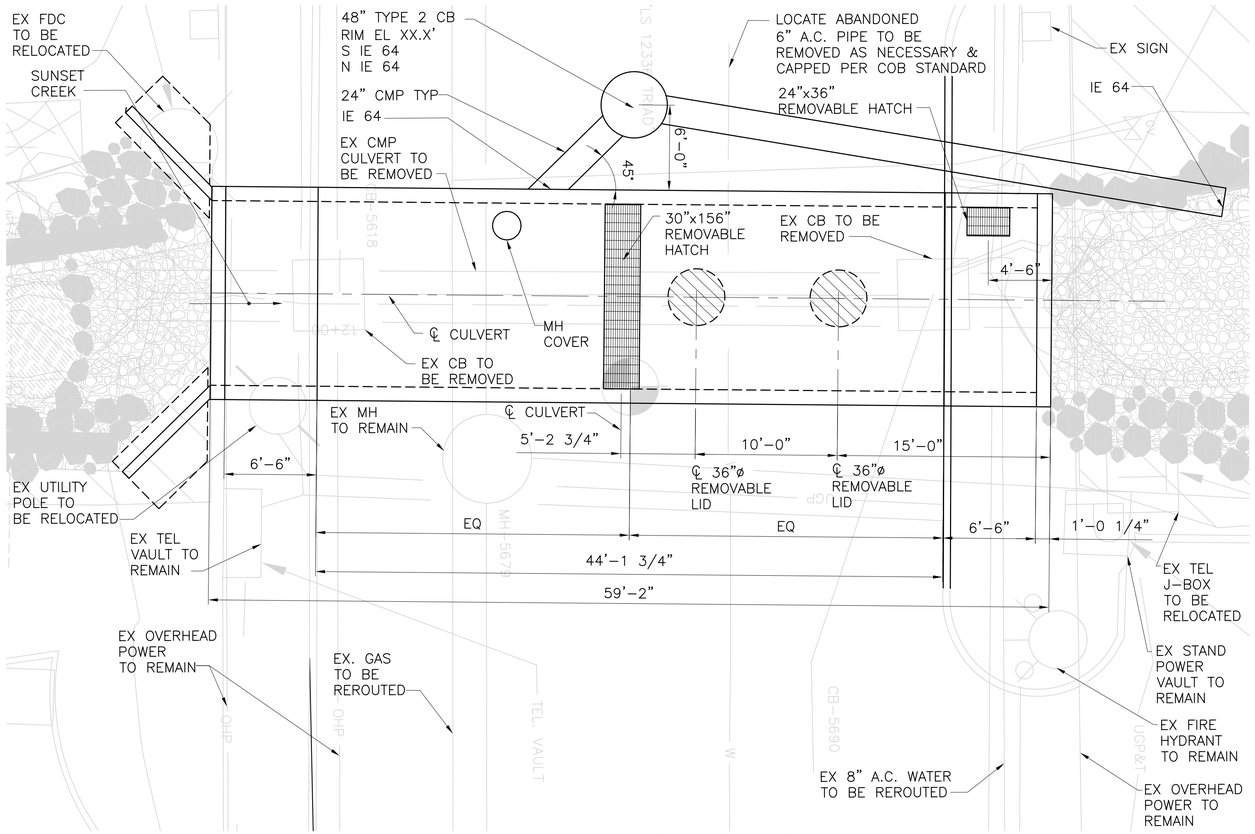
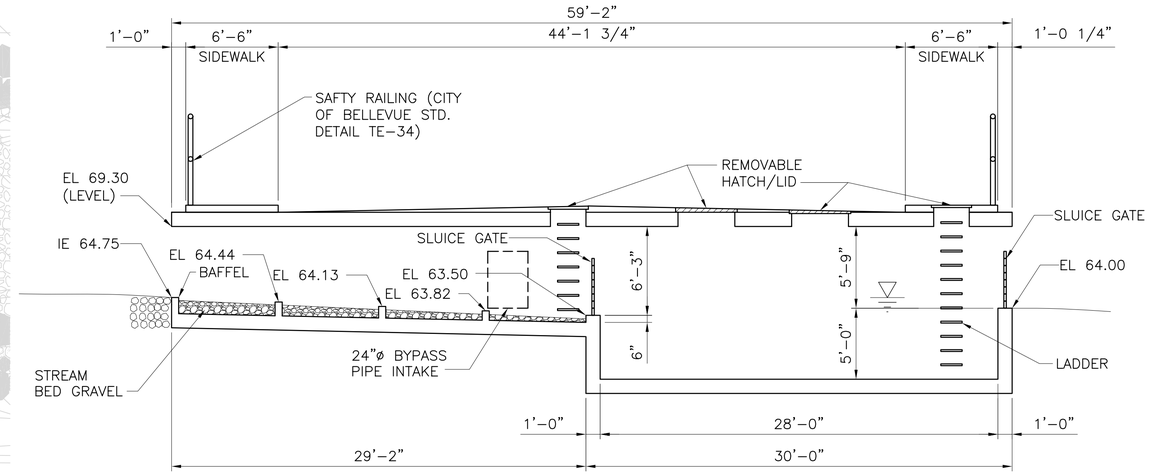
City of Bellevue
UTILITIES

ROADWAY SECTION

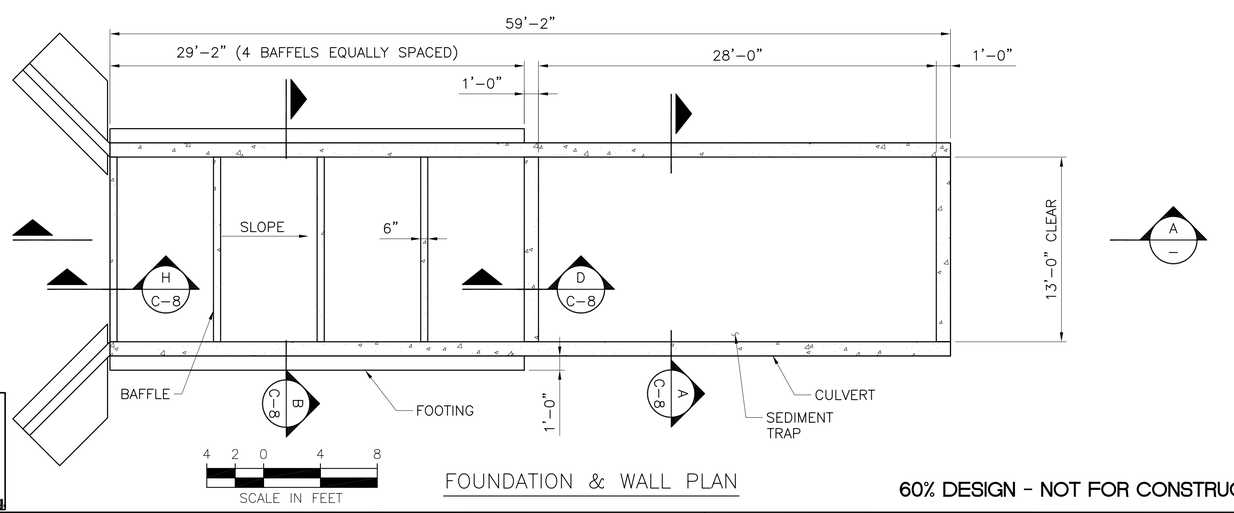
DRAWING C-6 SHT 10 OF 24



CULVERT LAYOUT PLAN



PROFILE-SECTION (A / –)
SCALE: 3/8"=1'-0"



FOUNDATION & WALL PLAN

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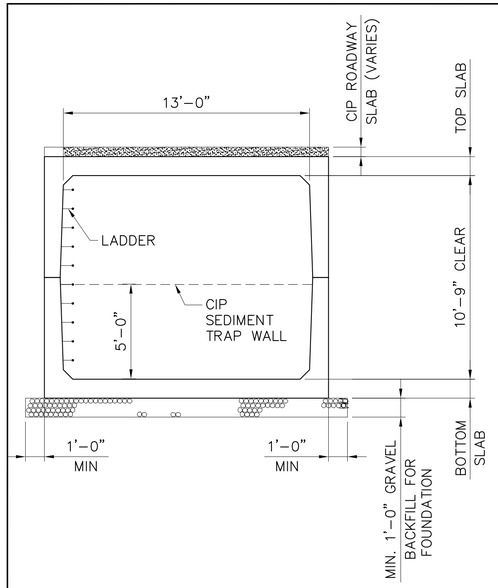
City of Bellevue
UTILITIES

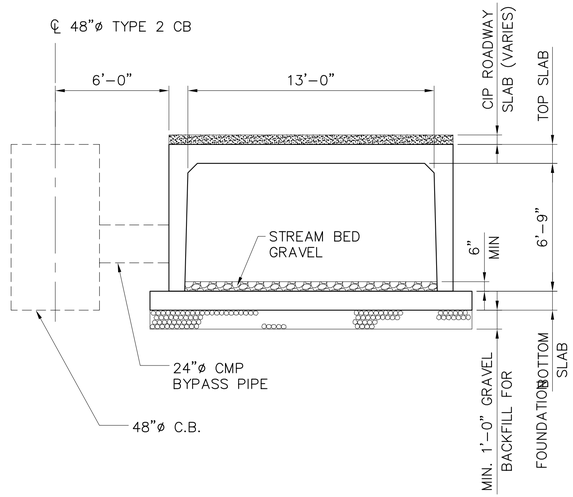
CULVERT REPLACEMENT
PLAN AND NOTES

DRAWING C-7 SHT 11 OF 24

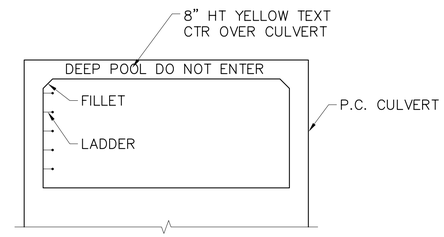
Path: P:\Structural\2007\27015 - SE 30 & Sunset Cr (Herrera)\Cad\Drawing\C-7.dwg
Plot Date: 6/10/2008 2:42 PM Cad User: Jeff Roberts



SECTION A / C-7
SCALE: 1/4"=1'-0"

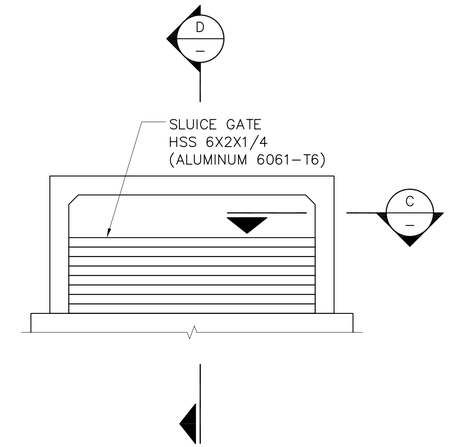


SECTION B / C-7
SCALE: 1/4"=1'-0"

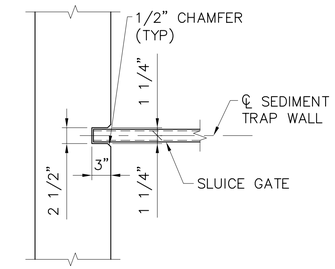


NOTE:
WARNING SIGN AT BOTH ENDS OF CULVERT.

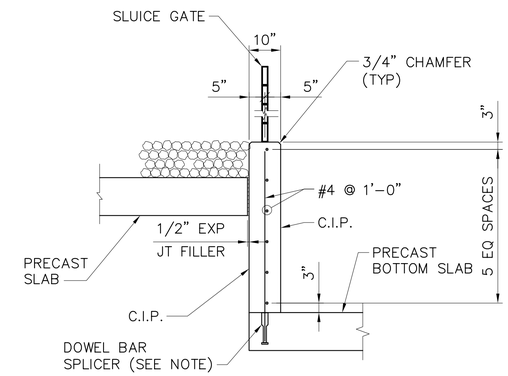
WARNING DETAIL 1 / C-7
SCALE: 1/4"=1'-0"



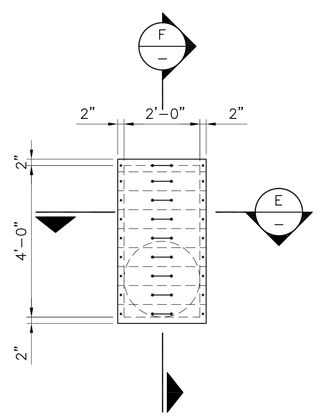
SLUICE GATE ELEVATION 2 / C-7
SCALE: 1/4"=1'-0"



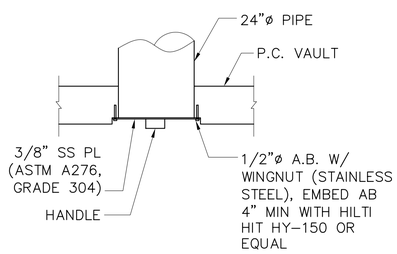
SECTION C / –
SCALE: 1/2"=1'-0"



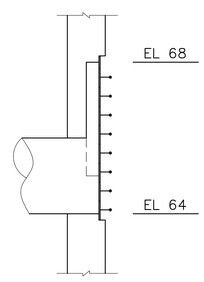
SECTION D / C-7
SCALE: 1/2"=1'-0"
(WALL @ BOX OUTLET END-SIMILAR)



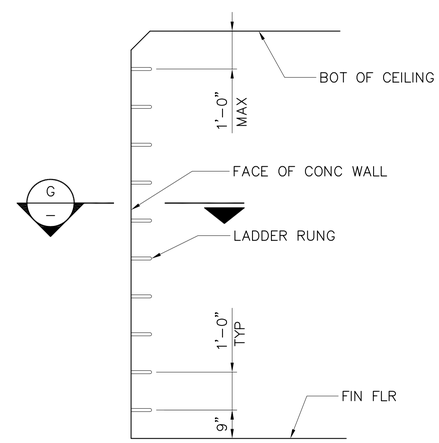
BYPASS INTAKE GATE ELEVATION 3 / –
SCALE: 1/2"=1'-0"



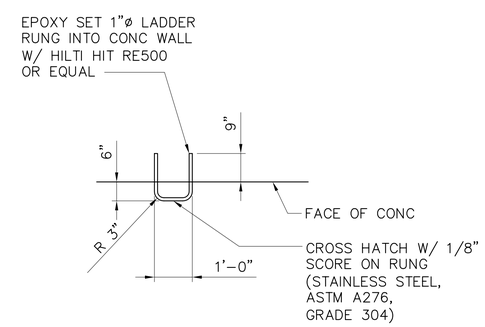
SECTION E / –
SCALE: 1/2"=1'-0"



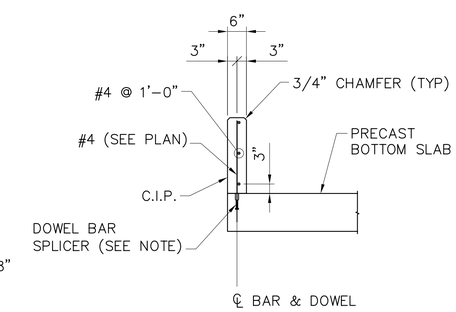
SECTION F / –
SCALE: 1/2"=1'-0"



LADDER ELEVATION 4 / –
SCALE: 1/2"=1'-0"



SECTION G / –
SCALE: 1/2"=1'-0"



SECTION H / C-7
SCALE: 1/2"=1'-0"
(TYP ALL BAFFLES UNLESS NOTED)

NOTES
1. ALL BARS & DOWEL BAR SPLICERS SHALL BE EPOXY COATED
2. f'c= 4000 PSI (MIN) fy = 60 KSI (ASTM A615)
3. DOWEL BAR SPLICERS SHALL BE DAYTON SUPERIOR D-108-A HEADED OR D-102-A 90° HOOKED OR OTHER EQUIVALENT.

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EXPIRES

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SE 30TH STREET / SUNSET CREEK CULVERT REPLACEMENT PROJECT

Approved By
DESIGN MANAGER DATE
PROJECT MANAGER DATE

D.C. ONG	04/2008
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J. ROBERTS	04/2008
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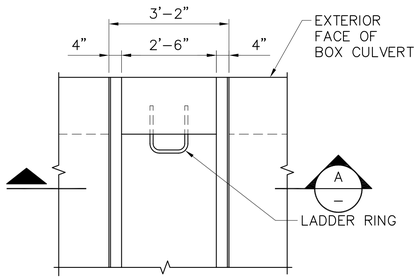
City of Bellevue UTILITIES

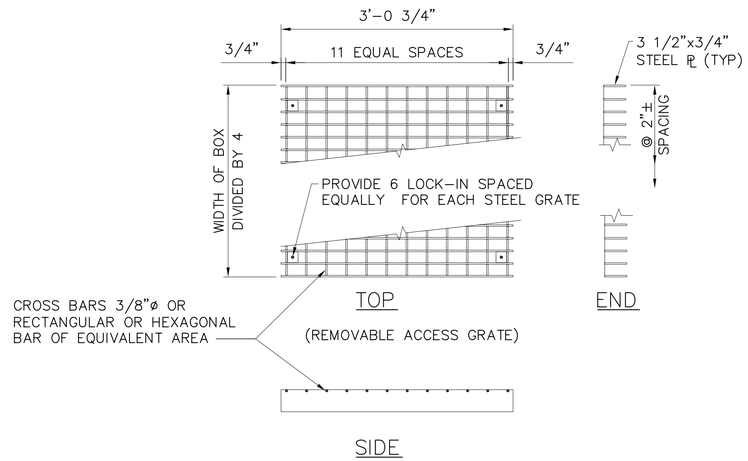
CULVERT REPLACEMENT PROFILE AND NOTES

DRAWING C-8 SHT 12 OF 24

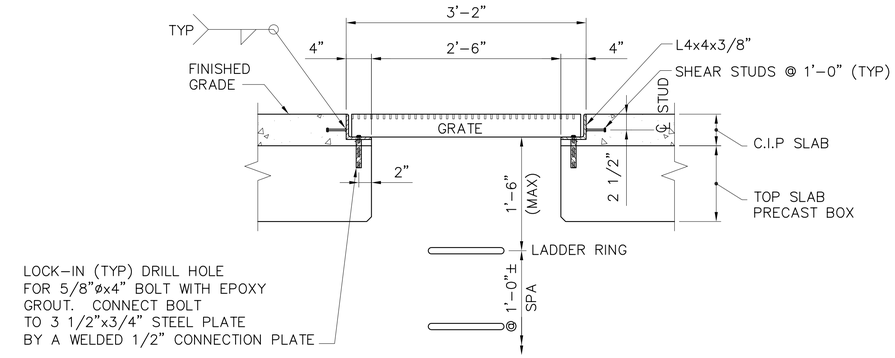
Path: P:\Structural\2007\27015 - SE 30 & Sunset Cr (Herrera)\Cad\Drawing\C-8.dwg
Plot Date: 6/11/2008 10:51 AM Cad User: Jeff Roberts



PLAN
SCALE: 1/2" = 1'-0"
(30"x WIDTH OF CULVERT REMOVABLE LID)
(STEEL GRATE, LOCK-IN BOLT & SHEAR STUDS NOT SHOWN)



REMOVABLE ACCESS GRATE (1)
SCALE: 1"=1'-0"



SECTION (A)
SCALE: 1"=1'-0"

Path: P:\Structural\2007\27015 - SE 30 & Sunset Cr (Herrera)\Cad\Drawing\C-9.dwg
Plot Date: 6/10/2008 2:43 PM Cad User: Jeff Roberts

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J. ROBERTS	04/2008
DRAWN BY	DATE
D.C. ONG	04/2008
CHECKED BY	DATE

City of Bellevue UTILITIES

DUSTIN CUONG ONG
STATE OF WASHINGTON
35684
REGISTERED PROFESSIONAL ENGINEER
EXPIRES

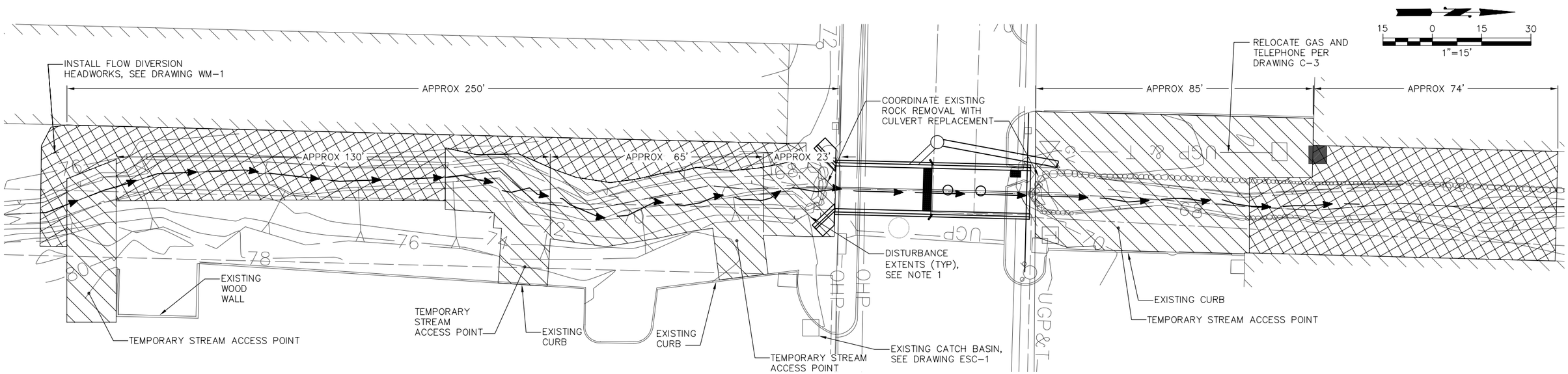
ONE INCH
AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

SECTIONS AND DETAILS

DRAWING C-9 SHT 13 OF 24

GENERAL NOTES:

1. CONTRACTOR SHALL FENCE THE PERIMETER OF THE CONSTRUCTION ZONE WITH A MINIMUM OF 6' TALL CHAINLINK FENCING PRIOR TO COMMENCEMENT OF ANY CONSTRUCTION ACTIVITIES.
2. PRIOR TO ANY CLEARING OR GRUBBING THE CONTRACTOR SHALL INSTALL TREE PROTECTION FOR ALL TREES DESIGNATED/FLAGGED BY THE CITY OF BELLEVUE TO REMAIN. TREE PROTECTION SHALL CONSIST OF ¾" 4'X'4 PLYWOOD BOXES CENTERED ON THE TRUNK OF THE TREE OR APPROVED EQUAL.
3. EXISTING PARKING LOT CURBS AND PAVEMENT USED FOR ACCESS SHALL BE PROTECTED FROM DAMAGE BY THE CONTRACTOR. DAMAGE INCURRED DURING CONSTRUCTION TO ADJACENT PROPERTY SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.



STREAM CORRIDOR SITE PREPARATION PLAN (1 / C-1)

SCALE: NOTED

Path: O:\proj\Y2006\06-03501-001\CAD\Dwgs\Phase II\C-10.dwg
Plot Date: 6/11/2008 11:37 AM Cad User: Wojciech Wieszczecinski

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2200 Sixth Avenue
Suite 1100
Seattle, Washington
98121-1820
206-441-9080
206-441-9108 FAX
http://www.herreralnc.com

SE 30TH STREET / SUNSET CREEK CULVERT REPLACEMENT PROJECT

Approved By

DESIGN MANAGER DATE

PROJECT MANAGER DATE

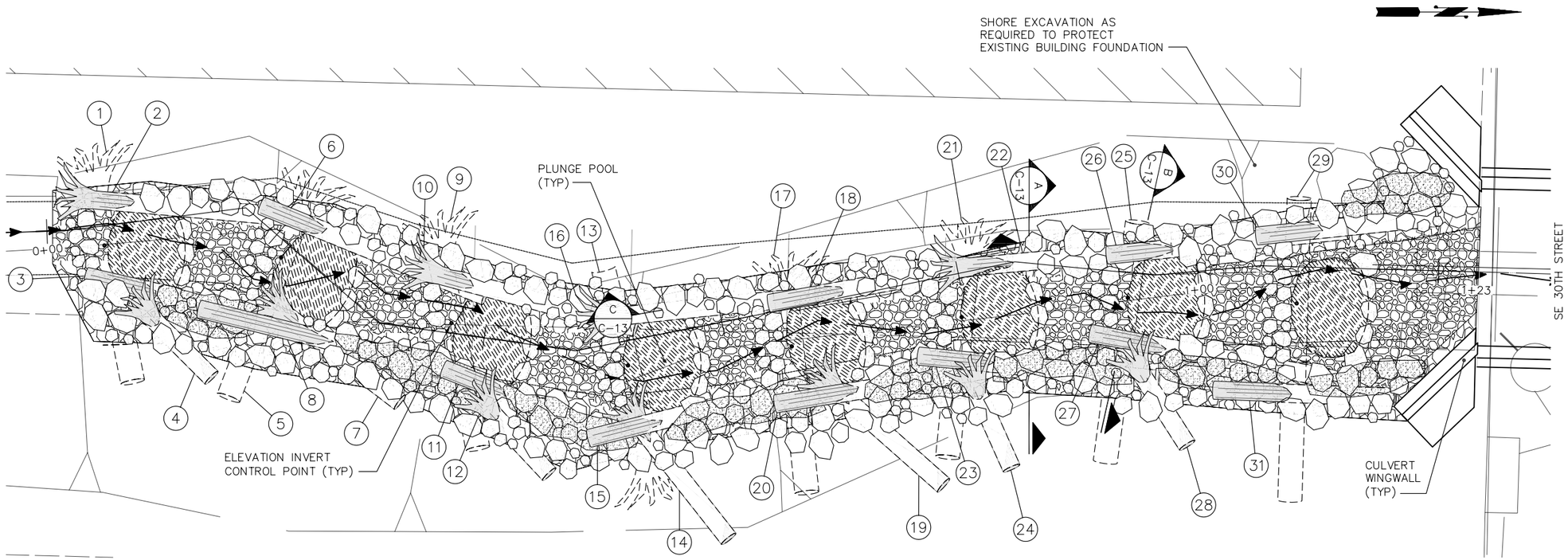
C. BARTON	05/2008
DESIGNED BY	DATE
W. WIESZCZECINSKI	06/2008
DRAWN BY	DATE
M. EWBANK	06/2008
CHECKED BY	DATE

City of Bellevue UTILITIES

STREAM CORRIDOR SITE PREPARATION PLAN

DRAWING C-10 SHT 14 OF 23

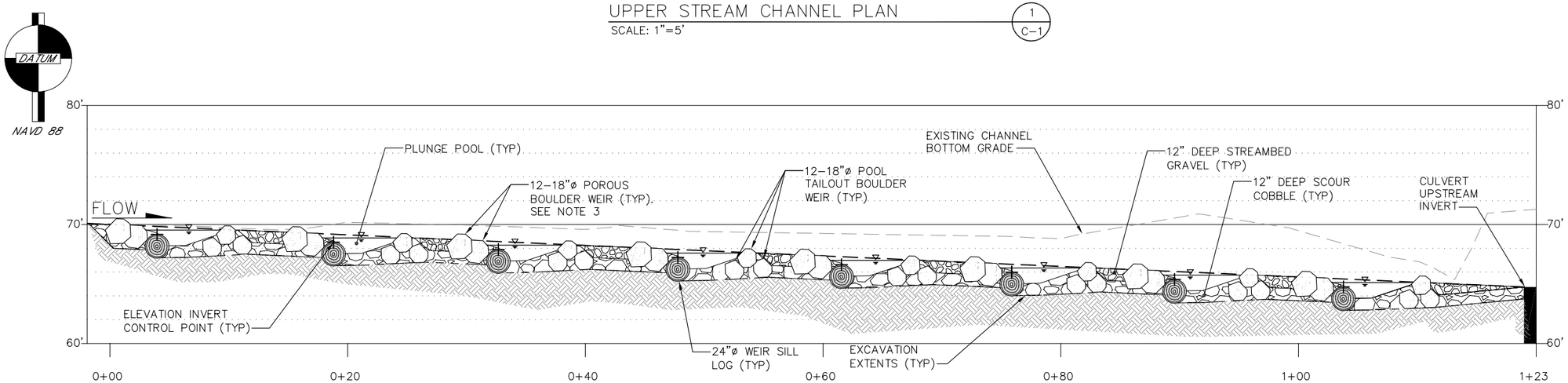
ONE INCH
AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY



UPPER STREAM CHANNEL PLAN

SCALE: 1"=5'

1 / C-1



UPPER STREAM CHANNEL PROFILE

SCALE: 1"=5'

A / –

GENERAL NOTES:

1. FILL ALL VOIDS DURING BACKFILLING AND CONSOLIDATE FILL USING WYCO 992A–FI–10 10 CONCRETE VIBRATOR OR APPROVED EQUAL.
2. LOG IDENTIFICATION NUMBERS REFLECT POTENTIAL CONSTRUCTION SEQUENCING AND LOG PLACEMENT SEQUENCING. SEE DRAWING C–13 FOR LOG SCHEDULE.
3. CONTACT POINTS BETWEEN BOULDERS SHALL BE MAINTAINED 4" ABOVE PLUNGE POOL WATER SURFACE.

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MARK EWBANK — STATE OF WASHINGTON — 29434 — CHALLENGE LEVER — PROFESSIONAL ENGINEER

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SE 30TH STREET / SUNSET CREEK
CULVERT REPLACEMENT PROJECT

Approved By

DESIGN MANAGER — DATE

PROJECT MANAGER — DATE

C. BARTON	05/2008
DESIGNED BY	DATE
W. WIESZCZECINSKI	06/2008
DRAWN BY	DATE
M. EWBANK	06/2008
CHECKED BY	DATE

City of Bellevue
UTILITIES

UPPER STREAM CHANNEL
MODIFICATIONS PLAN AND PROFILE

DRAWING C-11 — SHT 15 OF 23

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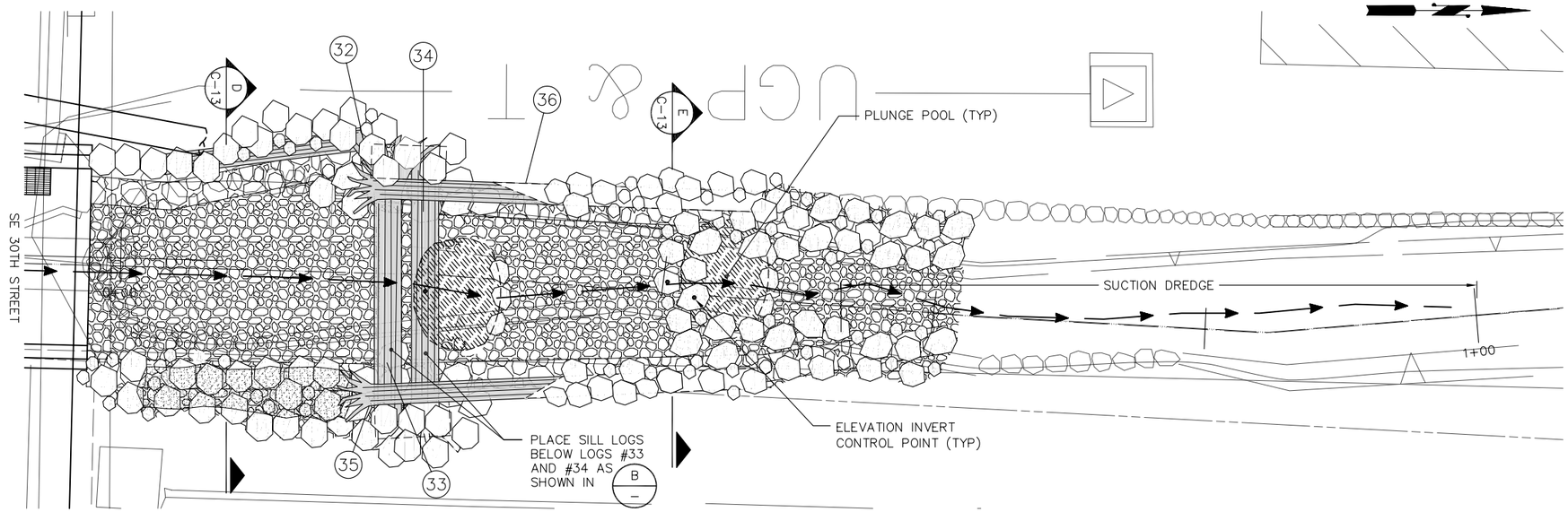
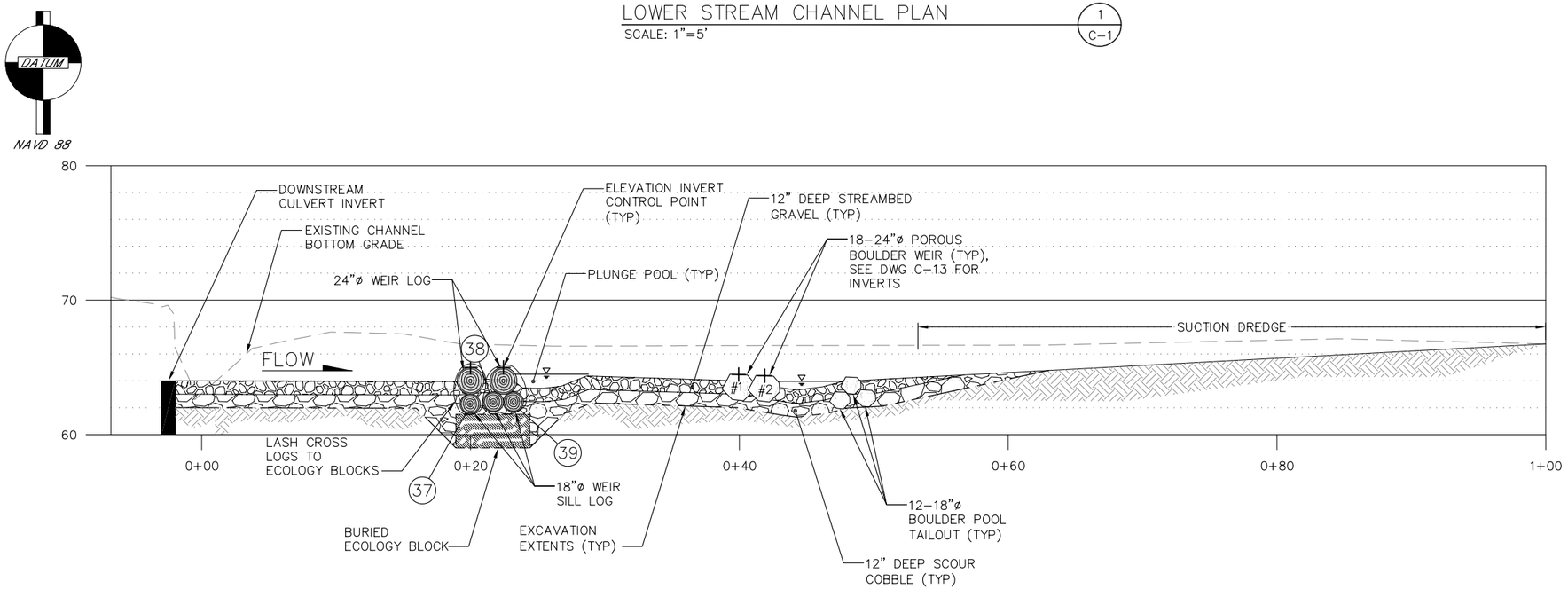
Cad User: Wojciech Wieszczecinski



LOWER STREAM CHANNEL PLAN (1 / C-1)

SCALE: 1"=5'



LOWER STREAM CHANNEL PROFILE (B / –)

SCALE: 1"=5'

GENERAL NOTES:

1. FILL ALL VOIDS DURING BACKFILLING AND CONSOLIDATE FILL USING WYCO 992A–FI–10 10 CONCRETE VIBRATOR OR APPROVED EQUAL.
2. LOG IDENTIFICATION NUMBERS REFLECT POTENTIAL CONSTRUCTION SEQUENCING AND LOG PLACEMENT SEQUENCING. SEE DRAWING C–13 FOR LOG SCHEDULE.

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SE 30TH STREET / SUNSET CREEK CULVERT REPLACEMENT PROJECT

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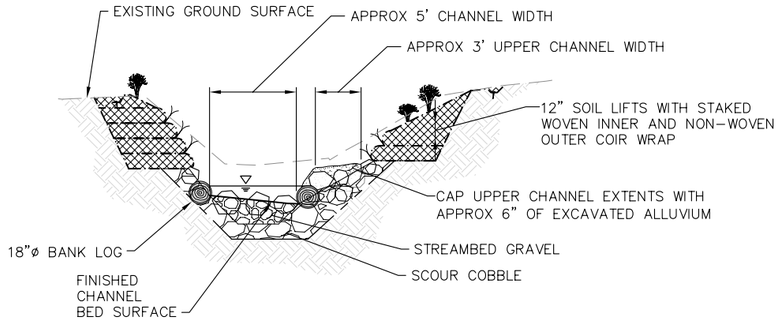
W. WIESZCZECINSKI	06/2008
DRAWN BY	DATE
M. EWBANK	06/2008
CHECKED BY	DATE

City of Bellevue UTILITIES

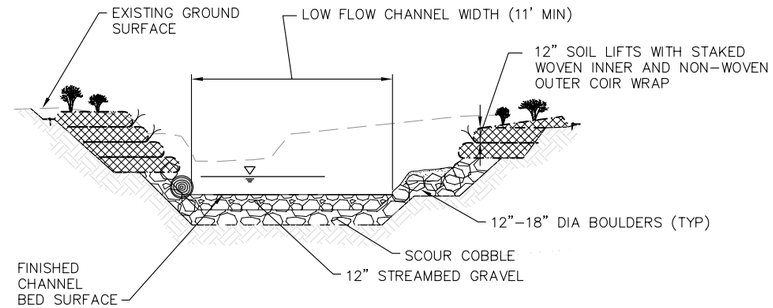
LOWER STREAM CHANNEL MODIFICATIONS PLAN AND PROFILE

DRAWING C-12 SHT 16 OF 23

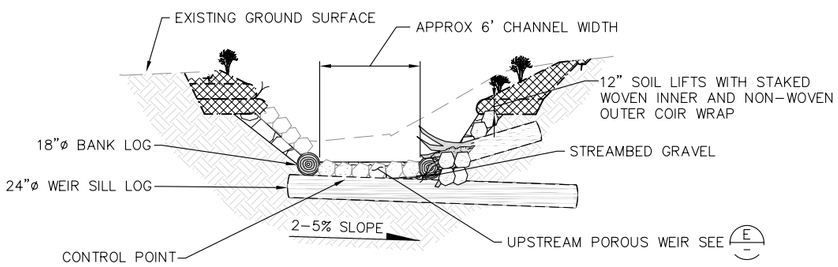
Path: O:\proj\Y2006\06-03501-001\CAD\Dwgs\Phase II\C-12.dwg
Plot Date: 6/11/2008 11:40 AM Cad User: Wojciech Wieszczecinski



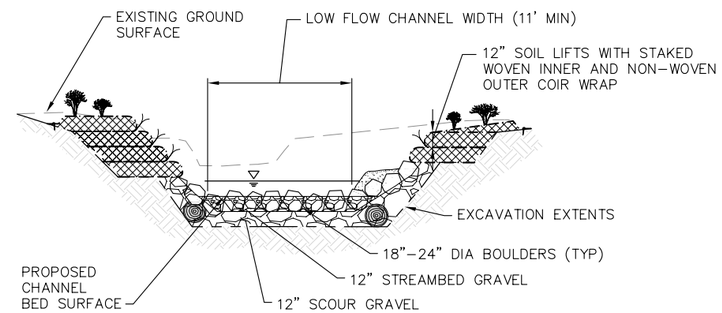
SECTION–TYPICAL UPSTREAM CHANNEL (A / C–11)
SCALE: 1"=5'



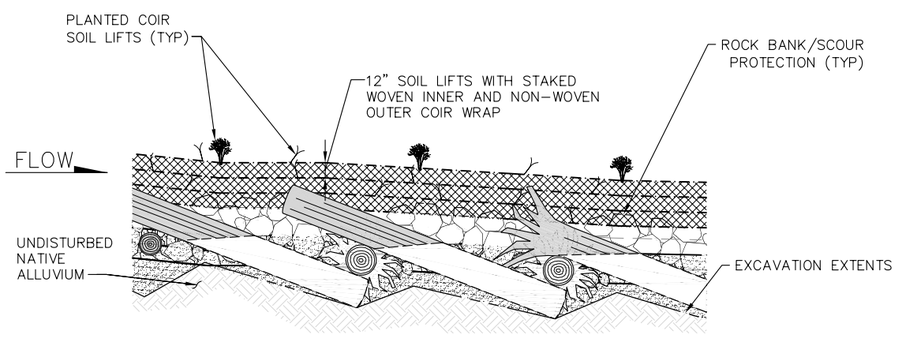
SECTION–TYPICAL DOWNSTREAM CHANNEL (D / C–12)
SCALE: 1"=5'



SECTION–TYPICAL UPSTREAM LOG GRADE CONTROL (B / C–11)
SCALE: 1"=5'



SECTION–TYPICAL DOWNSTREAM CHANNEL AT BOULDER WEIR (E / C–12)
SCALE: 1"=5'



SECTION–TYPICAL UPSTREAM CHANNEL BANK (C / C–11)
SCALE: 1"=5'

TABLE – DOWNSTREAM BOULDER INVERTS:

BOULDER #	INVERT ELEVATION	APPROX STATION
#1	64.47	0+40
#2	64.38	0+42

TABLE – DOWNSTREAM LOG SCHEDULE:

LOG #	DIA. (IN)	LENGTH (FT)	ROOTWAD	INVERT ELEVATION	APPROX STATION
32	18–22	15	NO	–	
33	24	22	YES	65.0	0+20
34	24	22	YES	65.0	0+22
35	18–22	30	YES	–	
36	18–22	30	YES	–	
37	18–22	22	NO	–	0+19
38	18–22	22	NO	–	0+21
39	18–22	22	NO	–	0+23

TABLE – UPSTREAM LOG SCHEDULE:

LOG #	DIA. (IN)	LENGTH (FT)	ROOTWAD	INVERT ELEVATION	APPROX STATION	DOWN SLOPE DIRECTION
1	24	20	YES	69.2	0+04	EAST
2	18–22	25	YES	–		
3	18–22	20	NO	–		
4	18–22	10	YES	–		
5	24	20	YES	68.5	0+21	WEST
6	18–22	15	NO	–		
7	18–22	18	YES	–		
8	18–22	25	NO	–		
9	24	20	YES	67.9	0+37	EAST
10	18–22	20	YES	–		
11	18–22	20	NO	–		
12	18–22	10	YES	–		
13	24	20	YES	67.2	0+52	WEST
14	18–22	15	YES	–		
15	18–22	20	NO	–		
16	18–22	20	YES	–		
17	24	20	YES	66.6	1+01	EAST
18	18–22	20	NO	–		
19	18–22	18	NO	–		
20	18–22	20	NO	–		
21	24	20	NO	66.0	1+15	WEST
22	18–22	18	NO	–		
23	18–22	20	NO	–		
24	18–22	20	NO	–		
25	24	20	NO	65.4	1+30	EAST
26	18–22	20	NO	–		
27	18–22	20	NO	–		
28	18–22	10	YES	–		
29	24	25	NO	64.8	1+44	WEST
30	18–22	15	NO	–		
31	18–22	15	NO	–		

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SE 30TH STREET / SUNSET CREEK CULVERT REPLACEMENT PROJECT

Approved By
DESIGN MANAGER DATE
PROJECT MANAGER DATE

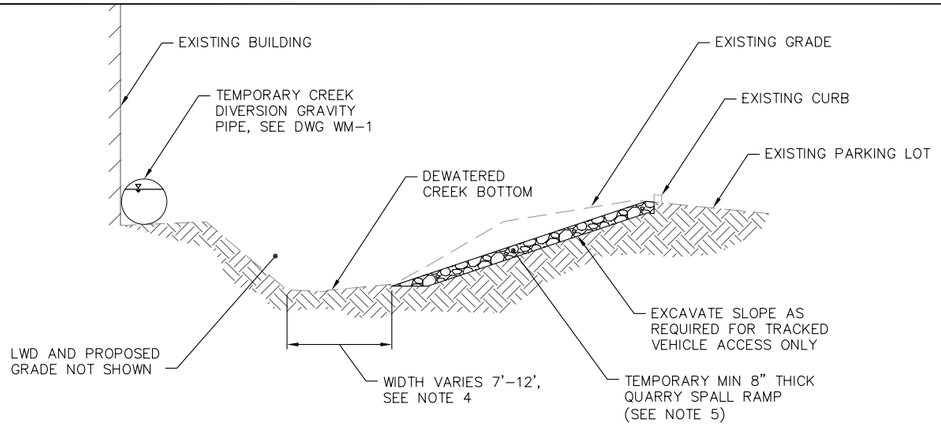
C. BARTON	05/2008
DESIGNED BY	DATE
W. WIESZCZECINSKI	06/2008
DRAWN BY	DATE
M. EWBANK	06/2008
CHECKED BY	DATE

City of Bellevue UTILITIES

STREAM CHANNEL MODIFICATIONS DETAILS

DRAWING C–13 SHT 17 OF 23

Path: O:\proj\Y2006\06-03501-001\CAD\Dwgs\Phase II\C-13.dwg
Plot Date: 6/11/2008 11:41 AM Cad User: Wojciech Wieszczecinski

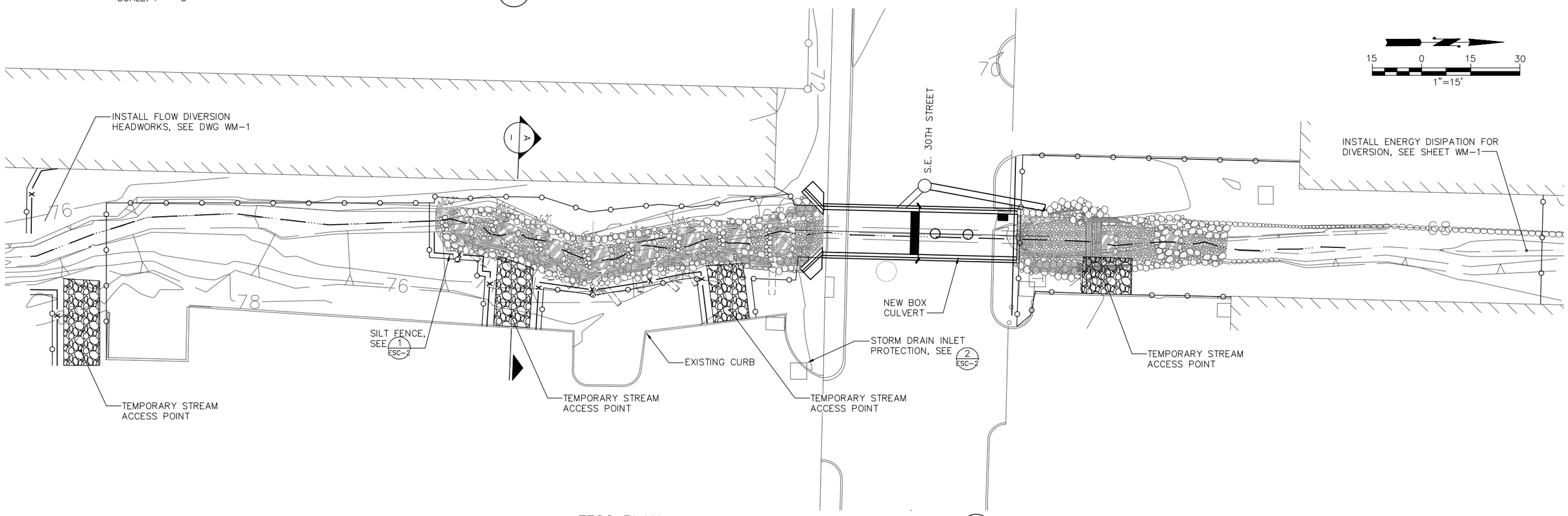


TEMPORARY STREAM ACCESS SECTION (TYP.) — A / –

SCALE: 1" = 5'

GENERAL NOTES:

1. NO MECHANIZED EQUIPMENT SHALL BE STORED WITHIN 100' OF CREEK.
2. HIGH VISIBILITY FENCE AND SILT FENCE SHALL BE INSTALLED PRIOR TO COMMENCING CLEARING AND GRUBBING. A MINIMUM OF 2 DAYS NOTICE WILL BE GIVEN TO THE ENGINEER TO ALLOW FOR APPROVAL OF CLEARING LIMITS PRIOR TO ANY CLEARING OR GRUBBING ACTIVITIES.
3. CONTRACTOR SHALL MAINTAIN SAFE ACCESS TO PARKING LOT FOR PRIVATE PROPERTY OWNERS DURING CONSTRUCTION.
4. TEMPORARY ACCESS FOR TRACKED EQUIPMENT ON CHANNEL ALIGNMENT MAY REQUIRE TEMPORARY GRADING OF CHANNEL BOTTOM.
5. QUARRY SPALLS FOR TEMPORARY STREAM ACCESS SHALL BE REMOVED WHEN NO LONGER NEEDED.



TESC PLAN — 1 / C-1

SCALE: NOTED

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PROJECT MANAGER — DATE

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DESIGNED BY	DATE
W. WIESZCZECINSKI	06/2008
DRAWN BY	DATE
M. EWBANK	06/2008
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City of Bellevue UTILITIES

TEMPORARY EROSION AND SEDIMENT CONTROL PLAN

DRAWING ESC-1 SHT 18 OF 23

Path: O:\proj\Y2006\06-03501-001\CAD\Dwgs\Phase I\ESC-1.dwg
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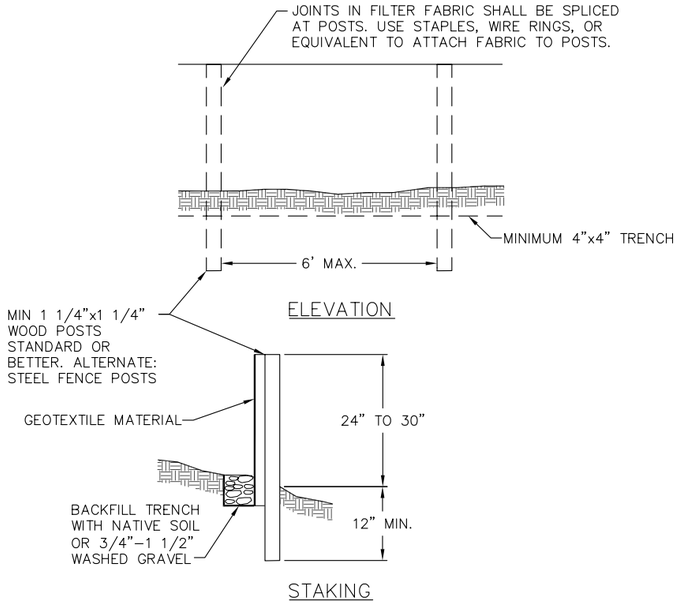
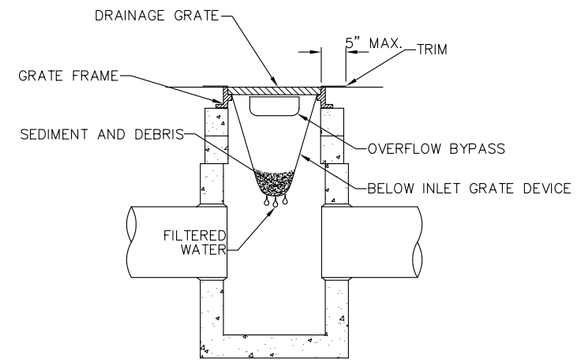
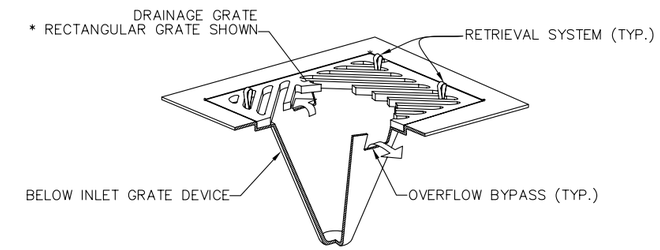


SILT FENCE DETAIL (1) ESC-1
SCALE: NTS



NOTES:

1. SIZE THE BELOW INLET GRATE DEVICE (BIGD) FOR THE STORM WATER STRUCTURE IT WILL SERVICE.
2. THE BIGD SHALL HAVE A BUILT-IN HIGH-FLOW RELIEF SYSTEM (OVERFLOW BYPASS).
3. THE RETRIEVAL SYSTEM MUST ALLOW REMOVAL OF THE BIGD WITHOUT SPILLING THE COLLECTED MATERIAL.
4. PERFORM MAINTENANCE IN ACCORDANCE WITH STANDARD SPECIFICATION 8-01.3(15).



ISOMETRIC VIEW

STORM DRAIN INLET PROTECTION (2) ESC-1
SCALE: NTS

NOTES:

1. THE FILTER FABRIC (CONSTRUCTION GEOTEXTILE FOR TEMPORARY SILT FENCE) SHALL BE PURCHASED IN A CONTINUOUS ROLL, 5FT WIDE, CUT TO THE LENGTH OF THE BARRIER TO AVOID USE OF JOINTS. WHEN JOINTS ARE NECESSARY, THE FILTER FABRIC SHALL BE SPLICED TOGETHER ONLY AT A SUPPORT POST, WITH A MINIMUM 6 INCH OVERLAP, AND SECURELY FASTENED TO THE POST.
2. THE FENCE POSTS SHALL BE SPACED A MAXIMUM OF 6 FEET APART AND DRIVEN SECURELY INTO THE GROUND A MINIMUM OF 12 INCHES.
3. A TRENCH SHALL BE EXCAVATED A MINIMUM OF 4 INCHES WIDE BY 4 INCHES DEEP, UPSLOPE AND ADJACENT TO THE POST TO ALLOW THE FILTER FABRIC TO BE BURIED.
4. THE FILTER FABRIC SHALL BE STAPLED OR WIRED TO THE POSTS, AND 12 INCHES OF THE FABRIC SHALL BE EXTENDED INTO THE TRENCH. THE FABRIC SHALL NOT EXTEND MORE THAN 30 INCHES ABOVE THE ORIGINAL GROUND SURFACE. FILTER FABRIC SHALL NOT BE STAPLED TO TREES.
5. THE TRENCH SHALL BE BACKFILLED WITH NATIVE SOIL OR WITH 3/4"-1 1/2" WASHED GRAVEL.
6. SILT FENCES SHALL BE REMOVED AT DIRECTION OF ENGINEER, BUT NOT BEFORE THE UPSLOPE AREA HAS BEEN PERMANENTLY STABILIZED.
7. SILT FENCES SHALL BE INSPECTED IMMEDIATELY AFTER EACH RAINFALL EVENT AND AT LEAST DAILY DURING PROLONGED RAINFALL. ANY REQUIRED REPAIRS SHALL BE MADE IMMEDIATELY.
8. SILT FENCE PERFORMANCE SHALL BE EVALUATED AND SILT FENCE LOCATIONS SHALL BE EVALUATED AND ADJUSTED AS DIRECTED OR APPROVED BY THE ENGINEER AND THE PERMITTING AUTHORITY.
9. SILT FENCE SHALL BE INSTALLED AS SHOWN ON DRAWINGS.
10. ANY DEVIATION OR CHANGE TO SILT FENCE DETAILS MUST BE APPROVED BY THE OWNERS REPRESENTATIVE.
11. THE CONTRACTOR SHALL MAINTAIN A COPY OF THE MANUFACTURER'S SPECIFICATIONS FOR FILTER FABRIC ON SITE.
12. MAINTENANCE STANDARDS:
    A. ANY DAMAGE SHALL BE REPAIRED IMMEDIATELY.
    B. IF CONCENTRATED FLOWS ARE EVIDENT UPHILL OF THE SILT FENCE, THEY MUST BE INTERCEPTED AND CONVEYED TO A SEDIMENT TRAP OR POND, OR OTHERWISE DIVERTED TO A LOCATION THAT DOES NOT RESULT IN TURBID DISCHARGES TO SURFACE WATERS.
    C. THE UPHILL SIDE OF THE SILT FENCE SHALL BE CHECKED FOR SIGNS OF THE SILT FENCE CLOGGING, ACTING AS A BARRIER TO FLOW, AND CAUSING CHANNELIZATION OF FLOWS PARALLEL TO THE FENCE. IF SUCH CHANNELIZATION OCCURS, THE CONTRACTOR SHALL REPLACE THE FENCE OR REMOVE THE TRAPPED SEDIMENT.
    D. SEDIMENT SHALL BE REMOVED AND PROPERLY DISPOSED OF WHEN THE SEDIMENT IS 6 INCHES HIGH.
    E. IF THE FILTER FABRIC HAS DETERIORATED DUE TO ULTRAVIOLET BREAKDOWN, IT SHALL BE REPLACED.

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City of Bellevue UTILITIES

TESC DETAILS

DRAWING ESC-2 SHT 19 OF 23

Path: O:\proj\Y2006\06-03501-001\CAD\Dwgs\Phase I\ESC-2.dwg
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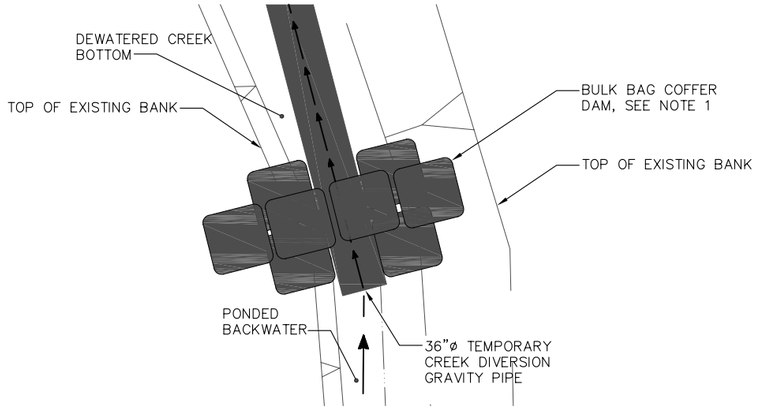
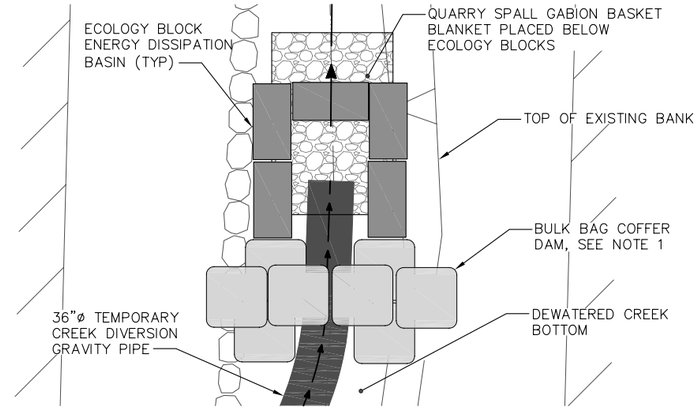


UPSTREAM COFFER DAM DETAIL (1 / –)

SCALE: 1" = 5'

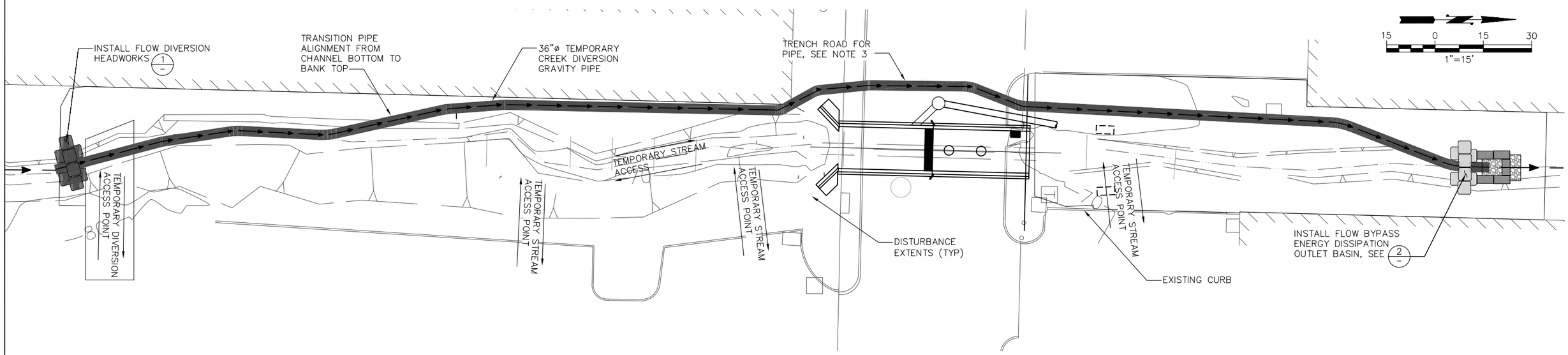


DOWNSTREAM OUTLET STRUCTURE DETAIL (2 / –)

SCALE: 1" = 5'

GENERAL NOTES:

1. BULK BAGS SHALL BE FILLED WITH CLEAN WASHED ROUNDED GRAVEL.
2. TEMPORARY PUMPING OF CREEK DURING GRAVITY PIPE, UPSTREAM COFFERDAM, AND DOWNSTREAM OUTFALL DISSIPATION INSTALLATION AND REMOVAL WILL BE REQUIRED.
3. COORDINATE TEMPORARY DIVERSION PIPE TRENCH WITH CULVERT SHORING REQUIREMENTS AND UTILITY RELOCATION.
4. COORDINATE FISH EXCLUSION WITH CREEK DIVERSION.



STREAM CHANNEL DIVERSION PLAN (1 / C-1)

SCALE: NOTED

Path: O:\proj\Y2006\06-03501-001\CAD\Dwgs\Phase I\WM-1.dwg
Plot Date: 6/11/2008 11:45 AM Cad User: Wojciech Wieszczecinski

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City of Bellevue UTILITIES

FLOW DIVERSION AND FISH EXCLUSION DETAILS

DRAWING WM-1 SHT 20 OF 23

MARK EWBANK STATE OF WASHINGTON 29434 CIVIL ENGINEER PROFESSIONAL ENGINEER

ONE INCH
AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

PLANT SCHEDULE

RIPARIAN LOW LIGHT 1 (RLL1)	SPECIES ABBRV	SCIENTIFIC NAME
	ALRU	ALNUS RUBRA
	THPL	THUJA PLICATA
	ACCI	ACER CIRCINATUM
	COCO	CORYLUS CORNUTA
	RUPA	RUBUS PARVIFLORUS
	SYAL	SYMPHORICARPOS ALBUS
	POMU	POLYSTICHUM MUNTIUM

RIPARIAN LOW LIGHT 2 (RLL2)	SPECIES ABBRV	SCIENTIFIC NAME
	ALRU	ALNUS RUBRA
	PSME	PSEUDOTSUGA MENZIESII
	ACCI	ACER CIRCINATUM
	COCO	CORYLUS CORNUTA
	MAAQ	MAHONIA AQUIFOLIUM
	RONU	ROSA NUTKANA
	RUPA	RUBUS PARVIFLORUS
	SYAL	SYMPHORICARPOS ALBUS

RIPARIAN HIGH LIGHT 1&2 (RHL)	SPECIES ABBRV	SCIENTIFIC NAME
	ALRU	ALNUS RUBRA
	PSME	PSEUDOTSUGA MENZIESII
	HODI	HOLODISCUS DISCOLOR
	MAAQ	MAHONIA AQUIFOLIUM
	RONU	ROSA NUTKANA
	POBA	POPULUS BALSAMIFERA
	SYAL	SYMPHORICARPOS ALBUS

LIVE STAKES (LS)	SPECIES ABBRV	SCIENTIFIC NAME
	COSE	CORNUS SERICEA
	SALU	SALIX LUCIDA SSP. LASIANDRA
	SASC	SALIX SCOULERIANA
	SASI	SALIX SITCHENSIS

LEGEND:

EXISTING CREEK FLOW LINE

PLANTING KEY LEGEND:

PLANTING MIX. SEE PLANTING LEGEND

PLANTING AREA NUMBER

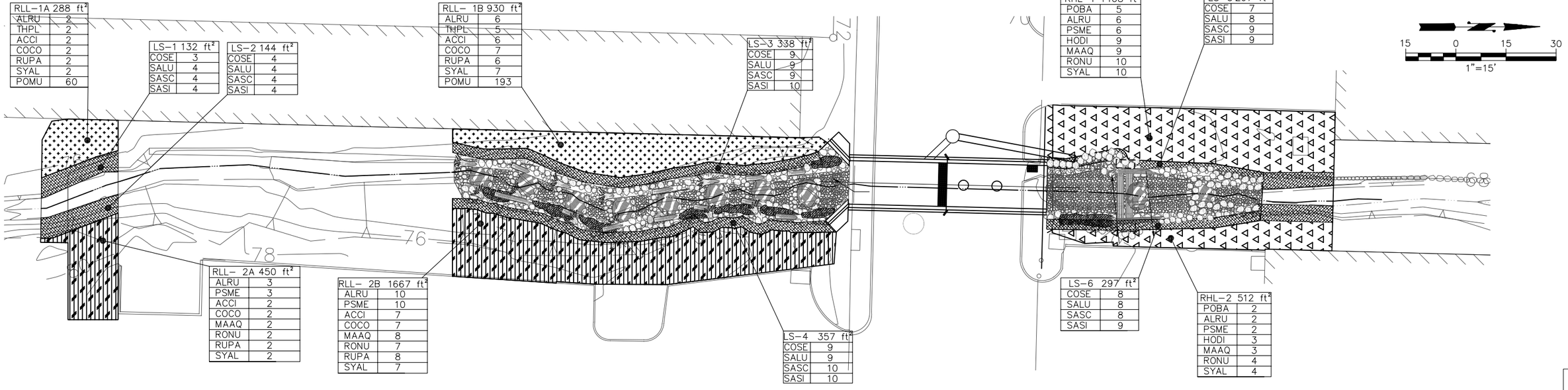
RLL-1B 649 ft²	
ALRU	4
THPL	4
ACCI	3
COCO	4
RUPA	4
SYAL	4
POMU	133

PLANTING ABBREV. SEE PLANTING LEGEND

QUANTITY OF PLANTS IN AREA

GENERAL NOTES:

1. NOXIOUS WEEDS SHALL BE REMOVED PRIOR TO COMMENCING CONSTRUCTION. WEEDS SHALL BE REMOVED BY SELECTIVE CLEARING METHODS WITHIN THE RIPARIAN ENHANCEMENT ZONES. THE WORK SITE SHALL BE MAINTAINED IN A WEED FREE CONDITION THROUGHOUT CONSTRUCTION UNTIL THE CLOSE OF THE CONTRACT. AT A MINIMUM, HIMALAYAN BLACKBERRY, REED CANARYGRASS, JAPANESE KNOTWEED AND ENGLISH IVY SHALL BE COMPLETELY REMOVED FROM THE PROJECT SITE.
2. SELECTIVE CLEARING METHODS CONSIST OF LIGHTWEIGHT HAND OR HAND-HELD EQUIPMENT TO PREVENT DAMAGE TO ROOTS OF EXISTING VEGETATION, COMPACTION OF SOIL, AND DISPERSAL OF SEEDS OR POLLEN FROM INVASIVE PLANTS.
3. NATIVE SEED MIX SHALL BE APPLIED TO ALL DISTURBED AREAS TO STABILIZED SOILS & TO PROVIDE HERBACEOUS COVER. SEEDING SHALL OCCUR AFTER SOIL PREPARATION AND GRADING HAS BEEN APPROVED BY ENGINEER. NATIVE SEED MIX SHALL BE APPLIED BY HAND TO FACES OF SOIL LIFTS PRIOR TO WRAPPING WITH WOVEN GEOTEXTILE. ALL OTHER AREAS WILL BE HYDROSEEDED.
4. ALL PLANTS, EXCEPT AS NOTED, SHALL BE NURSERY CONTAINER GROWN A MINIMUM OF ONE YEAR AND CONTAINERIZED PER ANSI STANDARDS. PLANT MATERIAL IS TO BE SUPPLIED BY COMMERCIAL NURSERIES THAT SPECIALIZE IN NATIVE PLANTS. PLANT SUBSTITUTIONS ARE SUBJECT TO APPROVAL BY THE ENGINEER.
5. SPECIFICATIONS FOR SIZE AND CONDITION ON DWG P-3 ARE MINIMUM.
6. PLANT SPECIES SELECTIONS FOR EACH PLANTING AREA ARE BASED ON PREDICTED LIGHT AND WATER AVAILABILITY. PLANTS SHALL BE RANDOMLY MIXED THROUGHOUT EACH PLANTING ZONE. VERIFICATION OF APPROPRIATE ENVIRONMENTAL CONDITIONS PER SPECIES REQUIREMENTS WILL BE NECESSARY TO ACHIEVE MAXIMUM PLANT SURVIVAL. LAYOUT OF ALL PLANT MATERIAL AND SEEDING TO BE APPROVED BY THE ENGINEER PRIOR TO INSTALLATION. PLANTING PLAN MAY REQUIRE MODIFICATION FOLLOWING ASSESSMENT OF AS-BUILT CONDITIONS: USE PLAN FOR QUANTITIES – FINAL LOCATIONS OF PLANTS SUBJECT TO CHANGE.
7. SHRUBS, TREES AND, LIVE STAKES SHALL BE INSTALLED ACCORDING TO DETAILS ON DWG. P-2.
8. DISCREPANCIES BETWEEN PLANS AND SITE CONDITIONS SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER PRIOR TO PROCEEDING.
9. ENGINEER TO APPROVE GRADING PRIOR TO PLANTING.
10. KEEP ALL PLANT MATERIAL WELL-WATERED AND SHADED UNTIL THE ACTUAL TIME OF PLANTING: DO NOT ALLOW PLANT MATERIAL TO BE EXPOSED TO SUNLIGHT OR OTHER DRYING CONDITIONS PRIOR TO PLANTING.
11. ALL SHRUB AND TREE PLANTING SHALL OCCUR DURING THE DORMANT SEASON (NOVEMBER THROUGH FEBRUARY).
12. THOROUGHLY WATER ALL PLANTED AREAS IMMEDIATELY AFTER PLANTING AND WATER FOR OPTIMUM HEALTH DURING DRY PERIODS DURING THE PLANT ESTABLISHMENT PERIOD.
13. EXISTING AREAS DISTURBED BY CONSTRUCTION ACTIVITIES AND NOT SHOWN TO BE RE-LANDSCAPED ON THESE PLANS SHALL BE RESTORED AND SEEDED AS DIRECTED BY THE ENGINEER.
14. SEE SPECIFICATIONS FOR ADDITIONAL SEEDING, PLANTING, AND SOIL PREPARATION NOTES.
15. ALL TREE OR SHRUB PLANTINGS SHALL BE SETBACK A MINIMUM OF 5 FEET FROM ALL PAVEMENT EDGES, AND ALL TREE PLANTINGS SHALL BE SETBACK A MINIMUM OF 10 FEET FROM BUILDINGS.



STREAM CHANNEL SITE PREP PLAN

SCALE: NOTED

1 / C-1

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http://www.herreralnc.com

SE 30TH STREET / SUNSET CREEK CULVERT REPLACEMENT PROJECT

Approved By

DESIGN MANAGER DATE

PROJECT MANAGER DATE

C. ELLIOT	05/2008
DESIGNED BY	DATE
W. WIESZCZECINSKI	06/2008
DRAWN BY	DATE
K. LEPINE	06/2008
CHECKED BY	DATE

City of Bellevue UTILITIES

PLANTING PLAN

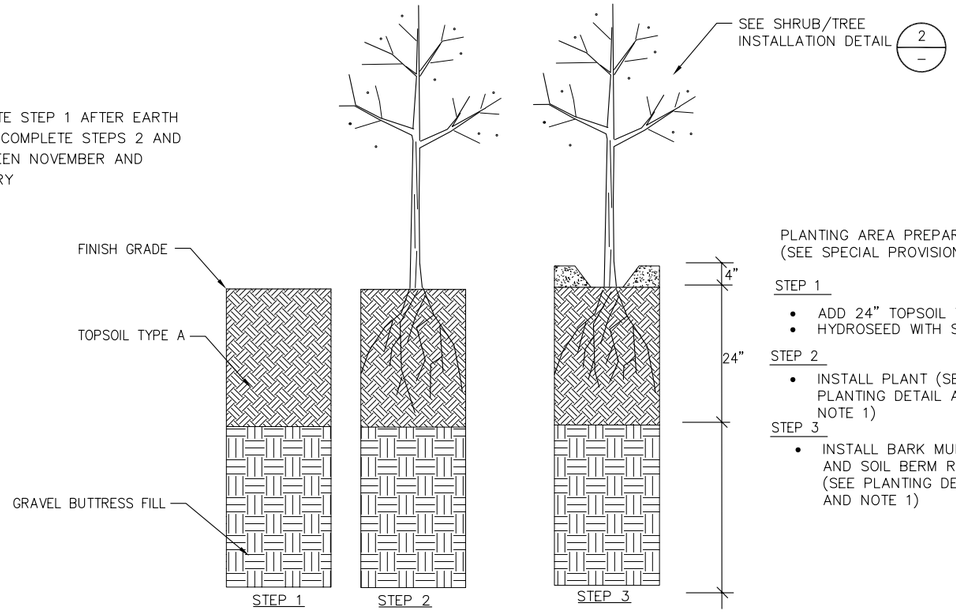
DRAWING P-1

SHT 21 OF 23

Path: O:\proj\Y2006\06-03501-001\CAD\Dwgs\Phase IIP-1.dwg
Plot Date: 6/11/2008 11:46 AM Cad User: Wojciech Wieszczecinski

NOTE:

1. COMPLETE STEP 1 AFTER EARTH WORK. COMPLETE STEPS 2 AND 3 BETWEEN NOVEMBER AND FEBRUARY



PLANTING AREA PREPARATION (SEE SPECIAL PROVISIONS)

STEP 1
- ADD 24" TOPSOIL TYPE A
- HYDROSEED WITH SEED MIX

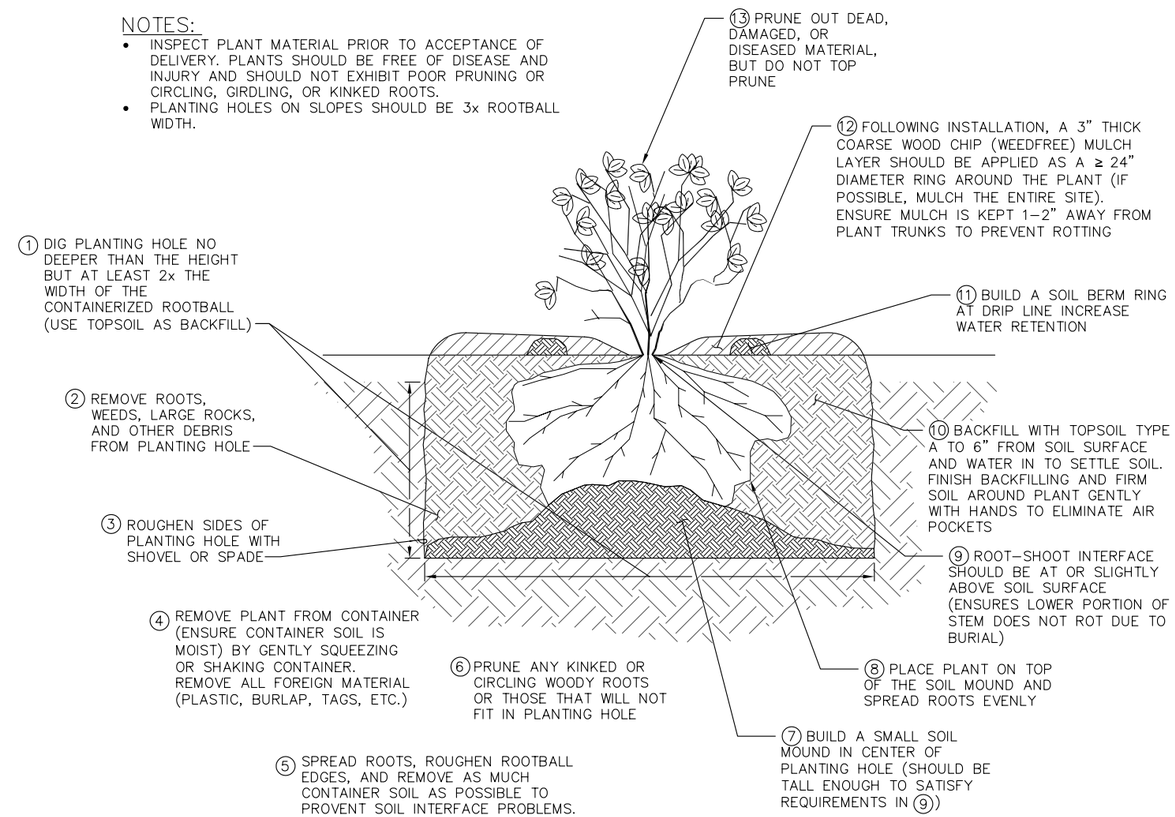
STEP 2
- INSTALL PLANT (SEE PLANTING DETAIL AND NOTE 1)

STEP 3
- INSTALL BARK MULCH AND SOIL BERM RINGS (SEE PLANTING DETAIL AND NOTE 1)

TOPSOIL TYPE A AMENDMENT AND PLANTING SEQUENCE OF WORK (1/–)

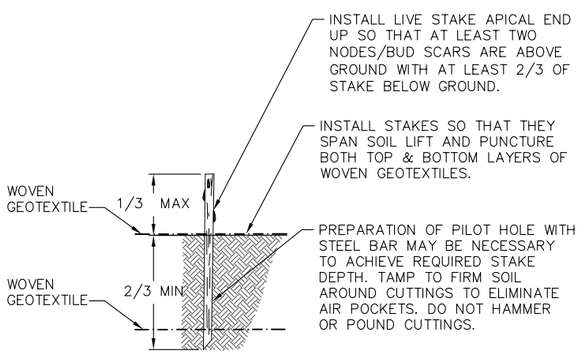
SCALE: NTS

NOTES:
- INSPECT PLANT MATERIAL PRIOR TO ACCEPTANCE OF DELIVERY. PLANTS SHOULD BE FREE OF DISEASE AND INJURY AND SHOULD NOT EXHIBIT POOR PRUNING OR CIRCLING, GIRDLING, OR KINKED ROOTS.
- PLANTING HOLES ON SLOPES SHOULD BE 3x ROOTBALL WIDTH.



CONTAINERIZED TREE/SHRUB INSTALLATION SEQUENCE (2/–)

SCALE: NTS



NOTES:
1. BASAL END OF LIVE STAKES SHOULD BE 0.5–1.5 INCHES IN DIAMETER AND AT LEAST 36 INCHES IN LENGTH.
2. KEEP LIVE STAKES COVERED, COOL, AND MOIST AT ALL TIMES PRIOR TO PLANTING. AT NO TIME SHOULD LIVE STAKES BE EXPOSED AND ALLOWED TO DRY OUT.
3. WHEN PLANTING ON STREAM BANKS, ANGLE STAKES SLIGHTLY DOWNSTREAM.

LIVE STAKE INSTALLATION (3/–)

SCALE: NTS

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City of Bellevue UTILITIES

PLANTING DETAILS

DRAWING P-2

SHT 22 OF 23

Path: O:\proj\Y2006\06-03501-001\CAD\Dwgs\Phase II\P-2.dwg
Plot Date: 6/11/2008 11:47 AM Cad User: Wojciech Wieszczecinski

STRUCTURAL CLASS	SPECIES ABBRV	QUANTITY	SCIENTIFIC NAME	COMMON NAME	WETLAND INDICATOR	MATERIAL TYPE & SIZE	SPACING ON CENTER (FEET)	NOTES
TREES								
	POBA	7	POPULUS BALSAMIFERA	BLACK COTTONWOOD	FAC	1 GAL CONT. 12" HEIGHT	9	
	ALRU	29	ALNUS RUBRA	RED ALDER	FAC	1 GAL CONT. 12" HEIGHT	9	
	PSME	23	PSEUDOTSUGA MENZIESII	DOUGLAS FIR	FACU	2 GAL CONT. 24" HEIGHT	9	
	SALU	42	SALIX LUCIDA SSP. LASIANDRA	PACIFIC WILLOW	NI	LIVE STAKE 36" LENGTH; 0.5–1" DIAMETER BASE; ANGLE CUT ON BASAL END	3	INSTALL AT OHWM AND BELOW
	THPL	6	THUJA PLICATA	WESTERN RED CEDAR	FAC	2 GAL CONT. 24" HEIGHT	9	
SHRUBS								
	ACCI	17	ACER CIRCINATUM	VINE MAPLE	FAC–	1 GAL CONT. 12" HEIGHT	5	
	COSE	40	CORNUS SERICEA	RED OSIER DOGWOOD	FACW	LIVE STAKE 36" LENGTH; 0.5–1" DIAMETER BASE; ANGLE CUT ON BASAL END	3	INSTALL AT OHWM AND BELOW
	COCO	18	CORYLUS CORNUTA	BEAKED HAZELNUT	FACU	1 GAL CONT. 12" HEIGHT	5	
	HODI	12	HOLODISCUS DISCOLOR	OCEANSPRAY	UPL	1 GAL CONT. 12" HEIGHT	5	
	MAAQ	23	MAHONIA AQUIFOLIUM	TALL OREGON GRAPE	UPL	1 GAL CONT. 12" HEIGHT	5	
	RONU	25	ROSA NUTKANA	NOOTKA ROSE	FAC	1 GAL CONT. 12" HEIGHT	5	
	RUPA	17	RUBUS PARVIFLORUS	THIMBLEBERRY	FAC–	1 GAL CONT. 12" HEIGHT	5	
	SYAL	31	SYMPHORICARPOS ALBUS	SNOWBERRY	FACU	1 GAL CONT. 12" HEIGHT	5	
	SASC	44	SALIX SCOULERIANA	SCOULER'S WILLOW	FAC	LIVE STAKE 36" LENGTH; 0.5–1" DIAMETER BASE; ANGLE CUT ON BASAL END	3	INSTALL AT OHWM AND ABOVE
	SASI	46	SALIX SITCHENSIS	SITKA WILLOW	FACW	LIVE STAKE 36" LENGTH; 0.5–1" DIAMETER BASE; ANGLE CUT ON BASAL END	3	INSTALL AT OHWM AND BELOW
HERBS								
	POMU	196	POLYSTICHUM MUNITUM	SWORD FERN	FACU	1 GAL CONT.	2	

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Plot Date: 6/11/2008 11:49 AM Cad User: Wojciech Wieszczecinski

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CHECKED BY	DATE

City of Bellevue UTILITIES

PLANT MATERIAL LIST

DRAWING P-3 SHT 23 OF 23

APPENDIX C

WSDOT Fish Exclusion Protocols and Standards

Fish Exclusion Protocols and Standards

8/3/06

WSDOT Fish Exclusion Protocols and Standards

Prior to dewatering, all fish and other vertebrate aquatic life will be removed from sites that will be dewatered. For projects where in-water work is limited to a specific area and dewatering will not occur, fish will be excluded from the area to the maximum extent feasible within an isolated work area.

The sequence for fish exclusion is as follows:

- Isolation of the work area.
- Removal of as many fish as possible.
- Gradual dewatering of the work area (if the work area is to be dewatered).
- Removal of remaining fish.
- Record fish exclusion activities and notify Services as required.

Isolation of the work area, fish removal and release shall be conducted or directed by a biologist who possesses the competence to ensure the safe handling of all Endangered Species Act (ESA) listed fish, and who is also experienced with work area isolation. This protocol may not apply or may be modified in emergency situations or in certain areas that have unique site-specific characteristics.

Isolation of the Work Area

Installation of block nets will occur at predetermined locations, based on site characteristics, to prevent fish and other aquatic wildlife from moving into the work area. Sites will be selected based on desirable attributes such as slower flows and suitable locations for stake and/or gravel bag placement. Areas with heavy vegetation, undercut banks, deep pools, etc. will be avoided due to the difficulty of sealing nets. The downstream block net will be angled across the stream if possible to prevent impingement of fish on the net. Additionally, a “mini-pool” may be constructed at the downstream block net to provide a lower velocity area for fish to maneuver away from the net. Whenever conditions allow, the upstream block net shall be placed first. The downstream block net shall then be used as a seine to herd fish from the upstream block net location downstream to the point selected for the downstream block net installation. If feasible, this action will potentially move significant numbers of fish downstream, out of the impact area prior to other removal methods.

Block net mesh size, length, type of material, and depth will vary based on site conditions. The directing biologist on site will base the design of block nets on specific site characteristics such as water depth, velocity and channel width. Typical block net material is 9.5 millimeter stretched mesh. Block nets shall remain in place until in-water work is completed. Block nets will require frequent leaf and debris removal. An individual will be assigned the responsibility of frequently checking the nets to maintain their effectiveness and integrity. The frequency of such checks will be determined on a

case-by-case basis, dependent upon the system, season and weather conditions. Block nets need to be secured along both banks and in-channel to prevent failure during unforeseen rain events or debris accumulation. Some locations may require additional block net support (examples include galvanized hardware cloth and metal fence posts).

Fish Removal and Dewatering

If the site is dewatered, dewatering and the placement of cofferdams or diversions will be in accordance with any provisions contained in the Hydraulic Project Approval (HPA) permit from WDFW.

Pumps used to temporarily bypass water around a work site, or to dewater residual pools within a dewatered site, shall be fitted with mesh screens to prevent aquatic life from entering the intake hose of the pump. The screens will also prevent aquatic life from entering the intake hose if a block net should fail. Screens shall be placed approximately 2-4 feet from the end of the intake hose to assure fish are not pinned upon the screen. Screening techniques must utilize the specifications in the HPA and be in compliance with Washington State Laws RCW 77.55.320, RCW 77.55.040 and RCW 77.55.070.

The site will be dewatered slowly enough to allow the efficient removal of all fish species and avoid strandings. The site will be rewatered slowly enough to prevent the loss of surface water downstream as the streambed absorbs water and to minimize or avoid a sudden increase in stream turbidity. During rewatering, the site will be monitored to prevent stranding of aquatic organisms below the construction site.

<u>Removal Methods:</u>

Methods for exclusion or removal of fish from the area between the block nets are described below. These methods are given in order of preference and for many locations a combination of methods will need to be applied. The use of visual observation techniques (e.g.. snorkeling, surveying with polarized glasses or Plexiglas bottomed buckets) should be considered for evaluation of removal method effectiveness and to identify specific locations of fish concentrations prior to removal attempts.

- **Seining** shall be the preferred method. The remaining methods shall be used when seining is not possible or to enhance the effectiveness of removal through seining. Seines made from 9.5 mm stretched nylon mesh shall be used to remove fish from the isolated stream reach. Seine design will be dependent upon site-specific characteristics. The on-site biologist will plan seining procedures based on an evaluation of site characteristics. Seines, once pursed, will remain partially in the water while aquatic life is removed. Aquatic life will be captured by personnel in water or on shore using hand held nets.
- **Baited minnow traps** (typically used in conjunction with seining) may be left in overnight, but will be checked at least three times daily to minimize predation within the trap. Traps will be checked more frequently if temperatures are in excess of 15◦C.

- **Dip Nets and Hand Removal** will be used in conjunction with seining and as a site is slowly dewatered. This usually occurs after other methods.
- **Connecting rod snakes** will be used to help move fish out of stream crossing structures. The connecting rod snake is made of wood sections approximately three feet in length. When dewatering is to occur a seine may be placed at the downstream end of the crossing structure. As the water level goes down fish inside the culvert, in theory, will evacuate downstream into the seine that is in place at the outlet. The snake may be wiggled slowly through the pipe to encourage evacuation of fish out of the culvert. Other previously listed capture techniques shall be employed if required.
- **Electrofishing** shall be performed only when other methods have been determined to be unfeasible or ineffective by the directing biologist. Electrofishing studies document injury rates to fish even at low settings. Therefore, use of this method is discouraged when unnecessary. For sites that will not be dewatered, the potential for injury to ESA-listed fish may outweigh the benefit of capture and relocation of all fish present in the work area. Electrofishing research results reveal a trend that as number of vertebrae and spine length increase, injury potential also increases. Therefore, the capture and removal of adult ESA-listed fish by electrofishing will be avoided when possible1.

  The following conditions shall apply to use of electrofishing as a means of fish removal:

  1. The USFWS will be provided written notification 10 working days prior to the initiation of electrofishing.
  2. Electrofishing shall only be conducted when a biologist with at least 100 hours of electrofishing experience is on site to conduct or direct all activities associated with capture attempts. The directing biologist shall be familiar with the principles of electrofishing including the interrelated effects of voltage, pulse width and pulse rate on fish species and associated risk of injury/mortality. The directing biologist shall have knowledge regarding galvanotaxis, narcosis and tetany, their respective relationships to injury/mortality rates, and have the ability to recognize these responses when exhibited by fish.
  3. The following chart shall be used as guidelines for electrofishing in water where the potential to encounter ESA-listed juvenile fish exists. Only DC or pulsed DC current will be used. Visual observation of the size classes of fish in the work area is helpful to avoid injury to larger fish by the mistaken assumption that they are not present.

[1] Timing windows provided by WDFW will be used to minimize the chance of encountering adult proposed or listed fish. However, complete avoidance may not be possible with resident bull trout.

Guidelines for initial and maximum settings for backpack electrofishing[2].

	Initial Setting	**Conductivity (μS/cm)**	**Maximum Settings**
Voltage	100 V	≤ 300	800 V
		> 300	400 V
Pulse Width	500 μs		5 ms
Pulse Rate	15 Hz		60 Hz (In general, exceeding 40 Hz will injure more fish)

Each session shall begin with low settings for pulse width and pulse rate. If fish present in the area being electrofished do not exhibit an appropriate response, the settings shall be gradually increased until the appropriate response is achieved (galvanotaxis). Conducting electrofishing activity at the minimal effective settings is imperative because as pulse width and pulse rate increase, fish injury rates increase. Minimum effective voltage settings are dependent upon water conductivity and will need to increase as conductivity decreases. Higher voltages elevate the risk of serious injury to fish removal personnel. The lowest effective setting for pulse width, pulse rate and voltage will be used to minimize personnel safety concerns and help minimize fish injury/mortality rates.

4. Seasonal timing restrictions for conducting electrofishing shall be dependent upon the river system, fish composition and an analysis of the life history of documented species. Spawning adults and redds with incubating eggs will not be subjected to the effects of electrofishing. As a general rule, waters with anadromous salmon should not be electrofished from October 15 to May 15 and resident waters from November 1 to May 15. In waters with potential bull trout presence, the timing may be more restrictive. It shall be the responsibility of the directing biologist to research and assess the time of year (for each river segment) when electrofishing is appropriate.
5. An individual shall be stationed at the downstream block net continuously during electrofishing sessions to recover stunned fish in the event they are washed downstream and pinned against the net.
6. The operator shall avoid allowing fish to come into contact with the anode. The zone of potential fish injury is 0.5 m from the anode. Netting shall never be attached to the anode. Techniques employed when using an unnetted anode keep fish farther from the anode and expose them to significantly less time in the zone of potential injury. Extra care shall be taken near in-water structures or undercut banks, in shallow waters or high-density fish areas. In these areas fish are more likely to come into close contact with the anode because fish may be less visible and the voltage gradients may be abnormally intensified. Voltage settings in shallow water sections shall be checked and readjusted by the operator if necessary. When electrofishing areas near

undercut banks or where structures may provide cover for fish, the anode will be used to draw the fish out by placing the activated anode near the area fish are likely present and slowly drawing the anode away. Fish experiencing galvanotaxis will be attracted to the anode and will swim away from the structure toward the anode so that they can be netted. This will not work on fish that experience narcosis or tetany. Therefore, fish response will be noted in adjacent areas prior to attempts made near structures. This should help avoid prolonged exposure of fish to the electrical field while in an immobilized state.

7. Electrofishing shall be performed in a manner that minimizes harm to fish. Once an appropriate fish response (galvanotaxis) is noted, the stream segment shall be worked systematically, moving the anode continuously in a herringbone pattern through the water without electrofishing one area for an extended period of time. The number of passes shall be kept to a minimum, will be dependent upon site-specific characteristics, and be at the discretion of the directing biologist. Adequate numbers of personnel shall be on-site to minimize the number of passes required for fish removal. Adequate staff to net, recover, and release fish as soon as possible shall be present. Fish shall be removed from the electrical field immediately. Fish shall not be held in the net while continuing to capture additional fish.
8. Condition of captured fish will be carefully observed and documented. Dark bands on the body and extended recovery times are signs of injury or handling stress. When such signs are noted, the settings for the electrofishing unit and/or manner in which the electrofishing session is proceeding need adjustment. These characteristics may be an indication that electrofishing has become an inappropriate removal method for that specific site. Each fish shall be capable of remaining upright and actively swimming prior to release (see Fish Handling, Holding and Release section).
9. Electrofishing shall not occur when turbidity reduces visibility to less than 0.5 meters, when water conductivity exceeds 350 µS/cm, or when water temperature is above 18°C or below 4°C.

<u>Fish Handling, Holding and Release:</u>

- Fish handling will be kept to the minimum necessary to remove fish from the work site.
- Fish will not be sampled or anesthetized during removal activities as this protocol is intended to address fish removal not research. Fish species, number, age class estimate, and release location will be documented.
- Individuals handling fish shall ensure that their hands are free of sunscreen, lotion, or insect repellent.
- Fish or other aquatic life captured shall be immediately put into dark colored containers filled with clean stream water. Fish removal personnel shall provide a

healthy environment for fish with minimum holding periods and low fish densities in holding containers to avoid effects of overcrowding. Large fish shall be kept separate from smaller fish to avoid predation during containment. Water-to-water transfers shall occur whenever possible. ESA listed fish should not be transferred out of water to prevent added stress. Holding container temperature and well being of specimens will be frequently monitored to assure that all specimens will be released unharmed. Potential shade areas and supplemental oxygen for fish holding shall be considered in designing fish handling operations.

- The release site(s) will be determined by the directing biologist and may be based on specific site characteristics (flow refuge and cover) and type of fish captured (out migrating smolt, kelt, prespawn migrating adult, etc). More than one site may be designated to provide for varying migrational needs and to separate prey size fish from larger fish. The directing biologist shall consider fish migration requirements, size classes of fish, and duration of work area isolation when designing fish release plans. Each fish shall be capable of remaining upright and have the ability to actively swim upon release. ESA-listed or proposed fish will have priority over other species for release. One person shall be designated to transport specimens in a timely manner to the site selected for release.
- All ESA-listed dead fish shall be preserved and delivered to the pertinent regulatory agency (see documentation below) as outlined in the appropriate permit's conditions.
- If authorized level of take is exceeded, the pertinent regulatory agency shall be notified as soon as possible.

Documentation

- All work area isolation, fish removal and fish release activity shall be thoroughly documented in a log book with the following information: project location, date, methods, personnel, in-stream temperature, visibility, electrofisher settings, and other comments.
- Species, number of each species, age class estimate, and location of release will be recorded for all fish handled.
- Information regarding injuries or mortalities to ESA-listed or proposed species shall be documented and provided within three working days to NOAA fisheries or USFWS, depending on which agency has jurisdiction over that species.

APPENDIX D

Noise Analysis

Summary of Noise Calculations

The proposed project will produce short-term noise effects on the surrounding terrestrial environments. In the case of the proposed project, definition of the action area requires determining the extent of influence of the direct and indirect effects. Generally construction related noise often produces the farthest reaching effects, therefore determining the extent of noise propagation is necessary for action area definition. All in-stream work will occur in a dewatered area thus there will be aquatic noise impacts associated with this project. In the case of the project, short-term terrestrial construction noise constitutes the farthest reaching effect of the project on the terrestrial environment (the completed project will have no influence on long term noise conditions in the vicinity). The terrestrial zone of the action area is defined as the point where construction related noise effects attenuate to measured or expected ambient levels occurring in the project vicinity.

Analysis of the area affected by terrestrial noise from construction of the proposed project is provided in the following sections. This information is applied in the Action Area component of the main body of this biological assessment.

Methods and Assumptions

The approach used to define the extent of terrestrial noise propagation is based on methods developed by the Federal Highway Administration (FHWA 2003), further refined with assistance from specialists in noise effect analysis from the Washington State Department of Transportation (WSDOT) (Magnoni 2006).

Sound is a pressure wave that diminishes over distance from the source due to attenuation caused by surface characteristics, terrain, vegetation effects, and atmospheric scattering. For the purpose of this analysis, construction noise is expected to emanate from the defined noise point sources, traveling along each defined noise propagation ray with diminishing intensity until it attenuates to ambient, or background, noise levels. Based on FHWA guidance for calculating noise attenuation (FHWA 2003; Magnoni 2006), the following rules apply (where D = distance from the source):

- Hard site (water, asphalt, or concrete) sound level propagation from a point source is 20 Log (D/Do), or a 6-dB reduction for every doubling of distance.

- Soft site (ploughed fields, grass, light vegetation, or residential and urban neighborhoods) sound level propagation from a point source is 25 Log (D/Do), or a 7.5-dB reduction for every doubling of distance.

This simplistic approach does not account for atmospheric conditions, terrain, vegetation, and other factors which contribute to sound attenuation, and is therefore likely to overestimate the distance required to attenuate construction noise to background levels.

Background Noise Levels

The project is located on a busy city street within an urban residential and commercial/light industrial zoned district. Background noise levels in this type of environment are variable, but 80 dBA, a typical noise levels for a busy city street (WSDOT 2006), is considered to be representative.

Noise Levels and Propagation Produced by Proposed Action

The proposed project will produce construction noise in excess of existing background noise levels. To determine the extent of noise related effects, it is necessary to determine how much noise would be produced by the proposed activity, and the distance required to attenuate this noise to the previously defined background levels.

Anticipated construction noise levels are calculated based on the types of equipment expected to be used at each noise source. WSDOT guidance provides noise ranges for common construction equipment, as measured 50 feet from the source (WSDOT 2006). The maximum sound level produced by multiple pieces of equipment typically does not exceed the combined noise level of the loudest three pieces of equipment as measured 50 feet from the source, even when multiple additional pieces of equipment are used.

Noise levels at each noise source point were calculated following this approach. Maximum noise levels at the end points of the construction zone were calculated at 102.3 dBA, under the assumption that heavy trucks and excavators are the loudest equipment that will be used simultaneously (see Table D-1).

Table D-1. Estimated maximum construction noise at project area (produced by the loudest three concurrently operating pieces of equipment) (WSDOT 2006).

Equipment	Sound Level at 50 ft.
Heavy Trucks	96
Class 300 excavator	97
Jackhammer	99
Maximum combined construction noise	102.3

Maximum combined construction noise calculated using formulae provided by FHWA (2003) and Magnoni.

The distance required to attenuate 102.3 dBA to the background noise threshold of 80 dBA is calculated using the simple attenuation formula provided in WSDOT guidance (WSDOT 2006). This formula provides that construction noise will attenuate at a rate of -7.5 dBA per doubling of distance away from the source of the sound. Using 50 feet from the sources as the starting distance for estimated noise levels, at this rate 102.3 dBA will attenuate to 80 dBA within approximately 400 feet of the noise producing activity (see Table D-2).

Table D-2. Distance required to attenuate 102.3 dBA to ambient noise level of 80 dBA over soft surface calculated using WSDOT (2006) methodology.

Distance from Source Over Hard Surface (urban neighborhood) (ft)	Construction Noise Level (dBA)
50	102.3
100	94.8
200	87.3
400	**79.8**
800	72.3
1,600	64.8
3,200	57.3
6,400	49.8
12,800	42.3
dBA at distance X =	50

APPENDIX E

Biology of Listed Species

Biology of Listed Species

The following sections describe the life histories and other biological information about the Chinook salmon that is relevant to the project effect analysis.

Chinook Salmon

Species: *Oncorhynchus tshawytscha*
ESU: Puget Sound
Federal Status: Listed threatened
Critical Habitat: Designated critical habitat does not occur within action area

Species Status

Chinook salmon species status is detailed in the main body of this biological assessment.

Life History

The chinook is the largest of the Pacific salmon, averaging 35 inches in length and 18 to 42 pounds in weight. Because of their large size and relatively poor jumping ability, Chinook salmon prefer large, low-gradient rivers and streams for spawning. These types of systems have been most profoundly affected by human activities throughout much of the species range (Wydowski and Whitney 1979).

Chinook salmon exhibit a number of life history patterns, however these can be grouped into two general categories based on their rearing and migratory behavior; ocean type and stream type. Ocean type chinook, which include the majority of chinook populations in the Puget Sound ESU and those that occur in Lake Washington tributaries, enter the river at or near sexual maturity and spawn almost immediately. Ocean type chinook migrate for spawning in summer and fall months. Ocean type chinook typically rear in freshwater for shorter periods, three to four months, before migrating to estuarine and marine areas as smolts. As adults, ocean type chinook tend to migrate shorter distances staying closer to the continental shore. Once in the ocean, ocean type Chinook engage in distant spawning migrations often far offshore (Healy 1991).

The Puget Sound TRT has identified two populations of Chinook that occurred historically in this area: the Sammamish (including Issaquah Creek and north Lake Washington tributaries) and Cedar River populations. The WRIA 8 Technical Committee has identified three populations—the Cedar River, North Lake Washington, and Issaquah. WDFW is currently conducting a genetics study that is expected to help resolve the different population identifications.

Spawning of the North Lake Washington population of chinook, which includes those fish found in Kelsey Creek, generally occurs from mid-September through October (WDFW 2007a). Chinook salmon of the North Lake Washington population demonstrate a similar to migration behavior seen in the Cedar River, juveniles migrate into the Sammamish River or Lake Washington either as fry or fingerlings between February and June (WRIA 8 Steering Committee 2005). As with other Chinook smolts from WRIA 8, they rear in marine nearshore areas of Puget Sound before heading to the ocean (WRIA 8 Steering Committee 2005).

Occurrence in Action Area

Steelhead occurrence in the project action area is detailed in the main body of this biological assessment.

Steelhead

Species: *Oncorhynchus mykiss*
DPS: Puget Sound
Federal Status: Proposed for listing
Critical Habitat: Critical habitat designation pending

Species Status

Steelhead species status is detailed in the main body of this biological assessment.

Life History

Steelhead trout are an anadromous form of rainbow trout. The relationship between the migratory anadromous and resident forms is complex and the two populations interbreed routinely. Both life history types are considered important to population diversity and health of the species; however, currently only anadromous populations have been listed under the ESA by NOAA Fisheries (Thomas R. Paine Associates and S.P. Cramer Associates 2005). Steelhead trout have an extremely variable life history pattern, with multiple freshwater and saltwater residence periods demonstrated within populations. Juvenile steelhead can spend up to 7 years rearing in freshwater prior to smoltification and maturing adults can spend anywhere from 1 year to 4 years in marine waters. Unlike other Pacific salmon, steelhead are capable of spawning as many as two or three times. Steelhead spawning and rearing habitat consists of cold, clear streams with deep pools, cobble and gravel substrate, and stream structures comprised of boulders and large woody debris. Cover is extremely important and plays a key role in habitat selection by young fish (Pauley et al. 1986). Steelhead feed on invertebrates as juveniles. In marine environments steelhead typically feed on fish, squid, crustaceans and other invertebrates.

Steelhead eggs may incubate for 1.5 to 4 months before hatching (Quinn 2005). Once they hatch, alevins spend approximately 12 weeks in the gravel feeding off their yolk sac (Pauley et al. 1986). The majority of steelhead juveniles reside in fresh water for 2 years prior to emigrating to marine habitats, with limited numbers emigrating as 1- or 3-year old smolts. In Washington state streams supporting steelhead populations, rearing juvenile steelhead will be present year-round. Smoltification and seaward migration occur principally from April to mid-May (NMFS 2005). Two-year-old naturally produced smolts are usually 140 to 160 millimeters in length (NMFS 2005). The inshore migration pattern of steelhead in Puget Sound is not well understood; but it is generally thought that steelhead smolts move quickly offshore (NMFS 2005).

Washington stocks of steelhead consist of two races, or runs, depending on their spawning timing, winter run and summer run. Steelhead in the Lake Washington watershed are winter run (WDFW 2007). Winter-run steelhead migrate to their native streams in the late fall (November through April) and spawn within the next few months (Emmett et al. 1991). Spawning takes place throughout the Lake Washington basin including the Sammamish River and its tributaries, Issaquah Creek, Coal Creek, May Creek, the lower Cedar River and several smaller Lake Washington tributaries (WDFW 2007b). Spawning of Lake Washington steelhead occurs from mid-December through early June (WDFW 2007b). Lake Washington winter steelhead status has been changed from depressed to critical due to chronically low escapements and a short-term severe decline in escapement in 2000 and 2001 (WDFW 2007b).

Naturally produced juvenile winter steelhead can either migrate to sea or remain in freshwater as a resident rainbow trout (Kerwin 2001). The vast majority of juvenile steelhead in the Lake Washington Basin smolt and migrate to saltwater (Kerwin 2001). Lake Washington steelhead usually spend 1 to 3 years in freshwater, with the greatest proportion spending 2 years (Busby et al. 1996). Because of this, juvenile steelhead rely heavily on the freshwater habitat are present in streams all year long (Kerwin 2001).

Occurrence in Action Area

Steelhead occurrence in the project action area is detailed in the main body of this biological assessment.

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APPENDIX F

Essential Fish Habitat Assessment

Essential Fish Habitat Assessment

Background

The Magnuson–Stevens Fishery Conservation and Management Act (MSA), as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), established procedures designed to identify, conserve, and enhance essential fish habitat (EFH) for those species regulated under a federal fisheries management plan. Pursuant to the MSA:

- Federal agencies must consult with NOAA Fisheries on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH (Section 305(b)(2))

- NOAA Fisheries must provide conservation recommendations for any federal or state action that would adversely affect EFH (Section 305(b)(4)(A))

- Federal agencies must provide a detailed response in writing to NOAA Fisheries within 30 days after receiving EFH conservation recommendations. The response must include a description of measures proposed by the agency for avoiding, mitigating, or offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with NOAA Fisheries EFH conservation recommendations, the federal agency must explain its reasons for not following the recommendations (Section 305(b)(4)(B)).

Essential fish habitat means those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (MSA Section 3). For the purpose of interpreting this definition of EFH: (1) “waters” include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; (2) “substrate” includes sediment, hard bottom, structures underlying the waters, and associated biological communities; (3) “necessary” means the habitat required to support a sustainable fishery and the managed species’ contribution to a healthy ecosystem; and (4) “spawning, breeding, feeding, or growth to maturity” covers a species’ full life cycle (50 CFR 600.10). Adverse effect means any impact that reduces quality and/or quantity of EFH, and may include direct (e.g., contamination or physical disruption), indirect (e.g., loss of prey or reduction in species fecundity), site-specific or habitat-wide impacts (including individual, cumulative, or synergistic consequences of actions [50 CFR 600.810]).

Consultation with NOAA Fisheries regarding essential fish habitat is required regarding any federal agency action that may adversely affect EFH, including actions that occur outside EFH,such as certain upstream and upslope activities. Any reasonable attempt to encourage the

conservation of EFH must take into account actions that occur outside EFH, such as upstream and upslope activities that may have an adverse effect on EFH. Therefore, EFH consultation with NOAA Fisheries is required by federal agencies regarding any activity that may adversely affect EFH, regardless of its location. The objectives of this EFH consultation are to determine whether the proposed project would adversely affect designated EFH and to recommend conservation measures to avoid, minimize, or otherwise offset potential adverse effects on EFH resulting from the proposed project.

EFH within the Action Area

Freshwater EFH for Pacific salmon includes all those streams, lakes, ponds, wetlands, and other water bodies in Washington, Oregon, Idaho, and California currently or historically accessible to salmon species managed under any federal fisheries management plan. Exceptions include areas upstream of certain impassable man-made barriers (as identified by PFMC [1999]), as well as longstanding, naturally impassable barriers (i.e., natural waterfalls in existence for several hundred years) (PFMC 1999). The project action area includes areas designated as EFH for various life-history stages of Chinook and coho. The project will have no effect on marine habitat conditions; therefore, it will have no effect on EFH for groundfish or coastal pelagic species.

A description of the project action area can be found in the main body of this BA.

Direct and Indirect Effects to EFH (Short- and Long-term)

As described in detail in the Effects of the Action section of this BA, the proposed project is likely to result in short-term construction-related impacts (specifically elevated suspended sediments), as well as immediate and eventual modifications of channel habitat features and geomorphic processes in the Sunset Creek stream channel. With regard to short-term effects, the following will occur as a result of the proposed project:

- Temporary dewatering of approximately 460 feet of instream habitat, including approximately 60 feet within the existing culvert footprint (approximately 50 days) to create a stream exclusion area for construction

- Direct disturbance of approximately 230 linear feet of channel (110 feet upstream and 60 feet downstream of the culvert and 60 feet within the culvert) for placement of the new culvert structure and related channel modifications

- Direct disturbance of approximately 0.16 acres (6,800 square feet) of existing degraded riparian habitat

- Temporary increases in suspended sediment concentrations during placement and removal of the stream exclusion area, and during the "first flush" of the affected area by storm flows

As discussed in the main body of this report, these short-term effects are of insufficient magnitude to significantly disrupt habitat conditions or quality in the project action area.

The proposed project will result in several long-term effects on habitat conditions in the project action area. Specifically:

- Hydraulic and habitat complexity within the project area will increase
- Fish passage within, upstream, and downstream of the replacement culvert will be improved
- Geomorphic effects resulting from decreased sediment loading to the Sunset Creek and Richards Creek channels will alter downstream habitat conditions
- Restoration of disturbed riparian habitat will result in increased riparian function and decreased density and distribution of invasive plant species

These effects are expected to produce net long-term benefits for EFH in the project action area. As discussed in the main body of this BA, the National Marine Fisheries Service (NMFS) has provided a Matrix of Pathways and Indicators for evaluating potential effects on ESA-listed salmonid species based on anticipated project effects on habitat conditions (NMFS 1996). As demonstrated, the proposed project will either maintain or improve the condition of each of these habitat indicators at the action area scale, and will have no effect on watershed scale indicators. Table F-1 provides a summary of the baseline condition of these indicators, and the anticipated effects of the proposed project.

Based on these findings, it is concluded that no permanent short-term or long-term adverse effects on EFH for Pacific salmonids or their prey species are expected to result from the proposed project. Therefore, the project is **not likely to adversely affect** EFH for Pacific salmonids.

Essential Fish Habitat Conservation Recommendations

The habitat requirements for the MSA-managed species within the action area (i.e., EFH) are similar or identical to those of the ESA-listed species.

The proposed project incorporates design elements and conservation measures that are expected to reduce and partially offset permanent effects to habitat and avoid and minimize impacts during construction.

Table F-1. Summary of the anticipated long-term effects of the proposed SE 30th Street/Sunset Creek Flood Improvement Project, based on NMFS Matrix of Pathways and Indicators values

Pathways: Indicators	Environmental Baseline			Effects of the Action		
	Properly Functioning	At Risk	Not Properly Functioning	Improve	Maintain	Degrade
Water Quality						
Temperature		X		X-		
Sediment/turbidity			X	X-		
Chemical contamination		X		X		
Habitat Access						
Physical barriers			X	X		
Habitat Elements						
Substrate		X			X	
Large woody debris			X	X		
Pool frequency/quality			X	X		
Off-channel habitat			X		X	
Refugia			X		X	
Channel Conditions						
Width/depth ratio				X		
Stream bank condition			X	X		
Floodplain connectivity		X			X	
Hydrologic Conditions						
Peak/base flows			X		X	
Drainage network increase			X		X	
Watershed Level Indicators						
Road density and location			X		X	
Disturbance history		X			X	
Riparian reserves			X		X	

[a] Impacts at a local level but not sufficient to alter the environmental baseline for the watershed are indicated using a "-" for temporary, localized, or minor impacts and a "+" for temporary or localized beneficial alterations.

Attachment 3
Addendum to the Critical Areas Report

CRITICAL AREAS REPORT ADDENDUM

SE 30th Street / Sunset Creek Flood Improvement Project

Prepared for

City of Bellevue
Utilities Department
450 110th Avenue NE
P.O. Box 90012
Bellevue Washington 98009

Prepared by

Herrera Environmental Consultants
2200 Sixth Avenue, Suite 1100
Seattle, Washington 98121
Telephone: 206/441-9080

August 11, 2008

Critical Areas Report Addendum

Following completion and submittal of the Critical Areas Report (CAR) on June 25, 2008, changes to the project design occurred that require updates to the analysis of effects. Specifically, utility relocation and other elements of the project design will require riparian tree removal that was not described in the CAR. This addendum provides the updated analysis of the anticipated effects of this design change on critical areas and species of local importance regulated by the City of Bellevue.

Utility relocation will require the removal of 8 significant trees from the riparian zone of Sunset Creek, as follows:

- Three 13-inch diameter-at-breast-height (DBH) Douglas-firs (*Pseudotsuga menziesii*) from the west bank downstream of SE 30th Street
- Two 15-inch DBH red alders (*Alnus rubra*) from the west bank upstream of SE 30th Street
- One 10-inch DBH red alder from the west bank upstream of SE 30th Street
- One 10-inch DBH bigleaf maple (*Acer macrophyllum*) from the east bank upstream of SE 30th Street
- One 24-inch DBH black cottonwood (*Populus balsamifera*) from the west bank upstream of SE 30th Street.

The locations of the trees to be removed are shown in updated Drawing C-10, attached to this addendum.

The trees will be cut down and the root mass will be removed to accommodate utility relocation and/or channel modifications and placement of bioengineered bank stabilization structures. The logs and rootwads will be removed for re-use or disposal at the construction contractor's discretion. (This discussion supplements Section 2.3.4 of the current CAR.)

The effects of tree removal on critical areas regulated by the City of Bellevue are described below. These effects are discussed relative to the pertinent sections of the effects analysis provided in the current CAR.

2.5.2 Projected Future Conditions: Proposed Action Permitted

The following bullet is added to the discussion of future conditions:

- Stream buffers, and buffers for habitats used by species of local interest (see BA, Appendix B, plan sheets P1-P3):
  - Removal of eight significant trees from the riparian area of Sunset Creek (removed trees will be replaced at a 3 to 1 ratio).

2.7 Restoration and Mitigation Requirements

Per LUC 20.25H.085.B, lost values and functions shall be mitigated on a 1 to 1 ratio.

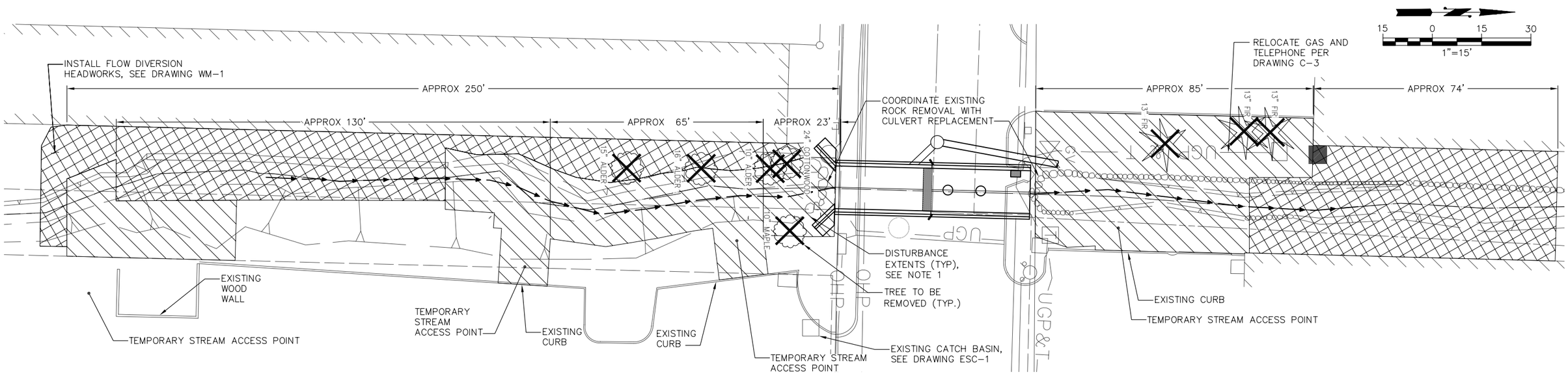
Trees removed for construction purposes will be replaced at a 3 to 1 ratio within the planned revegetation area (the construction clearing limits). All lost vegetation functions will be replaced on an equal area basis (i.e., all disturbed areas will be revegetated). However, the proposed action includes the replacement of non-native invasive and ornamental species with site appropriate native tree and shrub species at higher than existing density. Therefore, the planned mitigation will exceed a 1 to 1 ratio over the long-term on the basis of improved functional conditions.

TREES OVER 8-INCH DIAMETER TO BE REMOVED:

QUANTITY	DIA. (IN)	SCIENTIFIC NAME	COMMON NAME
3	13	PSUEODOTSUGA MENZIESII	DOUGLAS FIR
2	15	ALNUS RUBRA	RED ALDER
1	10	ALNUS RUBRA	RED ALDER
1	10	ACER MACROPHYLLUM	BIGLEAF MAPLE
1	24	POPULUS BALSAMIFERA	BLACK COTTONWOOD

GENERAL NOTES:

1. CONTRACTOR SHALL FENCE THE PERIMETER OF THE CONSTRUCTION ZONE WITH A MINIMUM OF 6' TALL CHAINLINK FENCING PRIOR TO COMMENCEMENT OF ANY CONSTRUCTION ACTIVITIES.
2. PRIOR TO ANY CLEARING OR GRUBBING THE CONTRACTOR SHALL INSTALL TREE PROTECTION FOR ALL TREES DESIGNATED/FLAGGED BY THE CITY OF BELLEVUE TO REMAIN. TREE PROTECTION SHALL CONSIST OF ¾" 4'X'4 PLYWOOD BOXES CENTERED ON THE TRUNK OF THE TREE OR APPROVED EQUAL.
3. EXISTING PARKING LOT CURBS AND PAVEMENT USED FOR ACCESS SHALL BE PROTECTED FROM DAMAGE BY THE CONTRACTOR. DAMAGE INCURRED DURING CONSTRUCTION TO ADJACENT PROPERTY SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.



STREAM CORRIDOR SITE PREPARATION PLAN (1 / C-1)

SCALE: NOTED

Path: O:\proj\Y2006\06-03501-001\CAD\Dwgs\Phase I\Addendum\C-10.dwg
Plot Date: 8/8/2008 11:55 AM Cad User: Wojciech Weszczedinski

Know what's below. Call before you dig.

60% DESIGN - NOT FOR CONSTRUCTION

NO	DATE	BY	APPR	REVISIONS
1	7/30	W.W	CH.B	ADD TREES TO BE REMOVED

HERRERA ENVIRONMENTAL CONSULTANTS
2200 Sixth Avenue
Suite 1100
Seattle, Washington
98121-1820
206-441-9080
206-441-9108 FAX
http://www.herrerainc.com

SE 30TH STREET / SUNSET CREEK CULVERT REPLACEMENT PROJECT

Approved By
DESIGN MANAGER DATE
PROJECT MANAGER DATE

C. BARTON 07/2008 DESIGNED BY DATE
W. WIESZCZECINSKI 08/2008 DRAWN BY DATE
M. EWBANK 08/2008 CHECKED BY DATE

City of Bellevue UTILITIES

STREAM CORRIDOR SITE PREPARATION PLAN

DRAWING C-10 SHT 14 OF 23

ONE INCH
AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

Attachment 4
SEPA Environmental Checklist

ENVIRONMENTAL CHECKLIST

Southeast 30th Street/Sunset Creek Flood Improvements Project – Phase 1

Prepared for

City of Bellevue – Department of Utilities

RECEIVED
JUL 3 0 2008
PERMIT PROCESSING

February 2008

ENVIRONMENTAL CHECKLIST

Southeast 30th Street/Sunset Creek Flood Improvements Project – Phase 1

Prepared for

City of Bellevue – Department of Utilities
450 110th Ave NE
P.O. Box 90012
Bellevue WA 98009
425-452-6932

Prepared by

Herrera Environmental Consultants, Inc.
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Seattle, Washington 98121
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February 6, 2008

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Environmental Checklist

A. Background

1. Name of proposed project if applicable:

Southeast 30th Street/Sunset Creek Flood Improvements Project – Phase 1

2. Name of applicant:

City of Bellevue

3. Address and phone number of applicant and contact person:

Brian Ward
City of Bellevue – Department of Utilities
450 110th Ave NE
P.O. Box 90012
Bellevue WA 98009
425-452-6932

4. Date checklist prepared:

February 4, 2008

5. Agency requesting checklist:

City of Bellevue – Department of Planning and Community Development

6. Proposed timing or schedule (including phasing, if applicable):

The project is proposed for construction in the summer of 2008.

7. Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain.

The proposed project is Phase I of the Flood Control and Sediment Management Plan for the Richards Creek, Sunset Creek, and East Creek Confluence Area. This multiphased project includes a range of sediment management and habitat restoration components, and incorporates long-term and adaptive management components. Subsequent phases of the Flood Control and Sediment Management Plan have not been fully defined, conceptual designs and permitting have not been initiated, and they may or may not be implemented as planned. The proposed project is considered to have independent utility from future phases, and is being permitted and implemented as a separate effort to address immediate needs.

Potential future phases of the plan identified above may include:

- Phase II – Complete channel improvements on Sunset Creek downstream of Southeast 30th Street to increase sediment transport capacity, improve habitat conditions and reduce structural flooding.

- Phase III – Install grade control structures along the "flow-split" and East Creek channels; and between the flow split and Kamber Road to provide sediment storage, limit future channel degradation, and increase the length of channel with quality habitat conditions.

- Phase IV – Establish further sediment control measures in upper watershed channels where areas of streambank and slope instability deliver considerable sediment to the Sunset Creek channel network.

8. List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal.

▪ Joint Aquatic Resource Permit Application (JARPA)	Complete
▪ Basis of Design Report	Pending
▪ Geomorphic Assessment	Pending
▪ Biological Assessment	Complete
▪ NEPA Documented Categorical Exclusion	Pending
▪ Critical Areas Report	Pending

9. Do you know whether applications are pending for governmental approvals of other proposals directly affecting the property covered by your proposal? If yes, explain.

No other relevant projects or permit applications have been identified.

10. List any government approvals or permits that will be needed for your proposal, if known.

- Hydraulic Project Approval - Washington Department of Fish and Wildlife

- Clean Water Act Section 404 permit (under Nationwide Permit 3) - U.S. Army Corps of Engineers

- Clean Water Act Section 401 Water Quality Certification - Washington State Department of Ecology

- Endangered Species Act concurrence – National Marine Fisheries Service (no U.S. Fish and Wildlife Service jurisdiction species occur in the action area)

- Critical Area Ordinance compliance, Clearing and Grading Permit - City of Bellevue.

11. Give brief, complete description of your proposal, including the proposed uses and the size of the project and site. There are several questions later in this checklist that ask you to describe certain aspects of your proposal. You do not need to repeat those answers on this page. (Lead agencies may modify this form to include additional specific information on project description.)

The City of Bellevue proposes to replace existing twin 42-inch diameter corrugated metal pipe culverts on Sunset Creek at Southeast 30th Street with a stream simulation and sedimentation structure, and modify the Sunset Creek channel upstream and downstream of the street to match the culvert replacement structure invert elevations. Proposed channel modifications include removing existing riprap along the channel banks and culvert headwalls, modifying the streambed grade, installing grade control and bank stabilization structures made of boulders and large woody debris, and revegetating disturbed stream banks. The culvert replacement project is designed to reduce ongoing flooding of Southeast 30th Street and adjacent properties and manage sediment transported in Sunset Creek to eliminate the need for annual dredging in the active channel. The replacement culvert project is designed to transmit the 100-year flood without allowing flow to overtop Southeast 30th Street, store approximately 50 cubic yards of sediment within the culvert structure, and provide improved aquatic habitat and fish passage conditions.

The project site is surrounded by commercial/industrial/warehouse facilities. Sunset Creek is located in the Kelsey Creek watershed within WRIA 8 (DNR 2007). Land uses in this drainage are predominantly suburban residential in the upper drainage, and commercial/light industrial in the portion of the drainage containing the project area. Sunset Creek crosses the Interstate 90 (I-90) corridor just east of I-405 before entering Richards Creek approximately 600 feet downstream of the project site. Overall, Sunset Creek has a moderate level of channel and flow modification; over 20 percent of the stream is contained in culverts (Bellevue Critical Areas Update Streams Inventory 2003). The portion of the stream within the project area is extensively hydromodified, contained within an artificial channel constrained between encroaching commercial and light industrial buildings (see Figures 1 and 2, Appendix A).

The aerial extent of the proposed project includes:

- A 565 foot dewatered exclusion area within the Sunset Creek channel, extending approximately 250 feet upstream and 250 feet downstream of Southeast 30th Street (see Figure 2, Appendix A).
- Clearing limits for site access, channel reconfiguration, grade control structure placement, and placement of the new culvert structure (see plan sheets 4 and 7, Appendix A). These limits cover:
  - Approximately 245 linear feet of stream channel (110 feet upstream and 60 feet downstream of Southeast 30th Street, and 64 feet of channel within the culvert).
  - 0.039 acres of adjacent riparian habitat (0.025 acres upstream and 0.014 acres downstream of Southeast 30th Street).

The area of streambank revegetation shown on the referenced plan sheets represents the proposed clearing limits.

12. **Location of the proposal. Give sufficient information for a person to understand the precise location of your proposed project, including a street address, if any, and section, township, and range, if known. If a proposal would occur over a range of area, provide the range or boundaries of the site(s). Provide a legal description, site plan, vicinity map, and topographic map, if reasonably available. While you should submit any plans required by the agency, you are not required to duplicate maps or detailed plans submitted with any permit applications related to this checklist.**

The project area is located in the City of Bellevue, northeast of the I-405/I-90 interchange, in Section 9 and 10 of Township 24 North, Range 5 East. The site lies in the Kelsey Creek watershed, part of WRIA 8. The City of Bellevue has defined 26 "storm drainage" basins that further subdivide drainage areas within WRIA 8. The proposed project is located within a tributary basin, the Sunset Creek drainage (see Figure 1, Appendix A) (City of Bellevue 2007).

The project site overlaps City of Bellevue owned right of way on Southeast 30th Street and adjacent private property on the north and south sides of the street (see Figure 2, Appendix A).

B. Environmental Elements

1. Earth

a. ***General description of the site (check one):***

_X_ **flat**
____ **rolling**
____ **hilly**
____ **steep slopes**
____ **mountainous**
____ **other:** _____

b. ***What is the steepest slope on the site (approximate percent slope)?***

The gradient of the Sunset Creek channel typically ranges from 5 percent upstream of Southeast 30th Street to 1.5 percent downstream. Stream bank gradients are up to 45 degrees and riprap-armored stream banks are nearly vertical. Other areas in the vicinity of the project are nearly flat.

c. ***What general types of soils are found on the site (for example, clay, sand, gravel, peat, muck)? If you know the classification of agricultural soils, specify them and note any prime farmland.***

Soil at the project site is classified as urban land, indicating that the road corridor was constructed in highly disturbed and/or fill soils. Soils in the project vicinity are Everett-Alderwood gravelly sandy loam, Everett gravelly sandy loam, and Seattle muck.

d. ***Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe.***

No (per King County sensitive areas map)

e. ***Describe the purpose, type, and approximate quantities of any filling or grading proposed. Indicate source of fill.***

Approximately 80 cubic yards of fill will be used in the proposed project, in the form of washed, rounded river boulders and streambed gravel and cobble. Imported fill will be offset by the removal of approximately 180 cubic yards of existing riprap, accumulated alluvium, and bank material. Non-regulated fill in the form of structural logs, some with rootwads, will be incorporated into the channel bed and banks.

All fill material will be imported from a licensed commercial source.

f. ***Could erosion occur as a result of clearing, construction, or use? If so, generally describe.***

Clearing of riparian vegetation will be required for the placement of the new culvert structure, grade control structures, and other construction activities. Water quality impacts will be controlled through use of construction best management practices (BMPs), including temporary dewatering of the stream reach through the construction site. All disturbed areas will be restored with bioengineered bank stabilization techniques and appropriate native vegetation upon completion of construction.

g. ***About what percentage of the site will be covered with impervious surfaces after project construction (for example, asphalt or buildings)?***

The proposed project will result in no-net increase in impervious surface area. A total of approximately 900 square feet of road surface and sidewalk will be removed and replaced to construct the replacement culvert structure.

h. ***Proposed measures to reduce or control erosion, or other impacts on the earth, if any:***

See proposed BMPs described below.

General Requirements

The proposed project will implement BMPs to avoid or minimize erosion-related impacts in accordance with regulatory requirements. The City of Bellevue will require its construction contractor to implement and maintain BMPs for temporary erosion and sediment control (TESC). These BMPs will be consistent with the Washington State Department of Ecology 2005 *Stormwater Management Manual for Western Washington* (Ecology 2005) and are considered an integral part of the effect determinations made in the biological evaluation of the proposed project.

Construction Timing

All construction activities associated with stream channel grading, culvert replacement, streamflow bypass, and installation of channel grade control structures will take place during the approved in-water work window for the project area (July 1 to August 31). Activities that may result in unavoidable short-term sediment releases to the stream will be scheduled to commence after July 1 to avoid adverse effects on sensitive fish life history stages.

Temporary Erosion and Sediment Control

TESC measures will be in place before work begins, and additional TESC measures will be implemented as work elements occur in different areas of the site. The TESC plan will include appropriate BMPs to be implemented throughout construction that will retain dust, soil, and stormwater runoff onsite and prevent pollutants and turbid discharges from entering Sunset Creek. Turbidity will be monitored during those construction activities having the potential to release sediments to the stream. If measured turbidity 100 feet downstream of construction is more than 5 nephelometric turbidity units (NTU) greater than the background level, the activities causing the turbidity increase will be discontinued until additional measures necessary to achieve the required performance objectives can be implemented. TESC measures will be upgraded and added as necessary in response to unexpected storm events and changing site conditions (i.e., operation of additional pumps or relocation of silt fences).

The TESC plan will be maintained onsite and a recorded log of BMP implementation and TESC measure performance will be updated weekly. The plan and the log will be available onsite throughout the duration of the project. Documentation will include, at a minimum, records of all BMP implementation and performance monitoring by the contractor's TESC lead as appropriate for the site conditions experienced during construction. Dewatering of the work area within the stream is planned as a major element of water quality protection during construction. Details on the dewatering plan are discussed later in this checklist.

Fueling and Lubrication

Fueling and use of lubricating oils and hydraulic fluids will be conducted offsite or at a designated staging area located at least 150 feet away from aquatic resources. All equipment working around aquatic resources that requires hydraulic fluids will use biodegradable hydraulic fluids.

The construction contractor will be required to develop a site-specific spill prevention, control, and countermeasures (SPCC) plan consistent with state law. The SPCC plan will address hazardous materials, fueling and maintenance of equipment, and spill containment and notification.

Removal of Best Management Practices

After the project is complete and disturbed soils are stabilized, all BMPs will be removed according to the following procedures:

- Evaluate the site to determine if the BMP is no longer needed (i.e., the area has been stabilized and the potential for sediment-laden water to exit the area has passed).
- Remove sediment buildup behind the BMP structures and dispose of sediments at an approved location offsite.
- Remove the BMP materials for reuse or recycling, if applicable.

Site Restoration and Revegetation

The boundaries of the clearing limits will be visibly flagged by a continuous tape or bright orange fencing before construction begins. All disturbed areas within the clearing limits will be replanted with native trees and shrubs appropriate for the site as described previously. Soil in stream access points and other areas that have been compacted by heavy machinery will be tilled prior to replanting to enhance restoration and encourage infiltration of runoff.

2. Air

a. What types of emissions to the air would result from the proposal (for example, dust, automobile exhaust, odors, industrial wood smoke) during construction and when the project is completed? If any, generally describe and give approximate quantities if known.

Heavy equipment used during construction of this project will emit exhaust and create dust that could contribute to ambient concentrations of suspended particulate matter during project construction. However, these emissions will be short term. Consequently, as long as construction equipment is properly maintained and operated to minimize emissions, no significant air quality impacts are expected to result from construction activities. The proposed project area is located in an urbanized environment characterized by light industrial land uses. The air quality impacts resulting from construction related heavy equipment use are expected to be indistinguishable from levels produced by typical levels of truck and other vehicle traffic in the affected neighborhood.

b. Are there any offsite sources of emissions or odor that may affect your proposal? If so, generally describe.

No.

c. Proposed measures to reduce or control emissions or other impacts on air, if any:

Emissions from construction equipment and trucks can be reduced by using relatively new, well maintained equipment. Avoiding prolonged periods of vehicle idling also

would reduce emissions. Construction contractors must comply with Puget Sound Clean Air Agency regulations requiring reasonable precautions to minimize odor and dust impacts. Best management practices for the control of windborne construction dust (such as applying water to the roadway) will be used, if needed.

3. Water

a. *Surface water:*

1) ***Is there any surface water body on or in the immediate vicinity of the site (including year-round and seasonal streams, saltwater, lakes, ponds, or wetlands)? If yes, describe and provide names. If appropriate, name the stream or river it flows into.***

Sunset Creek flows into Richards Creek, a tributary stream within the Kelsey Creek watershed. Kelsey Creek is a tributary to Lake Washington. The project work area encompasses approximately 565 feet of the lower Sunset Creek channel. This 565 feet encompasses the dewatered exclusion area. Approximately 245 feet of active channel will be modified for channel reconfiguration, bank protection, and grade control structures. There are no wetlands or other surface water features in the action area.

2) ***Will the project require any work over, in, or adjacent to (within 200 feet of) the described waters? If yes, please describe and attach available plans.***

The proposed project will require work in Sunset Creek, including culvert replacement and associated channel modifications. The project plan sheets are provided in Appendix A.

3) ***Estimate the amount of fill and dredge material that would be placed in or removed from surface water or wetlands and indicate the area of the site that would be affected. Indicate the source of fill material.***

The existing roadway and fill material will need to be excavated prior to culvert replacement. The excavation dimensions will allow for installation of a pipe that will act as the temporary stream bypass adjacent to the existing culverts. Volumes of excavation and fill below the OHWM for culvert replacement, channel grading, and installation of grade control and bank protection structures are summarized in Table 1.

Table 1. Volumes of excavation and fill below the OHWM for culvert replacement, channel grading, and installation of grade control and bank protection structures.

Impact	Upstream of Culvert	Downstream of Culvert
Volume of excavation below existing OHWM (cy) [a]	98	82
Volume of fill below existing OHWM (cy) [b]	52	28
Area of fill below existing OHWM (acre)	0.02	0.01

[a] Includes streambed material and riprap
[b] Includes streambed material and boulders

The existing twin 42-inch diameter corrugated metal pipe (CMP) culverts on Sunset Creek at Southeast 30th Street will be removed and replaced with a natural-substrate bedded, fish-passable culvert and sedimentation structure to reduce Sunset Creek flooding at Southeast 30th Street. Once the existing culverts are removed the new culvert structure will be installed at approximately the same location. The new culvert will be constructed by a combination of poured in-place concrete and precast concrete structures. A 2-foot diameter high flow and maintenance bypass culvert will be installed west of and parallel to the main culvert structure.

Riprap armoring along the banks of Sunset Creek and surrounding the culvert inlet and outlet will be removed in the project area concurrent with the installation of the new culvert and grade control construction. Because riprap forms the toe of the stream banks through much of its extent within the work area, riprap removal will occur within the OHWM. Riprap removal will be conducted in the dry after the streamflow bypass is in place and the project site is dewatered. This component of the project will take place during the in-water work window. The riprap will either be stored on City property for use in future permitted projects, or will be delivered to a permitted commercial facility for reuse. A summary of the location and quantity of riprap to be removed as part of the proposed project is shown in Table 2 below.

Table 2. Location and quantity of riprap to be removed.

Location	Bank Length (ft)	Bank Area (ft^2)
Upstream		
Left Bank	10	30
Above Culvert	14	42
Downstream		
Left Bank	20	80
Right Bank	20	80
Above Culvert	10	50
Totals	74	282

Approximately 8.5 cubic yards of riprap will be removed upstream of the twin culverts from the left bank and above the culvert openings. No riprap is currently present immediately upstream of the culverts on the right bank. Downstream of the culverts approximately 25 cubic yards of riprap will be removed from both the left and right banks as well as above the culvert openings.

Grading of the channel will be conducted both up and downstream of the culvert replacement structure to match the channel streambed to the invert elevations of the new structure. Channel grading will extend approximately 120 feet upstream and 110 feet downstream of the culvert replacement structure. Volumes of excavation and fill below the OHWM for culvert replacement, channel grading, and installation of grade control and bank protection structures are summarized in

Table 1. Any fill in the channel will be either boulders incorporated in grade control structures, a cobble mixture that will be placed in the channel bed to resist scour, or a gravel "fish" mixture that will be placed to form the streambed surface. These rock materials would be imported from a permitted commercial source.

Upstream of the new culvert structure, channel grading will include excavation of the existing channel bed, installation of log and boulder grade control structures, installation of stable channel substrate material consisting of cobble and gravel, installation of gravel streambed material, and reshaping of banks and installation of wood and boulder bank stabilization. The grade control structures will prevent aggradation of sediment at the upstream entrance of the new culvert and allow for the passage of sediment through the culvert. They will each consist of two 18 to 24 inch diameter logs that will span the entire width of the stream channel and that will be keyed into the adjacent stream banks. Boulders will be rounded to subrounded and will be imported from a permitted commercial source. The grade control structures will be keyed into each bank to a distance that is equivalent to approximately one-third the width of the channel that is spanned.

Channel grading downstream of the replacement culvert will include excavation or removal of the existing channel bed, installation of a log and boulder grade control structure, reshaping of banks, and installation of wood and boulder bank stabilization.

Stream banks will be rebuilt and stabilized in all areas where they are disturbed (~110 feet upstream and 60 feet downstream). Bank toes will be protected from stream erosion using large woody debris and boulders that are buried into the stream bank and integrated into grade control structures. Higher portions of the bank that are disturbed will be stabilized with coir-wrapped lifts of soil. The coir fabric will be staked and the top layer will be secured with an anchor trench. These areas will then be replanted.

All fill materials will be imported from a licensed commercial source. All excavated materials that are not backfilled will be retained on City of Bellevue property for use in future permitted actions, or disposed of at a permitted commercial facility.

4) ***Will the proposal require surface water withdrawals or diversions? Give general description, purpose, and approximate quantities if known.***

The channel will be temporarily dewatered for a reach extending from approximately 250 feet upstream to 250 feet downstream of the Southeast 30th Street culvert to create a 565 foot long exclusion area for project construction. Streamflows will be diverted using sandbag and membrane coffer dams into a gravity or pump fed bypass pipe. Flows will be discharged back into the Sunset Creek channel downstream of the project area. Channel dewatering/rewatering and fish capture and relocation will be conducted consistent with WSDOT standard practices. The temporary flow bypass pipe will be a 2-foot diameter pipe sized to carry up to approximately 96 cubic feet per second, which equates to approximately the _-year recurrence interval flow in Sunset Creek at the project site.

5) ***Does the proposal lie within a 100-year floodplain? If so, note location on the site plan.***

Yes. The 100-year floodplain has been designated along Sunset Creek (see Figure 2 Appendix A).

6) ***Does the proposal involve any discharges of waste materials to surface waters? If so, describe the type of waste and anticipated volume of discharge.***

No waste materials will be discharged to surface waters as a result of the proposed project. Minor surface erosion of restored bed and bank areas will occur during site rewatering, and during the "first flush" of the project area during initial exposure to storm flows.

b. ***Ground water:***

1) ***Will ground water be withdrawn, or will water be discharged to ground water? Give general description, purpose, and approximate quantities if known.***

Not applicable.

2) ***Describe waste material that will be discharged into the ground from septic tanks or other sources, if any (for example, domestic sewage; industrial waste, containing the following chemicals . . .; agricultural waste; etc.). Describe the general size of the system, the number of such systems, the number of houses to be served (if applicable), or the number of animals or humans the system(s) are expected to serve.***

Not applicable.

c. ***Water runoff (including stormwater):***

1) ***Describe the source of runoff (including stormwater) and method of collection and disposal, if any (include quantities, if known). Where will this water flow? Will this water flow into other waters? If so, describe.***

The proposed project is designed to improve conveyance of Sunset Creek through the culvert at Southeast 30th Street and prevent recurring flooding of the surrounding properties. No changes will be made to stormwater collection or disposal systems.

The project will result in replacement of approximately 900 square feet of existing impervious surface, which is below the 5,000 square foot threshold requiring retrofitting for stormwater runoff treatment.

2) ***Could waste materials enter ground or surface waters? If so, generally describe.***

Potential spills from construction activities and equipment could enter surface or ground water; however a SPCC plan will be in place to prevent or reduce impacts from accidental spills.

d. ***Proposed measures to reduce or control surface, ground, and runoff water impacts, if any:***

All construction work will be conducted within a dewatered exclusion area and on adjacent streambanks and uplands. Curing of concrete will occur within this exclusion area. Curing concrete and leachate will not be allowed to come into contact with surface waters. Stormwater or alluvial flow entering the work area will be pumped into the municipal sewer system, or will be treated using a filtration system to remove suspended sediments and other pollutants prior to discharge back to surface waters.

During construction a SPCC plan will be in place to prevent of reduce impacts from accidental spills, consistent with City of Bellevue requirements for construction activities near critical areas.

4. Plants

a. ***Check types of vegetation found on the site:***

X **deciduous tree:**
- X **alder**
- X **maple**
- ___ **aspen**
- X **others:** Black cottonwood, willow, ornamentals

X **evergreen tree:**
- X **fir**
- X **cedar**
- X **pine**
- ___ **others:** ___

X **shrubs**

X **grass**

___ **pasture**

___ **crop or grain**

___ **wet soil plants:**
- ___ **cattail**
- ___ **buttercup**
- ___ **bulrush**
- ___ **skunk cabbage**
- ___ **others:** ___

___ **water plants:**
- ___ **water lily**
- ___ **eelgrass**
- ___ **milfoil**
- ___ **others:** ___

X **other types of vegetation:** ornamental landscaping

b. ***What kind and amount of vegetation will be removed or altered?***

The proposed project will result in temporary disturbance of approximately 1,700 square feet (0.039 acres) of riparian vegetation. This disturbance is necessary to reconfigure the channel to support the new culvert, to place grade control structures, remove riprap, and stabilize the banks using bioengineering methods. The vegetated areas to be disturbed extend approximately 110 feet upstream and 60 feet downstream of Southeast 30th Street, and range from approximately 5 to 15 feet in width. Site access and construction will be managed to limit impacts to non-native vegetation to the greatest extent practicable. No large trees will be removed or harmed during the process. Following completion of the project all disturbed areas will be replanted with site appropriate native vegetation, resulting in a net-increase in riparian function. Bioengineering methods used to stabilize reconfigured streambanks will emphasize the use of native vegetation, consistent with Washington State Integrated Streambank Protection Guidelines.

Downstream of the culvert replacement structure approximately 600 square feet (0.014 acres) of streambank will be disturbed and replanted. Currently the affected area is poorly vegetated, characterized predominantly by reed canarygrass over vertical riprap banks with a sparse mixture of other invasive and ornamental plant species. This vegetation will be replaced by native species that, in combination with riprap removal and bank reshaping, should provide increased habitat and riparian function.

Upstream of the culvert replacement structure approximately 1,100 square feet (0.025 acres) will be disturbed and replanted. The banks in this area are generally covered with English ivy and a mix of shrubs and small diameter (less than 4-inch at breast height) alders, and mature alders and cottonwoods, and young red cedars. Non-native species will be removed to provide access corridors between the mature trees. Once construction has been completed, the site will be replanted with native trees, shrubs and other understory vegetation to provide improved riparian function.

c. ***List threatened or endangered species known to be on or near the site.***

No known listed threatened or endangered plant species are on or near the sites.

d. ***Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any:***

Stream banks that have been disturbed during channel regrading and bank stabilization will be revegetated with native trees and shrubs. Revegetation will occur along a riparian area extending approximately 120 feet upstream and 60 feet downstream of the culvert replacement structure, encompassing approximately 1700 square feet (0.039 acres). See response 4b above.

5. Animals

a. ***List the names of any birds and animals that have been observed on or near the site or are known to be on or near the site:***

Birds: Songbirds

Mammals: Raccoon, opossum, other urban mammals

Fish: Salmon, trout

b. ***List any threatened or endangered species known to be on or near the site.***

Puget Sound Chinook Salmon and Puget Sound steelhead are known to have used this system historically. Prior to hydromodification and subsequent changes in downstream habitat conditions, known and/or likely distribution in Sunset Creek extended up to and perhaps beyond Southeast 30th Street.

c. ***Is the site part of a migration route? If so, explain.***

Sunset Creek is a migratory corridor and a preferential spawning location used by native, anadromous, and adfluvial salmonids. Chinook salmon and steelhead have not been observed in the system in recent years, potentially due to passage barriers imposed by extensive beaver dam complexes in downstream reaches (Paulsen 2007). The affected reach of Sunset Creek is currently used as a preferential spawning location by large adfluvial cutthroat trout.

d. ***Proposed measures to preserve or enhance wildlife, if any:***

The proposed project is principally intended to address routine flooding exacerbated by chronic sediment deposition in and around the culvert at Southeast 30th Street. However, the design incorporates a number of elements that make this project self mitigating. The project also includes several standard construction BMPs to avoid and minimize adverse impacts on fish and wildlife.

First, the proposed project will improve fish passage in Sunset Creek. Hydraulic conditions induced by sediment deposition within and upstream of the Southeast 30th Street culvert present a barrier to fish passage under high stream flow conditions. The replacement culvert and integrated sediment retention structure have been designed to provide fish passage consistent with WDFW (2003) design guidance. In addition, sediment accumulation downstream of Southeast 30th Street has produced a large sediment plug that present a barrier to fish passage under low flow conditions. The integrated sediment trap will provide the increased capacity and flexibility needed to adaptively manage sediment delivery rates to the downstream channel. This will allow for the gradual development of improved conditions for fish passage, spawning and rearing over time.

Second, the proposed project includes channel and bank reconfiguration, and riparian restoration elements that will result in improved habitat conditions in the affected reach. The channel grade control structures will be composed primarily of logs with intact rootwads and large rounded river boulders. The bank protection elements will also be composed of logs with root wads, integrated with vegetative treatments. The reconfigured channel will have a decreased width/depth ratio, increased roughness, and increased pool density. In combination with riparian enhancements, these elements will increase habitat complexity and productivity in the affected reach. Enhanced riparian conditions will also increase the value of this habitat for birds and wildlife species, and its use as a migratory corridor (recognizing that these uses are probably limited in this urbanized environment).

Third, the proposed project will decrease the frequency of and need for dredging of accumulated sediments in the active channel of Sunset Creek. By integrating a sediment trap into the culvert structure, sediment management and removal will be greatly simplified. The trap will provide increased sediment storage capacity, which will limit the frequency of dredging activities over time, and will allow these activities to be conducted within an enclosed structure. This structure incorporates features that will simplify fish removal and exclusion, decreasing the need for electrofishing during sediment removal. This will in turn decrease the likelihood of fish injury and mortality associated with normal maintenance. Dredging of the active channel will only be required under infrequent circumstances when large sediment delivery events overwhelm the sediment trap and aggrade the downstream channel at unacceptable levels. This will significantly reduce the frequency of routine habitat disturbance associated with flood conveyance dredging in Sunset Creek.

Finally, with regards to construction BMPs, the proposed project has been designed to avoid and minimize adverse impacts on fish and wildlife. The primary concern in this respect is the potential for adverse effects on fisheries resources and aquatic habitats during construction. The in-water construction component of this project will take place entirely within the in-water work window for the Sunset Creek system. The work area will be dewatered using a temporary flow bypass to avoid construction related water quality impacts. The bypass and all related materials will be removed upon completion of the project. Dewatering/rewatering, and fish capture and relocation will be conducted using an accepted protocol for these practices (i.e. the Washington State Department of Transportation standard prococol). Alluvial water and stormwater that collects in the work area during construction will be pumped to the municipal sewer system, or will be treated prior to discharge to surface waters to avoid suspended sediment effects. Turbidity monitoring will be conducted throughout construction to ensure BMP effectiveness. The performance threshold for monitoring is 5 nephelometric turbidity units (NTU) or more above background levels. Should measured turbidity increase above this threshold, construction activities causing elevated turbidity will be halted and the BMPs will be addressed as necessary to achieve the desired performance. Consistent with City of Bellevue requirements, the construction contractor will have TESC and SPCC plans in place to avoid any water quality impacts, and will be required to diligently review and update those plans as site conditions warrant.

6. Energy and Natural Resources

a. What kinds of energy (for example, electricity, natural gas, oil, wood stove, solar) will be used to meet the completed project's energy needs? Describe whether it will be used for heating, manufacturing, etc.

Not applicable.

b. Will your project affect the potential use of solar energy by adjacent properties? If so, generally describe.

No.

c. ***What kinds of energy conservation features are included in the plans of this proposal? List other proposed measures to reduce or control energy impacts, if any:***

Not applicable.

7. Environmental Health

a. ***Are there any environmental health hazards, including exposure to toxic chemicals or risk of fire and explosion, spill, or hazardous waste, that could occur as a result of this proposal? If so, describe.***

Environmental health hazards could occur from accidental spills of chemicals during project construction, and construction accidents related to the use of heavy equipment. Small amounts of materials likely to be present during construction include gasoline and diesel fuels, hydraulic fluids, oils, lubricants, and other chemical products. A spill of chemicals could potentially occur during construction as a result of either equipment failure or worker error. During construction, heavy equipment and fuels will be stored at a nearby location. Spills could also occur during refueling, from stored fuels, or from improperly disposed waste materials. Standard construction practices and safety measures will be employed to minimize the risk of spills or accidents.

1) ***Describe special emergency services that might be required.***

Emergency response during an incident would be the responsibility of the contractor. The contractor would require the assistance of the Washington Department of Ecology, Washington Department of Fish and Wildlife, or other agencies depending on the severity of the spill, and the risk to people and the environment. It is expected that the contractor will rely on local emergency services for any accident related injuries.

2) ***Proposed measures to reduce or control environmental health hazards, if any:***

The contractor will develop and implement a SPCC plan according to City of Bellevue requirements, as defined in the bid documents. The SPCC plan will address hazardous materials, fueling and maintenance of equipment, and spill containment and notification. Discovered potentially hazardous waste would be handled in accordance with Environmental Protection Agency, Department of Ecology, and local health regulations.

b. ***Noise***

1) ***What types of noise existing in the area may affect your project (for example, traffic, equipment operation, other)?***

None. Typical background noise levels in this urbanized environment are estimated at 80 to 85 A-weighted decibels (dBA).

2) ***What types and levels of noise will be created by or associated with the project on a short-term or long-term basis (for example, traffic, construction, operation, other)? Indicate what hours noise will come from the site.***

Heavy equipment used during project related materials transportation, staging, and construction will produce noise levels above ambient background. Estimated peak noise levels will range between 90 and 102.3 dBA. After completion of the project, occasional noise from equipment used for on-going routine maintenance and repair will occur. These noise levels will be consistent with those produced by current maintenance dredging activities. The proposed project will not increase the traffic capacity of Southeast 30th Street, nor will it result in any increase in development. Therefore the project will not result in any long-term change in noise conditions in the vicinity.

3) ***Proposed measures to reduce or control noise impacts, if any:***

The contractor will adhere to all applicable federal, state, and local noise regulations governing construction activities.

8. Land and Shoreline Use

a. ***What is the current use of the site and adjacent properties?***

The project site is surrounded by commercial/industrial/warehouse facilities.

b. ***Has the site been used for agriculture? If so, describe.***

No.

c. ***Describe any structures on the site.***

Twin 42-inch diameter corrugated metal pipe (CMP) culverts are currently located on Sunset Creek at Southeast 30th Street. Southeast 30th Street is a two-lane, dead-end, urban corridor serving light industrial and commercial properties. The Sunset Creek channel and riparian buffer is bordered on both banks by commercial/light industrial buildings and parking lots, both upstream and downstream of Southeast 30th Street.

d. ***Will any structures be demolished? If so, what?***

The twin 42-inch diameter corrugated metal pipe (CMP) culverts are currently located on Sunset Creek at Southeast 30th Street will be removed and replaced with a natural-substrate bedded, fish-passable culvert and sedimentation structure to reduce Sunset Creek flooding at Southeast 30th Street. Existing street pavement, sidewalk, and hand rail at the culvert crossing will be removed and replaced. Several utilities in the street corridor will be relocated, potentially requiring partial demolition.

e. ***What is the current zoning classification of the site?***

Light industrial (City of Bellevue 2007).

f. ***What is the current comprehensive plan designation of the site?***

Light industrial (City of Bellevue 2006).

g. ***If applicable, what is the current shoreline master program designation of the site?***

Not applicable.

h. ***Has any part of the site been classified as an environmentally sensitive area? If so, specify.***

Environmentally sensitive areas include the 100 year floodplain of Sunset Creek, the stream channel, and stream buffer (riparian corridor).

i. ***Approximately how many people will reside or work in the completed project?***

None.

j. ***Approximately how many people will the completed project displace?***

None.

k. ***Proposed measures to avoid or reduce displacement impacts, if any:***

None proposed.

l. ***Proposed measures to ensure that the proposal is compatible with existing and projected land uses and plans, if any:***

Not applicable.

9. Housing

a. ***Approximately how many units will be provided, if any? Indicate whether high, middle, or low-income housing.***

Not applicable.

b. ***Approximately how many units will be eliminated, if any? Indicate whether high, middle, or low-income housing.***

Not applicable.

c. ***Proposed measures to reduce or control housing impacts, if any:***

Not applicable.

10. Aesthetics

a. ***What is the tallest height of any proposed structure, not including antennas; what is the principal exterior building material proposed?***

Not applicable.

b. ***What views in the immediate vicinity will be altered or obstructed?***

The proposed project will not change, alter, or obstruct views in the long-term. Excavation and backfill required for the installation of the culvert and channel work will alter views until vegetation can be reestablished on disturbed sites. The viewshed will

not change in the long-term, but improved stream and riparian habitat conditions will provide a visual amenity and fish and wildlife viewing opportunities.

c. ***Proposed measures to reduce or control aesthetic impacts, if any:***

Not applicable.

11. Light and Glare

a. ***What type of light or glare will the proposal produce? What time of day will it mainly occur?***

Not applicable.

b. ***Could light or glare from the finished project be a safety hazard or interfere with views?***

Not applicable.

c. ***What existing offsite sources of light or glare may affect your proposal?***

Not applicable.

d. ***Proposed measures to reduce or control light and glare impacts, if any:***

Not applicable.

12. Recreation

a. ***What designated and informal recreational opportunities are in the immediate vicinity?***

The Sunset Ravine Open Space is located approximately 0.5 miles south of the Southeast 30th Street culvert conveying Sunset Creek, and the Mercer Slough Nature Park is about 0.8 miles west of the confluence of the Southeast 30th Street culvert conveying Sunset Creek. No known informal recreation occurs in the immediate project vicinity.

b. ***Will the proposed project displace any existing recreational uses? If so, describe.***

The proposed project will not permanently displace any existing recreational uses.

c. ***Proposed measures to reduce or control impacts on recreation, including recreational opportunities to be provided by the project or applicant, if any:***

Not applicable.

13. Historic and Cultural Preservation

a. ***Are there any places or objects listed on, or proposed for, national, state, or local preservation registers known to be on or next to the site? If so, generally describe.***

No cultural resources or listed historic properties are known to exist in the project vicinity.

b. ***Generally describe any landmarks or evidence of historic, archaeological, scientific, or cultural importance known to be on or next to the site.***

The project area is characterized by light industrial and commercial properties developed during the 1960s and 1970s. Historic development planning documents and existing conditions present no evidence of these types of resources.

c. ***Proposed measures to reduce or control impacts, if any:***

Should evidence of cultural remains, either historic or prehistoric, be encountered during excavation, work in that immediate area will be suspended, and the find will be examined and documented by a professional archaeologist. Decisions regarding appropriate mitigation and further action will be made at that time.

14. Transportation

a. ***Identify public streets and highways serving the site, and describe proposed access to the existing street system. Show on site plans, if any:***

Southeast 30th Street crosses over Sunset Creek.

b. ***Is the site currently served by public transit? If not, what is the approximate distance to the nearest transit stop?***

Yes, the nearest transit stop is at the intersection of SE 32nd Street and Richards Road, approximately 0.18 miles southwest of the project area.

c. ***How many parking spaces will the completed project have? How many will the project eliminate?***

Not applicable.

d. ***Will the proposal require any new roads or streets, or improvements to existing roads or streets, not including driveways? If so, generally describe (indicate whether public or private).***

The proposal does not require new roads. Following project construction, the road surface will be re-built in the same location. The project will not change the capacity of Southeast 30th Street in any way.

e. ***Will the project use (or occur in the immediate vicinity of) water, rail, or air transportation? If so, generally describe.***

Not applicable.

f. ***How many vehicular trips per day will be generated by the completed project? If known, indicate when peak volumes will occur.***

None.

g. ***Proposed measures to reduce or control transportation impacts, if any:***

Temporary traffic disruption will occur during project construction, which will be minimized using a traffic control plan developed by the construction contractor per bid document requirements.

15. Public Services

a. ***Will the project result in an increased need for public services (for example, fire protection, police protection, health care, schools, other)? If so, generally describe.***

No.

b. ***Proposed measures to reduce or control direct impacts on public services, if any.***

Not applicable.

16. Utilities

a. ***Check utilities currently available at the site:***

X **electricity**
X **natural gas**
X **water**
____ **refuse service**
X **telephone**
X **sanitary sewer**
____ **septic system**
____ **other:** _____

b. ***Describe the utilities that are proposed for the project, the utility providing the service, and the general construction activities on the site or in the immediate vicinity that might be needed.***

The proposed project will not require new utilities. However, existing utilities will be relocated within the project footprint to accommodate the replacement culvert structure.

C. Signature

The above answers are true and complete to the best of my knowledge. I understand that the lead agency is relying on them to make its decision.

Signature: Brian Ward

Date: 7/30/08

References

City of Bellevue. 2007. Generalized Zoning [Map]. City of Bellevue, IT Department, GIS Services. Obtained from city website on August 20, 2007: <http://www.ci.bellevue.wa.us/pdf/PCD/zoning_f.pdf>.

City of Bellevue. 2006. Comprehensive Plan, Volume 2, Subarea Plans and Transportation Facilities Plan, Factoria Sub Area Plan, Amended Ord. 5651. Obtained from city website on August 20, 2007: <http://www.ci.bellevue.wa.us/pdf/PCD/CompPlan_Vol_2_SP06.Factoria.pdf>.

Ecology. 2005. Stormwater Management Manual for Western Washington. Washington State Department of Ecology, Olympia, Washington. April 2005.

King County. 2005. King County, Washington, Surface Water Design Manual. King County Department of Natural Resources and Parks. January 24, 2005.

WDFW. 2003. Design of Road Culverts for Fish Passage. Olympia, Washington: Washington Department of Fish and Wildlife, Habitat Program, Environmental Engineering Section.

APPENDIX A

Figures and Plan Sheets

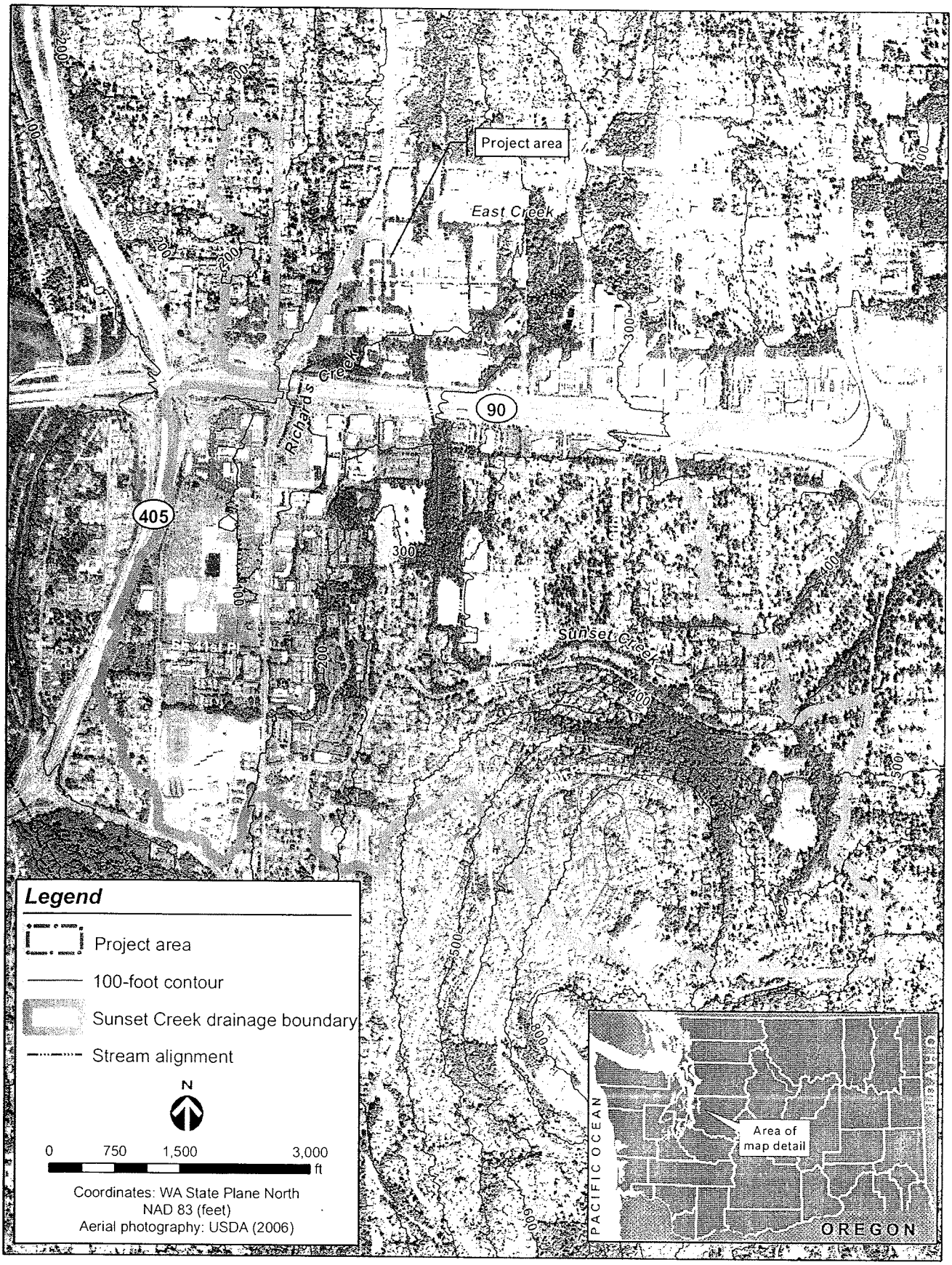


Figure 1. SE 30th Street/Sunset Creek Flood Improvement project vicinity.

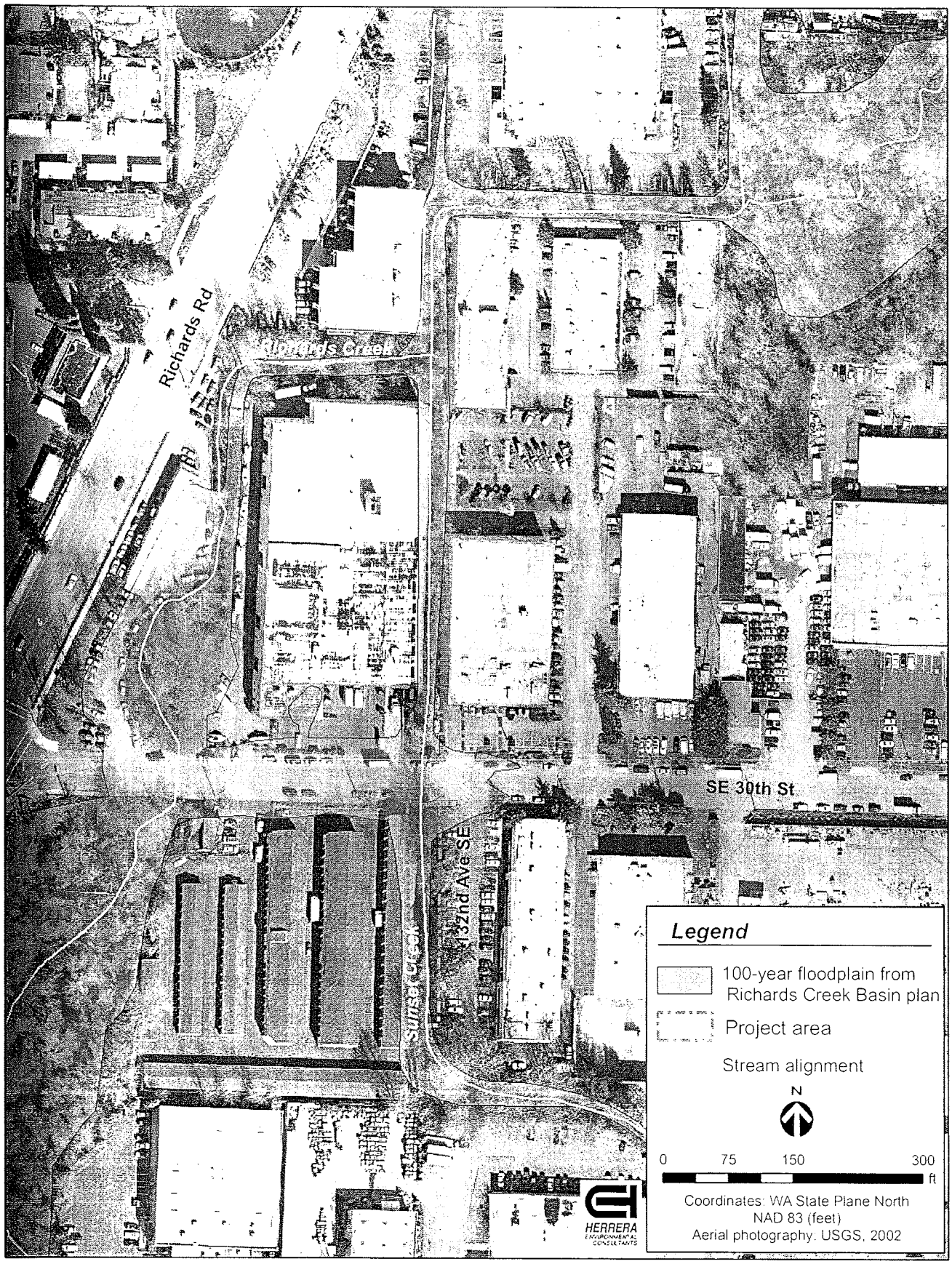
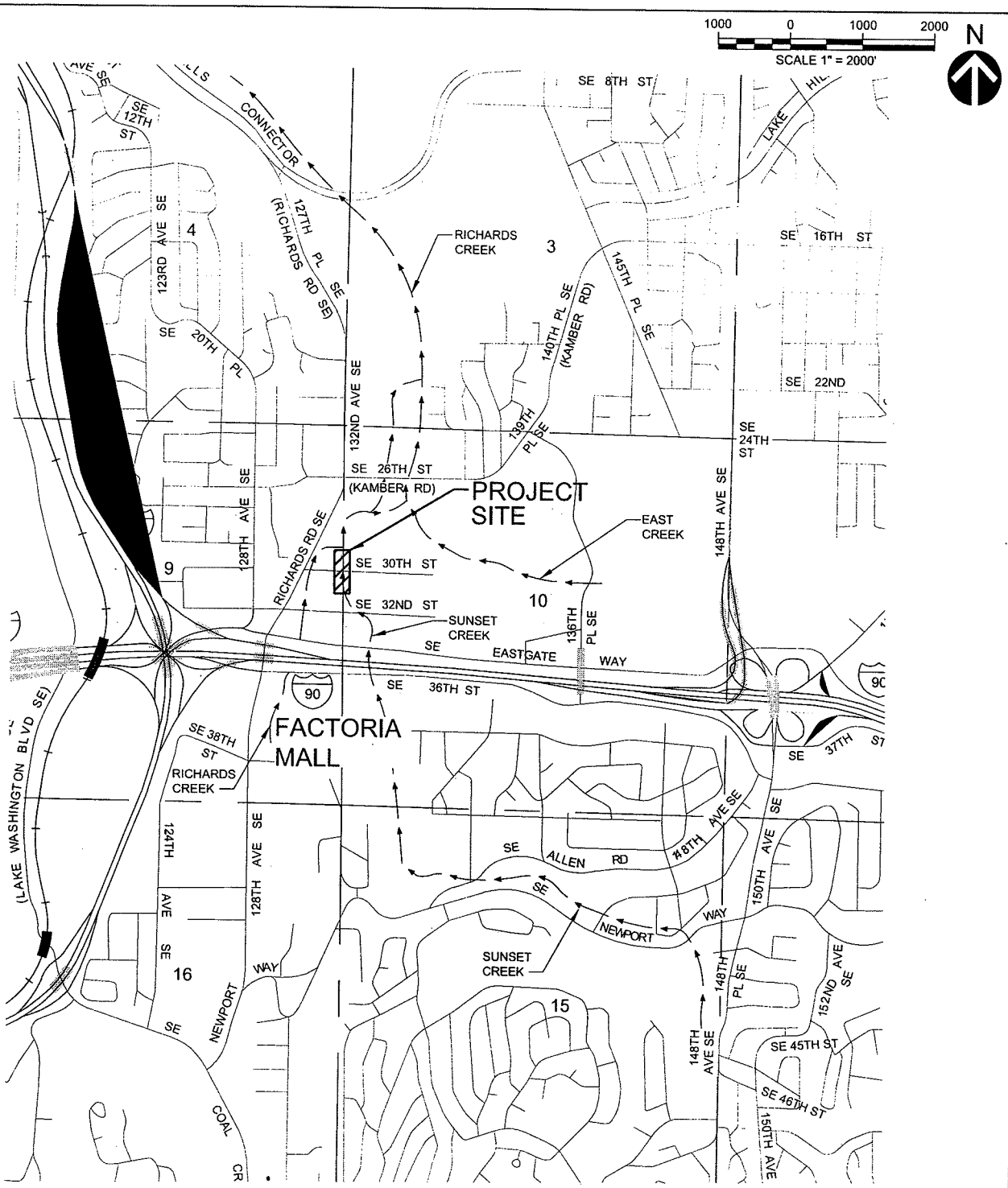


Figure 2. SE 30th Steet/Sunset Creek Flood Improvement project area.



NOTE:
RICHARDS CREEK IS TRIBUTARY TO KELSEY CREEK.

PROJECT SITE COORDINATES:
NORTH 1/2, SEC. 10, TWP. 24 N., RGE 5 E., W.M.
LATITUDE: 47°35'01.91"N
LONGITUDE: 122°10'21.95"W

Prepared by: C. BARTON	VICINITY MAP	Applicant: CITY OF BELLEVUE
HERRERA ENVIRONMENTAL CONSULTANTS — 2200 Sixth Avenue, Suite 1100, Seattle, Washington 98121-1820; 206-441-9080; 206-441-9108 FAX; http://www.herrerainc.com	Application for: SE 30th / SUNSET CREEK CULVERT REPLACEMENT	Project Location: BELLEVUE, KING COUNTY, WASHINGTON
	Purpose: FLOW CONVEYANCE	SCALE AS NOTED
Date: DECEMBER 2007	Waterbody: SUNSET CREEK	SHEET 1 of 9

Path: O:\proj\Y2006\06-03501-001\CAD\Dwgs\JarpaU-1.dwg
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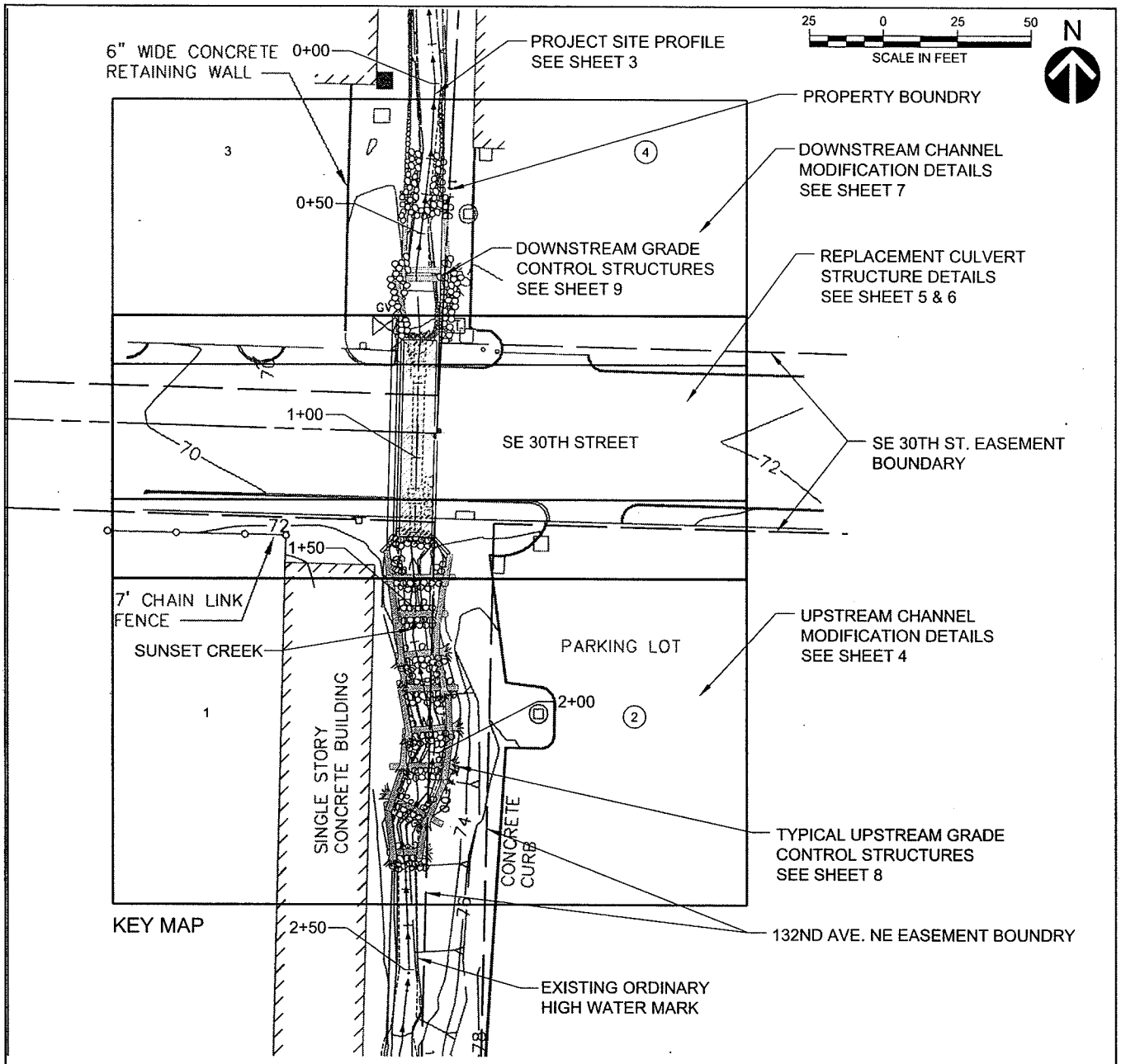

ADJACENT PROPERTY OWNERS:

1 SHURGARD MINI STORAGE (PARCEL #5453300244)
2 PRINTED CIRCUITS ASSEMBLY CORP. (PARCEL #5453300291)
3 SHURGARD MINI STORAGE (PARCEL #5453300194)
4 STEAD BUILDING (PARCEL #5453300183)

NOTE: BOUNDARIES FOR PROPERTIES ADJACENT TO PROJECT AREA DEFINED BY SE 30TH STREET ROAD RIGHT OF WAY. PROPERTIES 1 AND 2 SEPARATED BY 20' EASEMENT PARALLEL TO STREAM CORRIDOR. PROPERTIES 3 AND 4 SEPARATED BY PROPERTY BOUNDARY.

EXCAVATION AND FILL WITHIN EXISTING ORDINARY HIGH WATER MARK

QTY. OF EXCAVATION (CY)	120
QTY. OF FILL (CY)	130
AREA OF FILL (ACRE)	0.04

NOTE: EXCAVATED MATERIAL INCLUDES RIPRAP, NATIVE SOIL, AND STREAMBED SEDIMENT. TO BE DISPOSED OF AT LICENSED DISPOSAL OR REUSE FACILITY.

Prepared by: C. BARTON
HERRERA ENVIRONMENTAL CONSULTANTS
2200 Sixth Avenue
Suite 1100
Seattle, Washington
98121-1820
206-441-9080
206-441-9108 FAX
http://www.herrerainc.com

Date: DECEMBER 2007

	DETAILED SITE SCHEMATIC	Applicant: CITY OF BELLEVUE
	Application for: SE 30th / SUNSET CREEK CULVERT REPLACEMENT	Project Location: BELLEVUE, KING COUNTY, WASHINGTON
	Purpose: FLOW CONVEYANCE	SCALE AS NOTED
	Waterbody: SUNSET CREEK	SHEET 2 of 9

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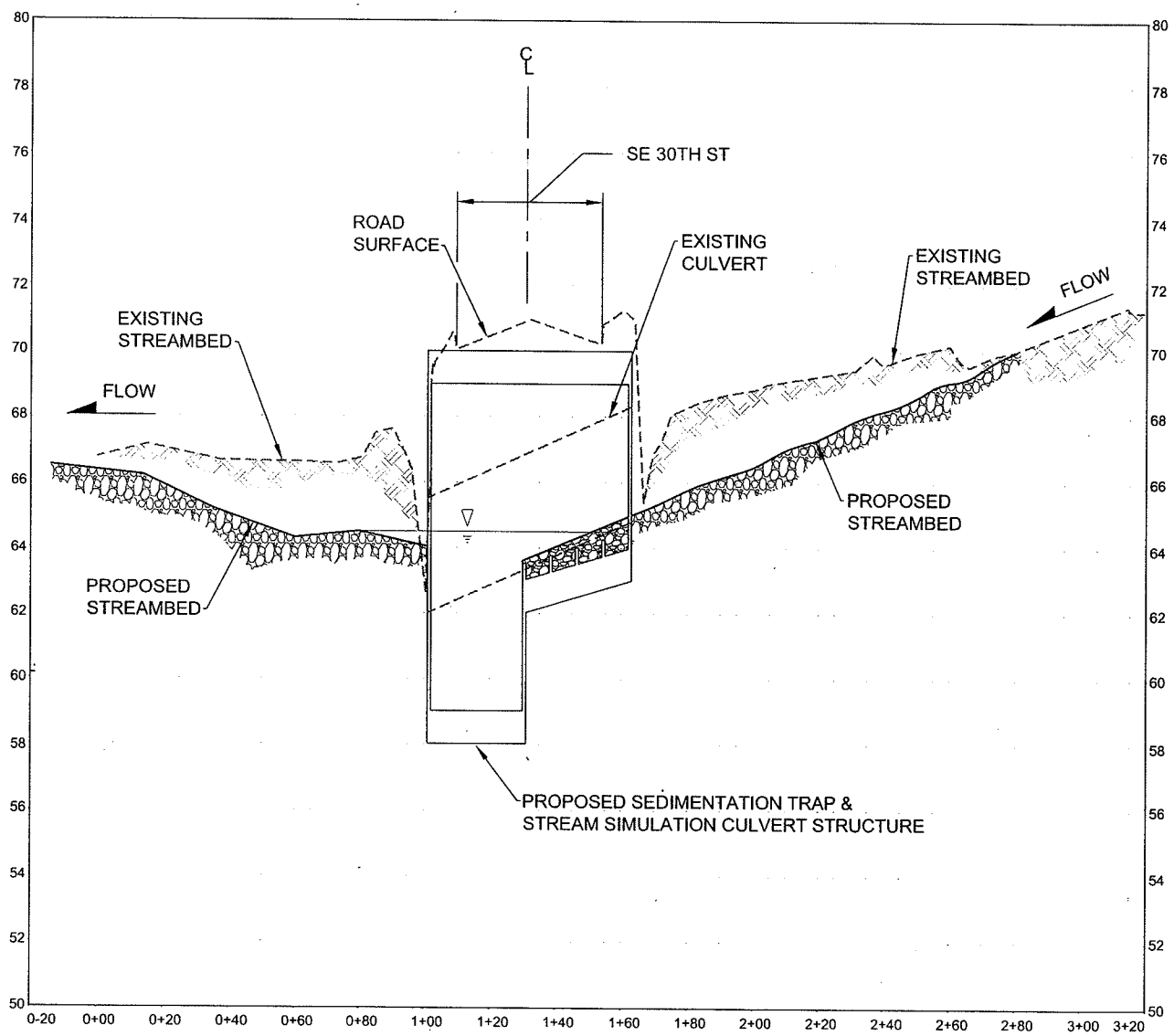

PROJECT PROFILE

HORIZ SCALE: 1"=50'
VERT SCALE: 1"=10'

NOTE:
VERTICAL DATUM NAVD 88

Prepared by: C. BARTON	PROJECT PROFILE	Applicant: CITY OF BELLEVUE
HERRERA ENVIRONMENTAL CONSULTANTS — 2200 Sixth Avenue, Suite 1100, Seattle, Washington 98121-1820, 206-441-9080, 206-441-9108 FAX, http://www.herrerainc.com	Application for: SE 30th / SUNSET CREEK CULVERT REPLACEMENT	Project Location: BELLEVUE, KING COUNTY, WASHINGTON
	Purpose: FLOW CONVEYANCE	SCALE AS NOTED
Date: DECEMBER 2007	Waterbody: SUNSET CREEK	SHEET 3 of 9

Path: O:\proj\Y2006\06-03501-001\CAD\Dwgs\JarpaU-3.dwg
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ADJACENT PROPERTY OWNERS:

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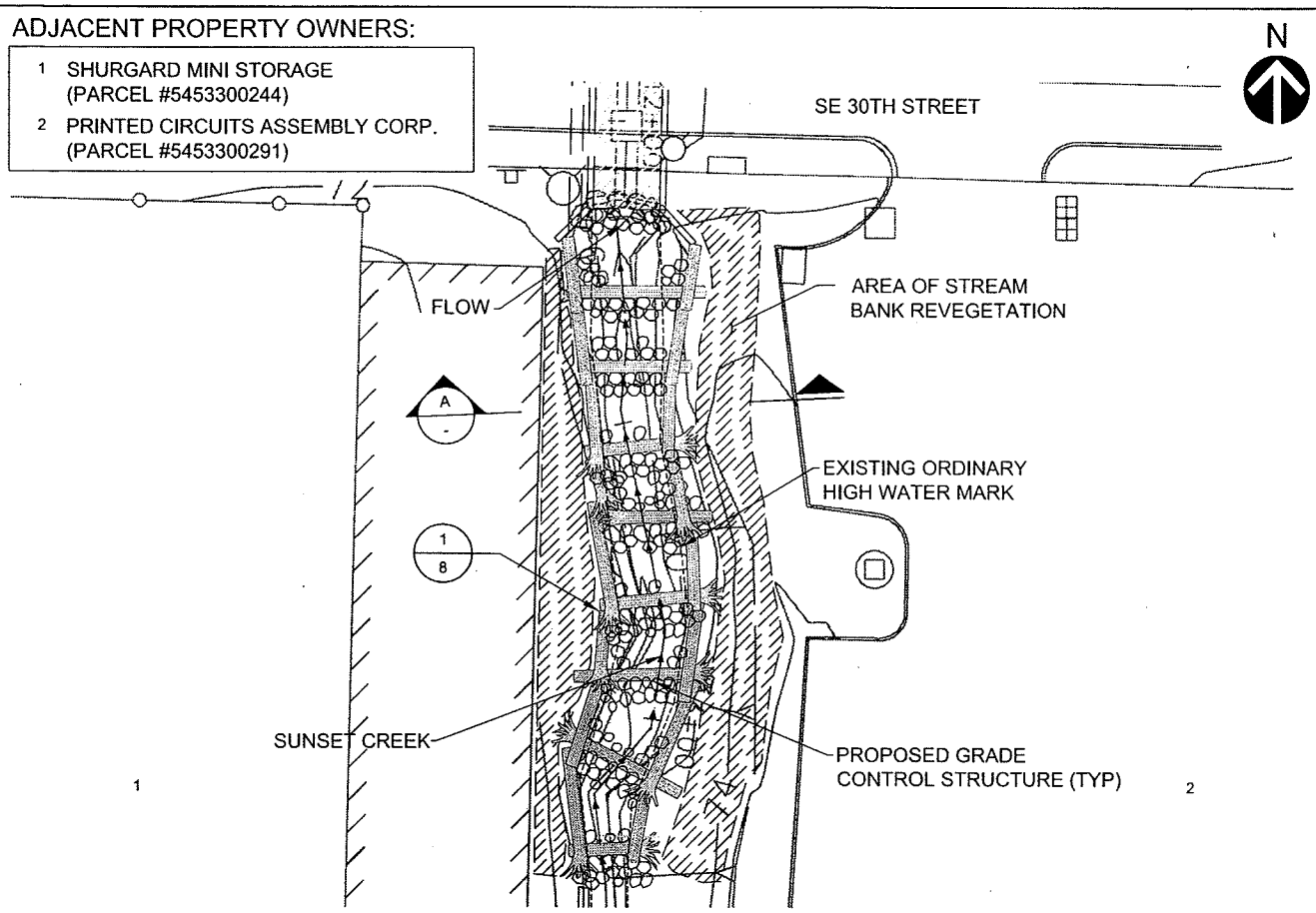
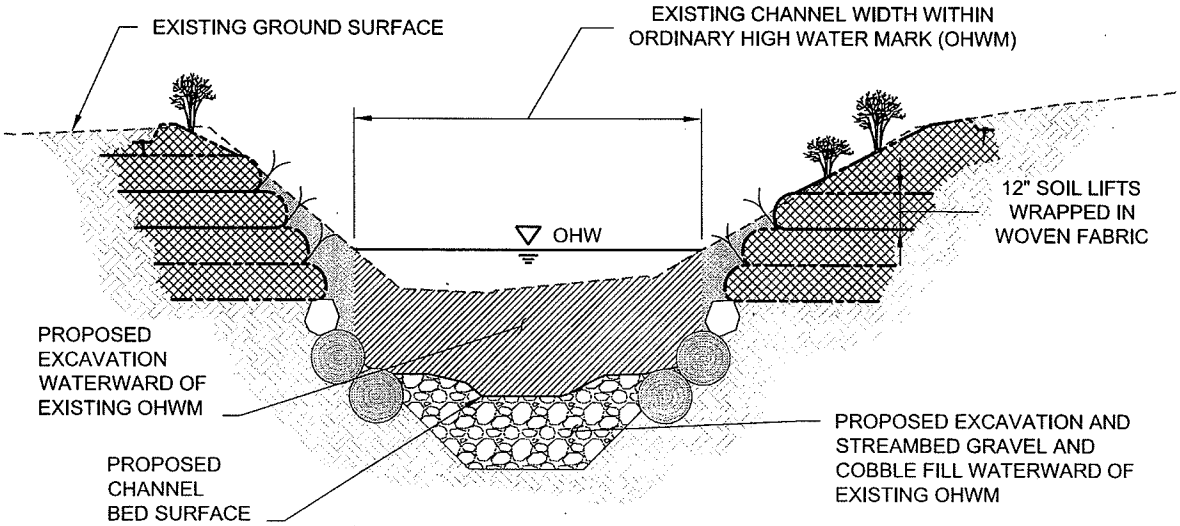
2 PRINTED CIRCUITS ASSEMBLY CORP. (PARCEL #5453300291)



PLAN VIEW - UPSTREAM CHANNEL MODIFICATION (-/2)

SCALE: 1"=30'



SECTION - TYPICAL STREAM CHANNEL SECTION (A/-)

SCALE: 1"=5'

Prepared by: C. BARTON HERRERA ENVIRONMENTAL CONSULTANTS 2200 Sixth Avenue Suite 1100 Seattle, Washington 98121-1820 206-441-9080 206-441-9108 FAX http://www.herrerainc.com	UPSTREAM CHANNEL MODIFICATION PLAN AND SECTION	Applicant: CITY OF BELLEVUE
	Application for: SE 30th / SUNSET CREEK CULVERT REPLACEMENT	Project Location: BELLEVUE, KING COUNTY, WASHINGTON
	Purpose: FLOW CONVEYANCE	SCALE AS NOTED
Date: DECEMBER 2007	Waterbody: SUNSET CREEK	SHEET 4 of 9

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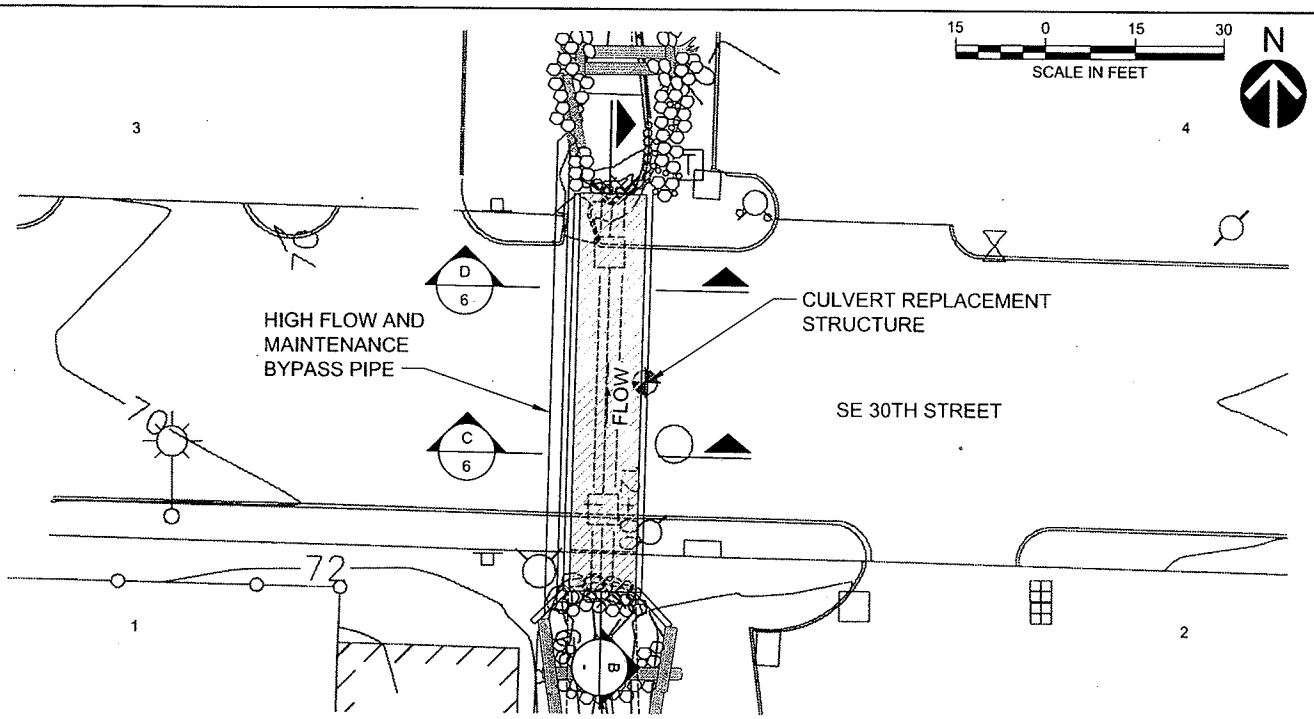
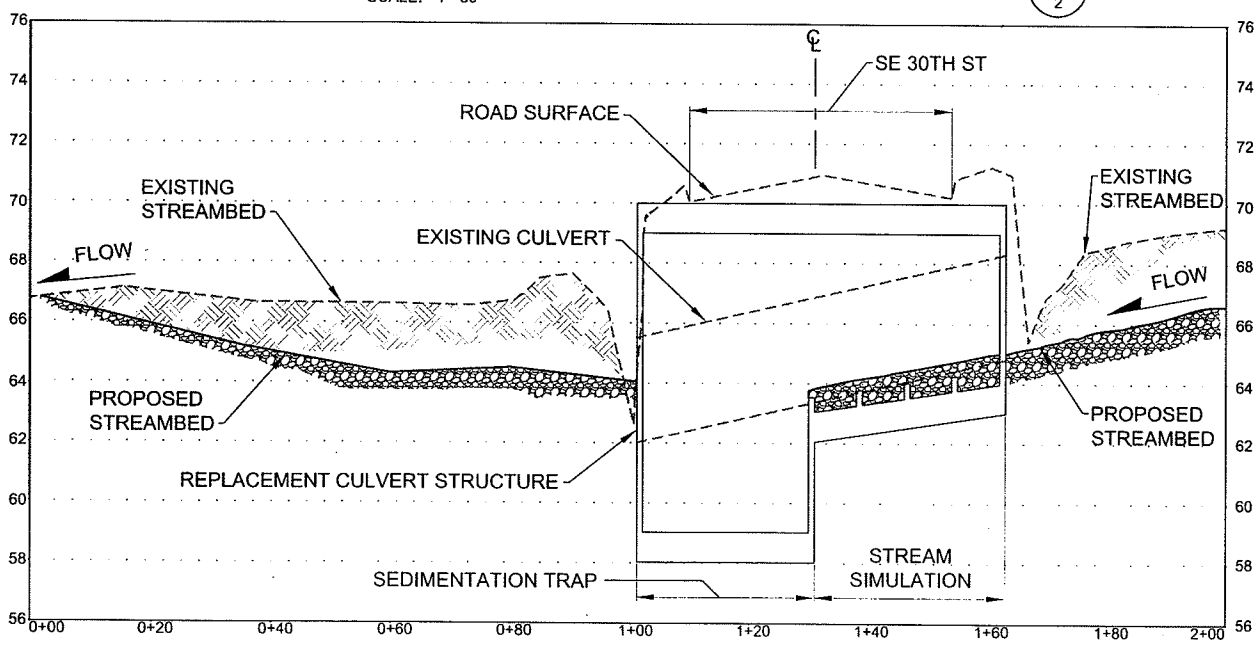


PLAN VIEW - REPLACEMENT CULVERT STRUCTURE (2)

SCALE: 1"=30'



REPLACEMENT CULVERT STRUCTURE PROFILE (B)

HORIZ SCALE: 1"=30'
VERT SCALE: 1"=6'

ADJACENT PROPERTY OWNERS:

(1) SHURGARD MINI STORAGE (PARCEL #5453300244)	3 SHURGARD MINI STORAGE (PARCEL #5453300194)
(2) PRINTED CIRCUITS ASSEMBLY CORP. (PARCEL #5453300291)	4 STEAD BUILDING (PARCEL #5453300183)

NOTE:
VERTICAL DATUM NAVD 88

Prepared by: C. BARTON	REPLACEMENT CULVERT STRUCTURE PLAN AND PROFILE VIEW	Applicant: CITY OF BELLEVUE
HERRERA ENVIRONMENTAL CONSULTANTS, 2200 Sixth Avenue, Suite 1100, Seattle, Washington 98121-1820, 206-441-9080, 206-441-9108 FAX, http://www.herrerainc.com	Application for: SE 30th / SUNSET CREEK CULVERT REPLACEMENT	Project Location: BELLEVUE, KING COUNTY, WASHINGTON
	Purpose: FLOW CONVEYANCE	SCALE AS NOTED
Date: DECEMBER 2007	Waterbody: SUNSET CREEK	SHEET 5 of 9

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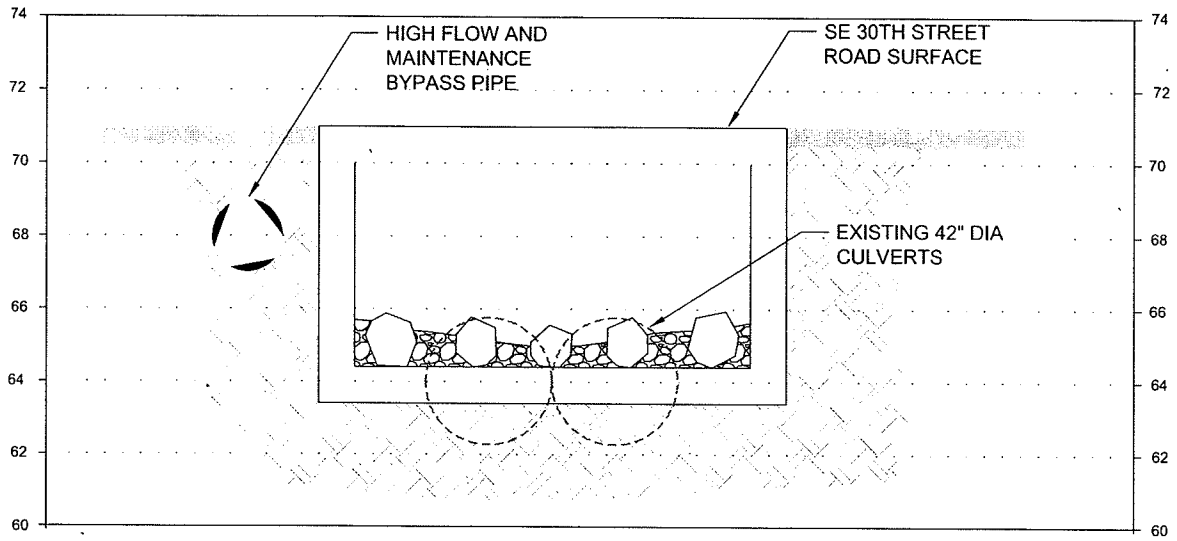
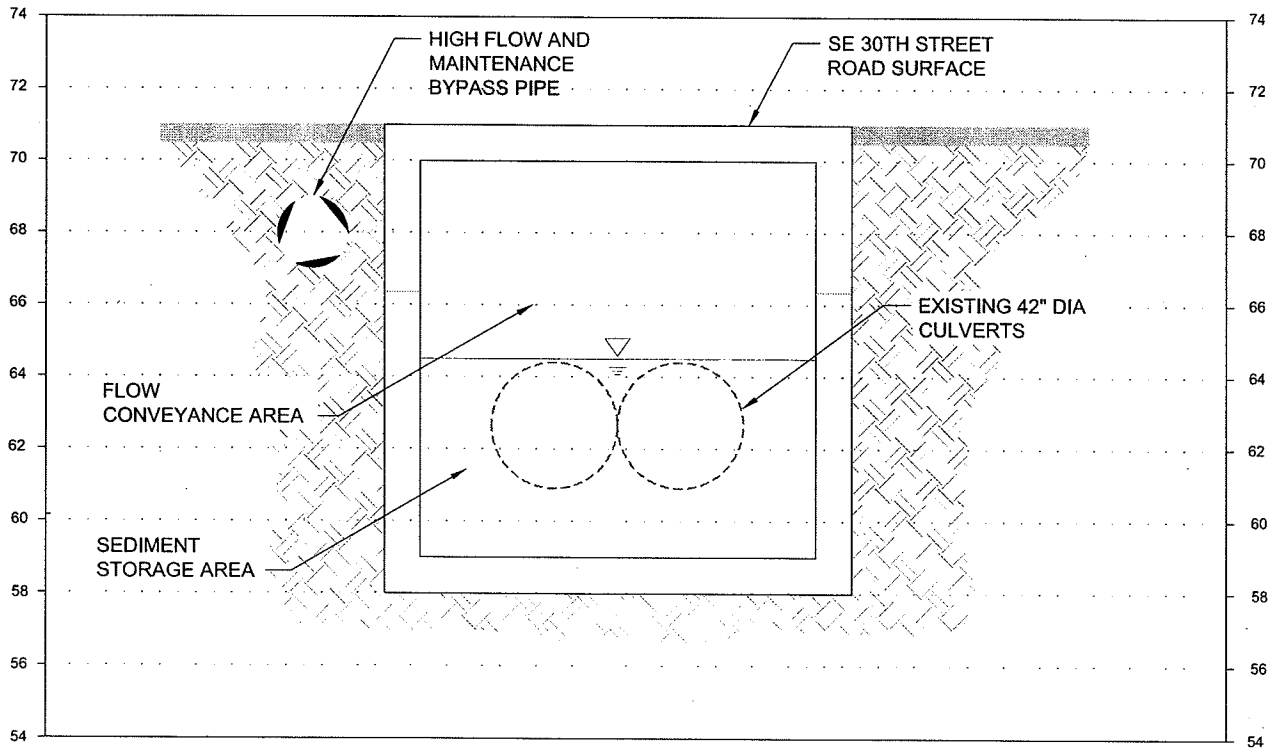


STREAM SIMULATION SECTION (C / 5)

SCALE: 1"=5'



SEDIMENT TRAP SECTION (D / 5)

SCALE: 1"=5'

NOTE:
VERTICAL DATUM NAVD 88

Prepared by: C. BARTON HERRERA ENVIRONMENTAL CONSULTANTS 2200 Sixth Avenue Suite 1100 Seattle, Washington 98121-1820 206-441-9080 206-441-9108 FAX http://www.herrerainc.com	REPLACEMENT CULVERT STRUCTURE SECTIONS VIEW	Applicant: CITY OF BELLEVUE
	Application for: SE 30th / SUNSET CREEK CULVERT REPLACEMENT	Project Location: BELLEVUE, KING COUNTY, WASHINGTON
	Purpose: FLOW CONVEYANCE	SCALE AS NOTED
Date: DECEMBER 2007	Waterbody: SUNSET CREEK	SHEET 6 of 9

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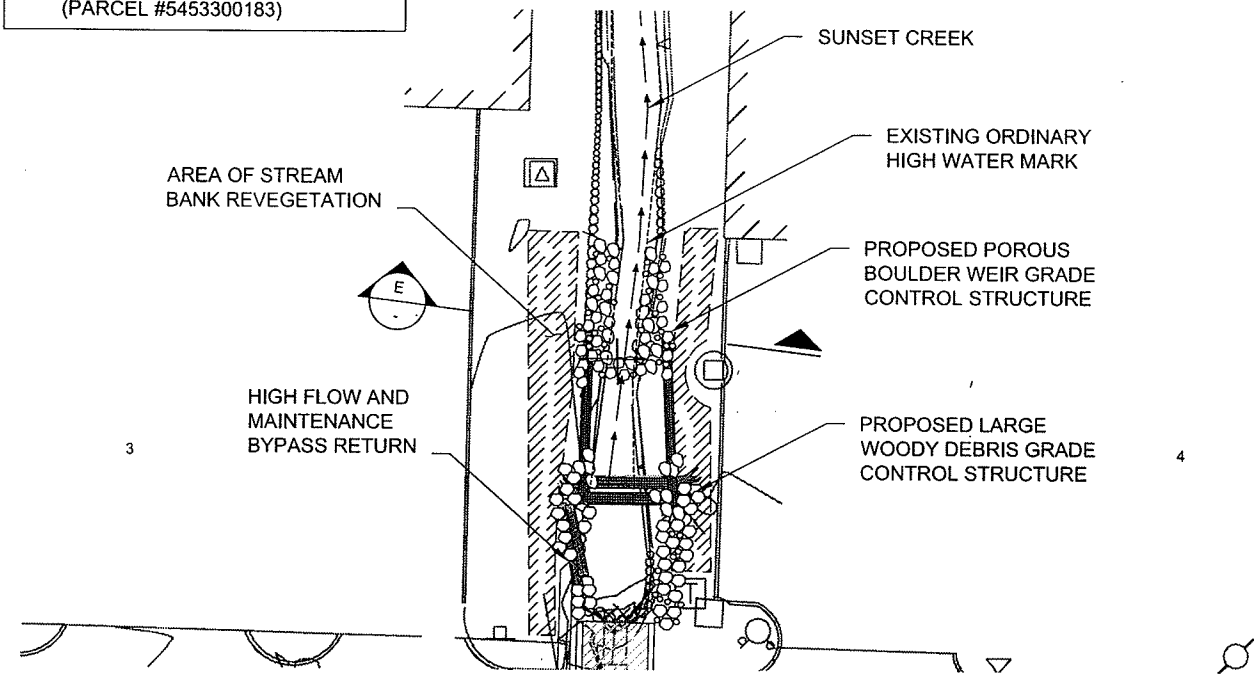
ADJACENT PROPERTY OWNERS:

3 SHURGARD MINI STORAGE (PARCEL #5453300194)

4 STEAD BUILDING (PARCEL #5453300183)



PLAN VIEW - DOWNSTREAM CHANNEL MODIFICATION (2)

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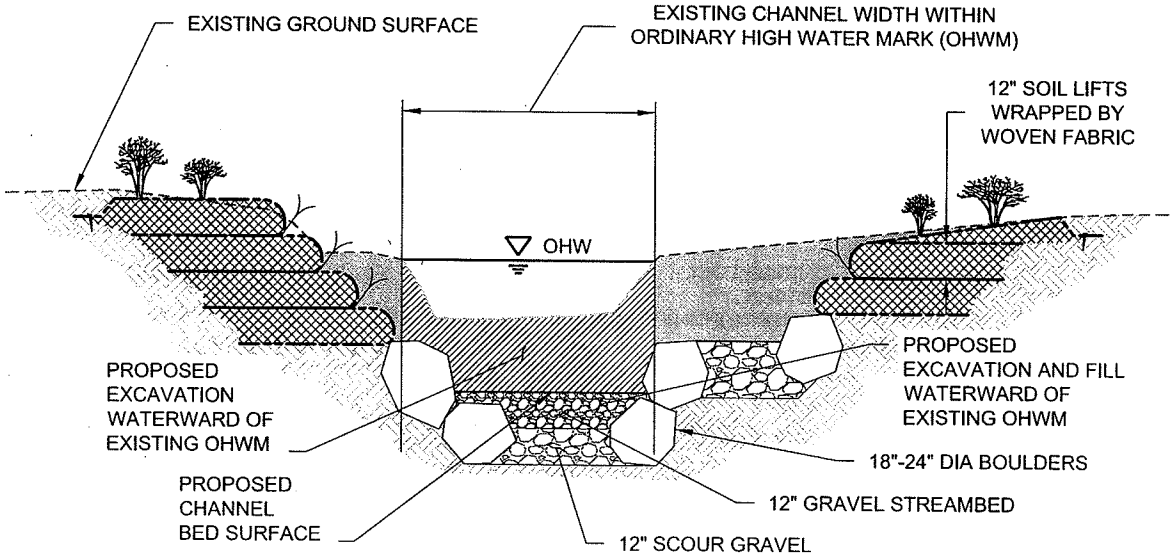

TYPICAL SECTION - DOWNSTREAM CHANNEL MODIFICATION (E)

SCALE: 1"=5'

Prepared by: C. BARTON HERRERA ENVIRONMENTAL CONSULTANTS 2200 Sixth Avenue Suite 1100 Seattle, Washington 98121-1820 206-441-9080 206-441-9108 FAX http://www.herrerainc.com	DOWNSTREAM CHANNEL MODIFICATION PLAN AND SECTION	Applicant: CITY OF BELLEVUE
	Application for: SE 30th / SUNSET CREEK CULVERT REPLACEMENT	Project Location: BELLEVUE, KING COUNTY, WASHINGTON
	Purpose: FLOW CONVEYANCE	SCALE AS NOTED
Date: DECEMBER 2007	Waterbody: SUNSET CREEK	SHEET 7 of 9

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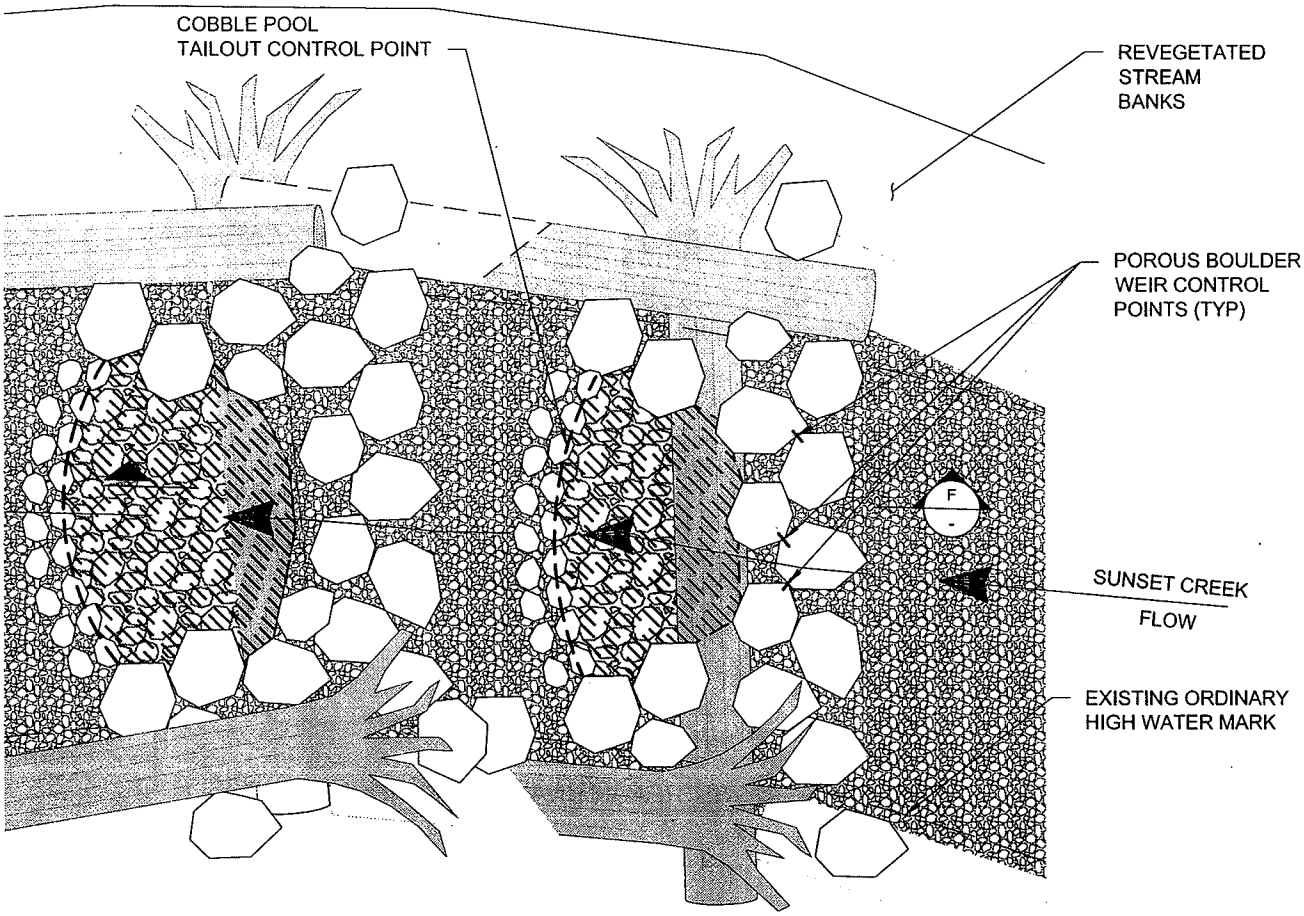

PLAN - TYPICAL UPSTREAM GRADE CONTROL (1 / -)

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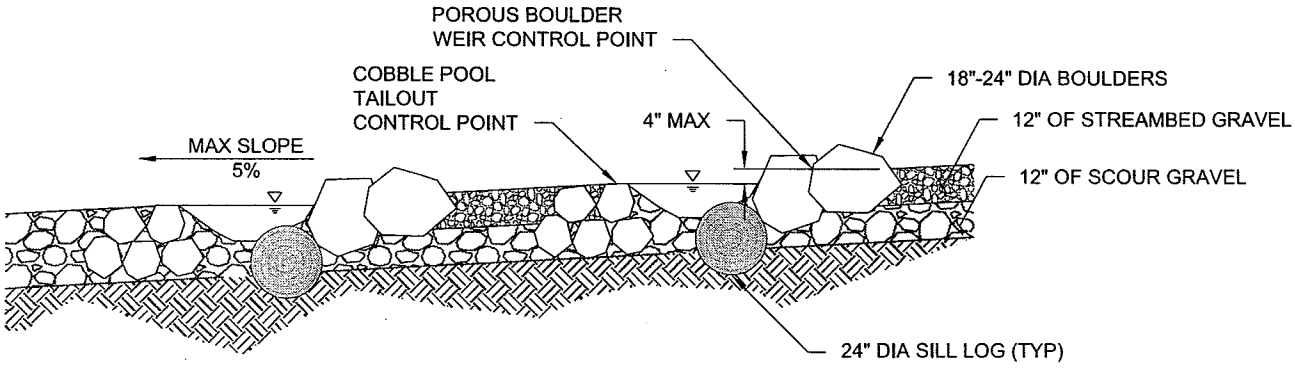

SECTION - TYPICAL UPSTREAM GRADE CONTROL (F / -)

SCALE: 1"=5'

Prepared by: C. BARTON HERRERA ENVIRONMENTAL CONSULTANTS 2200 Sixth Avenue Suite 1100 Seattle, Washington 98121-1820 206-441-9080 206-441-9108 FAX http://www.herrerainc.com	UPSTREAM GRADE CONTROL DETAILS PLAN AND SECTION	Applicant: CITY OF BELLEVUE
	Application for: SE 30th / SUNSET CREEK CULVERT REPLACEMENT	Project Location: BELLEVUE, KING COUNTY, WASHINGTON
	Purpose: FLOW CONVEYANCE	SCALE AS NOTED
Date: DECEMBER 2007	Waterbody: SUNSET CREEK	SHEET 8 of 9

Path: C:\proj\Y2006\06-03501-001\CAD\Dwgs\JarpaU-8.dwg
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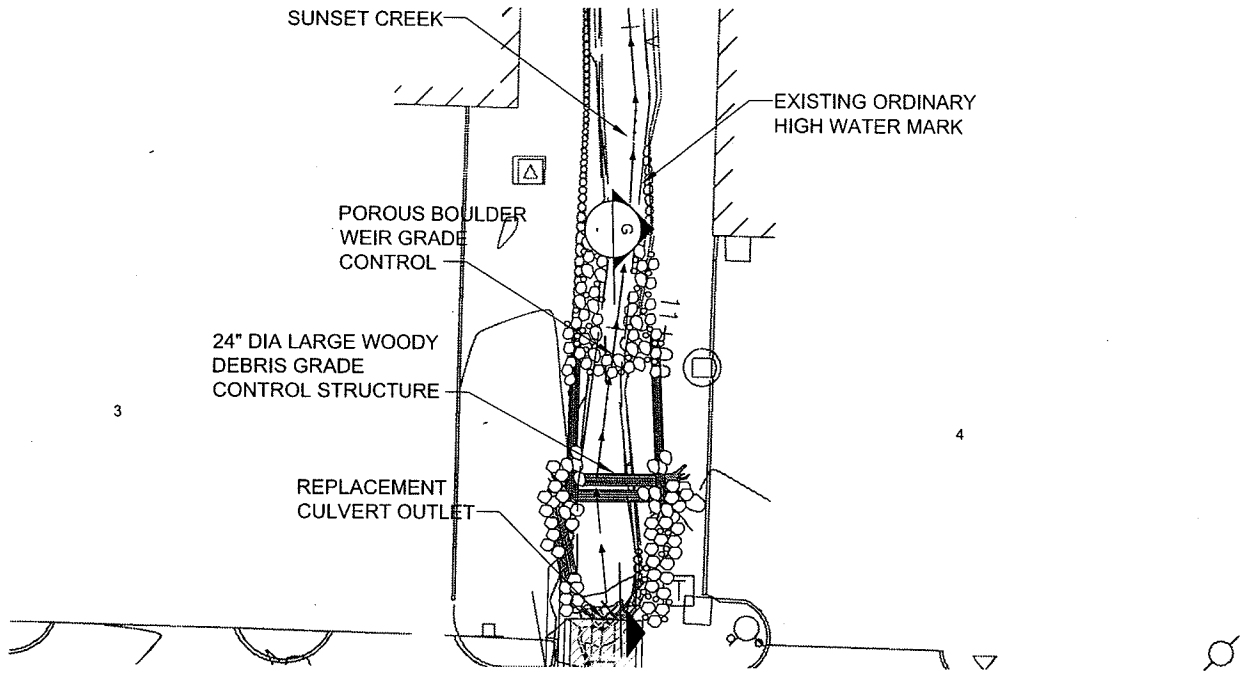
ADJACENT PROPERTY OWNERS:

3 SHURGARD MINI STORAGE (PARCEL #5453300194)

4 STEAD BUILDING (PARCEL #5453300183)

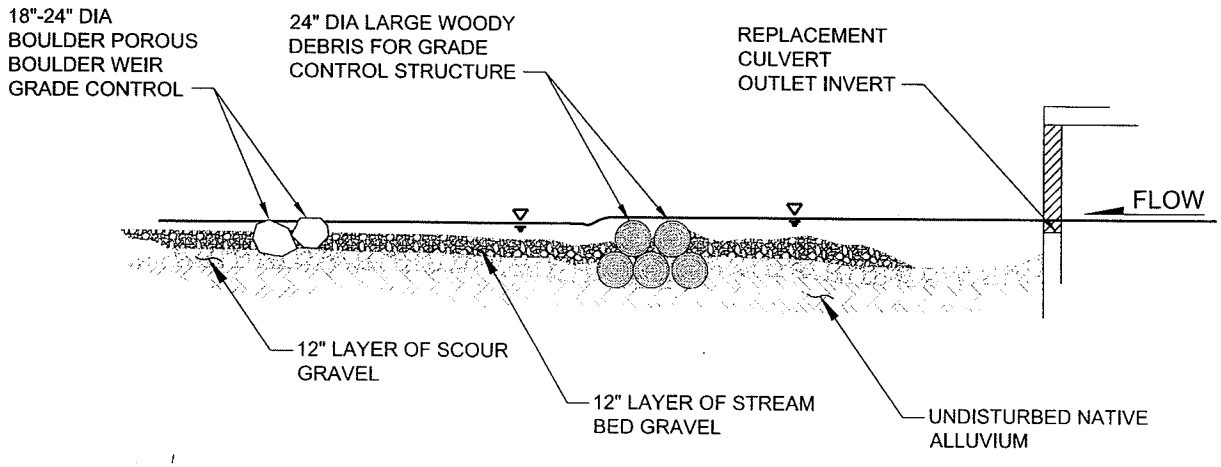
N



PLAN - DOWNSTREAM GRADE CONTROL STRUCTURES

SCALE: 1"=30'

2



PROFILE - DOWNSTREAM GRADE CONTROL STRUCTURES

SCALE: 1"=10'

G

Prepared by: C. BARTON HERRERA ENVIRONMENTAL CONSULTANTS 2200 Sixth Avenue Suite 1100 Seattle, Washington 98121-1820 206-441-9080 206-441-9108 FAX http://www.herrerainc.com	DOWNSTREAM CHANNEL MODIFICATION PLAN AND PROFILE	Applicant: CITY OF BELLEVUE
	Application for: SE 30th / SUNSET CREEK CULVERT REPLACEMENT	Project Location: BELLEVUE, KING COUNTY, WASHINGTON
	Purpose: FLOW CONVEYANCE	SCALE AS NOTED
Date: DECEMBER 2007	Waterbody: SUNSET CREEK	SHEET 9 of 9

Path: O:\proj\Y2006\06-03501-001\CAD\Dwgs\Japa\J-9.dwg
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Attachment 5
Public Comment

HERRERA
ENVIRONMENTAL
CONSULTANTS

2200 Sixth Avenue
Suite 1100
Seattle
Washington
98121

(206) 441-9080
FAX 441-9108

101 E Broadway
Suite 610
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59802

(406) 721-4204
FAX 721-4232

322 NW Fifth Avenue
Suite 315
Portland
Oregon
97209

(503) 228-4301
FAX 228-3373

435 Holgerson Road
Sequim
Washington
98382

(360) 683-9109
FAX 683-3671

November 18, 2008

Karen Walter
Watersheds and Land Use Team Leader
Muckleshoot Indian Tribe Fisheries Division
39015 172nd Avenue SE
Auburn, Washington 98092

Subject: City of Bellevue Utilities Department SE 30th Street/Sunset Creek Flood Improvement Project

Dear Ms. Walter:

On behalf of the City of Bellevue, Utilities Department we welcome your comments related to the proposed SE 30th Street/Sunset Creek Flood Improvement Project, which is associated with the following permit references:

- Nationwide Permit NWS-2008-155-NO
- 08-12859 LO, Optional Determination of Non-Significance (DNS) Notice Materials.

We have worked closely with the City to develop a broad management approach for the Richards Creek, Sunset Creek, and East Creek watersheds that provides complementary benefits to flood control, sediment management, and aquatic and riparian habitat. We have carefully reviewed and evaluated your comments and concerns in collaboration with City staff. Our project team's responses to those comments are attached.

We look forward to working cooperatively with the Muckleshoot Indian Tribe and other regulatory agencies on this and other related projects.

Sincerely,

Herrera Environmental Consultants, Inc.

Chase Barton

Chase Barton, L.G.
Project Engineer and Geomorphologist

cc: Amy Klein, ACOE
Heidi Bedwell, City of Bellevue, PCD
Matt Longenbaugh, NMFS
Lori Enlund, WDOE, NW Region
Larry Fisher, WDFW, Region 4
Brian Ward, City of Bellevue, Utilities Department

Comment Responses:

Proposed design of Phase I concerns

Comment 1

The proposed in-culvert sediment trap has the potential to starve downstream areas of Sunset Creek, Richards Creek and East Creek of spawning gravel necessary for successful spawning. It appears quite likely that the project will adversely affect these downstream areas as the sediment trap will remove the large sized gravels (i.e., 32 mm and larger) and much more gravel will be removed from the stream compared to the last 4 years of annual dredging (50 cubic yards versus 10-20 cubic yards). In addition to monitoring the proposed 5 cross-sections to determine potential changes in streambed elevations, and sediment transport and deposition, the project should monitor downstream spawning areas to determine if there is a change in spawning gravel area and particle size distribution. One method that could be used can be found at http://www.nwifc.org/tfw/documents/TFW_Salmonid_Spawning_Gravel_Composition.pdf.

Response to Comment 1

The objective of the proposed sediment trap is to reduce the delivery of sediment to the Sunset Creek channel downstream of SE 30th Street where the rate of sediment delivery has historically far exceeded the sediment transport capacity of the channel. Optimally, the trap would be sized to capture the sediment in excess of the downstream channel's sediment transport capacity, thereby maintaining a flux of gravel through the channel that would not result in net aggradation. Although the capacity of the trap is approximately 50 cubic yards, adaptive management of the trap, including documenting the amount of sediment captured by the trap, may determine that the optimal sediment removal volume is less than the capacity of the sediment trap. For example, if only 30 cubic yards of sediment are captured annually, the trap could be maintained with a storage capacity of 20 cubic yards so that that amount of sediment delivered in excess of this amount would be delivered to the downstream channel.

Currently, the City of Bellevue documents the condition of salmonid spawning in the Richards and Sunset Creek channels during the spawning season, generally from August to October. During this period City staff conduct surveys of Richards Creek from its confluence with Kelsey Creek to the project site every other week documenting spawning redds and counting fish carcasses. The frequency of surveys is adjusted to once per week if observations warrant the change. Salmon surveys are also conducted through the Salmon Watcher program, a program where volunteers go to designated locations each week to look for salmon. Richards and Sunset Creeks are part of that program.

These surveys will be complemented by the proposed channel monitoring protocol which will document changes in both channel geometry and substrate condition. The protocol for documenting substrate conditions will be guided by the protocols within the recommended document (TFW Monitoring Methods Manual for Spawning Gravel Composition Surveys, TFW-AM9-99-006, 1999).

The protocol for documenting substrate conditions will include gathering bulk samples from areas representative of potential spawning habitat, such as riffle crests or gravel bar features at the proposed monitoring cross-sections. The samples will be gathered using a McNeil sampler. The information gathered will be suitable for:

- Evaluating the characteristics and composition of gravel within the sampling extent
- Estimating the percentage of fine sediment less than 0.85 mm in order to evaluate the potential impact of fine sediment on survival to emergence
- Comparing the composition of gravel from different locations within the sampling area and from other watersheds
- Monitoring trends in gravel composition over time.

At present there are very limited to no spawning areas located between the Richards Creek flow split and Kamber Road, therefore the proposed extent of the channel monitoring protocol is expected to capture the extent of the channel area containing potential spawning habitat that may be directly affected by an immediate reduction in bedload delivery.

Comment 2

We have several concerns regarding the monitoring plan and adaptive management strategy. First, the monitoring plan lacks a numeric standard for the proposed gravel supplementation (i.e., when and how much) that will occur as mitigation for the Phase I components if changes occur in streambed transport and deposition components compared to existing conditions. Second, the actual 'desirable habitat conditions to be maintained' for this project and the adaptive management protocols should be specifically identified. Third, the monitoring plan should include standards regarding both adult and juvenile fish passage to ensure that the new culvert is passing all fish species and all life history stages as purported in the BE. The project must have a specific monitoring plan that addresses the concerns above. We request the opportunity to review this plan and reach agreement with the applicant for this plan prior to the issuance of permits for this project.

Response to Comment 2

The Protocols for Channel Monitoring and Replacement Culvert Sedimentation Structure Maintenance will be completed before the summer of 2009 so that baseline channel data can be acquired before the implementation of Phase I. These protocols will include decision criteria for the reservoir volume of sediment to be maintained in the sedimentation structure as well as downstream channel and substrate conditions that warrant gravel supplementation. Existing habitat conditions will be incorporated into the development of those downstream channel and substrate conditions warranting gravel supplementation. Monitoring protocols for the replacement culvert will address fish passage by documenting the performance of the sedimentation structure and stream simulation culvert with respect to the installed design (i.e.,

document whether backwater of the sedimentation structure is maintained by the downstream weir, and hydraulic complexity through the stream simulation portion of the culvert is maintained by the stream bed boulders and culvert bed material). The City will evaluate the feasibility of incorporating the direct monitoring of fish passage into the monitoring protocol. The City will provide a draft copy of the monitoring protocol to MITFD for comment before it is finalized.

Comment 3

Phase I as currently proposed provides very little instream habitat diversity for salmonids. The proposed boulders and wood is such that the any pool habitat is likely to be minimal due to the type and orientation of these materials such that they will be resistant to scour necessary to create pool habitat. The design is for streambed and bank stabilization than instream habitat [sic]. The project should be modified by adding wood to additional upstream areas that is allowed to retain sediment and form pools with cover in a more natural manner than what is proposed.

Response to Comment 3

The channel modifications as proposed in Phase I are intended to balance aquatic habitat enhancements with flow conveyance and channel stability. The proposed channel modifications include placing 31 pieces of large woody debris upstream of SE 30th Street, including 11 pieces with rootwads that will directly interact with flows. This reach currently contains no functional woody debris. The proposed orientation of the woody debris, particularly the pieces with attached rootwads, will provide both hydraulic complexity and areas for sediment deposition. Rootwads that project from the bank to the margins of pools at the downstream end of porous boulder weirs will promote local scour, locally maintain pool depths, and provide cover for fish. The hydraulic complexity created by these pieces will also produce depositional environments in their lee. The hydraulic complexity resulting from the pools and rootwads in the active channel is expected to provide a range of depositional zones with distinct grain size distributions. The placement of wood pieces, particularly those with rootwads, will be refined as design progresses in an attempt to maximize their benefits for aquatic habitat.

Due to the proximity of infrastructure and the risks associated with erosion or significant channel deformation, the proposed channel modifications are designed to provide improved aquatic habitat with minimal structural deformation. As such, channel and bank materials in the Phase I project reach are designed considering both stability and habitat conditions. There is flexibility, however, within the proposed design to lower the elevation of pool boulders relative to the upstream porous boulder weirs and sill logs to increase potential pool depths. These modifications will be incorporated to the extent possible as design progresses.

Comment 4

Phase I will also remove 8 trees that are 10 inches in diameter or greater (see BA addendum). All of these trees should be used in the project to support the Phase I design or to create habitat for salmonids as recommended above. Otherwise, the project will result in an adverse impact to future wood recruitment (temporal loss) that could be avoided.

Response to Comment 4

Of the 8 trees that may be removed during utility relocation and channel modification activities, 3 are conifers and 5 are deciduous. Due to the stability requirements of the proposed channel modifications, and the greater decay rates of deciduous trees relative to coniferous trees, only the 3 Douglas firs are potentially suitable for incorporation into the proposed channel modifications. These 3 trees will be incorporated into the project designs to the extent possible. Opportunities for placing the remaining deciduous trees at other locations in the channel network will be evaluated. The proposed design includes planting 107 native trees during Phase I including; 7 black cottonwood, 29 red alder, 23 Douglas fir, 42 Pacific willow, and 6 Western red cedar. The long-term benefits of these trees are expected to include improved riparian habitat and wood recruitment for Sunset Creek that far exceeds the functions of the 8 trees to be removed.

Comment 5

The removal of these trees may adversely affect water temperature. An analysis or discussion about the potential loss of shade due to removal of these trees or shrubs that may be providing shade is lacking. A shade analysis should be conducted, and if there is a potential increase in water temperature, then additional tree planting should be required.

Response to Comment 5

A temporary increase in water temperatures was identified as a possible effect of the proposed tree removal. Page 2 of the BA Addendum states:

> *"Current conditions for water temperatures in Sunset Creek are rated as **at risk**. The proposed action [tree removal] will temporarily degrade water temperatures by reducing available shade. However, these effects will be offset by the deeper and narrower channel profile produced by the planned channel modifications. This will reduce the surface area exposed to insolation, which will mitigate the temporary reduction in shade. As the planned site revegetation matures, shading of the stream channel will increase relative to the current environmental baseline. As a result, the proposed action will **improve** water temperature conditions over the long-term."*

The proposed planting plan incorporates four distinct plant communities based on the available light and proximity to the channel at different locations in the project area. In addition to the 107 trees that will be planted during Phase I (detailed above), the project design calls for removal of invasive species within the project area and additional planting of 256 shrubs, and 196 herbs during Phase I. This is an extensive planting plan relative to the size of the project.

<u>Phase I and Phase II concerns</u>

Comment

Per the documents that we reviewed, the Phase I project is not independent of the Phase II project and should be evaluated for its potential impacts to salmonids and their habitats

concurrently. Phase II is needed so that the 30th Street SE [sic] culvert can pass the 100 year flood event with 1 foot of freeboard and meet Bellevue's engineering standards and likely those standards of FEMA and other agencies. The Phase II project is also needed to meet the project's purpose "to address chronic flooding of SE 30th Street and surrounding private property". As noted in the Biological Assessment (BA, page 7), the Phase II project primary purpose is to address the flooding of properties surrounding the project area and to "optimize the flood conveyance capacity of Sunset Creek from the downstream project extents of Alternative 1 to the confluence of Sunset Creek and Richards Creek through channel modifications and construction of a flood containment berm". Also, Phase II was analyzed for sediment transport with the Phase I improvements and compared against the existing conditions in the technical sections of the Flood Control and Sediment Plan for this project. Finally, the Flood Control and Sediment Plan clearly notes that there will continue to be a backwater condition in the new culvert and deposition in the area of the modified channel downstream of SE 30th Street until the high point in the channel downstream is lowered, either by Phase II channel modifications or due to geomorphic response of the channel to reduced sediment delivery.

Response to Comment

The Flood Control and Sediment Management Plan for the Richards Creek, Sunset Creek, and East Creek Confluence Area recommends a range of alternatives to address recurrent flooding and sedimentation problems, channel instability, and degraded habitat conditions. Phase I includes the culvert replacement at SE 30th Street and channel modifications upstream and downstream to provide a stable streambed transition to the culvert inlet and outlet. The specific objectives of Phase I are to address the recurrent flooding at SE 30th Street and the recurrent sedimentation upstream and downstream of the existing culverts that requires annual dredging within the active channel. Satisfaction of these objectives does not require Phase II. Phase II includes approximately 400 feet of channel modifications from the downstream end of Phase I to the confluence of Sunset Creek and Richards Creek. The specific objective of Phase II is to limit the extent of flooding into neighboring properties downstream of SE 30th Street and the Phase I project extents. Channel modifications under both phases include the following project components that will improve the aquatic habitat conditions of Sunset Creek:

- Construction of a two-stage channel
- Biostabilization of stream banks
- The removal of invasive species
- Replanting with native vegetation.

Due to the limited width of the channel corridor and the distinct change in channel slope at SE 30th Street, neither Phase I or Phase II can fully meet the City of Bellevue's engineering standard stating that culverts should pass the 100-year flow with one foot of freeboard.

Under the existing conditions, flows as small as the 1-year recurrence interval event are predicted to flood SE 30th Street. These modeled conditions are supported by observations of at least six flooding events at SE 30th Street since January 1, 2005. The replacement culvert and channel modifications proposed under Phase I will improve the flow conveyance capacity and

keep the 100-year flow from flooding SE 30th Street, though the City's freeboard requirement in the culvert cannot be met. Immediately following the construction of Phase I, the replacement culvert is designed to pass the 2-year flow with a free water surface at the upstream culvert inlet (i.e., with freeboard through the culvert length). Following either downstream channel responses to reduced bedload delivery rates, or the construction of Phase II channel modifications, the replacement culvert is designed to pass the 25-year flow with a free water surface at the culvert inlet.

Based on extensive hydraulic modeling, sediment transport analyses, and a detailed understanding of the geomorphic processes at the project site, it is anticipated that the downstream geomorphic responses to the Phase I culvert replacement and channel modifications would include the transport of sediments that have accumulated within the channel downstream of the Phase I project extents over the last 30 years. The exact timeframe of this response is difficult to predict, but the resulting hydraulic influences of this response to the downstream channel would likely mimic those that will result from the channel modifications proposed under Phase II. Therefore, while Phase I could be implemented to reduce the recurrent flooding at SE 30th Street and the recurrent sedimentation upstream and downstream of the existing culverts without implementing Phase II, the benefits of constructing Phase II include limiting the extent of flooding into neighboring properties downstream of the Phase I extents while also extending the length of channel with improved aquatic habitat. Although Phase II would provide some control over the timing and character of channel modifications downstream of the Phase I project extents, it is not a required component of long-term flood control at SE 30th Street and is thus considered independent of Phase I.

<u>Phase IV concern</u>

Comment

Phase IV of the flood control plan recommends bank stabilization and channel grade control measures in three reaches upstream of the project area to address ongoing sediment delivery from the upper Sunset Creek watershed. Phase IV also recommends a geomorphic assessment of the East Creek channel network to determine the relative contribution of sediment generated by reported channel degradation and develop appropriate treatment recommendations. This Phase should be completed simultaneously with Phase I. It is currently unfunded and will not be completed until Phases I, II, III are funded and completed [sic]. Phase IV will address source control and could actually reduce the need for dredging and channel alterations as proposed under Phases II and III, and result in reduced environmental impacts; therefore, this phase should be completed first and monitored.

Another alternative that has not been seriously considered is to flood proof and elevate SE 30th Street and the surrounding properties that suffer from chronic flooding along with the Phase I improvements. Raising the roadway is briefly discussed in the Flood Control and Sediment Management Plan; however, it was dismissed due to costs without a full discussion of these costs compared to project and long term monitoring and maintenance costs. The project should be revised to flood proof the affected properties before Phases II and III so that they may be either eliminated due to a lack of need, or redesigned to have less environmental impact.

Response to Comment

The City of Bellevue is committed to a basin-wide approach to flood control and sediment management in the Richards Creek, Sunset Creek, and East Creek watersheds. The recommended elements of the Flood Control and Sediment Management Plan are intended to provide complementary benefits to flood control, sediment management, and habitat improvements.

The needs for Phases I and II have been known the longest and are currently funded for design and construction. Phase III (Alternative 3) grade control structures and channel modifications are one identified capital improvement project among many in the Bellevue Utilities Department Stream Modification/Restoration Program. Phase IV bank stabilization and grade control measures in the upper Sunset Creek watershed, and an evaluation of channel degradation in the East Creek channel network will be added to the list of pending projects in the Utilities Department's program. The timing of Phases III and IV is not known at this point because the City's process for funding projects has not included their evaluation to date. The Capital Improvement Program is updated every two years at which time identified projects are evaluated and ranked among the list of existing projects. Funding is generally made available to projects that are top ranked in the programs identified to address flooding, fish passage and habitat improvement.

Elevating SE 30th Street and flood proofing of properties neighboring the channel network have been considered during the selection of the alternatives recommended in the Flood Control and Sediment Management Plan. Elevating SE 30th Street would require:

- Increasing the Phase I project limits and regrading SE 30th Street.
- Re-grading driveway entrances to the northwest, northeast, and southeast. This work would require agreements with the property owners.
- Resolving modified surface drainage flow paths resulting from local super-elevation of the roadway.

No significant sediment management or habitat benefits would result from these project activities. Flood proofing of neighboring properties, however, is being incorporated into Phase II channel modifications in the form of a flood containment berm to limit the extent of lateral flooding downstream of SE 30th Street. Flood berms may also be necessary with the grade control structures and channel modifications proposed under Phase III (Alternative 3).

The chronic flooding at SE 30th Street is one of the worst flooding problem sites in the city. If the City were to implement Phase IV improvements in the upper Sunset Creek watershed and monitor the outcome for a few years, prior to implementing any flood improvements at and near SE 30th Street, the City would risk continuing flooding at and near SE 30th Street due to the legacy of historical sediment accumulation in the Sunset and Richards Creek channels, and the high flows generated in the Sunset Creek watershed. Because of this, the City must choose to

proceed with Phase I and Phase II as the top priorities, and move on to Phases III and IV as funding is available.

We understand your concerns relating to the environmental impacts associated with the recommended phasing of flood control and sediment management alternatives. As the BA for Phase I illustrates, however, the long-term improvements in aquatic habitat and riparian habitat far outweigh the anticipated short-term impacts related to project implementation according to this phasing plan. We intend to proceed in good faith with the Muckleshoot Indian Tribe and other regulatory agencies to carry out the phasing of all aspects of the Flood Control and Sediment Management Plan, but do not have the luxury of immediate funding to launch all of the planned actions at this time.