



DEVELOPMENT SERVICES DEPARTMENT
 ENVIRONMENTAL COORDINATOR
 450 100th Ave NE., P.O. BOX 90012
 BELLEVUE, WA 98009-9012

DETERMINATION OF NON-SIGNIFICANCE

PROPONENT: Bruce Jensen, City of Bellevue Utilities Department

LOCATION OF PROPOSAL: 3316 102nd Ave NE (Generally)

NAME & DESCRIPTION OF PROPOSAL:

City of Bellevue Utilities Yarrow Creek Stream Stabilization and Habitat Improvements

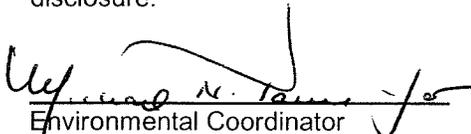
Application for critical areas land use permit to retroactively permit the emergency stabilization of a segment of Yarrow Creek and authorize additional in-channel stream stabilization and habitat improvements.

FILE NUMBER: 10-130253-LO

The Environmental Coordinator of the City of Bellevue has determined that this proposal does not have a probable significant adverse impact upon the environment. An Environmental Impact Statement (EIS) is not required under RCW 43.21C.030(2)(C). This decision was made after the Bellevue Environmental Coordinator reviewed the completed environmental checklist and information filed with the Land Use Division of the Development Services Department. This information is available to the public on request.

- There is no comment period for this DNS. There is a 14-day appeal period. Only persons who submitted written comments before the DNS was issued may appeal the decision. A written appeal must be filed in the City Clerk's office by 5:00 p.m. on _____.
- This DNS is issued after using the optional DNS process in WAC 197-11-355. There is no further comment period on the DNS. There is a 14-day appeal period. Only persons who submitted written comments before the DNS was issued may appeal the decision. A written appeal must be filed in the City Clerk's Office by 5 p.m. on **May 5, 2011**.
- This DNS is issued under WAC 197-11-340(2) and is subject to a 14-day comment period from the date below. Comments must be submitted by 5 p.m. on _____. This DNS is also subject to appeal. A written appeal must be filed in the City Clerk's Office by 5 p.m. on _____.

This DNS may be withdrawn at any time if the proposal is modified so that it is likely to have significant adverse environmental impacts; if there is significant new information indicating, or on, a proposals probable significant adverse environmental impacts (unless a non-exempt license has been issued if the proposal is a private project); or if the DNS was procured by misrepresentation or lack of material disclosure.


 Environmental Coordinator

April 21, 2011
 Date

OTHERS TO RECEIVE THIS DOCUMENT:

- State Department of Fish and Wildlife
- State Department of Ecology,
- Army Corps of Engineers
- Attorney General
- Muckleshoot Indian Tribe



**City of Bellevue
Development Services Department
Land Use Staff Report**

Proposal Name: Yarrow Creek Stream Stabilization and Habitat Improvements

Proposal Address: 3316 102nd Ave NE (Generally)

Proposal Description: Application for critical areas land use permit to retroactively permit the emergency stabilization of a segment of Yarrow Creek and authorize additional in-channel stream stabilization and habitat improvements.

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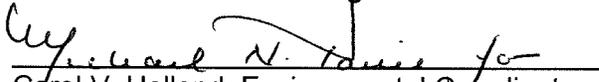
Applicant: Bruce Jensen, City of Bellevue Utilities Department

Decisions Included: Critical Areas Land Use Permit
(Process II. LUC 20.30P)

Planner: David Pyle, Planner

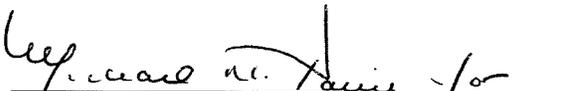
**State Environmental Policy Act
Threshold Determination:**

Determination of Non-Significance



Carol V. Helland, Environmental Coordinator
Development Services Department

Director's Decision: **Approval with Conditions**



Carol V. Helland, Land Use Director
Development Services Department

Application Date:	December 30, 2010
Notice of Application Publication Date:	February 10, 2011
Decision Publication Date:	April 21, 2011
Project/SEPA Appeal Deadline:	May 5, 2011

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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1. Project Plans
2. Critical Areas Report and Restoration Plan
3. Public Comment Letter
4. City Response to Public Comment
5. Environmental Checklist

I. Proposal Description

General Description

The City of Bellevue Utilities Department is proposing in-channel stream stabilization repairs with associated habitat improvements to stabilize the ravine of the west tributary of Yarrow Creek located east of 102nd Ave NE (Yarrow Creek tributary), including repairs to the culvert that crosses under 102nd Ave NE. Significant erosion and channel downcutting has occurred over several years at this location resulting in near-vertical side slopes in many areas jeopardizing the stability of the upstream roadway embankment that supports an 8-inch sewer line, a 6-inch waterline, a gas line, and overhead power lines. The excessive erosion was caused by a failed culvert outfall that disconnected underground prior to 2008 and caused a slow and undetected failure of the road embankment contributing to excessive sedimentation downstream.

The downstream erosion problem was discovered when the City of Bellevue Utilities Department Operations and Maintenance Division attempted to perform routine sediment removal in the fall of 2008 at an established maintenance location immediately upstream from an abandoned section of old Lake Washington Boulevard adjacent to State Highway 520. At the time of discovery, Utilities Maintenance crews removed over 320 cubic yards of material from the maintenance location as an emergency action after determining that the excessive accumulation of sediment at the location was threatening a sewer main that crosses under Yarrow Creek within an abandoned section of Lake Washington Boulevard. The emergency removal of sediment was retroactively permitted under file 09-104532-LO. Following this emergency action the lower reach of the stream where the sediment deposit was located and removed was restored in accordance with City code requirements. Upstream analysis completed as part of this past project identified the source of the erosion as the 102nd Ave NE roadway embankment.

Emergency Repairs Completed to Date

After identification of the erosion problem, the Utilities Department began monitoring the roadway bank failure to track the progression of the erosion. During this period a contract was negotiated with the project engineering consultant to begin design work on the stabilization of the roadway and rehabilitation of the stream channel. During the design period monitoring revealed the erosion was progressing at an advanced rate and immediate emergency stabilization was needed to prevent road and associated utility failures. Following this determination, in July 2010 the City declared an emergency to repair the 102nd Avenue NE culvert and roadway embankment. In order to address the hazard, the existing concrete culvert was replaced with new 24-inch plastic replacement pipe, and new culvert inlet and outlet structures were installed. In addition, approximately 1,300 cubic yards of gravel fill was placed at the eroded base of the ravine in order to buttress the roadway embankment by creating a new fill slope. The 24-inch plastic pipe was extended approximately 100 ft downstream through the fill area to a more stable discharge location where an energy dissipater outlet was located. A detailed cross section profile demonstrating work completed is available in the project plan set included as **Attachment 1** to this staff report.

Post Emergency Improvements Proposed

To stabilize and improve stream channel conditions following years of accelerated erosion, stream restoration along approximately 220 linear ft of stream is proposed for the summer of 2011. The proposed channel stabilization and habitat improvements include the following:

- Modification of the newly installed manhole at the outlet of the culvert and constructing a stream channel on the fill slope that was built as part of the emergency repair;

- Installation of rock and large woody debris to create a cascade pool complex;
- Extending installation of rock and large woody debris downstream of the emergency repair;
- Installation of native plantings adjacent to the proposed work;
- Separation of flows - base flows will be contained within the open channel, and high flows will be diverted by a flow splitter to the pipe constructed within the fill slope as part of the emergency repair.

Because of the steepness of the fill placed to buttress the roadway embankment, the constructed stream segment will have to include multiple splash pools using rock and large woody debris to get the newly daylighted base flow down to the existing stream elevation without causing erosion of the newly installed fill. An impervious liner will be used under the constructed stream segment to help prevent the base flow from undercutting the newly installed rock and logs. The surface of the fill, which is currently covered with jute erosion control mat and hydroseeded grass as part of the emergency repair, will be replanted with a mix of native trees, shrubs, and groundcovers.

The goal of the proposed habitat improvements is to maximize habitat improvements while protecting the road and sewer infrastructure. The design will provide habitat for wildlife and aquatic insects, but will not support fish use upstream of the high flow outlet due to stream channel slope (30% or greater), however habitat improvements will also be completed downstream of the high flow outlet and all habitat improvements planned will benefit the lower reach of the stream that has been identified as potential fish habitat after fish passage improvements proposed as part of the State Highway 520 reconstruction project are complete. The stream buffer restoration will improve habitat value and functional performance by increasing vegetative structure and diversity. The proposed restoration includes re-planting of 5,370 sq. ft. of buffer area that will be temporarily impacted during construction and was created as part of filling activities associated with the emergency repair.

Base flows will be returned to the restored stream channel by a flow splitter to be installed on the upstream end of the ravine. A base flow of 0.3 cubic feet per second will be diverted to and maintained within the stream channel, which is consistent with flows modeled for the basin prior to development. Flows greater than base flow rates will be redirected to the high-flow bypass pipe installed as part of the emergency repair and will exit the bypass and enter the main channel at the bottom of the embankment slope. Project plans are included as **Attachment 1**.

Typically, modification of a stream channel is not permitted except as allowed under LUC 20.25H.080.B which specifies that the stream channel may be only be modified through a critical areas report in conjunction with a stream stabilization project or a habitat improvement project where there is a net benefit in ecological function. In response to this requirement, the applicant has obtained the services of a qualified professional who has prepared a critical areas report and has identified how habitat improvements can be achieved as part of the stream stabilization efforts required to stabilize the roadway and prevent future downcutting of the stream channel. The critical areas report contains a complete project summary and outlines potential impacts and actions being taken to avoid or when unavoidable provide mitigation as abatement. The project critical areas report is included as **Attachment 2**.

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

A. Site Description

The study area extends from the west side of 102nd Avenue NE approximately 220 ft east of 102nd Avenue NE near the confluence with the west tributary of Yarrow Creek and includes areas within 300 ft of the tributary on parcels 4122700080, 4122700090, and 412270TRCT (Figures 2 and 3). The study area is located within the Cedar-Sammamish watershed (Water Resource Inventory Area 8) in Section 20, Township 25 North, Range 5 East. Land use in the study area consists primarily of residential properties. The project area contains steep slopes adjacent to the Yarrow Creek tributary and 102nd Avenue NE. A complete description of the project area and project history is available in the project critical areas report included as **Attachment 2**.

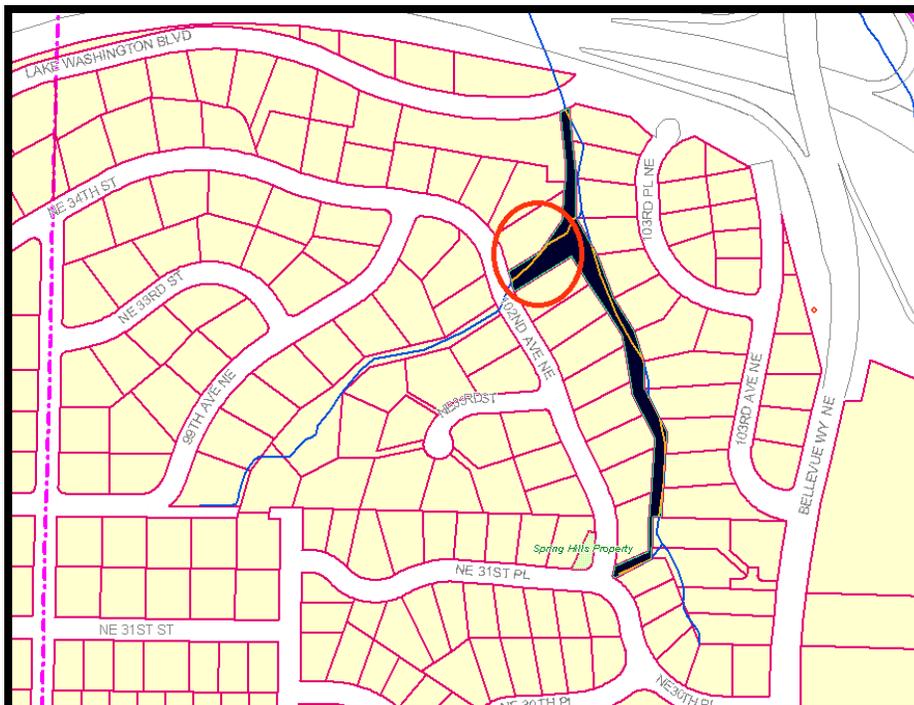


Figure 1: Project Location

B. Zoning and Land Use Context

The project area is zoned as single family R-2.5 and is developed with single family residences and open space tracts. Field study of the project area located 1 wetland unit in addition to the Yarrow Creek stream channel and adjacent steep slope ravine banks. The site is in the Critical Areas Overlay District governed by the regulations in LUC 20.25H. No changes are proposed to the character of the area and no additional development is included in this proposal.

C. Critical Areas Functions and Values

i. Streams and Riparian Areas

a. Stream and Riparian Area Functions:

A healthy aquatic environment relies on processes sustained by dynamic interaction between the stream and the adjacent riparian area. Riparian vegetation in floodplains and along stream banks provides a buffer to help

mitigate the impacts of urbanization. Healthy riparian areas support healthy stream conditions.

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 floodflows, which in turn, are released to the stream as baseflow.

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.

b. Existing Stream conditions:

The section of Yarrow Creek proposed for in-channel improvement in the project area provides flow support to downstream sections of the stream. The lower portions of the stream support a variety of native fish species, including anadromous salmonids. The stream in the project area also provides some food sources to aquatic species downstream. These include macroinvertebrates, leaf litter, and other organic inputs. The existing channel provides some water velocity reductions (hydrologic function) and sediment processing (water quality function). A complete description of the conditions of Yarrow Creek is available in the project critical areas report included as **Attachment 2**.

c. Stream Impacts:

Permanent and temporary impacts to Yarrow Creek and the adjacent riparian area resulting from construction have been identified on the project plans (**Attachment 1**). Impacts will be restored as part of the project in accordance with an approved restoration plan.

The impacts to the Yarrow Creek tributary as part of the proposed restoration will be beneficial impacts. The culvert replacement and stabilization of the embankment ravine was the minimum necessary to address the high flows and erosion of the ravine and threat to public infrastructure. The proposed habitat improvements will occur in the area of the former channel and will improve upon the conditions of the Yarrow Creek tributary. Completing habitat improvements for this stream segment, which at 30% is too steep for fish habitat, will improve water quality and provide natural biological support for fish habitat that exists further downstream and that may be extended into the eastern segment of this project in the future to link improvements being made in association with the State Highway 520 project.

. Restoration of the stream does not degrade the quantitative and qualitative functions and values of the habitat, and will achieve equivalent or better biologic and hydrologic functions. To limit temporary impacts to

downstream resources, the channel will be dewatered during construction, and all flow will be bypassed directly to the downstream outlet culvert. Therefore no permanent effects to downstream resources are expected.

The restoration and habitat improvements are in two discrete sections. The first section represents the larger project area, representing approximately 120 linear ft of stream, and includes modifying the newly installed manhole at the outlet of the culvert and constructing a stream channel on the fill slope that was built as part of the emergency repair. The newly installed manhole will be modified to include a baffle wall and small-diameter pipe to split the stream flow, delivering the stream's base flow of 0.3 cfs into the constructed stream channel. The constructed stream channel will extend from the modified manhole and carry the base flow down the 30% grade to a point next to the recently installed stilling well. The stilling well acts as the energy dissipater and outfall for the bypass pipe.

The second section of the project starts at the toe of the fill slope and continues downstream approximately 100 linear ft to within 20 ft of the confluence of the tributaries of Yarrow Creek (see Appendix F, Sheet 14 and 20). This second section of the project is designed to stabilize this section of creek against further damage by head cutting, erosion of side slopes, and the loss of habitat through the movement of existing small rock or the existing unsecured woody debris. Work in this stream segment will also include supplemental plantings with native species and the placement of habitat structures consisting of large rock and large woody debris.

The stream restoration will include the placement of large woody debris, streambed cobbles, streambed boulders, streambed aggregate, and streambed sediment as directed by the project engineer to prevent future stream channel downcutting and improve habitat conditions in the upper and lower reaches of the project. The buffer restoration will improve habitat value and functional performance of the stream buffer by increasing vegetative structure within the buffer. The proposed restoration includes replanting of 5,730 sq. ft. of buffer area between the stream and top of bank that is to be temporarily impacted representing a 1:1 ratio of restoration to impacts.

A complete summary of potential impacts to Yarrow Creek, including mitigation measures is available in the project critical areas report included as **Attachment 2**.

ii. Wetlands

a. Wetland Functions:

Wetlands provide important functions and values for both the human and biological environment—these functions include flood control, water quality improvement, and nutrient production. The benefits provided depend on their size and location within a basin, as well as their diversity and quality. While Bellevue's wetlands provide various beneficial functions, not all wetlands perform all functions, nor do they perform all functions equally well. However, the combined effect of functional processes of wetlands within basins provides benefits to both natural and human environments. For example, wetlands provide significant stormwater control, even if they

are degraded and comprise only a small percentage of area within a basin.

b. Existing Wetland Conditions:

One approximately 1,600 square foot Category III palustrine emergent (PEM)/slope wetland was identified in the project vicinity during field reconnaissance. A complete description of wetland conditions is available in the project critical areas report included as **Attachment 2**.

c. Wetland Impacts

As a Category III wetland with a buffer of 60 to 110 ft, the wetland and associated buffer were determined to have no impact from project activities. No further analysis or discussion of wetland resources is needed.

iii. Geologic Hazard Areas

a. Geologic Hazard Area Functions:

Geologic hazards pose a threat to the health and safety of citizens when development is inappropriately sited in areas of significant hazard. Some geologic hazards can be reduced or mitigated by engineering, design, or modified construction practices. When technology cannot reduce risks to acceptable levels, building in geologically hazardous areas is best avoided.

Steep slopes may serve several other functions and possess other values for the City and its residents. Some of Bellevue's remaining large blocks of forest are located in steep slope areas, providing habitat for a variety of wildlife species and important linkages between habitat areas in the City. These steep slope areas also act as conduits for groundwater, which drains from hillsides to provide a water source for the City's wetlands and stream systems. Vegetated steep slopes also provide a visual amenity in the City, providing a "green" backdrop for urbanized areas enhancing property values and buffering urban development.

b. Existing Geologic Hazard Area Conditions:

The proposed project is located at the bottom of a steep ravine, with slopes in excess of 40 percent and some sections nearly vertical due to slumping. The area is characterized by features designated as steep slopes, landslide hazards, and erosion hazards as defined by LUC 20.25H.120.

c. Impacts To Geologic Hazard Areas:

All work will occur in the channel and there will be no disturbance to the vegetation or soils on the steep slopes. The project goal is to stabilize the channel, which will reduce the ongoing toe slope erosion evident at the site. Geotechnical analyses of the project area confirmed that the proposed work will enhance the stability of the steep slopes and landslide hazard areas by reducing toe-of slope erosion. Therefore, the project will have no negative effect on geologic hazards, and will reduce risks to these hazards by reducing channel and slope erosion in the long-term.

iv. Habitat Associated With Species of Local Importance

a. Habitat Functions:

Urbanization, the increase in human settlement density and associated intensification of land use, has a profound and lasting effect on the natural

environment and wildlife habitat (McKinney 2002, Blair 2004, Marzluff 2005 Munns 2006), is a major cause of native species local extinctions (Czech et al 2000), and is likely to become the primary cause of extinctions in the coming century (Marzluff et al. 2001a).

Cities are typically located along rivers, on coastlines, or near large bodies of water. The associated floodplains and riparian systems make up a relatively small percentage of land cover in the western United States, yet they provide habitat for rich wildlife communities (Knopf et al. 1988), which in turn provide a source for urban habitat patches or reserves. Consequently, urban areas can support rich wildlife communities. In fact, species richness peaks for some groups, including songbirds, at an intermediate level of development (Blair 1999, Marzluff 2005).

Protected wild areas alone cannot be depended on to conserve wildlife species. Impacts from catastrophic events, environmental changes, and evolutionary processes (genetic drift, inbreeding, colonization) can be magnified when a taxonomic group or unit is confined to a specific area, and no one area or group of areas is likely to support the biological processes necessary to maintain biodiversity over a range of geographic scales (Shaughnessy and O'Neil 2001). As well, typological approaches to taxonomy or the use of indicators present the risk that evolutionary potential will be lost when depending on reserves for preservation (Rojas 2007). Urban habitat is a vital link in the process of wildlife conservation in the U.S.

b. Existing Habitat Features

To evaluate habitat conditions in the project area and vicinity, the applicant consulted with biologists who surveyed the area to identify dominant species, forest maturity, concentrations of native and invasive plant populations, other habitat features (e.g., snags, logs), and habitat potential to support protected wildlife species and indications of use by these species. Information provided by WDFW's Priority Habitats and Species (PHS) Program (WDFW 2010), fish usage information from the Salmonscape mapping program (WDFW 2010b), and fish survey data collected in 2001 (Watershed Company 2001) was also reviewed. There are no PHS areas or documented occurrences of protected species in the project vicinity. Fish usage is restricted to the portion of Yarrow Creek downstream of the culvert under State Highway 520 (about 1/2 mile downstream). No anadromous or resident fish occur in the section of Yarrow Creek proposed for restoration.

c. Impacts to Habitat Features:

There will be no permanent impacts to the existing habitat features identified above. No habitat trees or standing snags will be removed. The only vegetation removal (temporary) will be restricted to trees, shrubs, ferns, emergents, and herbs along narrow construction access routes adjacent to the stream. All temporarily disturbed vegetation will be restored following construction. Work will occur in the summer during low water conditions. Noise impacts from the project are not expected to be of sufficient magnitude or duration to disturb wildlife species. Sensitive species may move away from construction activity during active work periods, but are expected to return once work is completed. During

construction the channel will be dewatered and all flow bypassed to a downstream outlet point. After construction, water quality will be monitored and turbid water will be discharged to the sewer. Only after turbidity has been reduced to meet water quality standards will the flow be directed to downstream receiving waters. Therefore no effect on downstream water quality will occur.

III. Consistency with Land Use Code Requirements:

A. Zoning District Dimensional Requirements:

This is a proposal to retroactively permit the emergency stabilization of a segment of Yarrow Creek and authorize additional in-channel stream repairs and habitat improvements. Standard single family district development standards do not apply.

B. Consistency with Critical Areas Performance Standards LUC 20.25H:

i. Performance Standards for Construction Staging LUC 20.25H.055.C.1

Construction staging associated with an allowed use is considered an allowed activity in critical areas, critical area buffers, or critical area structure setbacks provided the applicable performance standards are adhered to.

The work shall be consistent with all applicable City of Bellevue codes and standards. The work includes the construction of a temporary access route from 102nd Ave NE along Yarrow. The applicant is required to apply for and obtain a Right-of-Way Use Permit for the mobilization and use of this access point. The applicant is also required to apply for and obtain a Clearing and Grading Permit to address temporary erosion and sedimentation control associated with the access route and the temporary construction impacts associated with the instream work. This permit also includes review and approval of a stream dewatering plan and turbidity monitoring during the course of the project. Because these permits must be applied for and obtained prior to the commencement of any construction activities, the applicable review department will ensure that all applicable codes and standards are being met.

The removal of significant trees is prohibited. The project is not proposing to remove any significant trees.

All areas of temporary disturbance associated with the work shall be restored to pre-project conditions, pursuant to a restoration plan meeting the requirements of LUC 20.25H.210. A restoration plan has been prepared that seeks to restore all areas of temporary disturbance.

ii. Performance Standards for Stabilization Measures LUC 20.25H.055.C.3.M

Proposed stabilization measures within a critical area or critical area buffer to protect against stream erosion may be approved in accordance with this subsection.

New or enlarged stabilization measures shall be allowed only to protect existing infrastructure. Stabilization measures shall be allowed only where avoidance measures are not technically feasible. Based on the existing location of the community assets, including nearby roadways and utility lines, there is no technically feasible alternative to stabilizing this section of the stream to prevent

continued downcutting.

When stabilization is allowed, soft stabilization measures shall be used, unless the applicant demonstrates that soft stabilization measures are not technically feasible. The applicant has proposed a mixture of soft stabilization and hard stabilization measures that will result in net improvement in ecological function of the critical area and critical area buffer.

The soft stabilization measures include the use of logs and root wads to stabilize the stream banks. The applicant is also proposing the use of vegetative enhancements along the banks to increase the plant species diversity and to establish more desirable bank stabilizing species in the area. Because of the steepness of the fill placed to buttress the roadway embankment, the constructed stream segment will have to include multiple splash pools using rock and large woody debris to get the newly daylighted base flow down to the existing stream elevation without causing erosion of the newly installed fill. An impervious liner will be used under the constructed stream segment to help prevent the base flow from undercutting the newly installed rock and logs. The surface of the fill, which is currently covered with jute erosion control mat and hydroseeded grass as part of the emergency repair, will be replanted with a mix of native trees, shrubs, and groundcovers.

iii. Performance Standards for Habitat Improvement Projects LUC 20.25H.055.C.3.j

The project is also classified as a habitat improvement project. It is classified as such because it has been approved by the Director in accordance with the provisions of an approved Critical Areas Report. The primary habitat improvement is the addition of large woody debris to the stream channel to improve habitat diversity and incorporate a source of organic material to improve overall long term stream conditions.

iv. Performance Standards for Stream Critical Areas LUC 20.25H.080.B

The proposed project has met the criteria of an “allowed use” under LUC 20.25H.055. It includes activities consistent with the uses of a habitat improvement project and in-stream structures. An approved Critical Areas Report has been prepared and submitted to support the design of the project and its desired objectives.

v. Performance Standards for Wetland Critical Areas LUC 20.25H.100

The following applicable performance standards have been considered and incorporated into the design of proposed project.

There is no current or additional lighting associated with the project that will affect stream or wetlands. The project is not proposing the creation of any noise generating activities other than those temporary noises associated with the construction activity. There will be no new impervious surface as part of the project. The site will be actively monitored and maintained for a period of 5 years to ensure success of the restoration effort. The use of pesticides, insecticides and fertilizers within 150 feet of the edge of the stream buffer shall be in accordance with the City of Bellevue’s “Environmental Best Management Practices,” now or as hereafter amended.

C. Consistency with Critical Areas Report LUC 20.25.230:

The applicant supplied a complete critical areas report prepared by a qualified professional. The report met the minimum requirements in LUC 20.25H.250.

D. Consistency with Critical Areas Report – Additional provisions LUC 20.25H.090:

Additional provisions required in a critical areas report for streams are required when the applicant is proposing to reduce the regulatory critical area buffer for the stream. The proposal includes no request to reduce or modify the prescribed critical area buffer or structure setback from Yarrow Creek.

E. Consistency with Critical Areas Report – Additional provisions LUC 20.25H.110:

The Land Use Code specifies additional provisions for critical areas reports for wetlands. This information includes an analysis of wetlands and wetland buffers that may occur within 300 feet of the project area. This section requires a discussion of avoidance and minimization measures, which is included in the applicant's critical areas report.

IV. Public Notice and Comment

Application Date: December 30, 2010
Public Notice (500 feet): February 10, 2011
Minimum Comment Period: February 24, 2011

The Notice of Application for this project was published in the City of Bellevue weekly permit bulletin on February 10, 2011. It was mailed to agencies, tribes, and property owners within 500 feet of the project site. One public comment letter was received from the Muckleshoot Indian Tribe Fisheries Division. The letter included several technical questions and comments related to the following issues:

- Request for additional information referenced in the SEPA checklist;
- Clarification on the emergency repair work completed;
- Suggestions related to the quantity, size, and location of wood being placed in the stream as a habitat improvement;
- Comments on the potential passage of resident trout in streams with a gradient of greater than 30%

The comment letter is included as **Attachment 3**. Staff response to the comments is included as **Attachment 4**. As a result of comment received, the project design was modified to add additional wood of varying sizes to the downstream reach to create additional pools and improve in-stream habitat conditions in an effort to plan for fish passage improvements proposed as part of the State Highway 520. Revised plans were submitted on March 31, 2011 reflecting the requested changes.

V. Summary of Technical Reviews

Clearing and Grading:

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

Transportation:

A representative of the Transportation Department was notified of the project proposal. Their review determined that a Right-of-Way Use Permit is required for the use of the public right-of-way for construction staging and access. This permit must be obtained prior to commencement of project activity.

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 complete SEPA Environmental Checklist is included as **Attachment 5**.

A. Earth and Water

A temporary erosion and sedimentation control plan is included in the project plans, and addresses all requirements for restoring the site to its current condition as well as erosion and sedimentation management practices. Erosion and sediment control best management practices include the use of a dewatering plan to dry out as much as feasible during the proposed construction activity. The proposal also includes the installation of silt fencing around the work area and covering exposed soils to prevent migration of soils to the adjacent stream and wetland. Final approval of the temporary erosion and sedimentation control plan will happen with the required Clearing and Grading Permit. The applicant will also be required to submit information regarding the use of pesticides, insecticides, and fertilizers to avoid impacts to water resources. See Section IX for related conditions of approval.

B. Animals

The project site is located around and within a regulated stream and is part of a habitat corridor. The proposed channel modifications are not expected to negatively impact habitat functions. As an objective of the required stream stabilization effort, the applicant is proposing to place large woody debris in the stream channel to improve habitat complexity and improve organic compound inputs. The project mitigation and restoration plan has been designed to further enhance the vegetation structure on the site, which is expected to have a positive impact on the wildlife resource.

C. Plants

Mitigation for temporary and permanent disturbance will be approved pursuant to an approved re-vegetation and monitoring plan. A complete restoration plan with monitoring performance standards and contingency plan has been submitted as part of the critical areas report (**Attachment 2**). It will be implemented as a condition of the subsequent clearing and grading permit. See Section IX for related conditions of approval.

D. Noise

The site is adjacent to single-family residences whose residents are most sensitive to

disturbance from noise during evening, late night and weekend hours when they are likely to be at home. Construction noise will be limited by the City's Noise Ordinance (Chapter 9.18 BCC) which regulates construction hours and noise levels. See Section IX 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 applicant has provided a complete critical areas report that demonstrates that the proposal leads to levels of protection of critical area functions and values that area at least as protective as the regulations and standards of this code.

The applicable regulation and standards of the code prohibit all clearing and grading in the stream, the riparian zone or disturbance in the wetland. Through the critical areas report process, it is clear that habitat functions will likely be improved, the riparian functions will improve in the long term through the incorporation of additional native plants. The inclusion of large woody debris will enhance the Instream habitat in the project reach.

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

Finding: The applicant, the City of Bellevue, has adequate resources to complete the required mitigation and monitoring efforts and the project is as an emergency repair.

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 complies with all of the applicable performance standards for streams and wetlands and includes an appropriate mitigation and restoration plan to offset identified short and long term impacts.

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

Finding: The construction of the stream work is consistent with the surrounding land uses. There is no change in use on the site or any of the adjacent sites.

B. Critical Areas Land Use Permit Decision Criteria 20.30P

The Director may approve or approve with modifications an application for a critical areas land use permit if:

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

Finding: The proposed activity is required to obtain a clearing and grading permit and right-of-way use permit from the City of Bellevue. The activity is also required to obtain permission from the Washington State Departments of Ecology and Fish & Wildlife, as well as the Army Corps of Engineers.

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 proposal has been designed by qualified professionals from Brown and Caldwell and Landau Associates with consultation with City of Bellevue and Washington Department of Fish and Wildlife Habitat Biologists, in order to ensure the best available design and techniques have been incorporated.

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

Finding: Section III above discusses how, the proposal incorporates the applicable performance standards.

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

Finding: The area is adequately serviced by public facilities. The proposal will not change the need for public facilities.

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

Finding: A mitigation and restoration plan consistent with the requirement of LUC 20.25H.210 has been prepared and submitted along with the project's critical areas report.

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 Development Services Director does hereby **approve with conditions** the proposal to retroactively permit the emergency stabilization of a segment of Yarrow Creek and authorize additional in-channel stream repairs and habitat improvements.

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:

<u>Applicable Ordinances</u>	<u>Contact Person</u>
Clearing and Grading Code- BCC 23.76	Savina Uzunow, 425-452-7860
Land Use Code- BCC 20.25H	David Pyle, 425-452-2973
Noise Control- BCC 9.18	David Pyle, 425-452-2973
Transportation Code	Rohini Nair, 425-452-2569

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

- 1. Clearing and Grading Permit:** Before commencing any construction activity, the applicant must apply for and obtain a Clearing and Grading Permit. On-going turbidity monitoring and submittal of turbidity monitoring data sheets will be required as part of the clearing and grading permit inspection process.

Authority: Bellevue City Code Section 23.76.025
Reviewer: Savina Uzunow, Clear and Grade

- 2. Restoration for Areas of Temporary Disturbance:** A 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.. This plan must include requirements and methods of documenting pre-construction site conditions and must demonstrate how areas of temporary disturbance resulting from construction activity and access will be restored and maintained to ensure the restoration is successful. See LUC 20.25H.220.H for more details on the requirements associated with this plan

Authority: Land Use Code 20.25H.220.H
Reviewer: David Pyle, Development Services Department

- 3. Mitigation, Maintenance, and Monitoring Plan:** To ensure the proposed restoration plan is successful, the mitigation, maintenance, and monitoring plan submitted as part of this application shall be submitted as part of the underlying clearing and grading permit required to implement the project. Any modifications to the mitigation plans submitted under this application must be approved prior to issuance of the clearing and grading permit. The mitigation, maintenance, and monitoring plan shall include:
 - a. The goals and objectives of the mitigation proposed, based on replacing or restoring the critical area and critical area buffer functions and values impacted by the proposal.
 - b. Measurable specific criteria for each year of the required monitoring period that evaluate whether or not the goals and objectives of the mitigation or restoration project have been successfully attained. The monitoring period shall not be less than five years.

- c. Written specifications and descriptions of the restoration or mitigation proposed.
- d. A plan for monitoring construction of the mitigation project and for assessing a completed project.
- e. The potential courses of action and any corrective measures to be taken if monitoring or evaluation indicates project performance standards are not being met.
- f. At a minimum, the restoration plan must require no less than three entries per year for maintenance activities for the full five years of maintenance.
- g. A requirement that monitoring reports be submitted annually for a period of five years at the end of each growing season before the last day of the calendar year.

Authority: Land Use Code 20.25H.220, 20.25H.180.C.5
Comprehensive Plan Policies EN-1, EN-10, EN-28, EN-30
Reviewer: David Pyle, Land Use

- 4. Mitigation Installation:** Mitigation installation shall commence immediately following permit issuance where technically feasible and shall be installed according to the mitigation plans submitted as part of this application within one year of project completion.

Authority: Land Use Code 20.25H.220, 20.25H.180.C.5
Reviewer: David Pyle, Land Use

- 5. Mitigation Maintenance:** Maintenance of mitigation plantings shall include, at a minimum, three entries per year. During each entry, plant growth will be evaluated, soils amended as needed, and invasives will be suppressed.

Authority: Land Use Code 20.25H.220, 20.25H.180.C.5
Reviewer: David Pyle, Land Use

- 6. Submittal of Mitigation Maintenance and Monitoring Reports:** As part of the required five years of mitigation maintenance and monitoring, the applicant shall submit annual monitoring reports to the Development Services Department Land Use Division at the end of the growing season by no later than December 31 for each year monitored.

Authority: Land Use Code 20.25H.220.D
Reviewer: David Pyle, Land Use

- 7. Rainy Season restrictions:** Due to the proximity to Yarrow Creek, 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: Savina Uzunow, Development Services Department

- 8. 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, unless otherwise authorized in writing by the Washington State Department of Fish and Wildlife.

Authority: Land Use Code 20.25H.160
Reviewer: David Pyle, Land Use

- 9. Pesticides, Insecticides, and Fertilizers:** The applicant must submit as part of the required Clearing and Grading Permit information regarding the use of pesticides, insecticides, and fertilizers in accordance with the City of Bellevue's "Environmental Best Management Practices".

Authority: Land Use Code 20.25H.220.H
Reviewer: David Pyle, Development Services Department

- 10. 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: David Pyle, Development Services Department

- 11. Right-of-Way Use:** The proposed project will likely require the use of a portion of the right-of-way adjacent to the subject property, specifically as a haul route for excavated material and imported fill and materials. If required, a right-of-way use permit from the Transportation Department should be obtained.

Authority: Bellevue City Code 14.30
Reviewer: Rohini Nair, Transportation Department

- 12. Obtain All Other Applicable State and/or Federal Permits:** 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: David Pyle, Development Services Department

- 13. Storm Water Pollution Prevention Plan:** A Storm Water Pollution Prevention Plan shall be approved by the Clearing and Grading Division prior to commencement of construction activities.

Authority: Clearing and Grading Code BCC 23.76
Reviewer: Savina Uzunow, Development Services Department

- 14. Temporary Erosion and Sedimentation Control Plan:** Prior to the 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 23.76.060 and 23.76.090
Reviewer: David Pyle, Land Use

- 15. Dewatering Plan:** To ensure the work area is free of moving water and turbid water generated during construction is not able to flow downstream from the work site, a satisfactory dewatering plan must be submitted and approved as part of the underlying clearing and grading permit.

Authority: Bellevue City Code 23.76
Reviewer: Savina Uzunow, Development Services Department

- 16. Turbidity Monitoring Plan:** A turbidity monitoring plan that meets the requirements of BCC 23.76 must be submitted and approved as part of the underlying clearing and grading permit.

Authority: Bellevue City Code 23.76
Reviewer: David Pyle, Land Use

GENERAL NOTES

- (1) ALL WORK SHALL CONFORM TO THE 2010 EDITION OF THE CITY OF BELLEVUE UTILITIES DEPARTMENT ENGINEERING STANDARDS.
- (3) THE LOCATIONS OF ALL EXISTING UTILITIES SHOWN HEREON HAVE BEEN ESTABLISHED BY FIELD SURVEY OR OBTAINED FROM AVAILABLE RECORDS AND SHOULD THEREFORE BE CONSIDERED APPROXIMATE ONLY AND NOT NECESSARILY COMPLETE. IT IS THE SOLE RESPONSIBILITY OF THE EXCAVATOR TO INDEPENDENTLY VERIFY THE ACCURACY OF ALL UTILITY LOCATIONS SHOWN, AND TO FURTHER DISCOVER AND AVOID ANY OTHER UTILITIES NOT SHOWN HEREON WHICH MAY BE AFFECTED BY THE IMPLEMENTATION OF THIS PLAN. IMMEDIATELY NOTIFY THE ENGINEER IF A CONFLICT EXISTS.
- (5) PROVIDE AND MAINTAIN TEMPORARY SEDIMENTATION COLLECTION FACILITIES TO ENSURE THAT SEDIMENT OR OTHER HAZARDOUS MATERIALS DO NOT ENTER THE STORM DRAINAGE SYSTEM IN ACCORDANCE WITH THE SITE'S APPROVED SWPPP. FOR ALL CONSTRUCTION DURING THE RAINY SEASON, DOWNHILL BASINS AND INLETS MUST BE PROTECTED WITH CATCH BASIN INSERTS. SIMPLY PLACING FILTER FABRIC UNDER THE GRATE IS NOT ACCEPTABLE.
- (6) PRIOR TO FINAL INSPECTION AND ACCEPTANCE OF STORM DRAINAGE WORK, PIPES AND STORM DRAIN STRUCTURES SHALL BE CLEANED AND FLUSHED. ANY OBSTRUCTIONS TO FLOW WITHIN THE STORM DRAIN SYSTEM, (SUCH AS RUBBLE, MORTAR AND WEDGE DEBRIS), SHALL BE REMOVED AT THE NEAREST STRUCTURE. WASH WATER OF ANY SORT SHALL NOT BE DISCHARGED TO THE STORM DRAIN SYSTEM.
- (10) ALL NEW MANHOLES SHALL HAVE A MINIMUM INSIDE DIAMETER OF 48" AND SHALL CONFORM TO THE STANDARD DETAILS. ALL NEW CATCH BASINS SHALL CONFORM TO THE STANDARD DETAILS.
- (18) THE CONTRACTOR SHALL USE A VACUUM STREET SWEEPER TO REMOVE DUST AND DEBRIS FROM PAVEMENT AREAS AS DIRECTED BY THE ENGINEER. FLUSHING OF STREETS SHALL NOT BE PERMITTED WITHOUT PRIOR CITY APPROVAL.
- (22) CALL 1-800-424-5555, OR 8-1-1, 72 HOURS BEFORE CONSTRUCTION FOR UTILITY LOCATES.
- (23) THE CONTRACTOR SHALL PERFORM A VIDEO INSPECTION AND PROVIDE A DVD OF THE STORM PIPE INTERIOR FOR THE CITY'S REVIEW. THE VIDEO SHALL PROVIDE A MINIMUM OF 14 LINES PER MILLIMETER RESOLUTION AND COVER THE ENTIRE LENGTH OF THE APPLICABLE PIPE. THE CAMERA SHALL BE MOVED THROUGH THE PIPE AT A UNIFORM RATE (≤ 30 FT/MIN), STOPPING WHEN NECESSARY TO ENSURE PROPER DOCUMENTATION OF THE PIPE CONDITION. THE VIDEO SHALL BE TAKEN AFTER INSTALLATION AND CLEANING TO INSURE THAT NO DEFECTS EXIST. THE PROJECT WILL NOT BE ACCEPTED UNTIL ALL DEFECTS HAVE BEEN REPAIRED.
- (30) SURFACE RESTORATION OF EXISTING ASPHALT PAVEMENT SHALL BE AS REQUIRED BY THE RIGHT-OF-WAY USE PERMIT.
- (37) WHEN WORK IS TO OCCUR IN EASEMENTS, THE CONTRACTOR SHALL NOTIFY THE EASEMENT GRANTOR AND BELLEVUE UTILITIES IN WRITING A MINIMUM OF 48 HOURS IN ADVANCE OF BEGINNING WORK (NOT INCLUDING WEEKENDS OR HOLIDAYS). FAILURE TO NOTIFY GRANTOR AND BELLEVUE UTILITIES WILL RESULT IN A STOP WORK ORDER BEING POSTED UNTIL THE MATTER IS RESOLVED TO THE SATISFACTION OF BELLEVUE UTILITIES. A WRITTEN RELEASE FROM THE EASEMENT GRANTOR SHALL BE FURNISHED TO THE UTILITIES INSPECTOR PRIOR TO PERMIT SIGNOFF.
- (38) THE CONTRACTOR SHALL RESTORE THE RIGHT-OF-WAY AND EXISTING PUBLIC STORM DRAINAGE EASEMENT(S) AFTER CONSTRUCTION TO A CONDITION EQUAL OR BETTER THAN CONDITION PRIOR TO ENTRY. THE CONTRACTOR SHALL FURNISH A SIGNED RELEASE FROM ALL AFFECTED PROPERTY OWNERS AFTER RESTORATION HAS BEEN COMPLETED.

SURVEY NOTES

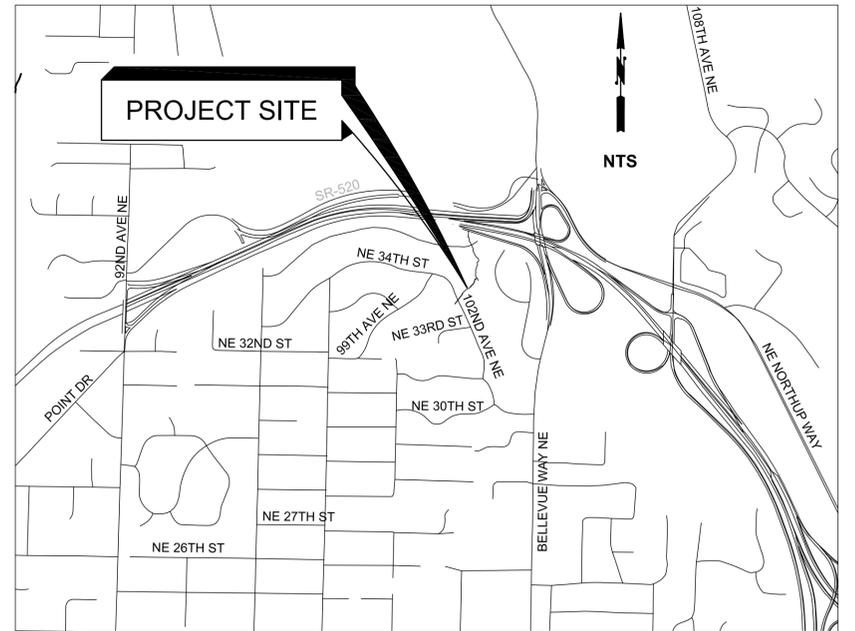
1. **THE FIELD SURVEY:** THIS PROJECT SITE WAS SURVEYED DURING JANUARY AND MARCH 2010 IN SUPPORT OF THE YARROW CREEK CULVERT REPLACEMENT DESIGN PROJECT. ADDITIONAL SURVEY WAS PERFORMED BY PLS, INC. IN SEPTEMBER 2010 TO PROVIDE AS-BUILT CONDITIONS AFTER THE YARROW CREEK CULVERT REPLACEMENT PROJECT WAS COMPLETED.
2. **HORIZONTAL DATUM:** WASHINGTON COORDINATE SYSTEM, NORTH ZONE, NAD-83/07.
3. **VERTICAL DATUM:** NAVD-88
4. **BENCHMARKS:** CITY OF BELLEVUE POINT DESIGNATION 414 LOCATED AT THE INTERSECTION OF NE 34TH ST AND 98TH AVE NE. THE POINT IS A COPPER TACK IN LEAD IN A 3"x3" CONCRETE MONUMENT IN CASE. ELEV = 208.34 FEET (NAVD 88)
5. **METHODOLOGY:** FIELD MEASUREMENTS FOR THE JANUARY/MARCH 2010 SURVEY WERE PERFORMED USING A LEICA TCPR 1201 TOTAL STATION AND LEICA ATX 1230 GPS RECEIVER. THIS SURVEY COMPLIES WITH THE MINIMUM REQUIRED "ERROR OF CLOSURE" OF 1:10,000 FOR WASHINGTON STATE PLANE COORDINATES AS SET FORTH PER W.A.C. 332-130-090 (AND POSITIONAL TOLERANCE LEVELS OF LESS THAN 0.011 METERS)
6. **PROPERTY LINES:** PROPERTY AND RIGHT-OF-WAY LINES ADJOINING THE SITE WERE CALCULATED BASED ON CENTERLINE MONUMENTATION AND RELATED DOCUMENTS. OTHER PROPERTY AND RIGHT OF WAY LINES SHOWN AS GIS LINES (SEE LEGEND) ARE FROM THE CITY OF BELLEVUE'S GEOGRAPHIC INFORMATION SYSTEM AND ARE SHOWN FOR GRAPHIC PURPOSES ONLY.

PROPERTY CORNERS WERE NOT STAKED IN CONJUNCTION WITH THIS SURVEY.
7. **UNDERGROUND UTILITIES:** UNDERGROUND UTILITY LOCATIONS WITHIN 102ND AVE NE WERE DETERMINED AND MARKED ON THE SURFACE BY A UTILITY LOCATE COMPANY. SAID SURFACE UTILITY MARKINGS WITHIN 102ND AVE NE WERE LOCATED BY DAVID EVANS AND ASSOCIATES, INC. AND ARE SHOWN HEREON.
NO GUARANTEE IS MADE THAT THE UNDERGROUND UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED OR THAT THE UNDERGROUND UTILITIES ARE SHOWN IN THEIR EXACT LOCATION. THE UNDERGROUND UTILITIES SHOWN HEREON WERE LOCATED BASED ON ABOVE GROUND OBSERVATIONS OF THESE UTILITIES.
8. **CONTOUR INTERVAL:** 2 FEET
9. **SUBSURFACE CONDITIONS:** WERE NOT EXAMINED OR CONSIDERED AS PART OF THIS SURVEY.
10. **ORDINARY HIGH WATER LINE:** THE ORDINARY HIGH WATER LINES SHOWN HEREON WERE ESTABLISHED AND FLAGGED BY THE ENVIRONMENTAL GROUP OF DAVID EVANS AND ASSOCIATES INC, AND MAPPED BY THE SURVEYING GROUP OF DAVID EVANS AND ASSOCIATES INC.
11. **CREEK OBSTRUCTIONS:** WHILE EFFORTS WERE MADE TO MAP OBSTRUCTIONS, (NATURAL AND MAN-MADE), WITHIN THE CREEK CHANNEL, NO GUARANTEE IS MADE THAT ALL OBSTRUCTIONS HAVE BEEN MAPPED.
12. 1-800-424-5555; MUST BE CALLED NOT LESS THAN 48 HOURS BEFORE BEGINNING EXCAVATION WHERE ANY UNDERGROUND UTILITIES MAY BE LOCATED. FAILURE TO DO SO COULD MEAN BEARING SUBSTANTIAL REPAIR COSTS. (UP TO THREE TIMES THE COST OF REPAIRS TO THE SERVICE).
13. **RIGHT-OF-WAY OWNERSHIP:** RIGHT-OF-WAY OWNERSHIPS AS SHOWN ON THIS SURVEY ARE BASED ON A WSDOT RIGHT-OF-WAY PLAN PROVIDED BY THE CITY OF BELLEVUE. ACTUAL OWNERSHIP SHOULD BE VERIFIED BY A CURRENT TITLE REPORT.

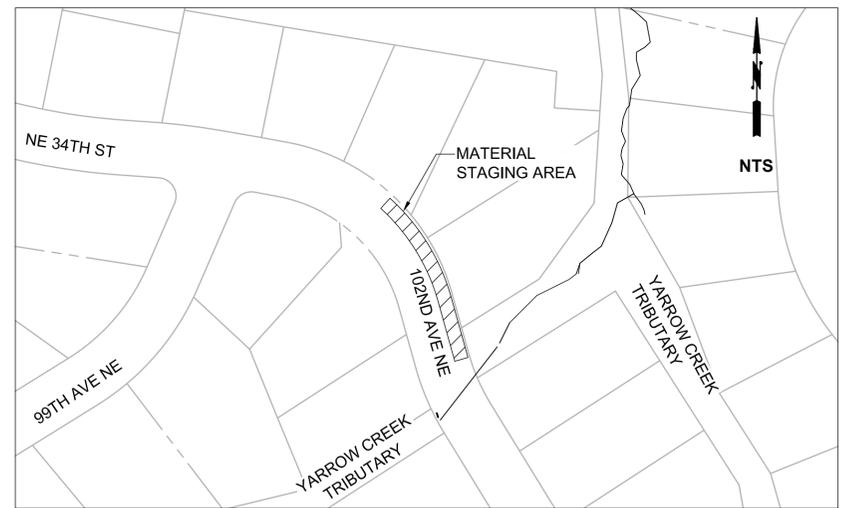
LEGEND

- PROPERTY LINE
- RIGHT-OF-WAY
- GIS PROPERTY LINE/RIGHT-OF-WAY
- EDGE OF CONCRETE/ASPHALT
- FLOWLINE
- STORM DRAIN LINE
- SANITARY SEWER LINE
- WATER MAIN
- GAS MAIN
- TELEPHONE LINE
- UNDERGROUND POWER LINE
- OVERHEAD LINE
- CREEK CENTERLINE
- ORDINARY HIGH WATER MARK
- SEWER MANHOLE
- STORM DRAIN CATCH BASIN
- GUY POLE
- GUY ANCHOR
- POWER POLE
- GAS VALVE
- MAIL BOX
- WATER VALVE
- WATER METER
- WATER RISER
- CONIFER TREE
- DECIDUOUS TREE
- HEDGE
- CREEK OBSTRUCTION, LOG
- PICTURE LOCATION (HYPERLINKED)
- ASSESSOR'S PARCEL NUMBER
- SURVEY CONTROL POINT

VICINITY MAP



PROJECT SITE MAP



SURVEY CONTROL POINTS				
POINT NO.	NORTHING	EASTING	ELEVATION	DESCRIPTION
3	236829.41	1302349.71	156.15	DEA_CON
7	236882.77	1302394.16	138.90	DEA_CON

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NO	DATE	BY	APPR	REVISIONS



FOR PERMIT REVIEW ONLY

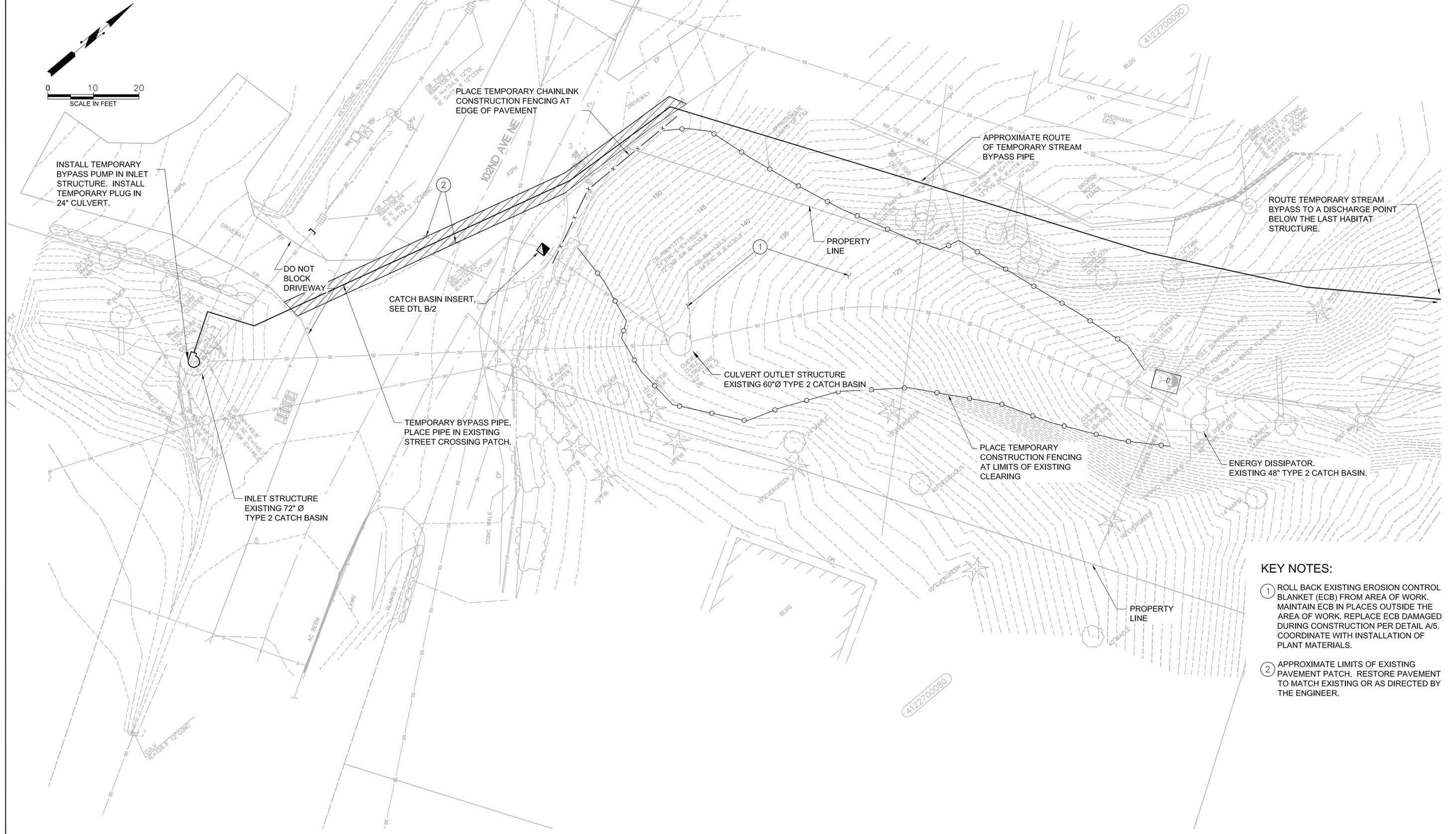
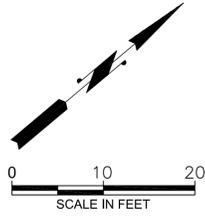
Approved By _____
DESIGN MANAGER _____ DATE _____
PROJECT MANAGER _____ DATE _____

JP /BN 12/13/10
DESIGNED BY DATE
WM /MH 12/13/10
DRAWN BY DATE
MF 12/13/10
CHECKED BY DATE



YARROW CREEK STREAM RESTORATION
PROJECT LOCATION, GENERAL NOTES, AND LEGEND
NW 20-25-5 E3 SHT 1 OF 8

SW 1/4 NW 1/4, SECTION 20, TOWNSHIP 25 NORTH, RANGE 5 EAST, W.M.



- KEY NOTES:**
- ROLL BACK EXISTING EROSION CONTROL BLANKET (ECB) FROM AREA OF WORK. MAINTAIN ECB IN PLACES OUTSIDE THE AREA OF WORK. REPLACE ECB DAMAGED DURING CONSTRUCTION PER DETAIL A/5. COORDINATE WITH INSTALLATION OF PLANT MATERIALS.
 - APPROXIMATE LIMITS OF EXISTING PAVEMENT PATCH. RESTORE PAVEMENT TO MATCH EXISTING OR AS DIRECTED BY THE ENGINEER.

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NO	DATE	BY	APPR	REVISIONS

Brown AND Caldwell



FOR PERMIT REVIEW ONLY

Approved By _____ DATE _____
 DESIGN MANAGER _____ DATE _____
 PROJECT MANAGER _____ DATE _____

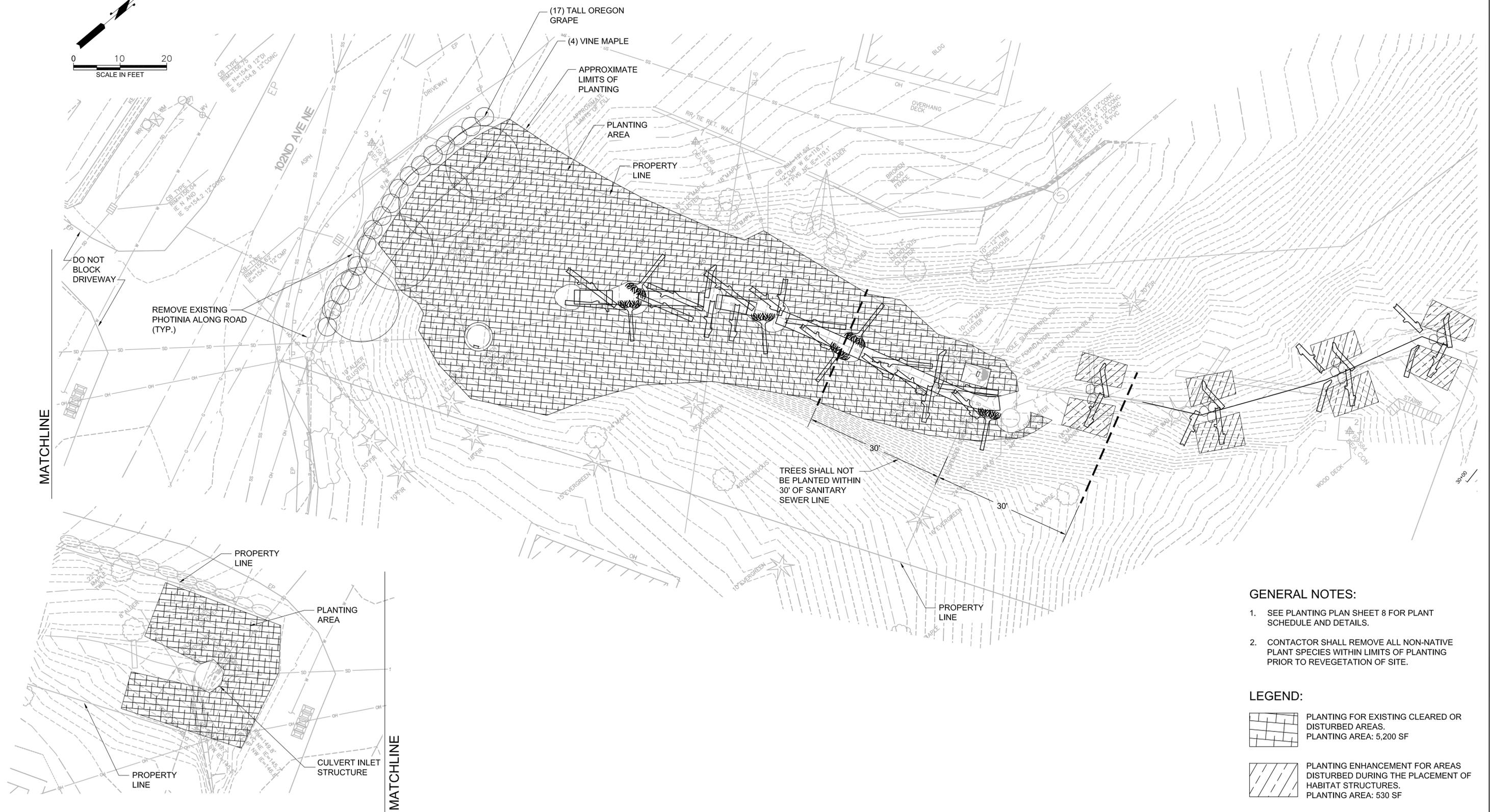
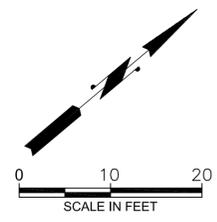
JP/BN 12/13/10
 DESIGNED BY DATE
 WM/MH 12/13/10
 DRAWN BY DATE
 MF 12/13/10
 CHECKED BY DATE



City of Bellevue

YARROW CREEK STREAM RESTORATION
 SITE PREPARATION AND
 TEMPORARY BYPASS / TESC PLAN
 NW 20-25-5 E3 SHT 2 OF 8

SW 1/4 NW 1/4, SECTION 20, TOWNSHIP 25 NORTH, RANGE 5 EAST, W.M.



- GENERAL NOTES:**
- SEE PLANTING PLAN SHEET 8 FOR PLANT SCHEDULE AND DETAILS.
 - CONTACTOR SHALL REMOVE ALL NON-NATIVE PLANT SPECIES WITHIN LIMITS OF PLANTING PRIOR TO REVEGETATION OF SITE.

- LEGEND:**
- PLANTING FOR EXISTING CLEARED OR DISTURBED AREAS. PLANTING AREA: 5,200 SF
 - PLANTING ENHANCEMENT FOR AREAS DISTURBED DURING THE PLACEMENT OF HABITAT STRUCTURES. PLANTING AREA: 530 SF

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NO	DATE	BY	APPR	REVISIONS

Brown AND Caldwell



FOR PERMIT REVIEW ONLY

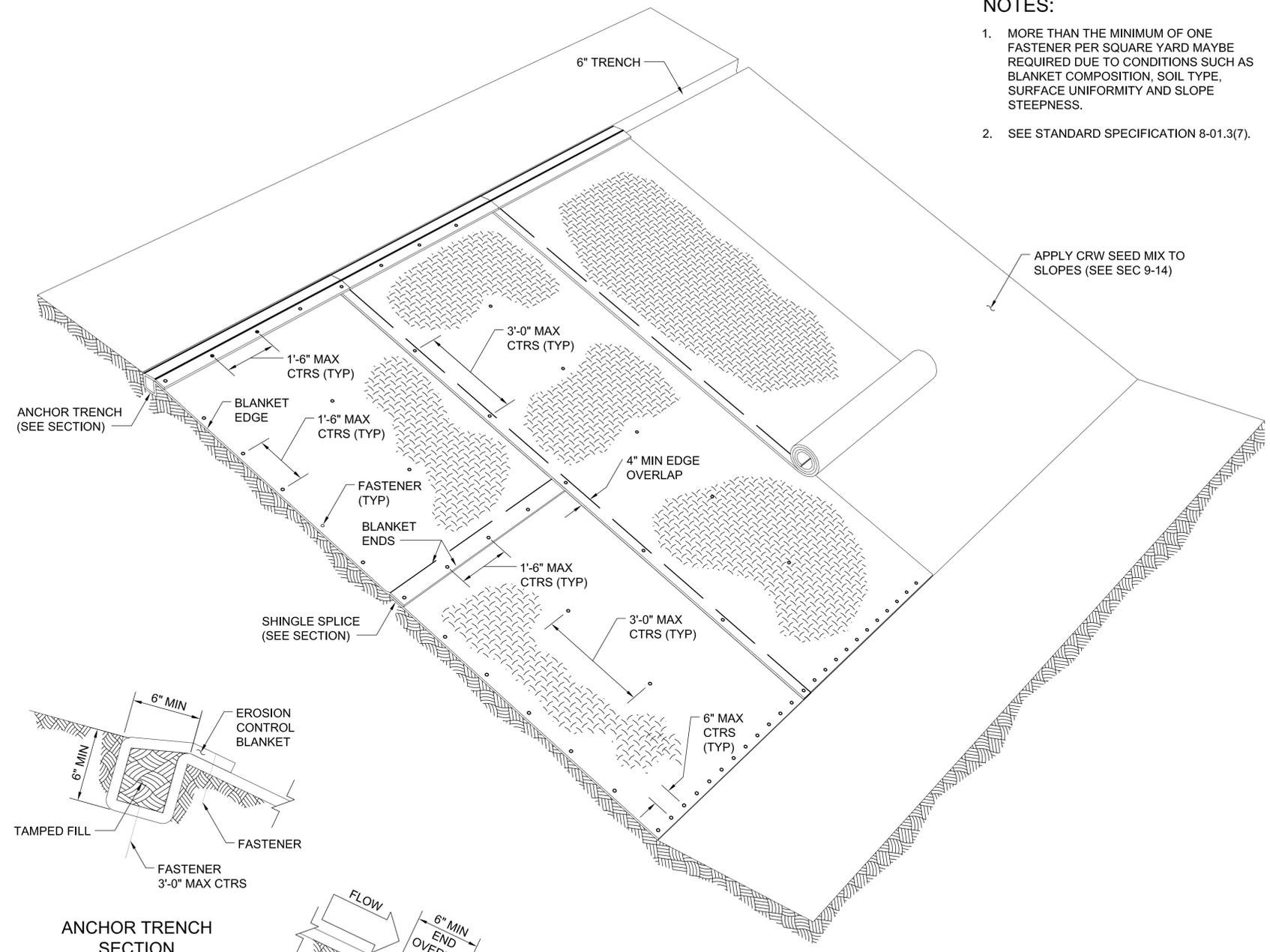
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DESIGN MANAGER _____ DATE _____
PROJECT MANAGER _____ DATE _____

JP/BN 12/13/10 DATE
DESIGNED BY
WM/MH 12/13/10 DATE
DRAWN BY
MF 12/13/10 DATE
CHECKED BY



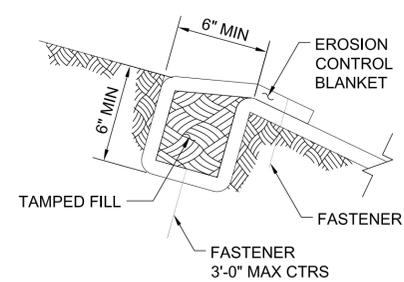
City of Bellevue

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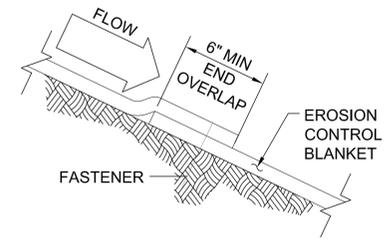


- NOTES:**
- MORE THAN THE MINIMUM OF ONE FASTENER PER SQUARE YARD MAYBE REQUIRED DUE TO CONDITIONS SUCH AS BLANKET COMPOSITION, SOIL TYPE, SURFACE UNIFORMITY AND SLOPE STEEPNESS.
 - SEE STANDARD SPECIFICATION 8-01.3(7).

APPLY CRW SEED MIX TO SLOPES (SEE SEC 9-14)



ANCHOR TRENCH SECTION

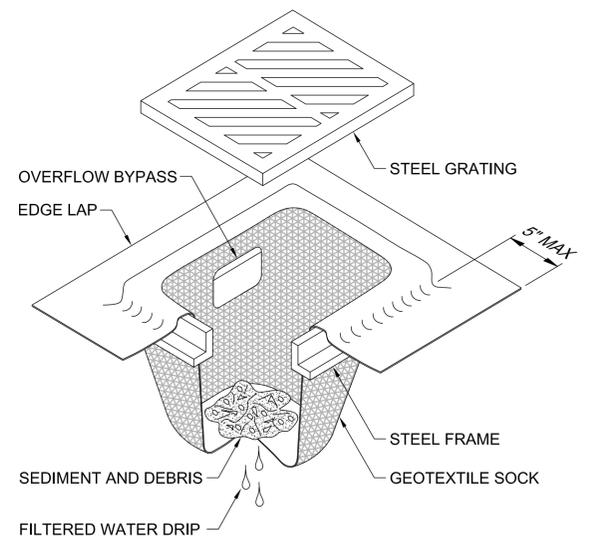


SHINGLE SPLICE SECTION

EROSION CONTROL BLANKET PLACEMENT ON SLOPE



PERSPECTIVE VIEW



- NOTES:**
- INSERT SHALL BE INSTALLED PRIOR TO CLEARING AND GRADING OR EXCAVATION ACTIVITY.
 - SEDIMENT SHALL BE REMOVED FROM THE UNIT WHEN IT BECOMES HALF FULL (12" FROM THE TOP OF THE SEDIMENT TO THE BOTTOM OF THE GRATE).
 - SEDIMENT REMOVAL SHALL BE ACCOMPLISHED BY REMOVING THE INSERT, EMPTYING, AND RE-INSERTING IT INTO THE CATCH BASIN. DISPOSE OF SEDIMENT IN ACCORDANCE WITH LOCAL, STATE AND FEDERAL REGULATIONS.
 - DURING THE CONSTRUCTION PERIOD, ADDITIONAL CATCH BASIN INSERTS OTHER THAN THOSE INDICATED ON THE DRAWINGS SHALL BE INSTALLED AS NEEDED TO PREVENT CONSTRUCTION RUNOFF FROM ENTERING UNPROTECTED CATCH BASINS.

CATCH BASIN INSERT



NO	DATE	BY	APPR	REVISIONS

Brown AND Caldwell



FOR PERMIT REVIEW ONLY

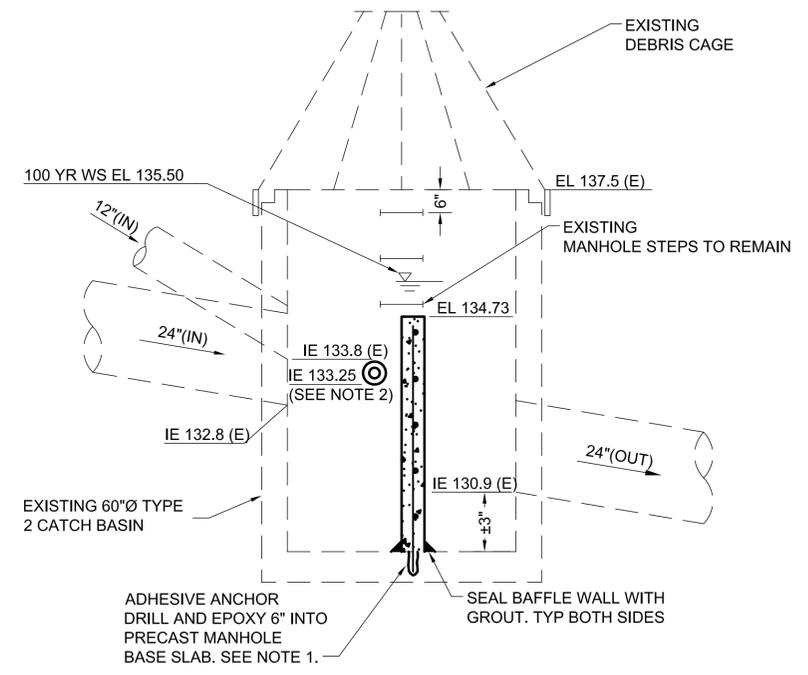
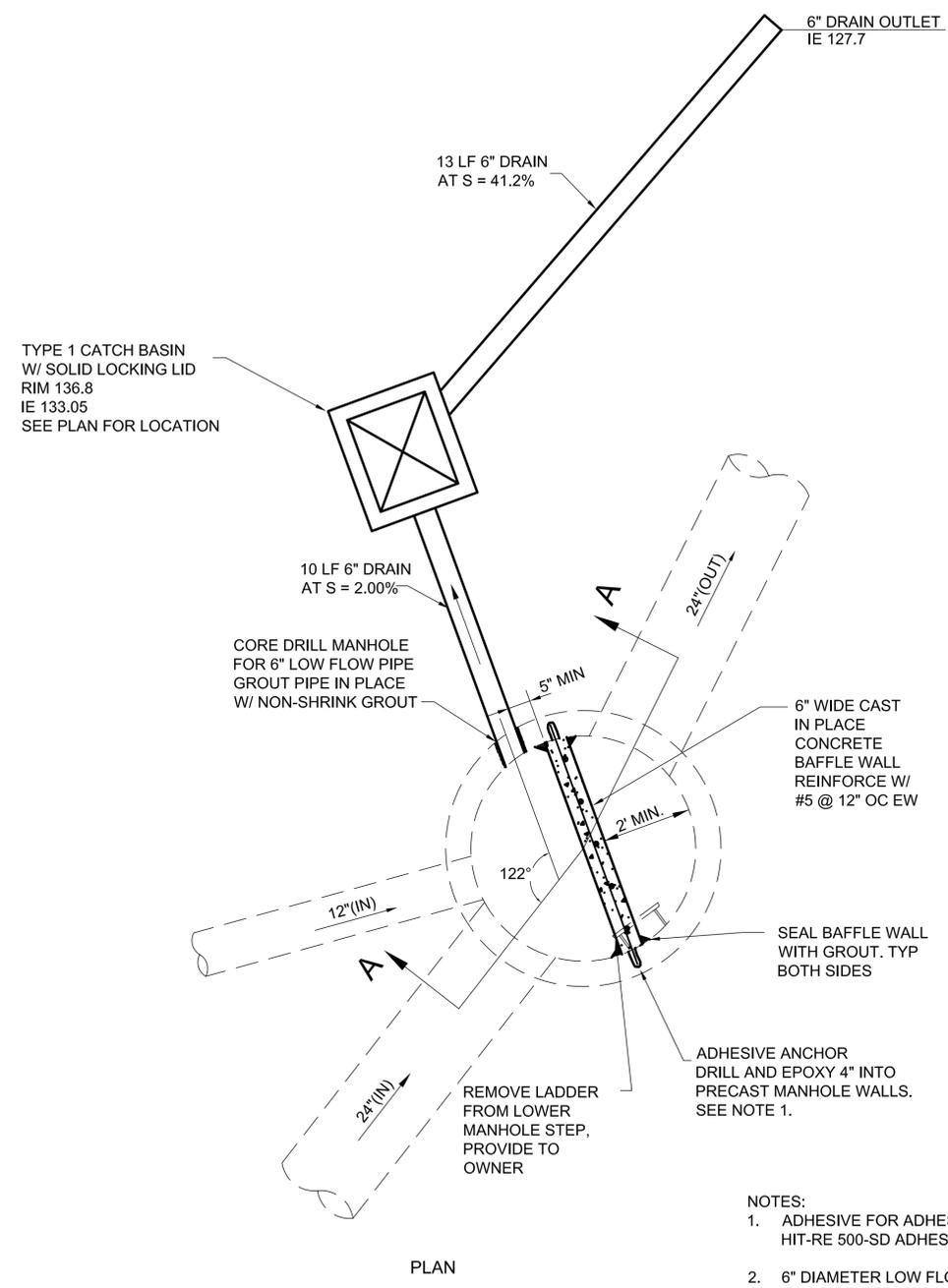
Approved By _____
DESIGN MANAGER _____ DATE _____
PROJECT MANAGER _____ DATE _____

JP/BN 12/13/10
DESIGNED BY DATE
WM/MH 12/13/10
DRAWN BY DATE
MF 12/13/10
CHECKED BY DATE



City of Bellevue

YARROW CREEK STREAM RESTORATION
DETAILS
NW 20-25-5 E3 SHT 5 OF 8



- NOTES:
- ADHESIVE FOR ADHESIVE ANCHOR SHALL BE HILTI HIT-RE 500-SD ADHESIVE OR APPROVED EQUAL.
 - 6" DIAMETER LOW FLOW PIPE WITH 2.75" DIAMETER ORIFICE PLATE. CENTER ORIFICE ON LOW FLOW PIPE.

FLOW SPLITTER
DETAIL A
3
SCALE: NO SCALE

NO	DATE	BY	APPR	REVISIONS

Brown AND Caldwell



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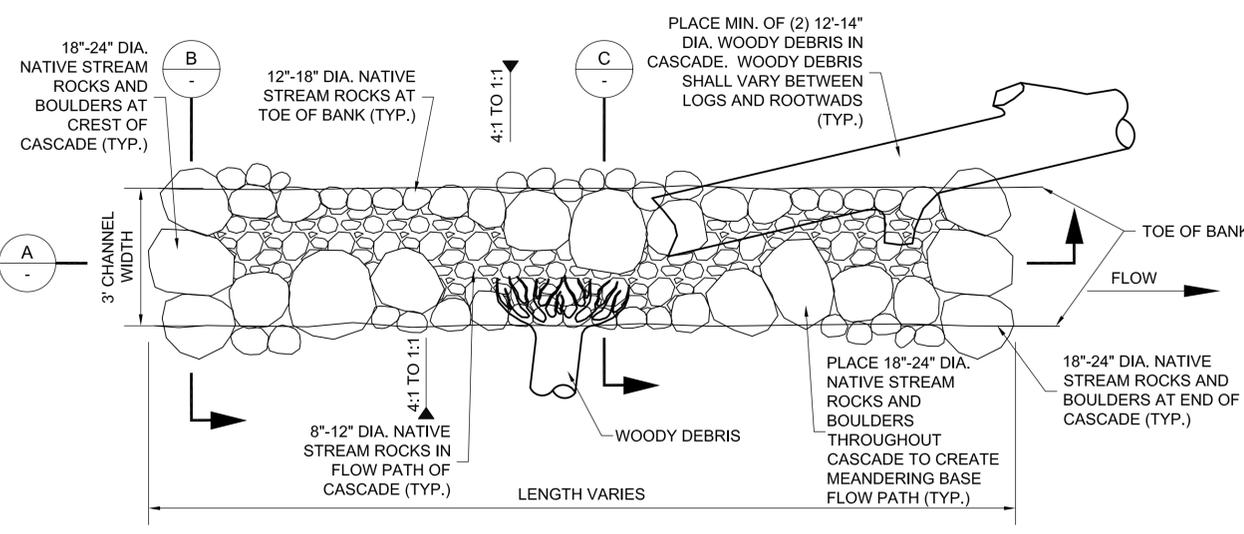
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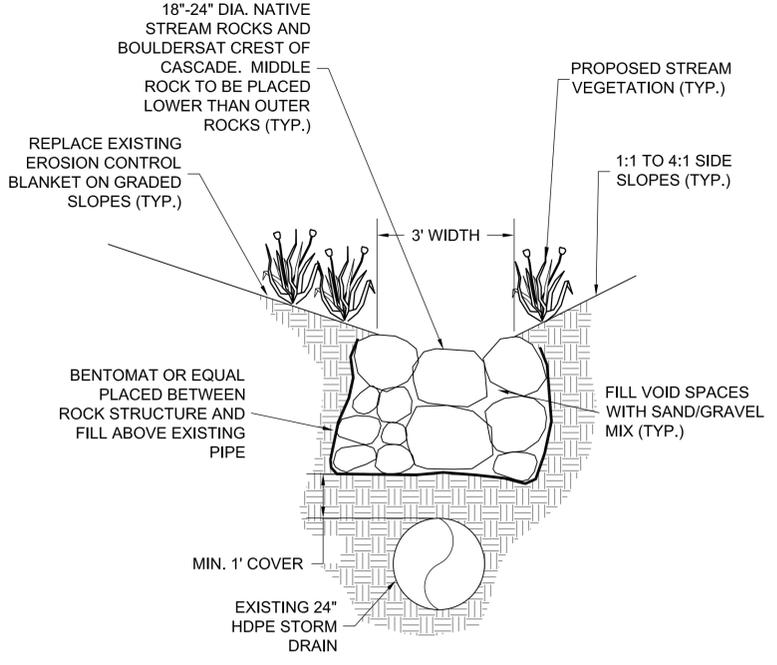


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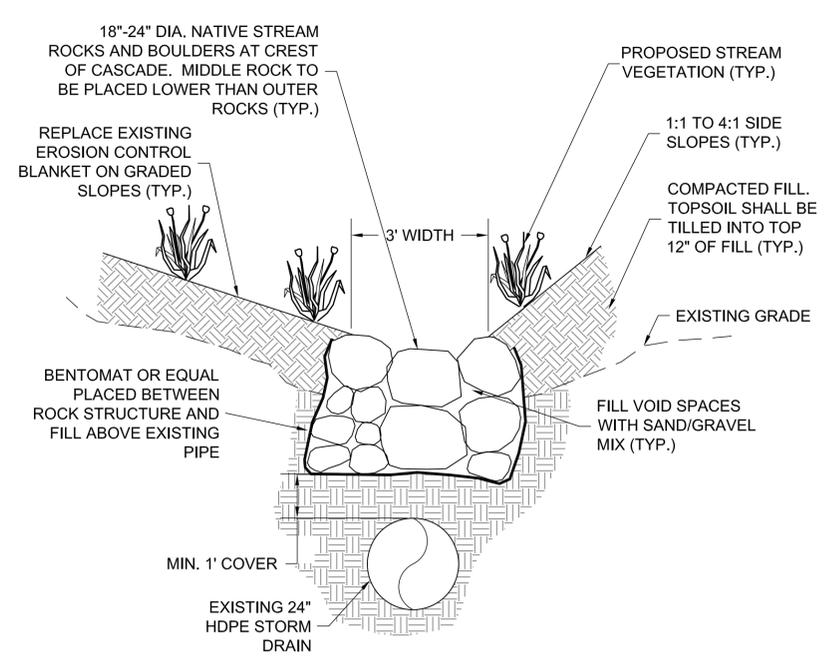
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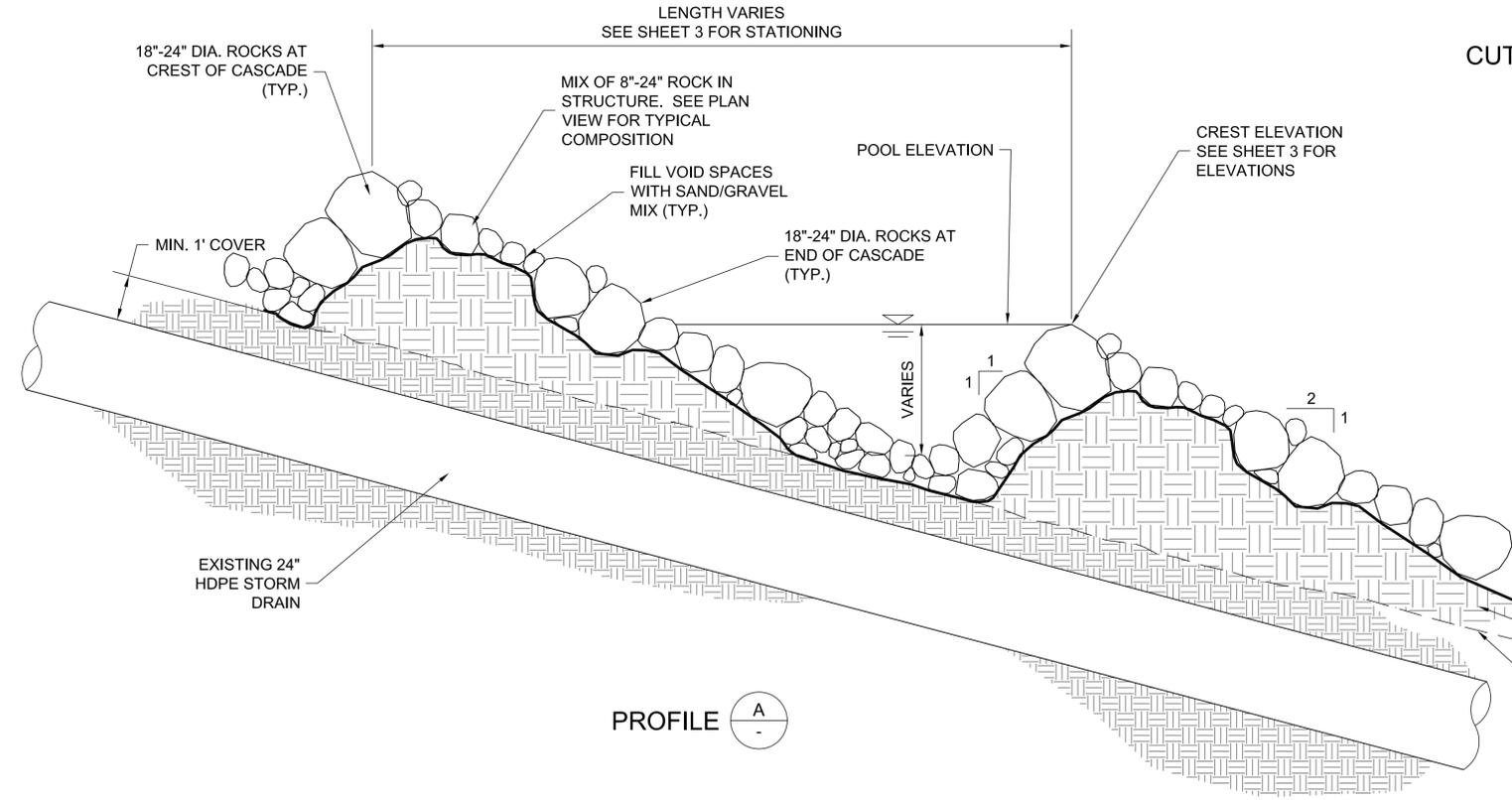
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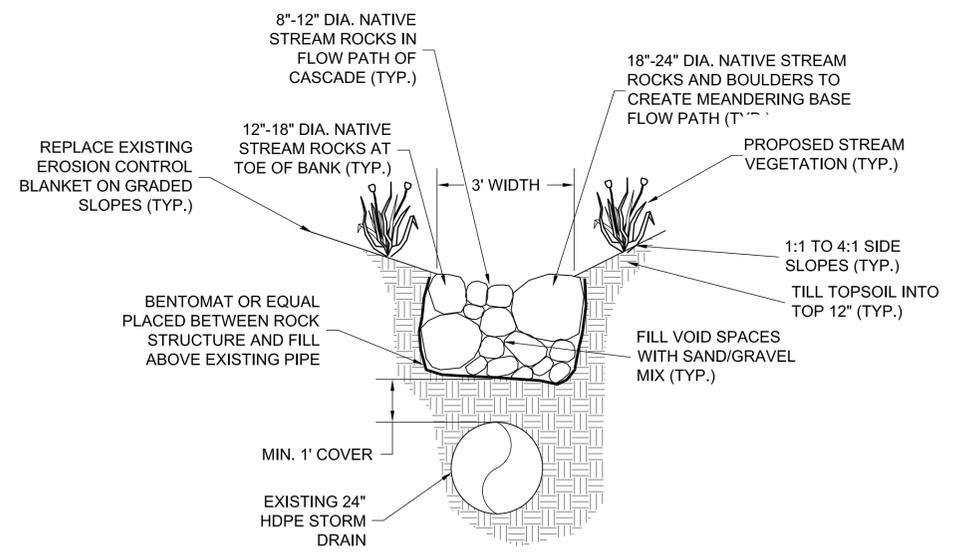
CUT SECTION B-B



FILL SECTION B-B



PROFILE A-A



SECTION C-C

ROCK CASCADE/POOL COMPLEX

DETAIL A-3

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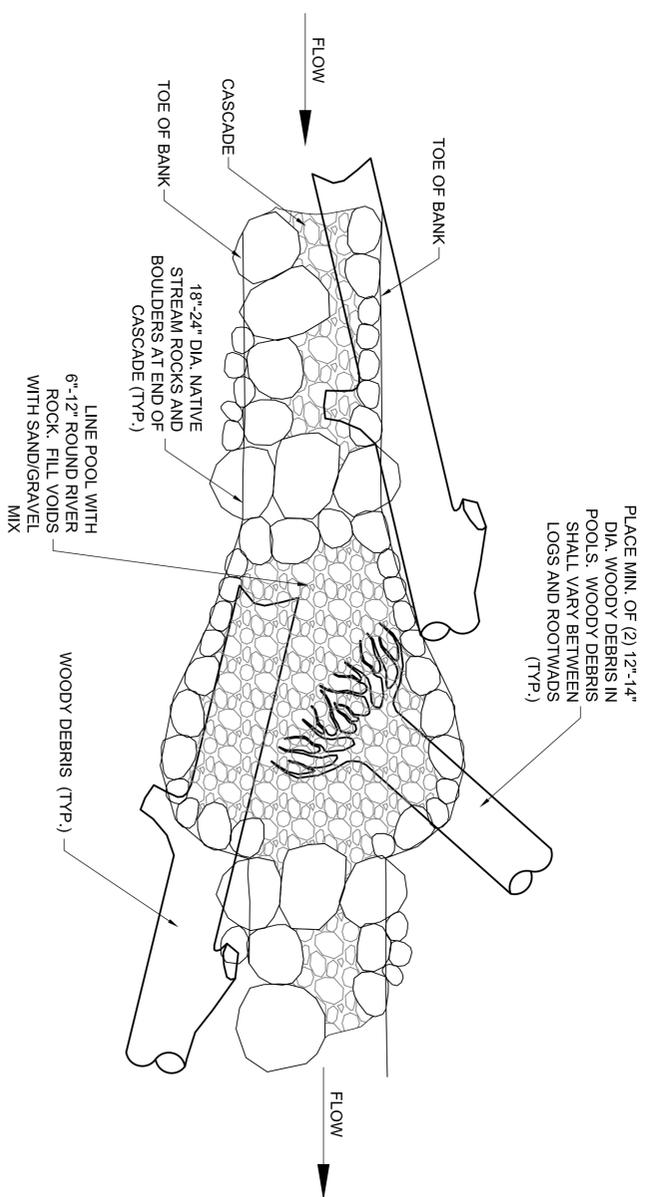
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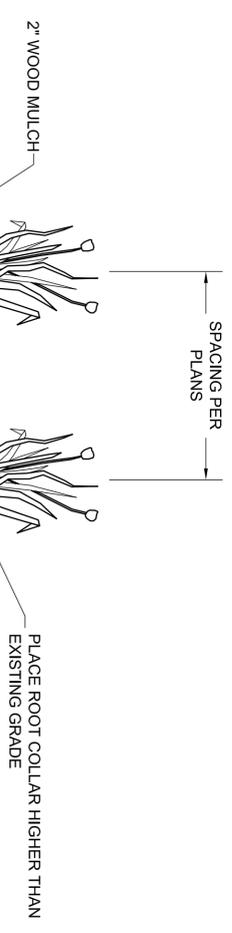
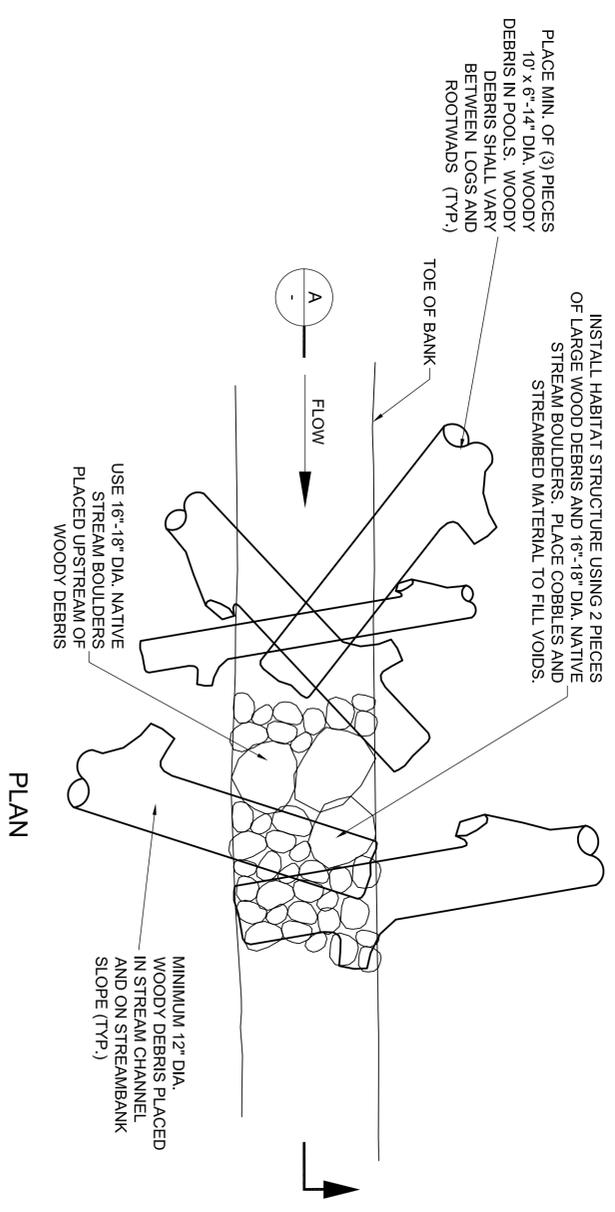
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YARROW CREEK STREAM RESTORATION
STREAM CHANNEL DETAILS

NW 20-25-5 E3 SHT 7 OF 8



TYPICAL POOL IN CASCADE
DETAIL A
SCALE: NO SCALE



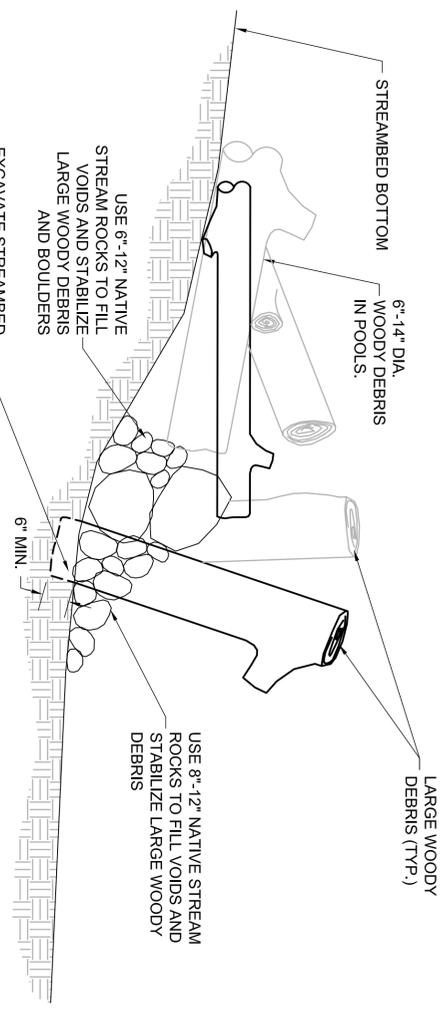
PLUG AND TUBLING PLANTING
DETAIL C
SCALE: NO SCALE

EXCAVATE PLANTING HOLE TWO TIMES THE WIDTH AND SIX INCHES DEEPER THAN ROOT MASS. BACKFILL WITH AMENDED TOPSOIL CAREFULLY TO AVOID INJURY TO ROOTS, FILLING ANY VOIDS. WATER THOROUGHLY AFTER PLANTING.

PLANT SCHEDULE:

QUANTITY	SCIENTIFIC NAME	COMMON NAME	TYPE	INDICATOR	SPACING	HABIT	NOTES
	ACER MACROPHYLLUM	BIG LEAF MAPLE	CONT.	FACU	20' O.C.	TREE	
	ALNUS RUBRA	RED ALDER	CONT.	FACU	20' O.C.	TREE	
	PSEUDOTSUGA MENZIESII	DOUGLAS FIR	CONT.	FACU+	20' O.C.	TREE	
	TSUGA HETEROPHYLLA	WESTERN HEMLOCK	CONT.	FACU-	20' O.C.	TREE	
	ACER CIRCINATUM	VINE MAPLE	CONT.	FAC-	6' O.C.	SHRUB	
	CORNUS SERICEA	REDOSEER DOGWOOD	CONT.	FACW	6' O.C.	SHRUB	PLANT WITHIN 2 FEET OF STREAM
	GAULTHERIA SHALLOM	SALAL	CONT.	FACU	6' O.C.	SHRUB	
	MAHONIA AQUIFOLIUM	TALL OREGON GRAPE	CONT.	UPL	6' O.C.	SHRUB	
	RUBUS PARVIFLORUS	THIMBLEBERRY	CONT.	FAC-	6' O.C.	SHRUB	
	RUBUS SPECTABILIS	SALMONBERRY	CONT.	FACU	6' O.C.	SHRUB	
	SAMBUCUS RACEMOSA	RED ELDERBERRY	CONT.	FACU	6' O.C.	SHRUB	
	SYMPHORICARPOS ALBUS	SNOWBERRY	CONT.	FACU	6' O.C.	SHRUB	
	ARCTOSTAPHYLOS UVA-URSI	BEARBERRY	CONT.	FACU-	6' O.C.	GROUNDCOVER	
	ETYMUS GLAUCUS	BLUE WILDRYE	SEED	FACU	-	GROUNDCOVER	SEED AT 20 LBS./AC OF PURE LIVE SEED
	FESTUCA IDAHOENSIS	IDAHO FESCUE	SEED	FACU+	-	GROUNDCOVER	
	JUNCUS ENSIFOLIUS	DAGGER-LEAF RUSH	PLUG	FACW	4' O.C.	GROUNDCOVER	PLANT IN CLUMPS OF 3 WITHIN 2 FEET OF STREAM
	POLYSTICHUM MUNITTUM	SWORD FERN	PLUG	FACU	4' O.C.	GROUNDCOVER	PLANT IN CLUMPS OF 3
	SCIRPUS ACUTUS	HARDSTEM BULRUSH	PLUG	OBL	4' O.C.	GROUNDCOVER	PLANT IN CLUMPS OF 3

HABITAT STRUCTURE
PROFILE A
SCALE: NO SCALE



- GENERAL NOTES:**
1. ALL PLANT MATERIAL TO MEET THE AMERICAN STANDARD FOR NURSERY STOCK.
 2. PLANT MATERIAL SHALL BE ESTABLISHED, MAINTAINED AND GUARANTEED AS PER SPECIFICATIONS.
 3. THE CONTRACTOR SHALL INSTALL TREES FIRST BEFORE SHRUBS WITHIN ANY PLANTING AREA.
 4. INSTALL CONTAINER PLANTS PER CITY OF BELLEVUE STD PLANS NO. 32 AND 33 IN THE SPECIFICATIONS APPENDIX.
 5. TREES SHALL NOT BE PLANTED WITHIN 30 FEET OF THE SANITARY SEWER LINE, AS SHOWN ON SHEET 4.

REVISIONS

NO	DATE	BY	APPR

Approved By

DESIGN MANAGER	DATE
PROJECT MANAGER	DATE

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CHECKED BY	DATE



City of Bellevue

YARROW CREEK STREAM RESTORATION

STREAM CHANNEL DETAILS AND PLANTING NOTES AND DETAILS

Critical Areas Study Restoration of Tributary to Yarrow Creek Bellevue, Washington

December 29, 2010

Prepared for

**Brown and Caldwell
701 Pike Street, Suite 1200
Seattle, Washington 98101**

EXECUTIVE SUMMARY

The City of Bellevue (City) is proposing habitat improvements to stabilize the ravine of the tributary to the west tributary of Yarrow Creek located east of 102nd Avenue NE (Yarrow Creek tributary), including repairs to the culvert under 102nd Avenue NE (Figure 1). Significant erosion and channel downcutting has occurred over the years at this location. The ravine has near-vertical side slopes in many areas, and significant erosion and sediment transport has occurred as a result of flow originating from the perched culvert at 102nd Avenue NE that is elevated approximately 20 feet (ft) above the channel bed. The stream channel erosion and downcutting jeopardized the stability of a sewer line that spans the channel downstream and the roadway embankment, and contributed to excessive sedimentation downstream.

In late July 2010, the City declared an emergency to repair the 102nd Avenue NE culvert and roadway embankment. In order to address these hazards, the existing concrete culvert was replaced with new 24-inch plastic replacement pipe; new culvert inlet and outlet structures were also installed. In addition, approximately 1,245 cubic yards (yd³) of gravel fill was placed at the eroded base of the ravine in order to buttress the roadway embankment. The 24-inch plastic pipe was extended approximately 116 ft through the fill area to a more stable discharge location downstream from the eroded ravine area. An energy dissipater was also installed at the base of the slope. Installation of habitat improvements along approximately 220 linear ft of stream is anticipated for 2011.

The additional habitat improvements include modifying the newly installed manhole at the outlet of the culvert and constructing a stream channel on the fill slope that was built as part of the emergency repair; installation of rock and large woody debris to create a cascade pool complex; extending installation of rock and large woody debris downstream of the emergency repair; and installation of native plantings adjacent to the proposed work.

Wetlands, surface waters, and/or their buffers can fall under the jurisdiction of the U.S. Army Corps of Engineers (USACE) under Section 404 of the Clean Water Act, the Washington State Department of Ecology (Ecology) under the State Water Pollution Control Act, and the City under the critical areas regulations of the Municipal Code.

This report provides results of the critical areas study including identification of one wetland and one stream; assessment of project-related impacts to stream and stream buffer; and a description of the proposed compensatory mitigation for those impacts in order to satisfy both the City's critical areas regulations and/or USACE requirements for compliance with Section 404 of the Clean Water Act.

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MITIGATION FACT SHEET

Site Information								
Location			Wetland Impact & Mitigation Sites (same)					
Site Names			102 nd Avenue NE and Yarrow Creek Tributary Emergency Culvert Repair and Restoration					
County			King County					
City			City of Bellevue					
Section, Township, Range			Section 19 and 20, Township 25 North, Range 5 East					
Latitude, Longitude (GIS verified)			47.641484°N, -122.204628°W					
Watershed			HUC 17110012, Lake Washington					
WRIA			8, Cedar-Sammamish					
Is the mitigation site(s) off of the project development site?					Onsite restoration is proposed.			
Construction schedule [development site and compensation site(s)]: Emergency repairs completed August-September 2010; habitat improvements scheduled for August-September 2011.								
Summary of project, including proposed type and location of work, discussion of avoidance and minimization measures, goals and objectives, wetland functions, impacted and mitigated (note assessment method used), and the general design concept (include where it has been done before).								
<p>The existing concrete culvert under 102nd Avenue NE was replaced with new 24-inch plastic replacement pipe; new culvert inlet and outlet structures were also installed. In addition, approximately 1,245 yd³ of gravel fill was placed at the eroded base of the culvert in order to buttress the roadway embankment. The 24-inch plastic pipe was extended approximately 100 ft through the fill area to a more stable discharge location downstream from the eroded ravine area. An energy dissipater was also installed at the base of the slope and currently all flow goes through the 24-inch pipe that is buried in the fill. The proposed habitat improvements will include creation of a perennial channel with cascade/pool complex and habitat features extending from the existing culvert to the bottom of the fill slope, and will extend into the stream segment beyond the fill slope. Base flows will be contained within the open channel, and overflows will be diverted by a flow splitter to the pipe constructed within the fill slope as part of the emergency repair. The goal of the project is to maximize habitat improvements while protecting the road and sewer infrastructure.</p>								
Wetland/Waterway Impact Sites								
Waterway Name	Impacts	Type of Waterway	Rating	Water Quality Score	Hydrologic Score	Habitat Score	Landscape Position	HGM Class
Yarrow Creek Tributary	5,730 ft ² (approx. 220 linear ft)	N	N/A	N/A	N/A	N/A	N/A	N/A
Acres of wetland impacts and mitigation								
Waterway Type		Impacted (Temporary)	Restoration					
Type N		5,730 ft ² (approx. 220 linear ft)	5,730 ft ² (approx. 220 linear ft)					
Describe other impacts and/or other mitigation activities.								
<p>The emergency repair was necessary to stop erosion, which was jeopardizing the stability of the roadway embankment and contributing to deposition of excessive sediment downstream. The stream channel restoration plan is to create a series of cascades/pools through installation of rock and large woody debris. The design will provide habitat for wildlife and aquatic insects, but will not support fish use due to slope (30% or greater) consistent with the historic condition of this tributary.</p>								
Describe the buffers being provided for the mitigation site, including minimum and maximum width, total buffer area, and description of surrounding land uses.								
<p>The buffer restoration will improve habitat value and functional performance of the wetland buffer by increasing vegetative structure within the buffer. The proposed restoration includes re-planting of 5,370 ft² of buffer area that is to be temporarily impacted during construction and was created as part of filling activities associated with the emergency repair.</p>								
Describe the water regime at the mitigation site(s), including source of water, expected water depth, average outflow (winter, spring, summer), and ownership of water rights.								
<p>Base flows will be returned to the restored stream channel by a flow splitter to be installed on the upstream end of the ravine. A base flow of 0.3 cubic feet per second (cfs) will be diverted to the stream channel, which is consistent with flows modeled for the basin prior to development. Flows greater than base flow rates will be redirected to the high-flow bypass pipe installed as part of the emergency repair.</p>								
Provide a list of performance standards and the estimated time to reach each.								
See Section 5.3								

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ABBREVIATIONS AND ACRONYMS

BGS	Below Ground Surface
cfs	Cubic Feet per Second
City	City of Bellevue, Washington
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
FAC	Facultative
FACU	Facultative Upland
FACW	Facultative Wetland
FEMA	Federal Emergency Management Agency
FSA	Farm Service Agency
ft	Feet
ft ²	Square Feet
HGM	Hydrogeomorphic
HPA	Hydraulic Project Approval
JARPA	Joint Aquatic Resources Permit Application
LUC	Land Use Code
NRCS	Natural Resources Conservation Service
NWI	National Wetlands Inventory
OBL	Obligate
OHWM	Ordinary High Water Mark
PEM	Palustrine Emergent
PHS	Priority Habitats and Species
RCW	Revised Code of Washington
SR	State Route
TESC	Temporary Erosion and Sediment Control
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife
WRIA	Water Resource Inventory Area
yd ³	Cubic Yards

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1.0 INTRODUCTION

The City of Bellevue (City) is proposing habitat improvements to stabilize the ravine of the tributary to the west tributary of Yarrow Creek located east of 102nd Avenue NE (Yarrow Creek tributary) including repairs to the culvert under 102nd Avenue NE (Figure 1). Significant erosion and channel downcutting has occurred over the years at this location. The ravine has near-vertical side slopes in many areas, and significant erosion and sediment transport has occurred as a result of flow originating from the perched culvert at 102nd Avenue NE that is elevated approximately 20 feet (ft) above the channel bed. The stream channel erosion and downcutting jeopardized the stability of a sewer line that spans the channel downstream and the roadway embankment, and contributed to excessive sedimentation of the downstream stream reach.

Landau Associates, under contract to Brown and Caldwell, conducted an investigation to assist the City in determining potential impacts to wetlands and other “waters of the U.S.,” and other critical areas regulated by the City. As a result of the proposed project, unavoidable impacts occur to one waterway (Yarrow Creek tributary) and its buffer, which are also proposed to be restored as part of the proposed project.

Landau Associates completed this report in support of mitigation sequencing streams and buffers associated with the proposed project. The mitigation sequence described in this report includes remedial action to correct an infrastructure and environmental hazard, minimization of impacts, and restoration of the affected environment. The results of Landau Associates’ investigation are presented in this report, along with a stream and buffer restoration plan.

1.1 PROJECT DESCRIPTION

In late July 2010, the City declared an emergency to repair the 102nd Avenue NE culvert and roadway embankment. The embankment below the culvert outlet dropped 20 ft vertically into an actively eroding ravine. The road surface was located approximately another 22 ft above the ravine at the top of a steep bank, which created an approximately 42-ft-high, oversteepened embankment that was in danger of failing, as cited in the Joint Aquatic Resources Permit Application (JARPA) prepared for the emergency repair. The culvert and embankment support the 102nd Avenue NE roadway and an 8-inch sewer, 6-inch water line, gas line, and overhead power lines.

In order to address these hazards, the existing concrete culvert was replaced with a new 24-inch plastic replacement pipe using a trenchless method that did not require excavating the roadway; new culvert inlet and outlet structures were also installed. In addition, approximately 1,245 cubic yards (yd³) of gravel fill were placed at the eroded base of the ravine in order to buttress the roadway embankment.

The 24-inch plastic pipe was extended approximately 116 ft through the fill area to a more stable discharge location downstream from the eroded ravine area. An energy dissipater was also installed at the base of the slope.

Any delay in repairing the culvert and embankment could have resulted in collapse of the roadway resulting in sewage effluent and significant amounts of sediment being washed into the Yarrow Creek tributary, as well as multiple utility outages, and a traffic hazard on 102nd Avenue NE. At a site meeting on June 17, 2010, staff from the Washington Department of Fish and Wildlife (WDFW) concurred that the situation was an emergency and the repair should take place the summer of 2010. WDFW issued a Hydraulic Project Approval (HPA) for the repair (WDFW Control No. 121558-1).

As a condition of the HPA, the City anticipates completing stream channel restoration and habitat improvements in 2011. The restoration and habitat improvements will occur in two discrete sections. The first section represents the larger project area and will occur on the approximately 120 linear ft western segment of the site that was affected by the emergency repair (Figure 2). The proposed improvements in this first section include modifying the newly installed manhole at the outlet of the culvert and constructing a stream channel on the fill slope that was built as part of the emergency repair. The newly installed manhole will be modified to include a baffle wall and small-diameter pipe to split the stream flow, delivering the stream's base flow of 0.3 cubic feet per second (cfs) into the constructed stream channel. The constructed stream channel will extend from the modified manhole and carry the base flow down the 30% grade to a point next to the downstream stilling well, which was installed as part of the emergency repairs. The stilling well acts as the energy dissipater and outfall for the bypass pipe.

The constructed stream channel will have an overall 30% grade, which will be too steep for the creation of fish habitat. However, the proposed planting with native species will help secure the new slope created as part of the emergency repair and provide food and shelter for a wide range of insects and animals. "Daylighting" the base flow will improve water quality and support the fish populations downstream and a wide range of species of local importance.

In the future, when downstream fish passage barriers at State Route (SR) 520 and the former Lake Washington Boulevard are removed, this constructed steep stream segment will help support future resident fish in the lower reaches of this stream tributary and the west tributary of Yarrow Creek. The fill to stabilize the road embankment was installed at a steep angle to reduce the amount of stream segment covered by the fill, thus maximizing the amount of fish habitat in the downstream segment of this tributary.

Because of the steepness of the fill placed to support the street, the constructed stream segment will include multiple splash pools using rock and large woody debris to get the newly daylighted base flow down to the existing stream elevation without causing erosion of the newly installed fill. An

impervious liner will be used under the constructed stream segment to help prevent the base flow from undercutting the newly installed rock and logs. The surface of the fill, which is currently covered with jute erosion control mat and hydroseeded grass as part of the emergency repair, will be amended with topsoil and replanted with a mix of native trees, shrubs, and groundcovers.

The second section of the project starts at the toe of the fill slope and continues downstream approximately 100 linear ft to within 20 ft of the confluence of the tributaries of Yarrow Creek (see Figure 2). This second section of the project is designed to stabilize this section of creek against further damage by head cutting, erosion of side slopes, and the loss of habitat through the movement of existing small rock or the existing unsecured woody debris. Work in this stream segment will also include supplemental plantings with native species and the placement of habitat structures consisting of large rock and large woody debris.

1.2 SITE DESCRIPTION

The study area extends from the west side of 102nd Avenue NE approximately 220 ft east of 102nd Avenue NE near the confluence with the west tributary of Yarrow Creek and includes areas within 300 ft of the tributary on parcels 4122700080, 4122700090, and 412270TRCT (Figures 2 and 3). The study area is located within the Cedar-Sammamish watershed (Water Resource Inventory Area 8) in Section 20, Township 25 North, Range 5 East. Land use in the study area consists primarily of residential properties. The project area contains steep slopes adjacent to the Yarrow Creek tributary and 102nd Avenue NE.

1.3 REGULATORY BACKGROUND

The Clean Water Act requires authorization for the discharge of dredged or fill material into the “waters of the U.S.” under Section 404. The City Land Use Code (LUC) contains requirements for establishing wetland and stream buffer widths and building setbacks, and for any alteration, including fill, of wetlands, streams, and their buffers. The Washington State Department of Ecology (Ecology) requires compliance with the State Water Pollution Control Act [Revised Code of Washington (RCW) 90.48], and it has administrative oversight of Section 401 of the Clean Water Act for water quality certification in the case of impacts to U.S. Army Corps of Engineers (USACE) jurisdictional “waters of the U.S.” Any work that will use, divert, obstruct, or change the bed or flow of state waters, including streams and rivers, must do so under the terms of an HPA issued by the WDFW. WDFW HPA is administered under RCW 77.55 and rules set forth in Washington Administrative Code (WAC) 220-110. Wetlands and certain waterways are regulated by federal, state, and local governmental agencies, and compliance with one agency does not necessarily fulfill permitting requirements of any other agencies.

All wetlands and waterways described in this report are subject to verification by the USACE. The USACE determines the jurisdiction of a wetland based on the connection, more commonly referred to as adjacency, to other “waters of the U.S.” Those wetlands determined to be “isolated” do not fall under the jurisdiction of the USACE. If identified “waters of the U.S.” are determined to be adjacent rather than isolated, any filling or dredging of onsite wetlands/streams would require compliance with Section 404 and 401 of the Clean Water Act and the Endangered Species Act. Only the USACE can make the determination if a “waters of the U.S.” is adjacent or isolated. If wetlands are determined to be isolated, they may still be subject to regulation by Ecology under the State Water Pollution Control Act (RCW 90.48).

In addition, the City has requirements for establishing wetland and stream buffer widths and building setbacks, as well as for any alteration, including fill, of wetlands and their buffers. Given an adequate enhancement plan, the City may allow a reduction of standard buffer widths along with averaging of buffer widths, provided that at no single point the buffer width is less than 75 percent of the original buffer width [Part 20.25H.075(B)(2) and 20.25H.095(C)(2) of the LUC].

2.0 METHODS

Landau Associates conducted an information review, wetland delineation, impact assessment, and prepared a mitigation sequencing plan for impacts to critical areas associated with the proposed project according to the methods described below.

2.1 WETLAND INVESTIGATION

Landau Associates conducted this wetland delineation in accordance with the USACE *Wetland Delineation Manual* (USACE 1987), the USACE Regional Guidance letter on the 1987 Manual (USACE 1994), the USACE *Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region* (USACE 2008), and the Ecology *Washington State Wetlands Identification and Delineation Manual* (Ecology 1997), which is accepted practice by the City as referenced in Part 20.25H.05 of the LUC.

The investigation of waterways was based on the methodology provided by Ecology's *Determining the Ordinary High Water Mark on Streams in Washington State* (Olson and Stockdale 2010) and City of Bellevue Critical Areas code (Part 20.25H) of the LUC.

In general, the USACE and Ecology recommend preliminary data gathering and a synthesis of available background information, followed by a field investigation to determine the presence of "waters of the U.S.," including wetlands and streams.

2.1.1 BACKGROUND INFORMATION REVIEW

Landau Associates reviewed the following public domain resources to determine existing conditions and potential wetlands and waterways within the study area:

- U.S. Geological Survey (USGS) topographic map (USDA, NRCS 2007a)
- Aerial photography (USDA FSA 2006)
- U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) map (USFWS 1981 to present)
- U.S. Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS) Soil Survey database (USDA, NRCS 2006a)
- USDA, NRCS National Hydric Soils List (USDA, NRCS website 2010)
- City Critical Areas map (City of Bellevue website 2009a)
- Floodplains database (FEMA 1996)
- SalmonScape website (WDFW website 2010).
- WDFW Priority Habitat and Species data (WDFW 2009)

2.1.2 WETLAND DELINEATION

Both USACE and Ecology outline a three-parameter approach to determine the presence or absence of wetlands that requires evaluating vegetation, soil, and hydrology (Table 1). Landau Associates biologists completed the field delineation using the routine onsite method, where data are collected at locations representative of typical wetlands and/or uplands of the study area. Following this method, an area is determined to be wetland if each of the following three criteria are met (also see Table 1):

- The dominant vegetation is hydrophytic.
- Soils are hydric.
- Wetland hydrology is present.

2.2 WETLAND AND STREAM CLASSIFICATION, RATING, AND BUFFER WIDTH

Any wetlands identified as part of this project were classified according to the USFWS's Cowardin classification system (Cowardin et al. 1979) and the USACE's hydrogeomorphic (HGM) classification system (Brinson 1993).

Wetlands were rated according to the *Washington State Wetlands Rating System for Western Washington* (Hruby 2004), which is accepted practice by the City. This system categorizes wetlands based on their existing functions, including water quality, hydrology, and habitat, as well as the wetland's rarity, sensitivity to disturbance, or irreplaceability. The wetland categories range from 1 to 4, and are defined in Part 20.25H.095 of the LUC as follows:

- Category I wetlands are those that (a) represent a unique or rare wetland type; or (b) are more sensitive to disturbance than most wetlands; or (c) are relatively undisturbed and contain ecological attributes that are impossible to replace within a human lifetime; or (d) provide a high level of functions.
- Category II wetlands are difficult, though not impossible, to replace, and provide high levels of some functions. These wetlands occur more commonly than Category I wetlands, but still need a relatively high level of protection. Category II wetlands in western Washington include: wetlands scoring between 51 to 69 points (out of 100) on the questions related to the functions present. Wetlands scoring 51 to 69 points were judged to perform most functions relatively well, or performed one group of functions very well and the other two moderately well.
- Category III wetlands are wetlands with a moderate level of functions (scores between 30 to 50 points). Wetlands scoring between 30 to 50 points generally have been disturbed in some ways, and are often less diverse or more isolated from other natural resources in the landscape than Category II wetlands.
- Category IV wetlands have the lowest levels of functions (scores less than 30 points) and are often heavily disturbed. These are wetlands that we should be able to replace, and in some cases be able to improve. However, experience has shown that replacement cannot be

guaranteed in any specific case. These wetlands may provide some important functions, and also need to be protected.

Wetland buffers were determined according to Part 20.25H.095(B) of the LUC.

2.3 SURFACE WATER DELINEATION, TYPING, AND BUFFER WIDTH

Landau Associates conducted a stream reconnaissance to characterize waterways within the study area for the purpose of determining stream classification. Information on approximate stream width, streambank stability, and habitat was collected. The ordinary high water mark (OHWM) of streams within the study area was estimated based on observation of field indicators including hydrology, soil and sediment, vegetation, and marks of scouring, etc.

Waterways were classified according to the classification system established under WAC 222-16-031, and Part 20.25H.075 of the LUC. Stream designations provided in Part 20.25H.075 of the LUC include:

- “Type S water” means all waters, other than shoreline critical areas designated under LUC 20.25E.017, within their bankfull width, as inventoried as “shorelines of the state” under Chapter 90.58 RCW and the rules promulgated pursuant to Chapter 90.58 RCW including periodically inundated areas of their associated wetlands.
- “Type F water” means all segments of waters that are not type S waters, and that contain fish or fish habitat, including waters diverted for use by a federal, state, or tribal fish hatchery from the point of diversion for 1,500 ft or the entire tributary if the tributary is highly significant for protection of downstream water quality.
- “Type N water” means all segments of waters that are not type S or type F waters and that are physically connected to a type S or F waters by an aboveground channel system, stream, or wetland.
- “Type O water” means all segments of waters that are not type S, F, or N waters and that are not physically connected to type S, F, or N waters by an aboveground channel system, stream, or wetland.

In accordance with WAC 222-16-031, waters, in part, having any of the following characteristics are presumed to have fish use:

- Stream segments having a defined channel of 20 ft or greater within the bankfull width and having a gradient of less than 4 percent
- Stream segments having a defined channel of 2 ft or greater within the bankfull width in western Washington; and having a gradient of 16 percent or less
- Stream segments having a defined channel of 2 ft or greater within the bankfull width in western Washington, and having a gradient greater than 16 percent and less than or equal to 20 percent, and having greater than 50 acres in contributing basin size in western Washington, based on hydrographic boundaries.

Buffer widths were determined according to Part 20.25H.075 of the LUC, and are measured from the top of bank.

2.4 MITIGATION SEQUENCING AND DESIGN

This project was designed in accordance with City, USACE, and Ecology guidance and requirements for mitigation sequencing, which allow for impacts to wetlands and/or other critical habitat when impacts are unavoidable and necessary.

2.4.1 IMPACT ASSESSMENT

Estimated proposed limits of clearing and grading and fill slopes were overlaid on the applicable stream, wetland, and buffer boundaries using AutoCAD software. The areas of wetland, waterway, and/or buffer impacts (including both temporary and permanent impacts) were calculated using AutoCAD software. The buffer average areas were also determined using AutoCAD.

Existing buffer functions were assessed in a narrative evaluation using the *Wetland Mitigation in Washington State Part 1: A Synthesis of the Science* (Ecology 2005) and best professional judgment given specific indicators.

2.4.2 MITIGATION PLAN

The onsite vegetation restoration plan was developed using the City of Bellevue Critical Areas Handbook (City of Bellevue undated). Brown and Caldwell engineers developed the stream channel restoration plan using the principles of stream restoration provided in the Washington State Aquatic Habitat Guidelines Program Integrated Streambank Protection Guidelines (Washington State Aquatic Habitat Guidelines Program 2003) and best professional judgment.

Comparison of buffer functions for pre- and post-mitigation was conducted using best professional judgment and incorporated into the functional assessment for the restoration project, as applicable for improving buffer functions.

3.0 CRITICAL AREAS INVESTIGATION RESULTS

This section provides the results of the background information review and onsite field delineation.

3.1 BACKGROUND INFORMATION REVIEW

This section provides a summary of topographic mapping, City of Bellevue mapping, soil survey information, National Wetlands Inventory (NWI) mapping, and other sources documenting conditions in and adjacent to the project area.

3.1.1 SURFACE WATERS

The topographic map for the project area (USDA, NRCS 2007a) does not identify the Yarrow Creek tributary (Appendix A, Figure A-1). The City of Bellevue Critical Areas Map (City of Bellevue website 2009a) identifies the subject tributary as a non-fish bearing stream (i.e., “Type Np, Ns” consistent with Type N or Type O waters described in Section 2.3).

3.1.1.1 Fish Usage

WDFW Priority Habitat and Species (PHS) data and the SalmonScape website do not identify the Yarrow Creek tributary, and no fish use is indicated (WDFW 2009; WDFW website 2010). A 2001 City of Bellevue survey of the Yarrow Creek basin indicated that no fish were found in the subject tributary and that the tributaries of Yarrow Creek lack sufficient flow to allow fish use, except possibly during high flow events (City of Bellevue website 2009b).

3.1.2 WETLANDS

The NWI Map (USFWS 1981 to present) does not identify any wetlands intersecting the study area (Appendix A, Figure A-2). The City critical area mapping also does not identify any wetlands in the project area (City of Bellevue website 2009a).

3.1.3 SOILS

The *Soil Survey Geographic Database for King County, Washington* (USDA, NRCS 2006a) identifies three soil series within the study area (Appendix A, Figure A-3; complete soil profile reports are provided in Appendix B):

- Alderwood (AmC) series consists of moderately deep to a cemented pan, moderately well-drained soils formed in glacial till. These soils are usually moist, but are dry between depths of 8 and 24 inches for 60 to 75 consecutive days in the summer in most years (USDA, NRCS

2007b). The Arents-Alderwood (AmC) series is classified as hydric in the *National Hydric Soils List* (USDA, NRCS website 2010) in depressions that contain components of the Bellingham, Seattle, or Tukwila soil series.

- Kitsap (KpB, KpD) series consists of very deep, moderately well-drained soils formed in lacustrine sediments (USDA, NRCS 2000). The Kitsap silt loam 2 to 8 percent (KpB) and 15 to 30 percent (KpD) are classified as hydric in the *National Hydric Soils List* (USDA, NRCS website 2010) in depressions that contain components of the Bellingham, Seattle, or Tukwila soil series.
- Urban Land (Ur) is soil that has been modified by disturbance of the natural layers with additions of fill material several feet thick to accommodate large industrial and housing installations (USDA, NRCS 1973).

3.1.4 FLOODPLAIN

The Q3 flood data (FEMA 1996) do not identify a 100-year floodplain associated with the Yarrow Creek tributary. The nearest floodplain is that of Lake Washington located north of the project area (see Figure A-4).

3.1.5 LAND USE

The *USDA-FSA-APFO NAIP MrSID Mosaic* aerial photograph (USDA, FSA 2006) shows the study area contains residential land uses with areas of lawn and forested area interspersed (see Figure 2).

3.1.6 PRECIPITATION

Precipitation data for the 3-month period prior to the field investigation in the Puget Sound Lowlands (National Climatic Data Center website 2010) indicate recorded precipitation levels were within the normal range listed in Natural Resources Conservation Service (NRCS) WETS tables (USDA, NRCS website 2002; Appendix C).

3.2 FIELD INVESTIGATION

Landau Associates wetland ecologists Steven Quarterman and Perry Welch conducted a field investigation on April 15, 2010, prior to completion of the emergency repair. The weather during the site reconnaissance was sunny and cool.

A sampling point was recorded in areas suspected to meet the mandatory wetland criteria, and nearby upland to determine corresponding wetland/upland boundaries. Detailed information on soils, vegetation, and hydrology was recorded at three sampling points as shown on Figure 3. The boundaries of one waterway and one wetland were estimated based on project survey plans (Figure 3).

A summary of the identified systems, including classifications and buffer requirements, is provided in Table 2. The sampling point locations and identified systems are shown on Figure 3, and the

completed data sheets describing the sampling points and site photographs are provided in Appendix D and Appendix E, respectively.

3.2.1 YARROW CREEK TRIBUTARY (WATERWAY) CHARACTERIZATION AND CLASSIFICATION

The Yarrow Creek tributary is identified on City critical area mapping as a Type Np, Ns stream originating near the intersection of 99th Avenue NE and NE 32nd Street, southwest of the study area.

At the time of the field investigation prior to the emergency repair, the Yarrow Creek tributary east of 102nd Avenue NE (downstream) contained flow, presumably perennial (i.e., continuous flow in parts of its bed all year round during years of normal rainfall) as evidenced by the quantity of flow and characteristics of stream bed materials (i.e., coarse sand and gravel) and the streambank condition. The height of the streambank is such that perennial flow is assumed to be present to create the conditions observed, which was a heavily downcut channel bed. The tributary was conveyed beneath 102nd Avenue NE by a 24-inch concrete culvert, which was partially failing due to age. Closed-circuit television of the culvert indicated areas of separated joints, cracked pipe, and crushed pipe (Landau Associates 2010). Water was observed flowing beneath the culvert at the time of the field investigation. Steep slopes and exposed soil were present on each side of the ravine where the buried sewer pipe emerges from the slope to span the ravine (see Figure 3). The resulting ravine had near-vertical side slopes in many areas (Appendix F, Sheets 2 to 5). An exposed outfall (corrugated metal pipe) was observed approximately 70 ft downstream of 102nd Avenue NE on the top of the north bank of the tributary (see Figure 3). The OHWM of the Yarrow Creek tributary was observed near the base of the ravine. The outfall from 102nd Avenue NE was largely obscured by vegetation.

Significant erosion and channel downcutting has occurred over the years downstream of 102nd Avenue NE transporting excess sediment downstream adjacent to SR 520. In 2008, City crews conducted sediment removal maintenance upstream from a utility access road (formerly a section of Lake Washington Boulevard) near SR 520 that was filled with sand/gravel material (see Figure 3). Investigation by the City of the upstream areas in 2008 identified the erosion in the Yarrow Creek tributary discussed above. In 2008, the City installed habitat improvements in the channel area disturbed by the maintenance activities. The Yarrow Creek tributary within the study area has continued to down cut and refill this downstream basin. Site reconnaissance indicates that an approximately 1.5-ft vertical drop resulted from erosion between September 2009 and June 2010 (Landau Associates 2010).

The tributary contains gravel and woody debris that provides fish habitat; however, the stream grade is too excessive to support fish use. As a result of the erosive flows in the tributary, the pre-existing stream profile from the base of the stream channel at the base of the drop from the culvert may have been

adequate to support fish (stream profile less than 16%); however, downstream culverts created fish passage barriers that precluded fish access during the time that likely fish access could have occurred, which is corroborated by fish surveys conducted by the City in 2001 (City of Bellevue website 2009b). The downstream culverts are being replaced as part of improvements to SR 520 to facilitate future upstream access for fish. The culvert at 102nd Avenue NE was likely constructed to discharge at the bed elevation that existed at that time in the stream channel, which can reasonably be assumed to be considerably less than the existing elevation difference. As a result, the pre-existing conditions of this tributary can reasonably be assumed to contain profiles greater than 20%, which does not support fish use.

Because the Yarrow Creek tributary east of 102nd Avenue NE is a presumed perennial waterway, it is classified as a “waters of the U.S.” subject to regulation by the USACE under the Clean Water Act. In accordance with the LUC, Type N waters are all segments of waters that are not Type S or Type F waters and that are connected to a Type S or Type F waters by an aboveground channel system, stream, or wetland. In accordance with the LUC, Type N waters are assigned a standard buffer of 50 ft on undeveloped sites. The condition of the buffer is described in Section 3.2.2.2.

3.2.2 WETLAND IDENTIFICATION AND CLASSIFICATION

One potential wetland was identified within the study area, but outside of the project area. This wetland and the adjacent upland are described below.

3.2.2.1 Wetland B

Wetland B is a potential palustrine emergent (PEM)/slope wetland located east of the confluence of two tributaries of Yarrow Creek within the study area but beyond the project area (see Figure 3). Due to the distance of the wetland from project work, a detailed investigation of soils was not completed and a “potential” wetland determination is presented. Wetland B is approximately 1,600 square feet (ft²), but the extent of the wetland was not fully assessed at the time of the field investigation. Vegetation in the wetland is dominated by skunk cabbage (*Lysichiton americanum*, OBL). The hydrology of this potential area was observed as seeps from slopes adjacent to the other Yarrow Creek tributary.

Wetland B is assigned a preliminary rating as a Category III wetland, and would require a buffer of 60 to 110 ft, depending on scoring for habitat functions.

3.2.2.2 Upland Characterization

The accessible areas on either side of the Yarrow Creek tributary were investigated for wetlands and to characterize adjacent stream buffer. Three sampling point were recorded in the project area; Sampling point SP-1 and SP-2 are located north of the tributary on the top of the ravine. Sampling Point

SP-3 is located south of the tributary near the confluence of the two Yarrow Creek tributaries. Sampling Point data forms are provided in Appendix D.

Both sides of the creek are residential properties with maintained lawns. The forest riparian buffer widens as the creek extends downstream from 102nd Avenue NE. Dominant vegetation at Sampling Points SP-2 and SP-3 includes, but is not limited to, Oregon grape [*Berberis nervosa*, No Indicator (NI)], sword fern (*Polystichum munitum*, FACU), red alder (*Alnus rubra*, FAC), laurel (*Kalmia* sp.), western hemlock (*Tsuga heterophylla*, FACU-), beaked hazelnut (*Corylus cornuta*, FACU), waterleaf (*Hydrophyllum tenuipes*, NI), stinging nettle (*Urtica dioica*, FAC+), English ivy (*Hedera helix*, NI), Himalayan blackberry (*Rubus discolor*, FACU), and big-leaf maple (*Acer macrophyllum*, FACU). Soils in the adjacent riparian buffer are a very dark brown (10YR 2/2) sandy loam from ground surface to 6 inches below ground surface (BGS), and brown (10YR 3/3) to dark brown (10YR 4/3) loamy sand from 6 to more than 12 inches BGS, and do not meet the hydric soils parameter(s).

Sampling Point SP-1 was recorded in an area that was likely recently disturbed, as evidenced by the presence of straw to stabilize disturbed groundcover. Vegetation in the area contains stinging nettle (FAC+), creeping buttercup (*Ranunculus repens*, FACW), and field horsetail (*Equisetum arvense*, FAC). The hydrology of this area was observed as seeps from slopes adjacent to 102nd Avenue NE. It is possible that the seeps are a result of degraded culverts and stormwater conveyance pipes that are associated with the 102nd Avenue NE road crossing. Soils at Sampling Point SP-1 are very dark gray (10YR 3/1) loam from the ground surface to 6 inches BGS, and very dark grayish brown (10YR 3/2) loam from 6 inches to more than 12 inches BGS. While the upper layer is a low chroma matrix, the layer is not at depth to satisfy the hydric soil parameter (i.e., immediately below the A-horizon or 10 inches BGS), and the area is classified as upland.

4.0 IMPACT ASSESSMENT

Surface water, and buffer impacts are described by area, type, and functions below.

4.1 IMPACTS BY AREA AND TYPE

The following table provides a summary of unavoidable wetland and buffer impacts in terms of area for stream and stream buffer:

Critical Area	Regulating Agency	Impacts	
		Temporary	Permanent
Yarrow Creek Tributary	USACE, WDFW, and City	approx. 220 linear ft	0
Buffer	City	5,730 ft ²	0

Stream buffers are measured from top of bank, as regulated under Part 20.25H.075 of the LUC. All project work is below top of bank.

Impact areas are also shown in the Joint Aquatic Resources Permit Application (JARPA) figures provided in Appendix F.

Two types of impacts will occur: temporary surface water impacts and temporary buffer impacts. The areas filled as a result of the emergency repair occur below the streambank. Stream buffers are measured from top of bank, as regulated under Part 20.25H.075 of the LUC, and all project work is below the top of bank. As part of the emergency repair, approximately 120 linear ft of stream was filled with approximately 1,245 cubic yards (yd³) of gravel to stabilize the bank slopes and protect the roadway embankment (see Appendix F, Sheet 6 to 10). A 24-inch diameter pipe was placed in the fill to convey flows of the tributary through the fill material to an energy dissipater to halt further erosion of the ravine.

All areas impacted will be restored with native vegetation following construction of the habitat improvements. A series of cascade/pool complexes will be constructed above the storm drain installed as part of the emergency repair, and base flows will be returned to the channel. Additional habitat improvements involving placement of rock and large woody debris will occur in an approximately 100-linear ft section of stream downstream of the emergency repair. The overall habitat improvements extend along approximately 220 linear ft of the Yarrow Creek tributary.

5.0 MITIGATION

This section presents the mitigation sequencing, impact analysis, and mitigation plan for unavoidable impacts to wetland, buffer, and floodplain area and functions.

5.1 MITIGATION SEQUENCING

Part 20.25H.215 of the LUC outlines requirements for mitigation associated with alterations to streams. Mitigation shall be required in the following order of preference, and may include a combination of the following:

1. Avoiding the impact altogether by not taking a certain action or parts of an action.
2. Minimizing impacts by limiting the degree or magnitude of the action and its implementation, by using appropriate technology, or by taking affirmative steps such as project redesign, relocation, or timing to avoid or reduce impacts.
3. Performing the following mitigation:
 - a. Rectifying the impact by repairing, rehabilitating, or restoring the affected environment.
 - b. Reducing or eliminating the impact over time by preservation and maintenance operations.
 - c. Compensating for the impact by replacing, enhancing, or providing substitute resources or environments.
4. Monitoring the hazard or other required mitigation and taking remedial action when necessary.

The mitigation sequencing details focusing on avoidance, minimization and restoration for the proposed project are described below.

5.1.1 AVOIDANCE

Impacts to the Yarrow Creek tributary associated with the habitat improvements cannot be avoided as the purpose of the project is mitigation. The culvert replacement and stabilization of the embankment ravine was the minimum necessary to address the high flows and erosion of the ravine and threat to public infrastructure (see Appendix F, Sheet 6 to 10). Likewise, the proposed restoration will occur in the area of the former channel and will improve upon the habitat conditions of the Yarrow Creek tributary. The proposed restoration project is considered mitigation, and avoidance of impacts is not considered further.

5.1.2 MINIMIZATION

Minimization of impacts includes sensitive site design and placement of construction staging areas and site access away from streams, wetlands, and the innermost portion of buffers to the greatest

extent practicable. As part of the emergency repair, the fill to stabilize the road embankment was installed at a steep angle to reduce the amount of stream segment covered by the fill, thus maximizing the amount of fish habitat in the downstream segment of this tributary. In addition, construction staging areas were located along existing roadways.

During construction, the drainage pipe placed as part of the emergency road stabilization work will be used to bypass stream flows during reconstruction of the stream segment on top of the fill. Work in the downstream, eastern segment of this stream project, will be bypassed by pumping the stream flow around this stream segment during the rehabilitation and streambank stabilization work. In addition, construction staging areas will be located along existing roadways.

5.1.3 UNAVOIDABLE IMPACTS

The impacts to the Yarrow Creek tributary as part of the proposed restoration will be beneficial impacts. The culvert replacement and stabilization of the embankment ravine was the minimum necessary to address the high flows and erosion of the ravine and threat to public infrastructure. The proposed habitat improvements will occur in the area of the former channel and will improve upon the conditions of the Yarrow Creek tributary. Daylighting this stream segment, which at 30% is too steep for fish habitat, will improve water quality and provide natural biological support for fish habitat that exists further downstream and that may be extended into the eastern segment of this project in the future. The purpose of the proposed restoration project is mitigation.

5.1.4 MITIGATION REQUIREMENTS

The emergency repair was necessary to meet the last step of the mitigation sequence presented in the LUC: “Monitoring the hazard or other required mitigation and taking remedial action when necessary.” The restoration of the stream channel and buffer follows the third step of the mitigation sequence presented in the LUC: “Rectifying the impact by repairing, rehabilitating, or restoring the affected environment.” Restoration of the waterway does not degrade the quantitative and qualitative functions and values of the habitat, and would achieve equivalent or better biologic and hydrologic functions.

Buffer impacts are not regulated by the USACE but are regulated by the City. Part 20.25H.085(B) of the LUC states that stream critical area buffers shall be replaced a ratio of one to one. Stream buffers are measured from top of bank, as regulated under Part 20.25H.075 of the LUC, and all proposed project work will be below the top of bank.

5.2 MITIGATION PLAN

The mitigation plan includes daylighting the base flow and reconstructing the stream segment on top of the fill placed as part of the emergency repair to buttress the roadway embankment. The restoration and habitat improvements are in two discrete sections. The first section represents the larger project area, representing approximately 120 linear ft of stream, and includes modifying the newly installed manhole at the outlet of the culvert and constructing a stream channel on the fill slope that was built as part of the emergency repair (see Appendix F, Sheet 13, Sheet 14, and Sheet 17). The newly installed manhole will be modified to include a baffle wall and small-diameter pipe to split the stream flow, delivering the stream's base flow of 0.3 cfs into the constructed stream channel. The constructed stream channel will extend from the modified manhole and carry the base flow down the 30% grade to a point next to the recently installed stilling well. The stilling well acts as the energy dissipater and outfall for the bypass pipe.

The constructed stream channel will have an overall 30% grade, following the grade of the placed fill, and will be too steep for the creation of fish habitat. However, the proposed planting with native species will help anchor the new slope and provide food and shelter for a wide range of insects and animals. Daylighting the base flow will improve water quality and support the fish populations downstream and a wide range of species of local importance.

In the future, when the fish passage barriers at SR 520 and the former Lake Washington Boulevard are removed, this constructed steep stream segment will help support future resident fish in the lower reaches of this stream tributary and the west tributary of Yarrow Creek.

Because of the steepness of the fill placed to buttress the roadway embankment, the constructed stream segment will have to include multiple splash pools using rock and large woody debris to get the newly daylighted base flow down to the existing stream elevation without causing erosion of the newly installed fill (see Appendix F, Sheet 13, 14, and 18 to 20). An impervious liner will be used under the constructed stream segment to help prevent the base flow from undercutting the newly installed rock and logs. The surface of the fill, which is currently covered with jute erosion control mat and hydroseeded grass as part of the emergency repair, will be replanted with a mix of native trees, shrubs, and groundcovers.

The second section of the project starts at the toe of the fill slope and continues downstream approximately 100 linear ft to within 20 ft of the confluence of the tributaries of Yarrow Creek (see Appendix F, Sheet 14 and 20). This second section of the project is designed to stabilize this section of creek against further damage by head cutting, erosion of side slopes, and the loss of habitat through the movement of existing small rock or the existing unsecured woody debris. Work in this stream segment

will also include supplemental plantings with native species and the placement of habitat structures consisting of large rock and large woody debris.

The stream restoration will include the placement of:

- Large woody debris (38 pieces; 8 to 12 inches in diameter)
- Streambed cobbles (4 to 12 inches; 20 yd³)
- Streambed boulders (18 to 24 inches; 8 yd³)
- Streambed aggregate (10 yd³)
- Streambed sediment (10 yd³)
- Approximately 70 yd³ of cut and 50 yd³ of fill to build the stream channel.

The buffer restoration will improve habitat value and functional performance of the stream buffer by increasing vegetative structure within the buffer. The proposed restoration includes replanting of 5,730 ft² of buffer area between the stream and top of bank that is to be temporarily impacted (see Sheet 15, 16, and 20 of Appendix F), representing a 1:1 ratio of restoration to impacts.

5.2.1 PROPOSED MITIGATION FUNCTIONS

The mitigation plan is meant to improve water quality by reintroducing base flow to a newly constructed stream segment on the fill that was placed to structurally support 102nd Avenue NE. The design will provide habitat for wildlife and aquatic insects, but will not support fish use due to slopes greater than or equal to 30%. The slope, and, therefore, absence of fish use in this reach, is consistent with the historical condition of this tributary. Work in the downstream segment is designed to secure this stream segment against further erosion and to secure rock and large woody debris to provide habitat complexity and fish habitat up to the base of the reconstructed steep stream segment.

The planting plan is designed to reintroduce native plantings to a natural ravine that had been severely damaged by residential construction and erosion caused by concentrated storm flow at the outlet to the culvert flowing under 102nd Avenue NE. Existing buffer functions were assessed in a narrative evaluation using the *Wetland Mitigation in Washington State Volume 1: A Synthesis of the Science* (Ecology 2005) and best professional judgment given specific indicators. Functions typically associated with wetland buffers include water quality (removing sediment, nutrients, toxics, and pathogens, and maintaining microclimate) and habitat (species richness, structural diversity/cover classes, visual screening from adjacent human development, and habitat connectivity).

The existing buffer consists of actively eroding slopes largely absent of vegetation. The restoration plan includes restoring and improving upon the impacted functions of the stream buffer, specifically the water quality and habitat functions. The planting plan includes a diverse assemblage of native vegetation.

5.3 MITIGATION GOALS, OBJECTIVES, AND PERFORMANCE STANDARDS

Goals are broad statements that generally define the intent or purpose of the proposed mitigation. Objectives specify the direct actions necessary to achieve the stated goals. The objectives of the goals listed below will be met by implementing the mitigation plan described above. Performance standards are the measurable values of specific variables that ensure objectives have been met. They provide the basis for determining if mitigation is a regulatory success. Three main goals and performance standards have been outlined for this effort:

Goal #1: Create stable stream segment consisting of rock and large wood creating a cascade/pool complex.

Performance Standard for Goal #1: Annual photographic documentation used for determination of site stability.

Goal #2: Return baseflow conditions to the restored stream channel.

Performance Standard for Goal #2: Annual photographic documentation used for determination of baseflow conditions.

Goal #3: Compensate for the impacts to buffer functions caused by the loss of existing buffer due to severe erosion events by creating at least 5,370 ft² of self-sustaining, structurally complex, species-rich buffer habitat within the immediate vicinity of the restored stream channel.

Performance Standard for Goal #3: Satisfy permit conditions specifying yearly plant survival requirements.

6.0 GRADING AND PLANTING PLANS

To compensate for spatial and temporal loss of wetland and buffer functions that will occur as a result of proposed impacts associated with the proposed project, a planting plan has been designed that will restore the wetland/stream/buffer complex on site. The planting plan, as well as project phasing, is presented in this section.

6.1 GRADING PLAN

Grading as part of restoration activities will create a streambed channel designed to carry baseflow consistent with pre-development characteristics. Approximately 70 yd³ of cut and 50 yd³ of fill are associated with the restoration plan. The cut material will be used to build the stream channel in fill areas or as streambed aggregate to fill voids within the large rock cascades and pools. The final topography of the buffer will allow for planting of tree, shrub, and herbaceous species.

6.2 PLANTING PLAN

The planting plan, as shown on Sheet 15 and 16 of Appendix F, is designed to restore riparian buffer habitat functions, provide enough shade to control the spread of invasive species, and to contribute to channel stability by providing erosion control. The plan is based on an average planting density of one tree or shrub per 6 to 20 ft on center plus hydroseeding, in order to account for damaged/salvaged plants to be replaced, as well as natural revegetation by native species from adjacent areas. Trees are not to be planted within 30 ft of the downstream suspended sanitary sewer, so as not to become hazard trees.

We have selected four native tree species, eight native shrub species, and six species of native groundcover that naturally occur on the subject property and that will supplement the existing native species present on the site (see Sheet 20 of Appendix F for a list of selected species). These species have been chosen not only for their ability to tolerate site-specific soil and moisture conditions, but also for their ability to provide wildlife forage, habitat, and erosion control functions.

The layout of the plant communities was designed to maximize interspersions of species. The layout of plants will include informal and irregular groupings of a variety of species to resemble naturally occurring plant communities. Because of the complexity in site topography, existing soils, and work within buffer areas, as well as the importance of retaining existing native vegetation and woody features (snags, stumps, etc.), the actual layout of plants will be determined by a biologist contracted by the City.

6.3 PHASING AND SPECIFICATIONS

The detailed specifications of the emergency repair and mitigation plan are provided in project specifications as part of the project plans. The emergency repair occurred between August and September 2010, and the restoration is anticipated to occur between August and September 2011. A summary of the construction sequencing for the restoration is as follows:

1. Establish contractor staging areas. Erosion control and spill control measures will be applied to all staging areas.
2. Mobilize construction equipment and materials to the project site.
3. Implement Temporary Erosion and Sediment Control (TESC) Plan to protect the areas cleared.
4. Remove trees/brush and other material and obstructions that might interfere with construction, while preserving/protecting natural growth that will not interfere with construction.
5. Install temporary stream bypass around the project area to a discharge point at the downstream end of the project area.
6. Construct the stream channel on the existing fill slope and place materials here and in the downstream reach of the tributary during designated in-water work window.
7. Re-establish stream base flow into the stream channel.

7.0 MONITORING AND MAINTENANCE

Monitoring and maintenance are important elements for the success of the mitigation project. The proposed mitigation will be monitored during and after completion of the initial construction work. Specific discussion of each of these elements is provided below.

7.1 QUALITY CONTROL OVERSIGHT

When plant installation is complete, a biologist will conduct an inspection and provide detailed notes on any changes to the final mitigation plan. This “as-built” plan will serve as the baseline for monitoring, and the monitoring period will commence when the City’s biologist approves the “as-built” plan. The final checklist will be used to document that specifications are met by the contractor.

7.2 FORMAL MONITORING

After construction, the mitigation areas will be monitored for a minimum of 3 years to make certain that performance standards, and ultimately the mitigation goals, are met. Monitoring will assess conditions in the mitigation areas based on data collected from permanent data collection stations established along transects at regular intervals. Permanent photographic stations will be established and mapped in the mitigation area. These will be placed to provide comprehensive visual documentation of the mitigation as the site matures over the monitoring period.

Site visits will occur twice annually between June 1 and September 15 to collect data on woody plant mortality; areal coverage of tree, shrub, and herb layers; invasive species coverage; and documentation of any colonization by native species.

7.3 REPORTING

Monitoring reports will be prepared at an interval agreed upon by the City/USACE for the monitoring period. These reports will document site conditions and evaluate the collected data to determine whether the performance standards are being met. Reports will be distributed to the City and all applicable regulatory agencies by December of each year.

7.4 SITE MAINTENANCE PROGRAM

Landscape maintenance will occur as needed for successful establishment of the plantings. To the extent practicable, the original landscape contractor will be responsible for 1 year of maintenance, including meeting grade and plant survival percentages.

While plant species chosen for this mitigation proposal are adapted to conditions in western Washington, supplemental irrigation may be required during the first three growing seasons following installation to ensure long-term survival of the planted communities, particularly in buffer areas.

The primary maintenance items that will be required within the mitigation areas are irrigation and/or removal of nuisance species. Any noxious weeds listed on the Washington State Noxious Weed Control Board list (NWCB website 2010) within the easement should be hand-weeded from the planted areas for the duration of the monitoring period. Plants installed for mitigation will be replaced, as needed.

8.0 CONCLUSIONS AND ASSESMENT OF NO NET LOSS

The mitigation plan presented in this report meets City requirements, as outlined in the LUC and meets state and federal agency guidance. The restoration plans presented in this report will mitigate for temporary impacts to stream and buffer areas; the proposed project will provide no net loss of stream or buffer functions. The mitigation plan includes monitoring and maintenance plans to ensure success of the restoration.

9.0 USE OF THIS REPORT

The findings presented herein are based on our understanding of the City of Bellevue Municipal Code, the USACE and Ecology wetland delineation methodology, and on our interpretation of the vegetative, soil, and hydrological conditions observed during the site visits on April 15, 2010. Within the limitations of scope, schedule, and budget, the findings presented in this report were prepared in accordance with generally accepted sensitive area investigation principles and practices in this locality at the time the report was prepared. We make no other warranty, either express or implied.

This report was prepared for the use of Brown and Caldwell and the City of Bellevue, and applicable regulatory agencies. No other party is entitled to rely on the information, conclusions, and recommendations included in this document without the express written consent of Landau Associates. Further, the reuse of information, conclusions, and recommendations provided herein for extensions of the project or for any other project, without review and authorization by Landau Associates, shall be at the user's sole risk.

Wetland areas delineated by Landau Associates are considered preliminary until the USACE and/or local jurisdictional agencies validate the wetland boundaries. Because wetlands are dynamic communities, wetland boundaries may change over time. The agencies typically recognize wetland delineations for a period of 5 years following an approved jurisdictional determination. In addition, changes in government code, regulations, and/or laws may occur.

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

LANDAU ASSOCIATES, INC.



Steven J. Quarterman
Senior Ecologist



W. Perry Welch, P.W.S.
Senior Ecologist

SJQ/WPW/ccy

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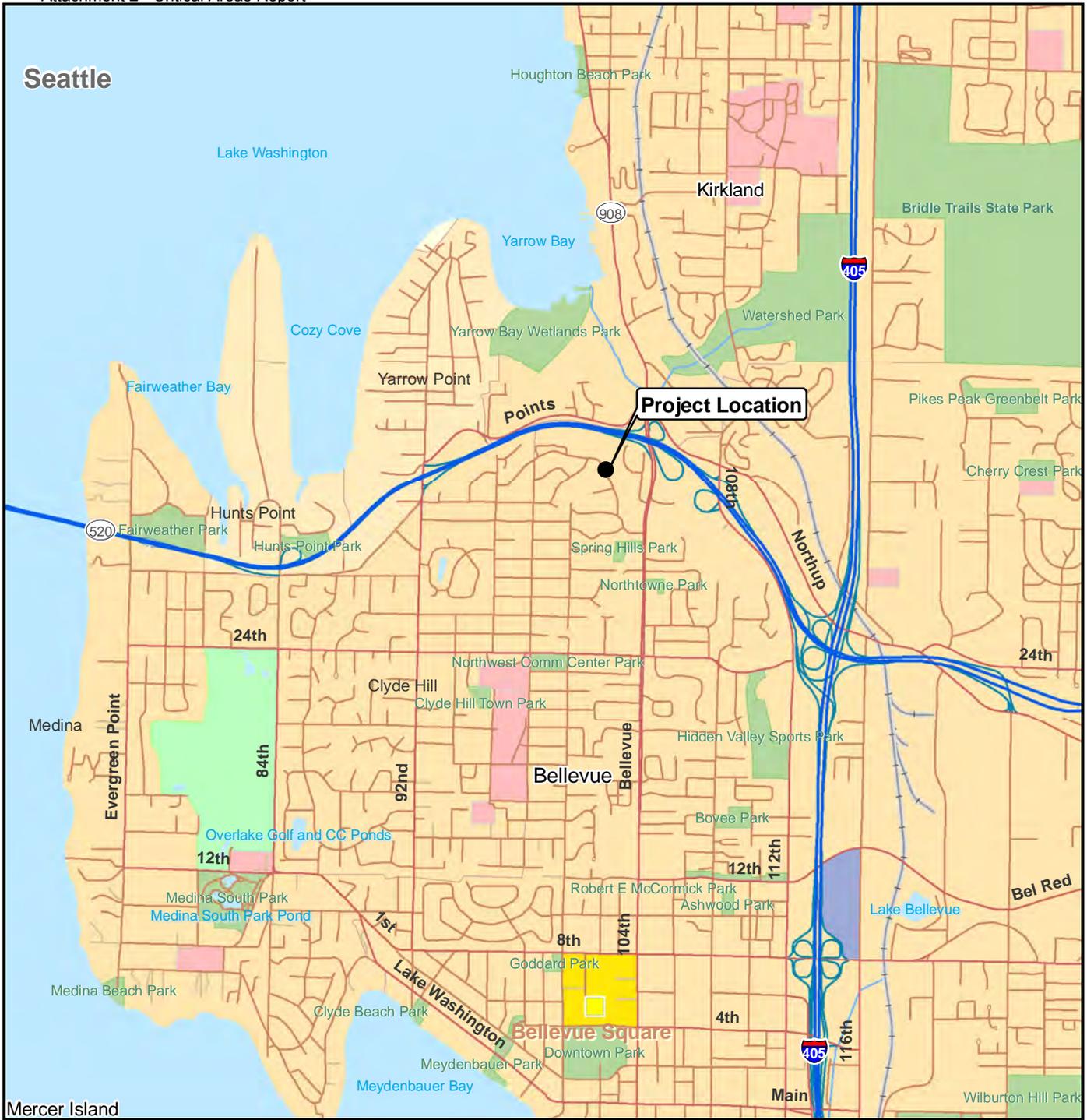
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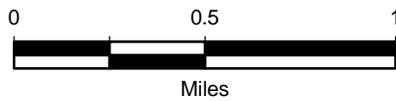
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Mercer Island

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Data Source: ESRI. 2006.



Yarrow Creek Tributary
 Erosion Repair
 Bellevue, Washington

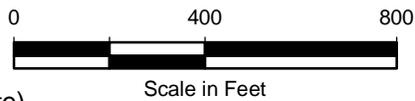
Vicinity Map

Figure
1



Legend

-  Project Area
-  300 ft Project Buffer (approximate)
-  Waterway



Note

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Data Source: USDA FSA 2006, King County 2008

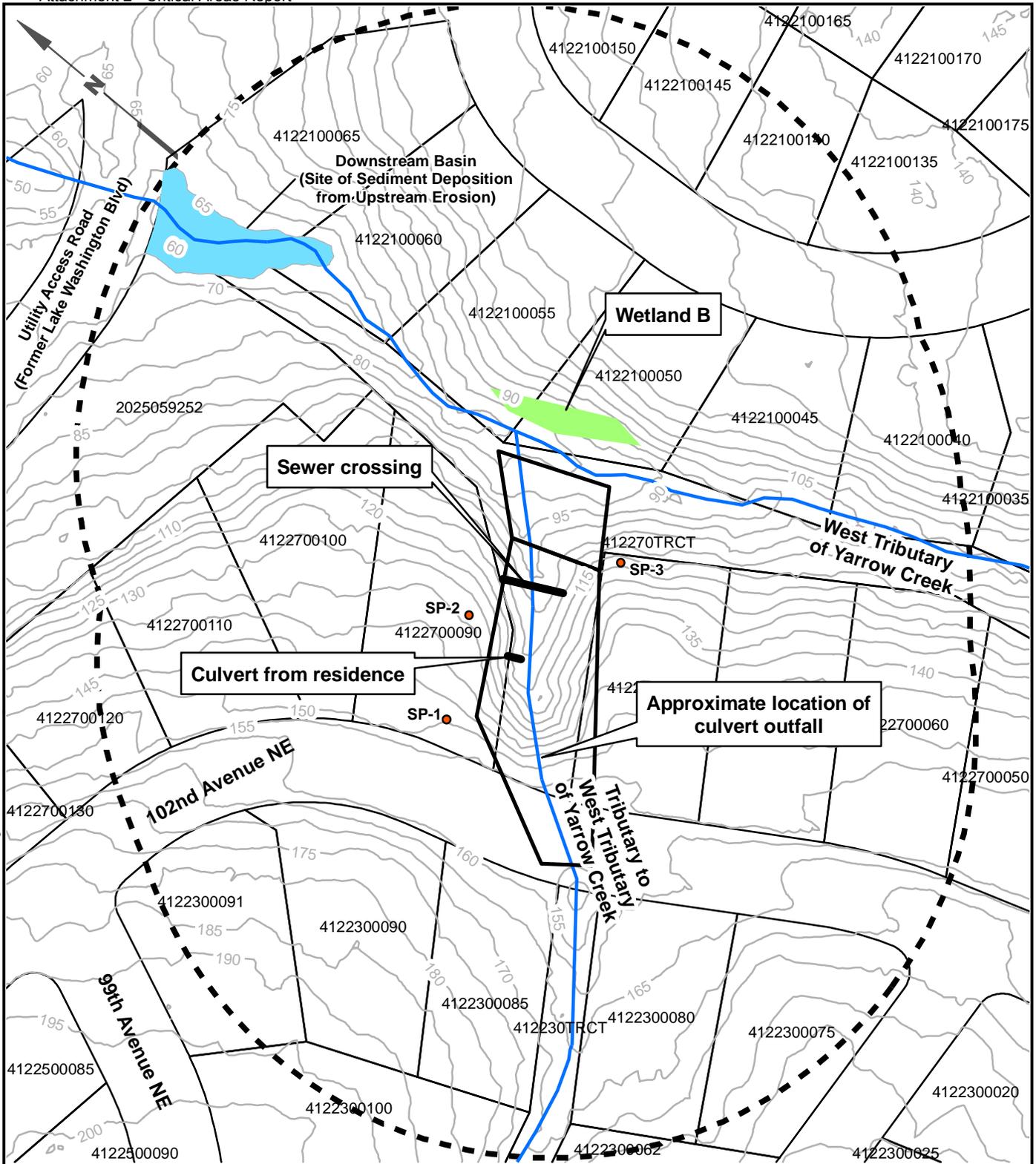
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Yarrow Creek Tributary
Erosion Repair
Bellevue, Washington

Study Area Map

Figure
2

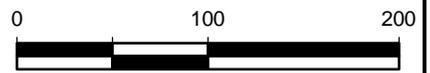


Legend

- Sample Point
- Downstream Basin
- Waterway
- Project Area
- 300 ft Project Buffer
- Potential Wetland
- NWI

Note

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.



Data Source: King County 2008

Y:\Projects\1080007\Mapdocs\Figs_ Wetland Location.mxd 12/17/2010 NAD 1983 StatePlane Washington North FIPS 4601 Feet



Yarrow Creek Tributary Erosion Repair Bellevue, Washington	Wetland Location Map	Figure 3
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**TABLE 1
METHODS FOR WETLAND DETERMINATION
YARROW CREEK TRIBUTARY EROSION REPAIR – BELLEVUE, WASHINGTON**

Parameter	Definition	Field Indicators	Field Assessment
Wetland Vegetation (a)	<p>Wetland vegetation is adapted to saturated soil conditions. The U.S. Fish and Wildlife Service (USFWS) assigned a wetland indicator to each plant species that denotes its frequency of occurrence within wetlands. These are as follows, and include modifiers (d):</p> <ul style="list-style-type: none"> • Obligate (OBL) wetland plants occur almost always in wetlands under natural conditions (more than 99 percent of the time). • Facultative wetland (FACW) plants usually occur in wetlands (67 to 99 percent of the time) but are occasionally found in nonwetlands. • Facultative (FAC) plants are equally likely to occur in wetlands or nonwetlands (34 to 66 percent of the time). • Facultative upland (FACU) plants usually occur in nonwetlands, but are occasionally found in wetlands (1 to 33 percent of the time). • Upland (UPL) plants almost always occur in uplands (more than 99 percent of the time). 	<p>More than 50% of the dominant plants totaled from all vegetation strata are hydrophytic, i.e., those species with indicators of OBL, FACW, or FAC (regardless of modifier), or; a plant community has a visually estimated cover percentage of OBL and FACW species that exceeds the coverage of FACU and UPL species. If dominance is not met, the Prevalence Index is calculated, or consideration is given to morphological adaptations and/or non-vascular plants observed.</p>	<p>1. Dominance: The dominant plants and their wetland indicator status are evaluated quantitatively within data plots and visually throughout the study area. If the test for dominance fails, and indicators of wetland soils and hydrology are present, the Prevalence Index is calculated.</p> <p>2. Prevalence Index: A weighted average of the percent cover of each indicator status is calculated (see data sheets in appendix). An index of 3 or less is considered meeting the hydrophytic vegetation criterion. If the Prevalence Index is not met, the consideration is given to morphological adaptations and/or non-vascular plants.</p> <p>3. Morphological Adaptations/Non-vascular Plants: Some plants develop recognizable morphological adaptations when occurring in wetland areas. These features must be observed on >50% of the individuals of a FACU species living in an area where indicators of hydric soils and wetland hydrology are present. Wetland non-vascular plants can include bryophytes (mosses, liverworts, hornworts). The cover of wetland bryophytes must be >50% of the total bryophyte cover in a plot in coastal Washington forested wetlands.</p>
Wetland Soils (b)	<p>Soils are classified as hydric, or they possess characteristics that are associated with reducing soil conditions. A hydric soil is formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part of the soil.</p>	<p>Hydric soils, in part, have an identifiable color pattern, which occurs if the soil is saturated, flooded, or ponded for a long period of time. Faint or washed-out colors typically form in the soil, and mottles of bright color, such as rust (known as redoxymorphic features), form. Accumulations of organic matter at the surface, a sulfur odor, and organic matter stains may also be present.</p>	<p>A shovel is used to dig holes at least 20 inches below ground surface (BGS) at multiple locations in the study area. Direct observation of the soil is made at multiple locations in both wetlands and uplands, as applicable. Soil organic content is determined visually and texturally, and soil color is determined using the Munsell soil color chart (Greyttag Macbeth 1994). Depth to water saturation and/or inundation is also observed (see Wetland Hydrology). The characteristics observed are compared to the hydric soil indicators for "all soils," "sandy soils," and "loamy clayey soils," as described in the USACE Interim Regional Supplement (USACE 2008).</p>
Wetland Hydrology (c)	<p>The area is inundated either permanently or periodically at mean water depths less than or equal to 6.6 ft, or The soil is inundated or saturated to the surface for at least 14 consecutive days during the growing season (the time during which two or more non-evergreen vascular plant species growing in a wetland or surrounding area exhibit biological activity, such as new growth, or as determined by soil temperature).</p>	<p>Primary indicators include surface inundation (standing water), saturated soils, water marks, drift lines, sediment deposits, and drainage patterns. Secondary indicators of hydrology include water-stained leaves, oxidized root channels, or local soil survey data for identified soils. In the absence of any primary indicators, at least two secondary indicators are required to meet the wetland hydrology criterion.</p>	<p>During investigation of soils, soil pits are allowed to stand up to 20 minutes in order to allow percolation of any groundwater into the pit to determine groundwater level in the soil profile. Additional digging may occur to 24 inches BGS during the dry season to investigate groundwater levels. In addition, the extent of soil saturation and presence/absence of oxidation are determined in the soils removed as part of the soils investigation (see Wetland Soils). Other indicators of wetland hydrology are observed at ground surface.</p>

Notes:

(a) Reed 1988 and USFWS 1993. Categories were originally developed and defined by the USFWS National Wetlands Inventory and were modified by the National Plant List Panel. (b) Per USACE 1987, 2008; USDA, NRCS 2006b. (c) Per USACE 1987, 2008.

(d) Modifiers:

+ Frequency toward the higher end of the category (more frequently found in wetlands).

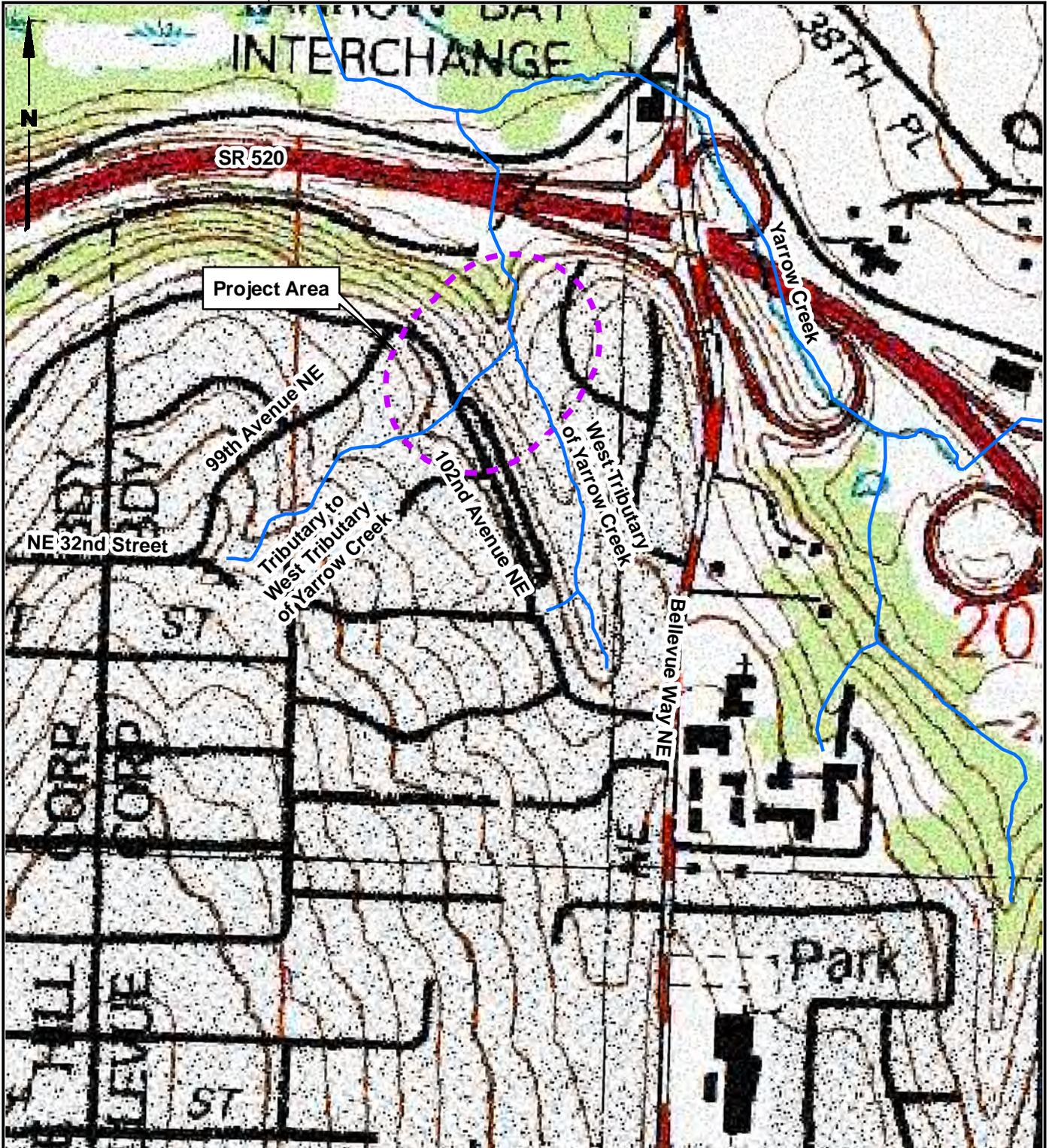
- Frequency toward the lower end of the category.

* Tentative assignment based on limited information from which to determine the indicator status.

TABLE 2
SUMMARY OF CHARACTERISTICS OF WATERWAYS
YARROW CREEK TRIBUTARY EROSION REPAIR – BELLEVUE, WASHINGTON

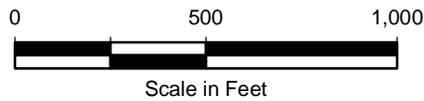
SUMMARY OF YARROW CREEK TRIBUTARY	
Classification	Perennial stream
Approximate Length	280 linear feet (within study area)
Fish Use (Documented)	None documented. Historical and proposed stream grade does not support fish use.
Stream Characteristics	Section of tributary within study area is severely eroded. Emergency repairs to the ravine were completed in 2010. Habitat improvements proposed are anticipated for construction in 2011.
Water Type and Buffer	Type N, requiring a 50-ft buffer in accordance with Part 20.25H.075 of the LUC.

Background Information Review Figures



Legend

-  300 ft Project Buffer
-  Waterway



Note

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Data Source: USGS 2001, King County 2008

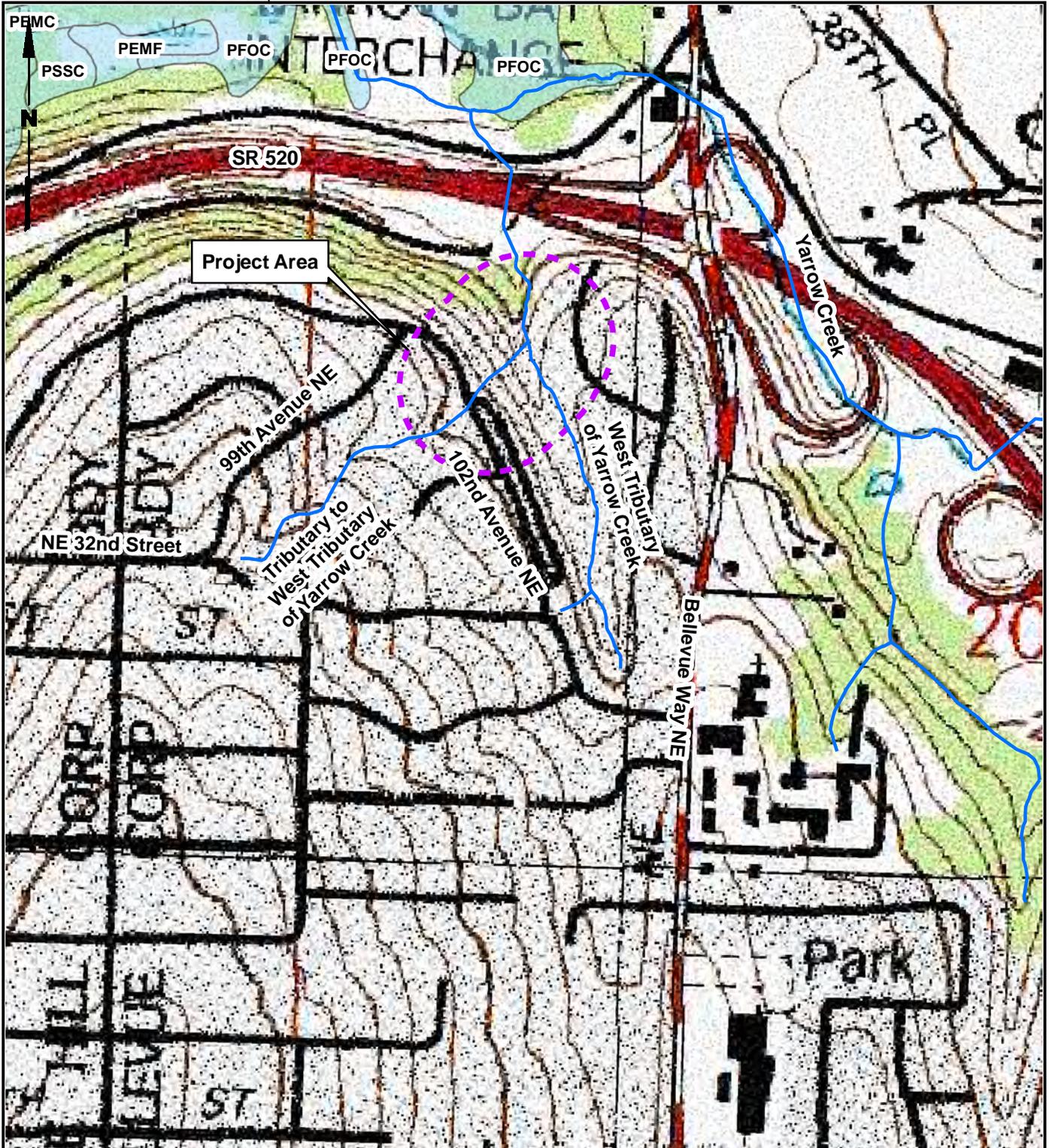
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Yarrow Creek Tributary
 Erosion Repair
 Bellevue, Washington

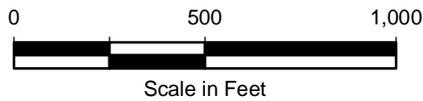
Topographic Map

Figure
A-1



Legend

-  300 ft Project Buffer
-  NWI wetland
-  Waterway



Note

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Data Source: USGS 2001, USFWS 1981 to present, King County 2008

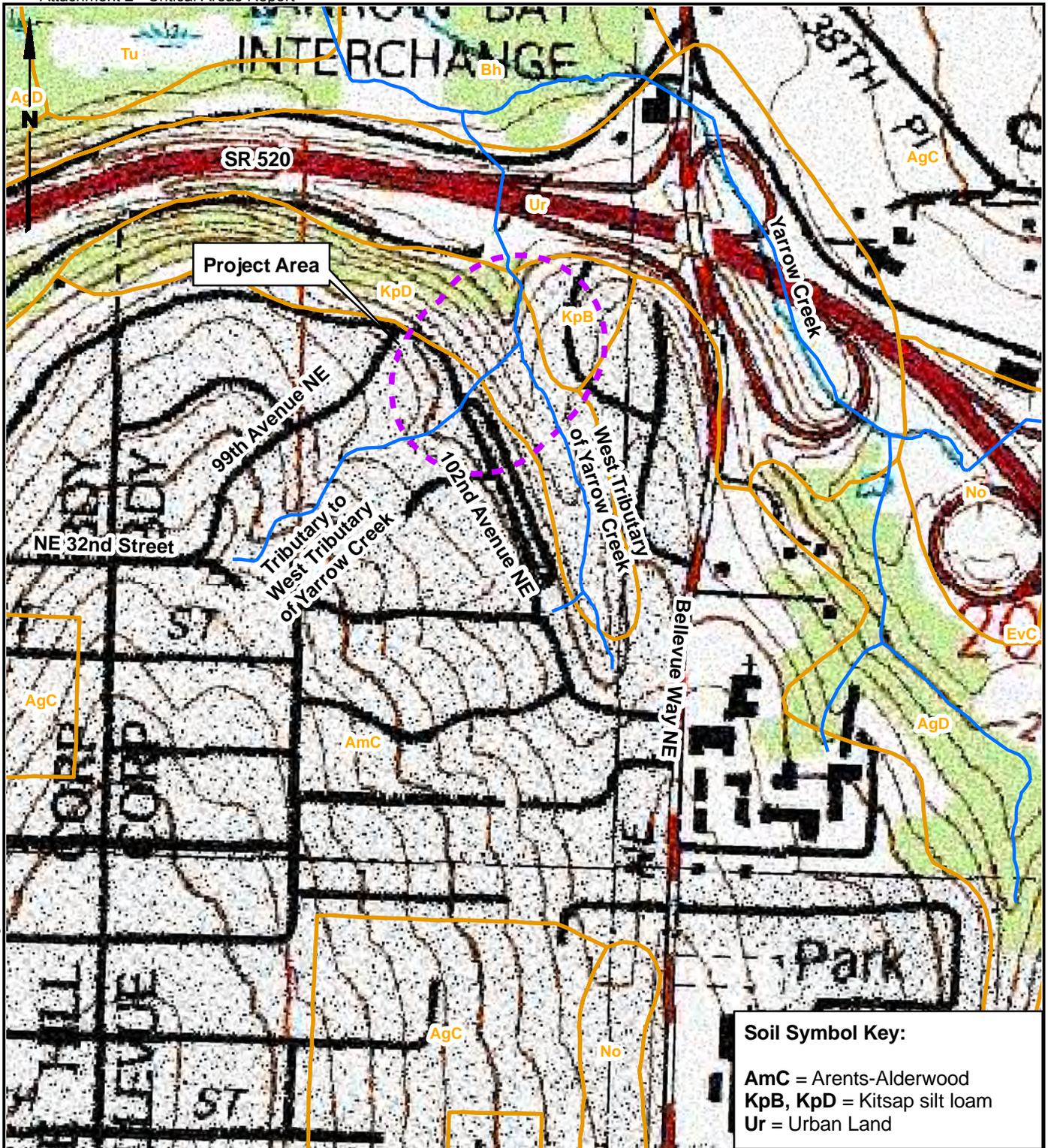
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Yarrow Creek Tributary
Erosion Repair
Bellevue, Washington

National Wetland Inventory Map

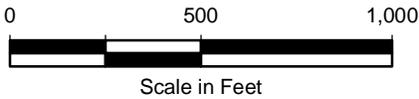
Figure
A-2



Soil Symbol Key:
 AmC = Arents-Alderwood
 KpB, KpD = Kitsap silt loam
 Ur = Urban Land

Legend

-  300 ft Project Buffer
-  Soils
-  Waterway



Note
 1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Data Source: USGS 2001, King County 2008

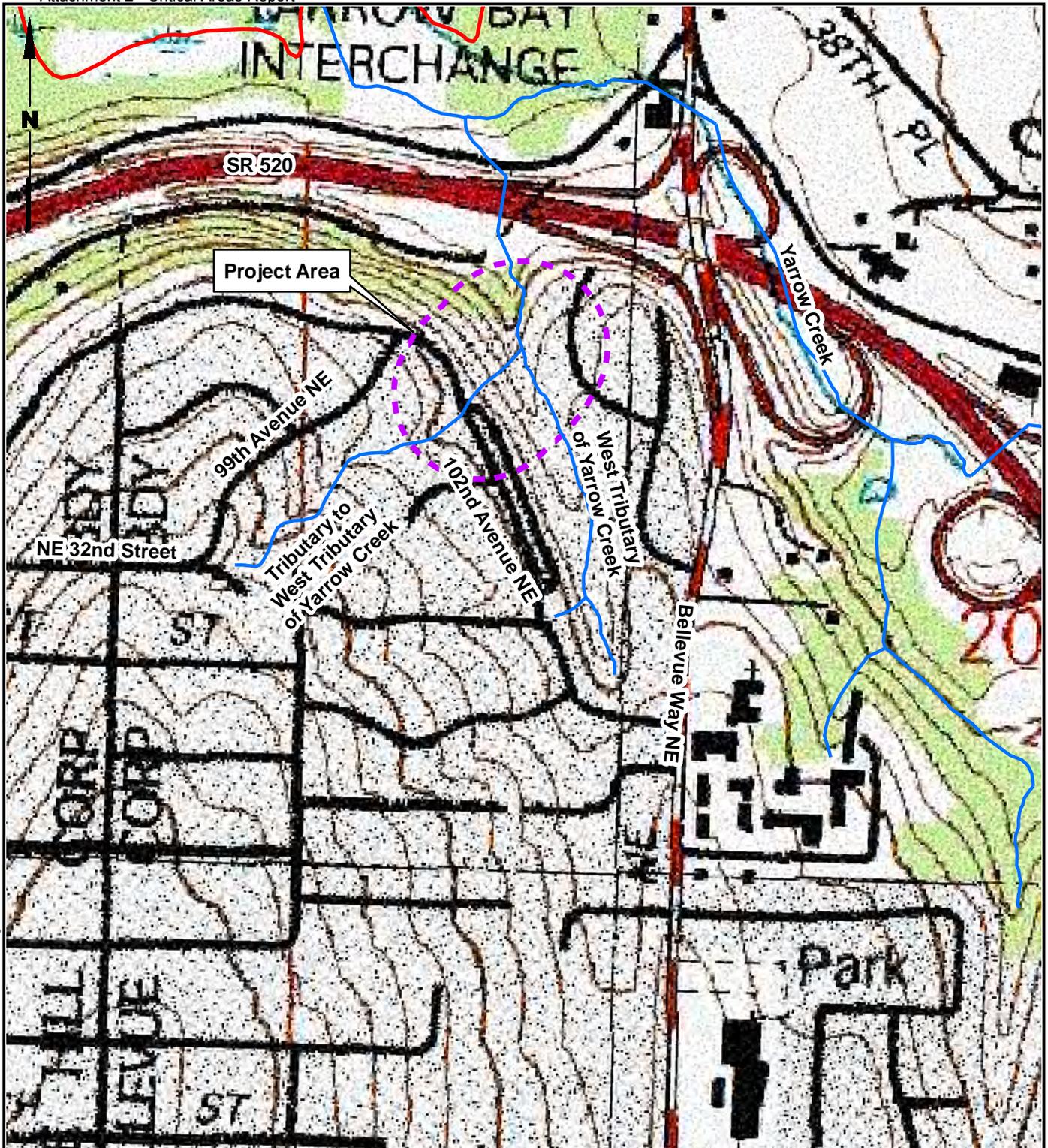
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Yarrow Creek Tributary
Erosion Repair
Bellevue, Washington

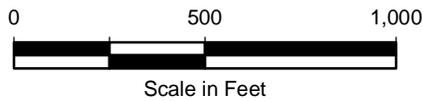
Soil Series Map

Figure
A-3



Legend

-  300 ft Project Buffer
-  100 Year Floodplain
-  Waterway



Note

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Data Source: USGS 2001, King County 2008

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Yarrow Creek Tributary
Erosion Repair
Bellevue, Washington

Floodplain Map

Figure
A-4

Soil Profile Reports

LOCATION ALDERWOOD WA
Established Series
Rev. AD/RJE/MPR
04/2007

ALDERWOOD SERIES

The Alderwood series consists of moderately deep to a cemented pan, moderately well drained soils formed in glacial till. Alderwood soils are on glacially modified foothills and valleys and have slopes of 0 to 65 percent. The average annual precipitation is about 40 inches, and the mean annual temperature is about 50 degrees F.

TAXONOMIC CLASS: Loamy-skeletal, isotic, mesic Vitrandic Dystroxerepts

TYPICAL PEDON: Alderwood gravelly ashy sandy loam - forested. (Colors are for moist soil unless otherwise noted.)

Ap--0 to 7 inches; very dark grayish brown (10YR 3/2) gravelly ashy sandy loam, brown (10YR 5/3) dry; moderate fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine roots; few fine irregular pores; slightly acid (pH 6.2); abrupt smooth boundary. (3 to 7 inches thick)

Bw1--7 to 21 inches; dark yellowish brown (10YR 4/4) very gravelly ashy sandy loam, yellowish brown (10YR 5/4) dry; weak medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; many fine roots; many fine tubular and irregular pores; 35 percent gravel; diffuse smooth boundary; slightly acid (pH 6.2).

Bw2--21 to 30 inches; brown (10YR 4/3) very gravelly ashy sandy loam, pale brown (10YR 6/3); dry; weak medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common fine roots; few very fine tubular pores; 40 percent gravel; slightly acid (pH 6.2); clear wavy boundary. (Combined Bw1 and Bw2 horizons are 15 to 30 inches thick)

2Bg--30 to 35 inches; 50 percent olive brown (2.5Y 4/4) very gravelly sandy loam, light yellowish brown (2.5Y 6/4) dry and 50 percent dark grayish brown (2.5Y 4/2) iron-mangeneese nodules with strong brown (7.5YR 5/6) coatings on fragments, light brownish gray (2.5Y 6/2) and reddish yellow (7.5YR 6/6) dry; massive; slightly hard, very friable, nonsticky and nonplastic; few fine roots; common fine tubular and interstitial pores; 45 percent gravel; moderately acid (pH 6.0); abrupt wavy boundary. (0 to 15 inches thick)

2Cd1--35 to 43 inches; dark grayish brown (2.5Y 4/2) very gravelly sandy loam, light brownish gray (2.5Y 6/2) dry; dark yellowish brown (10YR 4/4), olive (5Y 4/4), yellowish red (5YR 4/6) and strong brown (7.5YR 5/6) in cracks; massive; extremely hard; extremely firm, nonsticky and nonplastic; few fine roots; few fine tubular pores; 40 percent gravel; moderately acid (pH 6.0); abrupt irregular boundary. (5 to 20 inches thick)

2Cd2--43 to 60 inches; grayish brown (2.5Y 5/2) dense glacial till that breaks to very gravelly sandy loam, light gray (2.5Y 7/2) dry; massive; extremely hard, extremely firm, nonsticky and nonplastic; 40 percent gravel; moderately acid (pH 6.0).

TYPE LOCATION: Snohomish County, Washington; about 5 miles east of Lynnwood on Maltby road; 200 feet south and 400 feet east of the center of sec. 28. T. 27 N., R. 5 E.

RANGE IN CHARACTERISTICS: The mean annual soil temperature is estimated to range from 47 to about 55 degrees F. These soils are usually moist, but are dry between depths of 8 and 24 inches for 60 to 75 consecutive days in the summer in most years. The soil is strongly acid to slightly acid above the 2Cd1 horizon and slightly acid or moderately acid in the 2Cd1 horizon. Depth to 2Cd1 horizon is 20 to 40 inches. Rock fragments in the particle-size control section range from 35 to 50 percent total including 35 to 50 percent gravel and 0 to 10 percent cobbles.

The A horizon has hue of 10YR or 7.5YR, value of 2 or 3 moist, 3 through 5 dry, and chroma of 2 to 4. It has weak or moderate granular structure. Some pedons have an E horizon less than 1 inch thick.

The Bw1 and Bw2 horizons have hue of 10YR or 7.5YR, and value and chroma of 2 through 6 dry or moist. It is very gravelly loam or very gravelly sandy loam and has weak or moderate blocky structure. The Bw1 is gravelly loam in some pedons. This horizon contains none to many hard concretions presumed to be of iron and manganese compounds.

The 2Bg horizon, or the 2BC or 2CB horizon has hue of 10YR or 2.5Y, value of 5 through 7 dry, and chroma of 2 through 4 moist and dry. They have redox concentrations in some pedons, but lack depletions of 2 or lower chroma within 30 inches of the surface. These horizons are very gravelly sandy loam or very gravelly loam. They have weak subangular blocky structure or are massive.

The 2Cd horizons (densic layers) have hues of 10YR or 2.5Y, value of 4 through 8 dry, and chroma of 1 through 3 moist and dry and are mottled in some pedons. It is very gravelly sandy loam, very gravelly loamy sand, gravelly sandy loam, or gravelly loamy sand when crushed.

COMPETING SERIES: These are the [Baldhill](#), Neausite, [Dabob](#), [Fidalgo](#), and [Whistle](#) series. The Baldhill soils are very deep and lack densic materials. The Beausitie and Fidalgo soils are 20 to 40 inches deep to a lithic contact. The Whistle soils are 40 to 60 inches deep to a lithic contact. Dabob soils have an albic horizon and lack densic materials within 60 inches.

GEOGRAPHIC SETTING: These soils are on till plains and moraines at elevations of 0 to about 800 feet. Slope is 0 to 65 percent. The soils formed in glacial till. Alderwood soils are in a cool marine climate. The summers are cool and dry, and the winters are mild and wet. Mean annual precipitation ranges from 25 to 60 inches, most of which falls as rain from November through March. Mean January temperature is 38 degrees F, mean July temperature is 60 degrees F, and mean annual temperature is 50 degrees F. The growing season (28 degrees F) is about 200 days.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the [Beausite](#), [Dick](#), [Everett](#), [Hoogdal](#), [Indianola](#), [Kitsap](#), [Norma](#), [Quilcene](#), [Skipopa](#) and [Whidbey](#) series. All of these soils except Whidbey soils lack a densic layer within 40 inches. In addition, the Beausite soils have a lithic contact at 20 to 40 inches. Dick, Hoogdal, Indianola, Kitsap, and Skipopa soils have less than 35 percent coarse fragments. Everett soils are sandy-skeletal. [McKenna](#) soils have an aquic moisture regime. Norma soils have an aquic moisture regime of less than 35 percent coarse fragments in the upper part of the control section. Quilcene soils are in a fine family. Whidbey soils have an E horizon 2 to 5 inches thick and have a higher base status.

DRAINAGE AND PERMEABILITY: Moderately well drained; slow to medium runoff; moderately rapid permeability to the densic layer and very slow permeability below. A perched water table is as high as 18 to 36 inches at times from January through March.

USE AND VEGETATION: Used mostly for woodland, field crops, hay and pasture, orchards, vineyards, wildlife habitat, watershed, and non-farm uses. The native vegetation is Douglas-fir, western hemlock, western redcedar, and red alder with an understory of salal, Oregon-grape, western brackenfern, western swordfern, Pacific rhododendron, huckleberry, red huckleberry, evergreen huckleberry, and Orange honeysuckle.

DISTRIBUTION AND EXTENT: Northwestern Washington; MLRA 2. The series is extensive.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Portland, Oregon

SERIES ESTABLISHED: Snohomish County, Washington 1936.

REMARKS: Classification only changed 4/94 because of recent amendments to Soil Taxonomy, except the horizon nomenclature was updated, and fragments of ortstein and ortstein were changed to iron-manganese nodules and a densic layer. Classification changed 1/2000 from mixed, mesic Vitrandic Durochrepts to isotic, mesic Vitrandic Dystrochrepts based on revision to Soil Taxonomy. Diagnostic horizons and features include:

Ochric epipedon

Cambic horizon - from 7 to 35 inches

Densic material - from 43 to 60 inches

Vitrandic feature - assumed to be from 0 to 30 inches

Oxyaquic feature - perched water table at 18 to 36 inches at times from January to March.

All depths to diagnostic horizons and features noted in the range of characteristics are measured from the top of the first mineral horizon.

More investigation is needed to differentiate the Alderwood from the Dabob series.

ADDITIONAL DATA: Partial data available for this series. Sample # S71WA-033-002, Riverside Lab., 11/73.

National Cooperative Soil Survey
U.S.A.

LOCATION KITSAP WA
Established Series
Rev. JPE/AZ/RJE
01/2000

KITSAP SERIES

The Kitsap series consists of very deep, moderately well drained soils formed in lacustrine sediments. Kitsap soils are on terraces and terrace escarpments and have slopes of 0 to 70 percent. The mean annual precipitation is about 37 inches. The mean annual temperature is about 50 degrees F.

TAXONOMIC CLASS: Fine-silty, isotic, mesic Aquandic Dystroxerepts

TYPICAL PEDON: Kitsap silt loam - pasture. (Colors are for moist soil unless otherwise noted.)

Ap--0 to 6 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; moderately acid (pH 5.8); abrupt smooth boundary. (3 to 6 inches thick)

Bw1--6 to 10 inches; dark brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; few very fine pores; many 2 to 5 mm light brown (7.5YR 6/4) concretions; moderately acid (pH 6.0); clear wavy boundary. (3 to 12 inches thick)

Bw2--10 to 17 inches; brown (10YR 4/3) silty clay loam, pale brown (10YR 6/3) dry; moderate medium subangular blocky structure; hard, firm, moderately sticky and moderately plastic; many very fine roots; common very fine pores about 3 percent fine pebbles; few 2 to 5 mm light brown (7.5YR 6/4) concretions; few silt balls; few krotovinas; slightly acid (pH 6.4); clear wavy boundary. (4 to 22 inches thick)

BC--17 to 32 inches; grayish brown (2.5Y 5/2) silty clay loam, light gray (2.5Y 7/2) dry; many large prominent strong brown (7.5YR 5/6) redox concentrations; moderate medium subangular blocky structure; hard, firm, moderately sticky and moderately plastic; few very fine roots; common very fine pores; slightly acid (pH 6.5); clear irregular boundary. (0 to 35 inches thick)

C--32 to 60 inches; light olive brown (2.5Y 5/4) silt loam and silty clay loam, light brownish gray (2.5Y 6/2) dry; very fine and fine stratification; hard, firm, moderately sticky and moderately plastic; few roots; few very fine pores; tongues of grayish brown (2.5Y 5/2) material like the B3 horizon; neutral; (pH 6.6).

TYPE LOCATION: Pierce County, Washington; 100 feet north of corner of 104th St. and 80th Ave.; 2,050 feet west and 2,750 feet south of the northeast corner of sec. 5, T. 19 N., R. 4 E.

RANGE IN CHARACTERISTICS: These soils are usually moist but are dry in the moisture control section for 45 to 60 consecutive days following summer solstice. The mean annual soil temperature is estimated to range from 50 to about 53 degrees F. These soils range from moderately acid to neutral throughout. Coarse fragments in the control section average 0 to 5 percent by volume. Depth to redoximorphic features with a chroma of 2 or less is 5 to 24 inches.

The A horizon has value of 2, 3 or 4 moist, 4, 5 or 6 dry, and chroma of 2 or 3 moist or dry. It is silt loam or loam.

The Bw horizon has value of 3 through 5 moist, 5 through 7 dry, and chroma of 3 or 4 moist or dry. It is silt loam or silty clay loam, and has weak or moderate blocky structure. The BC horizon has hue of 10YR or 2.5Y, value of 4 through 6 moist, 6 through 8 dry and is prominently mottled. It has blocky or prismatic structure or is massive.

The C horizon has hue of 10YR, 5Y or 2.5Y, value of 5 or 6 moist, 6 through 8 dry, chroma of 2 through 4 moist and dry and is mottled. In some pedons bluish gray (5B 5/1) gleying is prominent in root channels. This horizon is stratified silt, silt loam and silty clay loam. Some pedons contain thin strata of silty clay, silt, or fine sand.

COMPETING SERIES: This is the [Aloha](#) series and the similar [Giles](#) and [Saxon](#) series. Aloha soils have an average soil temperature of 54 to 56oF and lack strata of silty clay loam in the lower part of the particle- size control section. Giles and Saxon soils lack grayish colors or mottles in the subsoil and are well drained. Also, Saxon soils have a dense laminated silt, clay, or silty clay loam B horizon.

GEOGRAPHIC SETTING: Kitsap soils are on terraces and terrace escarpments at elevations ranging from near sea level to about 500 feet. Slopes are 0 to 70 percent. The soils formed in lacustrine sediments. These soils occur in a mild marine climate. Summers are cool and dry and winters are mild and wet. The mean annual precipitation ranges from 30 to 45 inches. The mean January temperature is 39 degrees F., mean July temperature is 61 degrees F., and mean annual temperature is 50 degrees F. The frost-free season is 160 to 200 days.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the [Alderwood](#), [Everett](#), [Harstine](#), and [Indianola](#) soils. These soils have less than 18 percent clay in the control section. Alderwood and Harstine soils have a duripan. Everett soils are sandy-skeletal, and Indianola soils are sandy.

DRAINAGE AND PERMEABILITY: Moderately well-drained; slow or medium runoff; slow permeability.

USE AND VEGETATION: Mostly forests and some cropland and pasture. Native vegetation is Douglas-fir, western hemlock, western redcedar, red alder, bigleaf maple, and willows, with understory of western brackenfern, western swordfern, salal, Oregon-grape, trailing blackberry, red huckleberry, vine maple, evergreen huckleberry, red elderberry, and wild ginger.

DISTRIBUTION AND EXTENT: Northwestern Washington. The series is of moderate extent.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Portland, Oregon

SERIES ESTABLISHED: Kitsap County, Washington, 1934.

REMARKS: Classification changed 4/94 and 1/00 because of amendments to Soil Taxonomy. The 0 to 10 inch depth is estimated to have >5 percent volcanic glass and >0.4 percent Al + 1/2 Fe by acid-oxalate.

ADDITIONAL DATA: Partial laboratory data available on this soil. Pedon # S77WA-061-30, NSSL, Lincoln, NE.

National Cooperative Soil Survey
U.S.A.

Precipitation Data

Yarrow CK TRIB

Figure 19-7 Rainfall documentation worksheet

Rainfall Documentation
(use with photographs)

Date: April 5 2010

Weather station: _____ Landowner: _____ Tract no.: _____

County: Kilgus Co. State: WA

Soil name: _____ Growing season: _____

Photo date: _____

Long-term rainfall records								
Month	3 yrs. in 10 less than	Normal	3 yrs. in 10 more than	Rain fall	Condition dry, wet, normal	Condition value	Month weight value	Product of previous two columns
1st prior month*	<u>Mar</u>	<u>2.77</u>	<u>3.75</u>	<u>4.40</u>	<u>3.85</u>	<u>Normal</u>	<u>2</u>	<u>3</u>
2nd prior month*	<u>Feb</u>	<u>2.73</u>	<u>4.18</u>	<u>5.02</u>	<u>3.89</u>	<u>Normal</u>	<u>2</u>	<u>4</u>
3rd prior month*	<u>Jan</u>	<u>3.58</u>	<u>5.13</u>	<u>6.10</u>	<u>5.79</u>	<u>Normal</u>	<u>2</u>	<u>2</u>
							Sum	<u>12</u>

* Compared to photo date

Note: If sum is
 6 - 9 then prior period has been drier than normal
 10 - 14 then prior period has been normal
 15 - 18 then prior period has been wetter than normal

Condition value:
 Dry =1
 Normal =2
 Wet =3

Conclusions:

Normal

WETS Station : SEATTLE TCOMA WSCMO AP, WA7473 Creation Date: 09/10/2002
 Latitude: 4727 Longitude: 12218 Elevation: 00400
 State FIPS/County(FIPS): 53033 County Name: King
 Start yr. - 1971 End yr. - 2000

Month	Temperature (Degrees F.)			Precipitation (Inches)				
	avg daily max	avg daily min	avg	avg	30% chance will have		avg	total
					less than	more than	# of days w/.1 or more	snow fall
January	45.8	35.9	40.9	5.13	3.58	6.10	11	2.4
February	49.5	37.2	43.3	4.18	2.73	5.02	10	1.3
March	53.2	39.1	46.2	3.75	2.77	4.40	10	0.6
April	58.2	42.1	50.1	2.59	1.71	3.11	7	0.1
May	64.3	47.2	55.7	1.77	1.16	2.13	5	0.0
June	69.5	51.7	60.6	1.49	0.96	1.79	4	0.0
July	75.2	55.3	65.3	0.79	0.43	0.97	2	0.0
August	75.5	55.7	65.6	1.02	0.38	1.24	2	0.0
September	70.1	51.9	61.0	1.63	0.62	2.03	4	0.0
October	59.7	45.7	52.7	3.19	1.96	3.86	7	0.1
November	50.5	39.9	45.2	5.90	4.10	7.02	13	1.1
December	45.4	35.9	40.7	5.62	3.94	6.68	11	1.9
Annual	-----	-----	-----	-----	33.52	40.09	--	-----
Average	59.7	44.8	52.3	-----	-----	-----	--	-----
Total	-----	-----	-----	37.07	-----	-----	86	7.5

GROWING SEASON DATES

Probability	Temperature		
	24 F or higher	28 F or higher	32 F or higher
	Beginning and Ending Dates Growing Season Length		
50 percent *	1/20 to 12/28 343 days	2/ 7 to 12/ 8 304 days	3/ 9 to 11/15 252 days
70 percent *	> 365 days > 365 days	1/31 to 12/15 319 days	3/ 3 to 11/21 263 days

* Percent chance of the growing season occurring between the Beginning and Ending dates.

StateCode	Division	YearMonth	PCP	TMP	3. Precip. txt		ZNDX	PMDI	CDD	HDD	SP01	SP02
					PDSI	PHDI						
45	03	201001	5.79	45.30	-1.07	-1.07	-0.36	-1.07	0.	611.	0.23	-0.67
0.27	0.67	0.65	0.37	0.14								
45	03	201002	3.09	45.20	-1.56	-1.56	-1.80	-1.56	0.	554.	-0.58	-0.27
-0.88	0.42	0.08	0.55	0.18								
45	03	201003	3.85	46.70	-1.56	-1.56	-0.48	-1.56	0.	567.	0.16	-0.37
-0.20	0.40	0.30	0.43	0.13								
45	03	201004	3.42	49.20	0.36	-1.03	1.09	-0.39	0.	474.	0.67	0.44
-0.08	0.12	0.48	0.45	0.20								

APPENDIX D

Data Sheets

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: 102nd Avenue NE/Yarrow Ck Tributary City/County: Bellevue/ King Sampling Date: 4/15/10
 Applicant/Owner: City of Bellevue State: WA Sampling Point: SP-1
 Investigator(s): SJQ/WPW Section, Township, Range: Section 20, Township 25N, Range 5E
 Landform (hillslope, terrace, etc.): Slope Local relief (concave, convex, none): None Slope (%): _____
 Subregion (LRR): LRR A, Northwest Forests and Coast Lat: _____ Long: _____ Datum: _____
 Soil Map Unit Name: Kitsap silt loam NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No (If no, explain in Remarks.)
 Are Vegetation Yes, Soil No, or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes No
 Are Vegetation No, Soil No, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Hydric Soil Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Remarks: Sampling point is located adjacent to 102nd Avenue NE along a side sewer alignment approximately 60 ft west of the Yarrow Creek tributary. Area is disturbed. The hydrology of this potential wetland area was observed as seeps from slopes adjacent to 102nd Avenue NE. It is possible that the seep is a result of degraded culverts and stormwater conveyance pipes that are associated with the 102nd Avenue NE road crossing.	

VEGETATION – Use scientific names of plants.

<u>Tree Stratum</u> (Plot size: <u>30 ft</u>)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet:
1. _____	_____	_____	_____	Number of Dominant Species That Are OBL, FACW, or FAC: <u>3</u> (A) Total Number of Dominant Species Across All Strata: <u>3</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100</u> (A/B)
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
0 = Total Cover				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
Sapling/Shrub Stratum				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
_____ = Total Cover				
Herb Stratum				
(Plot size: <u>5 ft</u>)				
1. <u>Ranunculus repens</u>	_____	Y	FACW	
2. <u>Urtica dioica</u>	_____	Y	FAC+	
3. <u>Equisetum arvense</u>	_____	Y	FAC	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	
_____ = Total Cover				
Woody Vine Stratum				
(Plot size: <u>30 ft</u>)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
0 = Total Cover				
% Bare Ground in Herb Stratum _____				
Hydrophytic Vegetation Indicators: <input type="checkbox"/> Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> Dominance Test is >50% <input type="checkbox"/> Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Wetland Non-Vascular Plants ¹ <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.				
Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>				

Remarks: Area is outside of project impacts, percent vegetation not recorded at time of field investigation.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: 102nd Avenue NE/Yarrow Ck Tributary City/County: Bellevue/ King Sampling Date: 4/15/10
 Applicant/Owner: City of Bellevue State: WA Sampling Point: SP-2
 Investigator(s): SJQ/WPW Section, Township, Range: Section 20, Township 25N, Range 5E
 Landform (hillslope, terrace, etc.): Slope Local relief (concave, convex, none): None Slope (%): _____
 Subregion (LRR): LRR A, Northwest Forests and Coast Lat: _____ Long: _____ Datum: _____
 Soil Map Unit Name: Kitsap silt loam NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No (If no, explain in Remarks.)
 Are Vegetation No, Soil No, or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes No
 Are Vegetation No, Soil No, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Hydric Soil Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Wetland Hydrology Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Remarks: Sampling point is located west of the Yarrow Creek tributary.	

VEGETATION – Use scientific names of plants.

<u>Tree Stratum</u> (Plot size: <u>30 ft</u>)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet:
1. <u>Acer macrophyllum</u>	<u>5</u>	<u>Y</u>	<u>FACU</u>	Number of Dominant Species That Are OBL, FACW, or FAC: <u>0</u> (A)
2. <u>Tsuga heterophylla</u>	<u>5</u>	<u>Y</u>	<u>FACU-</u>	Total Number of Dominant Species Across All Strata: <u>5</u> (B)
3. _____				Percent of Dominant Species That Are OBL, FACW, or FAC: <u>0</u> (A/B)
4. _____				
	<u>10</u>	= Total Cover		
<u>Sapling/Shrub Stratum</u> (Plot size: <u>5 ft</u>)				Prevalence Index worksheet:
1. <u>Rubus discolor</u>	<u>5</u>	<u>Y</u>	<u>FACU</u>	Total % Cover of: _____ Multiply by:
2. _____				OBL species _____ x 1 = _____
3. _____				FACW species _____ x 2 = _____
4. _____				FAC species _____ x 3 = _____
5. _____				FACU species _____ x 4 = _____
	<u>5</u>	= Total Cover		UPL species _____ x 5 = _____
				Column Totals: _____ (A) _____ (B)
				Prevalence Index = B/A = _____
<u>Herb Stratum</u> (Plot size: <u>5 ft</u>)				Hydrophytic Vegetation Indicators:
1. <u>Hedera helix</u>	<u>70</u>	<u>Y</u>	<u>NI</u>	<input type="checkbox"/> Rapid Test for Hydrophytic Vegetation
2. <u>Urtica dioica</u>	<u>30</u>	<u>Y</u>	<u>FAC+</u>	<input type="checkbox"/> Dominance Test is >50%
3. _____				<input type="checkbox"/> Prevalence Index is ≤3.0 ¹
4. _____				<input type="checkbox"/> Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet)
5. _____				<input type="checkbox"/> Wetland Non-Vascular Plants ¹
6. _____				<input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain)
7. _____				¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
8. _____				
9. _____				
10. _____				
11. _____				
	<u>100</u>	= Total Cover		
<u>Woody Vine Stratum</u> (Plot size: <u>30 ft</u>)				Hydrophytic Vegetation Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
1. _____				
2. _____				
	<u>0</u>	= Total Cover		
% Bare Ground in Herb Stratum _____				
Remarks:				

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: 102nd Avenue NE/Yarrow Ck Tributary City/County: Bellevue/ King Sampling Date: 4/15/10
 Applicant/Owner: City of Bellevue State: WA Sampling Point: SP-3
 Investigator(s): SJQ/WPW Section, Township, Range: Section 20, Township 25N, Range 5E
 Landform (hillslope, terrace, etc.): Slope Local relief (concave, convex, none): None Slope (%): _____
 Subregion (LRR): LRR A, Northwest Forests and Coast Lat: _____ Long: _____ Datum: _____
 Soil Map Unit Name: Kitsap silt loam NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No (If no, explain in Remarks.)
 Are Vegetation No, Soil No, or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes No
 Are Vegetation No, Soil No, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Hydric Soil Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Wetland Hydrology Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Remarks: Sampling point is located east of the Yarrow Creek tributary.	

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status	
Tree Stratum (Plot size: <u>30 ft</u>)				
1. <u>Alnus rubra</u>		<u>Y</u>	<u>FAC</u>	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>2</u> (A) Total Number of Dominant Species Across All Strata: <u>6</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>33</u> (A/B)
2. <u>Tsuga heterophylla</u>		<u>Y</u>	<u>FACU-</u>	
3. _____				
4. _____				
			= Total Cover	
Sapling/Shrub Stratum (Plot size: <u>5 ft</u>)				
1. <u>Mahonia aquifolium</u>		<u>Y</u>	<u>NI</u>	Prevalence Index worksheet: Total % Cover of: _____ Multiply by: OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
2. <u>Corylus cornuta</u>		<u>Y</u>	<u>FACU</u>	
3. _____				
4. _____				
			= Total Cover	
Herb Stratum (Plot size: <u>5 ft</u>)				
1. <u>Polystichum munitum</u>		<u>Y</u>	<u>FACU</u>	Hydrophytic Vegetation Indicators: <input type="checkbox"/> Rapid Test for Hydrophytic Vegetation <input type="checkbox"/> Dominance Test is >50% <input type="checkbox"/> Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Wetland Non-Vascular Plants ¹ <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
2. <u>Hydrophyllum sp.</u>		<u>Y</u>	<u>FAC</u>	
3. _____				
4. _____				
5. _____				
6. _____				
7. _____				
8. _____				
9. _____				
10. _____				
11. _____				
			= Total Cover	
Woody Vine Stratum (Plot size: <u>30 ft</u>)				
1. _____				Hydrophytic Vegetation Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
2. _____				
			= Total Cover	
% Bare Ground in Herb Stratum _____				
Remarks:				

Selected Site Photographs

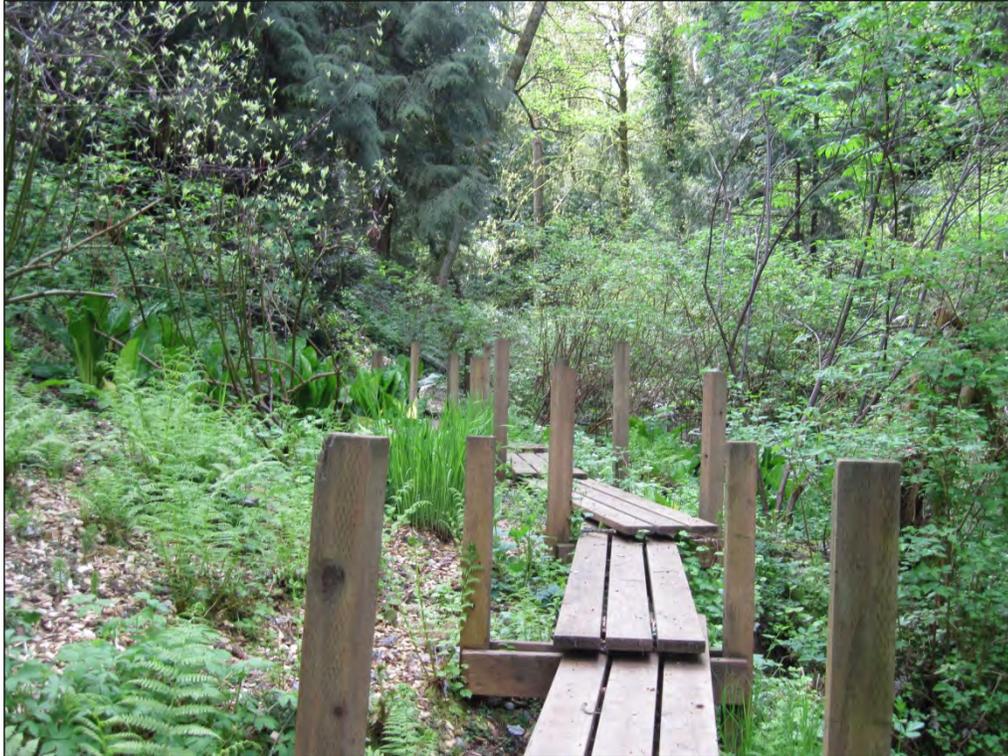


1. Yarrow Creek tributary facing upstream from sewer line before emergency repair.



2. Yarrow Creek tributary ravine facing downstream near 102nd Avenue NE before emergency repair.

12/20/10 P:\0800007\060\Files\IR\Critical Areas Report\Appx\Yarrow Creek Critical Areas_ape-1.docx



3. Wetland B along Yarrow Creek (east of project area).



4. Sampling Point SP-1.

12/20/10 P:\0800007\060\Files\IR\Critical Areas Report\Appendix\Yarrow Creek Critical Areas_ape-2.docx



5. Sampling Point SP-2 on west side of tributary.



6. Sampling Point SP-3 on east side of tributary.

12/20/10 P:\080\007\060\Files\MIR\Critical Areas Report\Appx\Yarrow Creek Critical Areas_ape-3.docx



7. Yarrow Creek tributary emergency repair, facing southeast toward 102nd Avenue NE.



8. Yarrow Creek tributary emergency repair, facing north toward downstream suspended sewer.

12/20/10 P:\080007\060\Files\IR\Critical Areas Report\Appx\Yarrow Creek Critical Areas_ape-4.docx

JARPA Figures



PURPOSE: THIS PROJECT IS EMERGENCY REPAIR AND RESTORATION OF A ROADWAY CULVERT AND EMBANKMENTS THAT CONTAIN A TRIBUTARY OF YARROW CREEK.

TOWNSHIP/RANGE: SEC 19 AND 20 TWP 25N RGE 05E
LAT/LONG: 47.641484°N, 122.204628°W; DATUM; NAD 83

ADJACENT PROPERTY OWNERS:

1. HANLEY (4122700090)
2. KOBLEIN (4122700080)
3. LAWRENCE (4122300085)
4. YANG (4122300080)

CITY OF BELLEVUE

102ND AVENUE NE AND YARROW CREEK TRIBUTARY REPAIR AND RESTORATION

VICINITY MAP

PROPOSED: RESTORATION OF APPROXIMATELY 220 LINEAR FEET OF STREAM.

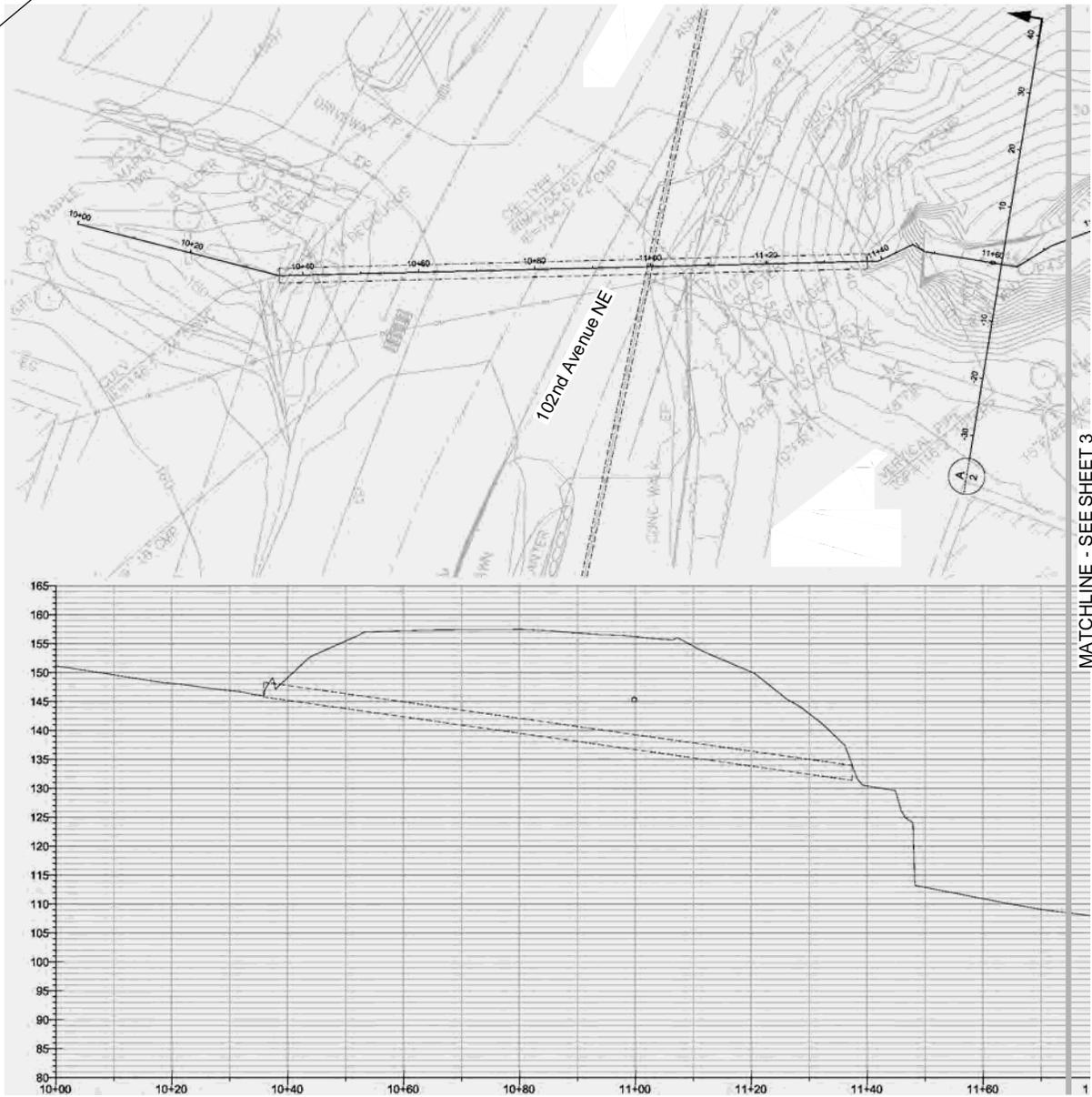
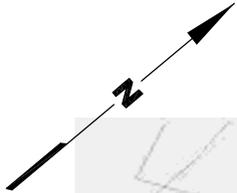
IN: JURISDICTIONAL WATERS OF THE U.S.
AT: CITY OF BELLEVUE, KING COUNTY, WA

APPLICATION BY: CITY OF BELLEVUE UTILITIES DEPARTMENT.

DATE: 12-17-2010

SHEET: 1 OF 20

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MATCHLINE - SEE SHEET 3

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PURPOSE: THIS PROJECT IS EMERGENCY REPAIR AND RESTORATION OF A ROADWAY CULVERT AND EMBANKMENTS THAT CONTAIN A TRIBUTARY OF YARROW CREEK.

TOWNSHIP/RANGE: SEC 19 AND 20 TWP 25N RGE 05E
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CITY OF BELLEVUE

**102ND AVENUE NE
AND YARROW
CREEK TRIBUTARY
REPAIR AND
RESTORATION**

**PRE-EXISTING
CONDITION PLAN
AND PROFILE**

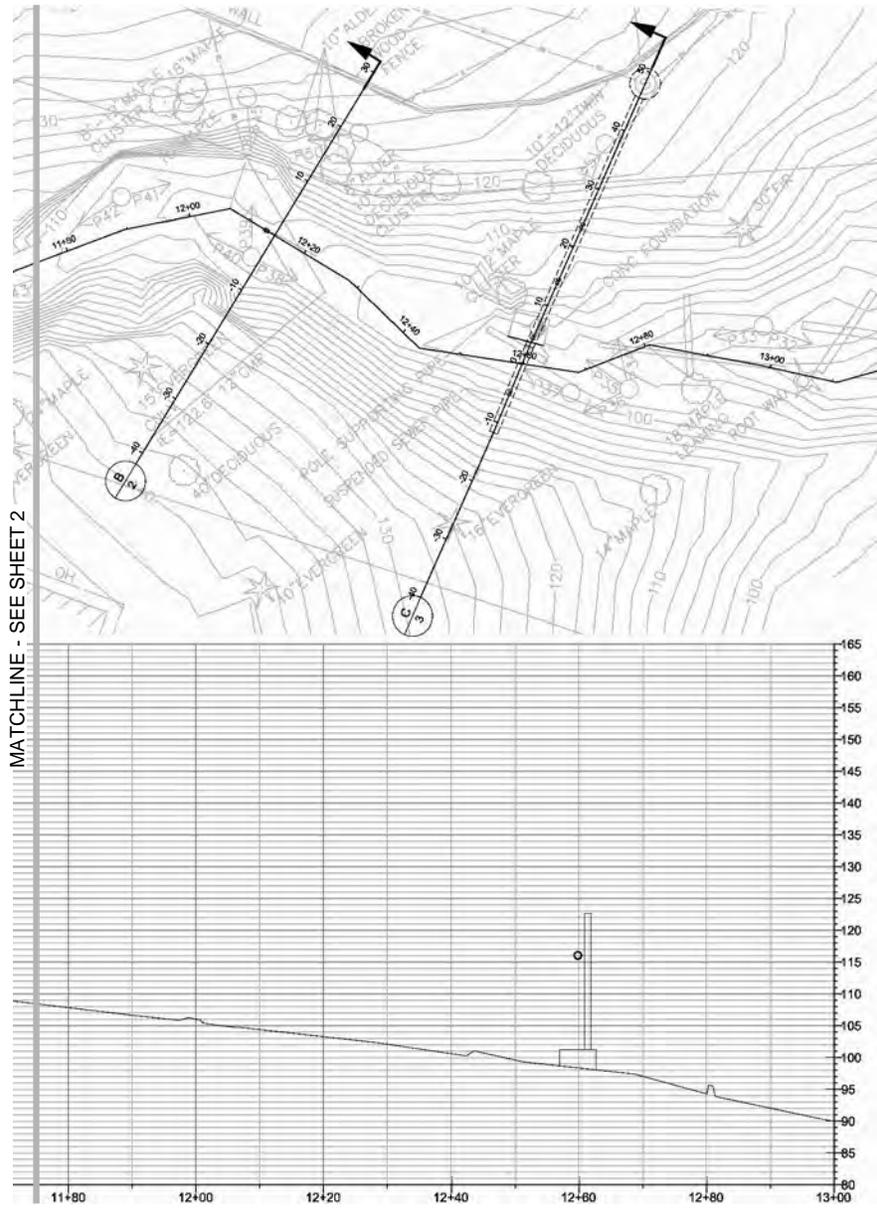
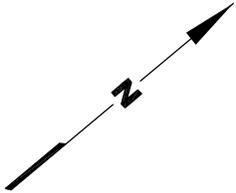
PROPOSED: RESTORATION OF APPROXIMATELY 220 LINEAR FEET OF STREAM.

IN: JURISDICTIONAL WATERS OF THE U.S.
AT: CITY OF BELLEVUE, KING COUNTY, WA

APPLICATION BY: CITY OF BELLEVUE UTILITIES DEPARTMENT.

DATE: 12-17-2010

SHEET: 2 OF 20



MATCHLINE - SEE SHEET 2

PURPOSE: THIS PROJECT IS EMERGENCY REPAIR AND RESTORATION OF A ROADWAY CULVERT AND EMBANKMENTS THAT CONTAIN A TRIBUTARY OF YARROW CREEK.

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CITY OF BELLEVUE

**102ND AVENUE NE
AND YARROW
CREEK TRIBUTARY
REPAIR AND
RESTORATION**

**PRE-EXISTING
CONDITION PLAN
AND PROFILE**

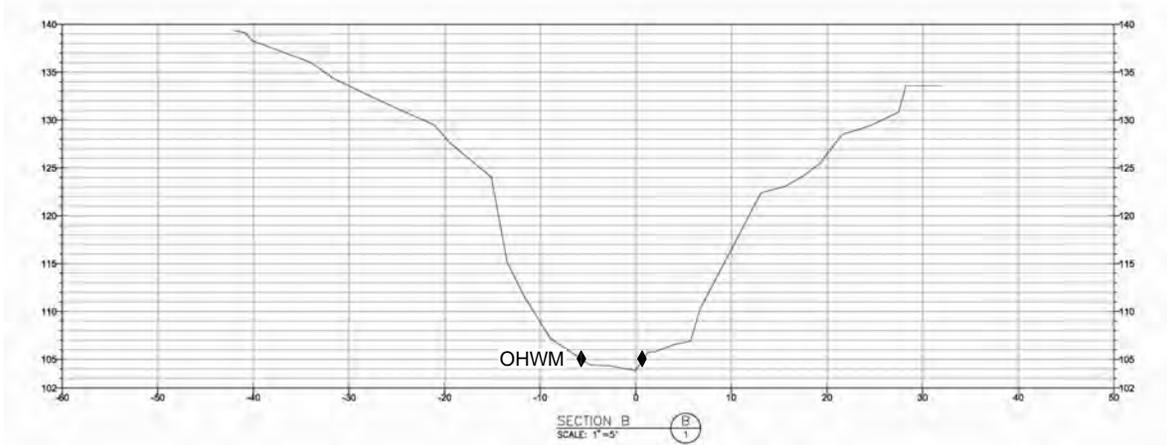
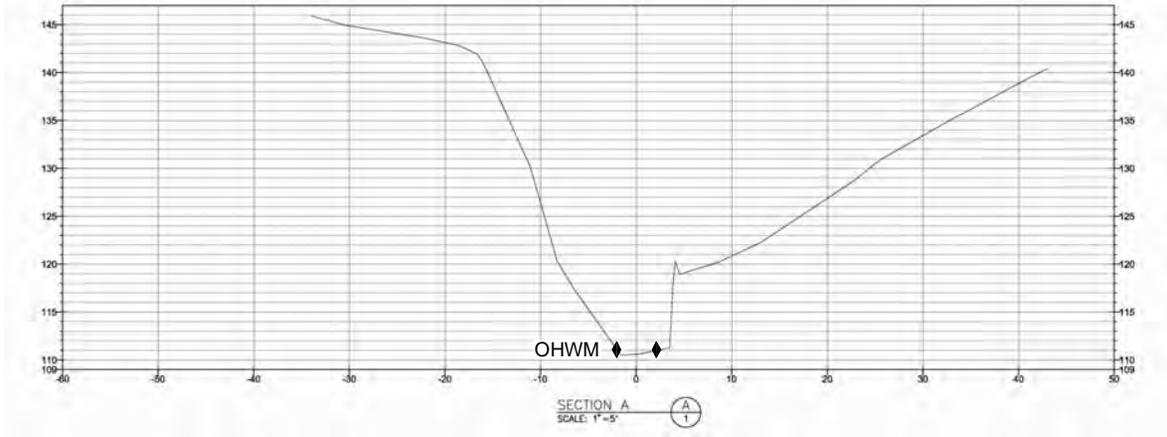
PROPOSED: RESTORATION OF APPROXIMATELY 220 LINEAR FEET OF STREAM.

IN: JURISDICTIONAL WATERS OF THE U.S.
AT: CITY OF BELLEVUE, KING COUNTY, WA

APPLICATION BY: CITY OF BELLEVUE UTILITIES DEPARTMENT.

DATE: 12-17-2010

SHEET: 3 OF 20



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PURPOSE: THIS PROJECT IS EMERGENCY REPAIR AND RESTORATION OF A ROADWAY CULVERT AND EMBANKMENTS THAT CONTAIN A TRIBUTARY OF YARROW CREEK.

TOWNSHIP/RANGE: SEC 19 AND 20 TWP 25N RGE 05E
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CITY OF BELLEVUE

**102ND AVENUE NE
AND YARROW
CREEK TRIBUTARY
REPAIR AND
RESTORATION**

**PRE-EXISTING
CONDITION CROSS
SECTIONS**

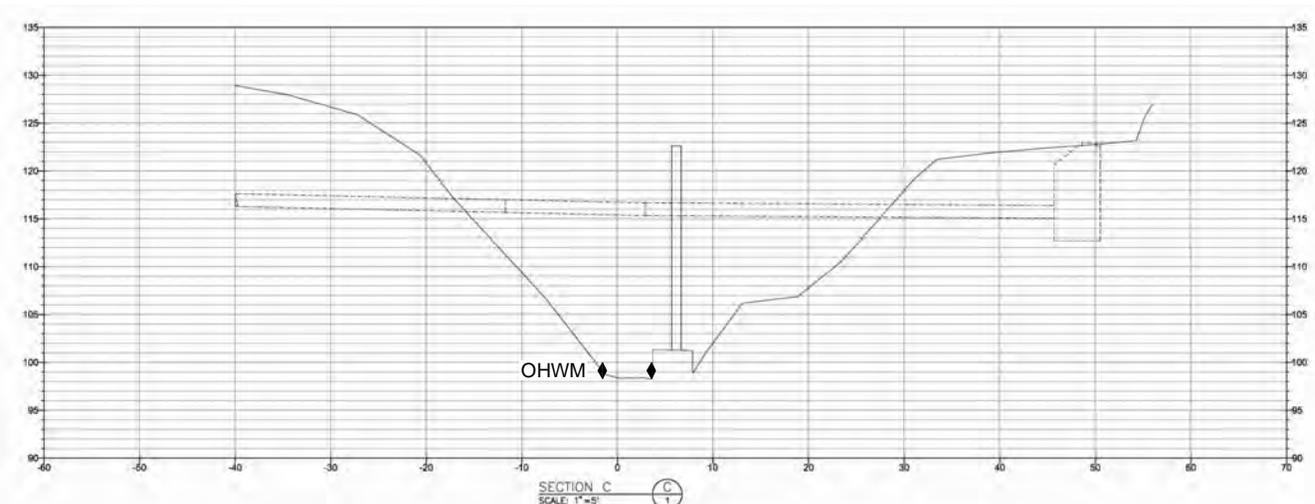
PROPOSED: RESTORATION OF APPROXIMATELY 220 LINEAR FEET OF STREAM.

IN: JURISDICTIONAL WATERS OF THE U.S.
AT: CITY OF BELLEVUE, KING COUNTY, WA

APPLICATION BY: CITY OF BELLEVUE UTILITIES DEPARTMENT.

DATE: 12-17-2010

SHEET: 4 OF 20



I:\V:\0680\007\060\061\JARPA\Sheet 1-5.dwg - 12/17/2010

PURPOSE: THIS PROJECT IS EMERGENCY REPAIR AND RESTORATION OF A ROADWAY CULVERT AND EMBANKMENTS THAT CONTAIN A TRIBUTARY OF YARROW CREEK.

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CITY OF BELLEVUE

102ND AVENUE NE AND YARROW CREEK TRIBUTARY REPAIR AND RESTORATION

PRE-EXISTING CONDITION CROSS SECTION

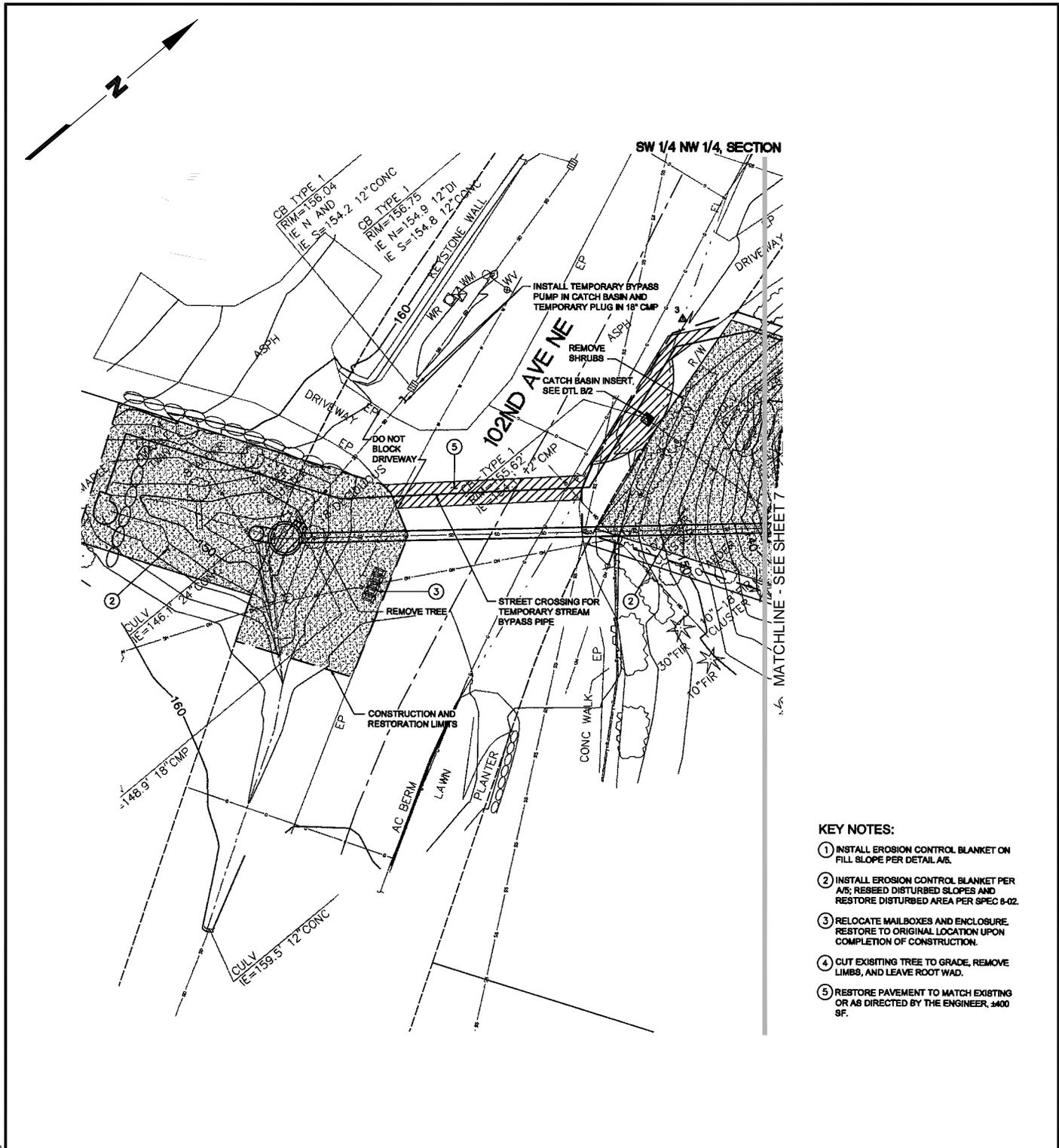
PROPOSED: RESTORATION OF APPROXIMATELY 220 LINEAR FEET OF STREAM.

IN: JURISDICTIONAL WATERS OF THE U.S.
AT: CITY OF BELLEVUE, KING COUNTY, WA

APPLICATION BY: CITY OF BELLEVUE UTILITIES DEPARTMENT.

DATE: 12-17-2010

SHEET: 5 OF 20



- KEY NOTES:**
- ① INSTALL EROSION CONTROL BLANKET ON FILL SLOPE PER DETAIL A5.
 - ② INSTALL EROSION CONTROL BLANKET PER A/5; RESEED DISTURBED SLOPES AND RESTORE DISTURBED AREA PER SPEC 8-02.
 - ③ RELOCATE MAIL BOXES AND ENCLOSURE. RESTORE TO ORIGINAL LOCATION UPON COMPLETION OF CONSTRUCTION.
 - ④ CUT EXISTING TREE TO GRADE, REMOVE LIMBS, AND LEAVE ROOT WAD.
 - ⑤ RESTORE PAVEMENT TO MATCH EXISTING OR AS DIRECTED BY THE ENGINEER, 3400 SF.

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PURPOSE: THIS PROJECT IS EMERGENCY REPAIR AND RESTORATION OF A ROADWAY CULVERT AND EMBANKMENTS THAT CONTAIN A TRIBUTARY OF YARROW CREEK.

TOWNSHIP/RANGE: SEC 19 AND 20 TWP 25N RGE 05E
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CITY OF BELLEVUE

102ND AVENUE NE AND YARROW CREEK TRIBUTARY REPAIR AND RESTORATION

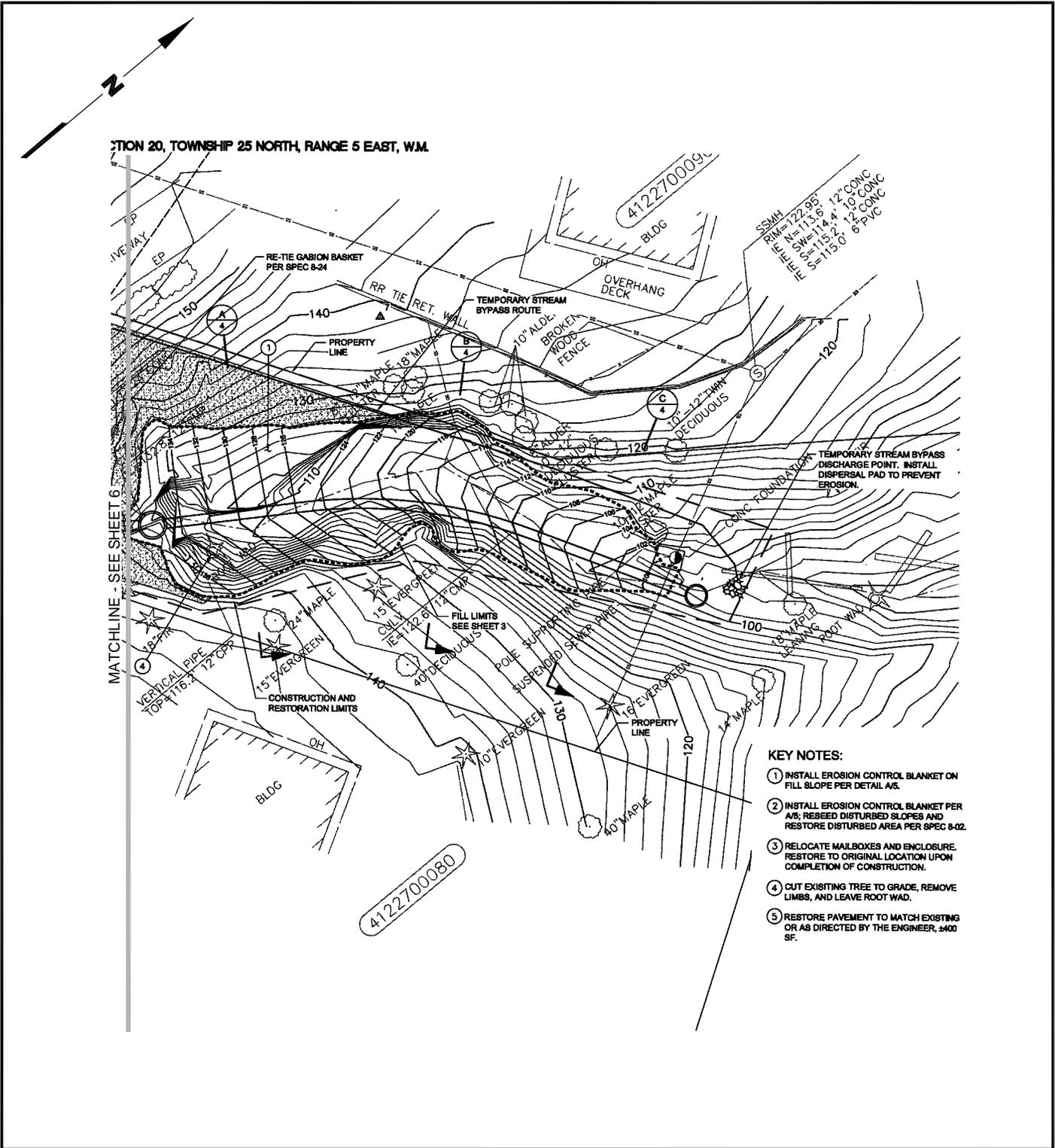
EMERGENCY REPAIR SITE PREPARATION AND GRADING PLAN

PROPOSED: RESTORATION OF APPROXIMATELY 220 LINEAR FEET OF STREAM.

IN: JURISDICTIONAL WATERS OF THE U.S.
AT: CITY OF BELLEVUE, KING COUNTY, WA

APPLICATION BY: CITY OF BELLEVUE UTILITIES DEPARTMENT.

DATE: 12-17-2010
SHEET: 6 OF 20



- KEY NOTES:**
- 1 INSTALL EROSION CONTROL BLANKET ON FILL SLOPE PER DETAIL A/B.
 - 2 INSTALL EROSION CONTROL BLANKET PER A/B; RESEED DISTURBED SLOPES AND RESTORE DISTURBED AREA PER SPEC 8-02.
 - 3 RELOCATE MAILBOXES AND ENCLOSURE. RESTORE TO ORIGINAL LOCATION UPON COMPLETION OF CONSTRUCTION.
 - 4 CUT EXISTING TREE TO GRADE, REMOVE LIMBS, AND LEAVE ROOT WAD.
 - 5 RESTORE PAVEMENT TO MATCH EXISTING OR AS DIRECTED BY THE ENGINEER, 3400 SF.

PURPOSE: THIS PROJECT IS EMERGENCY REPAIR AND RESTORATION OF A ROADWAY CULVERT AND EMBANKMENTS THAT CONTAIN A TRIBUTARY OF YARROW CREEK.

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CITY OF BELLEVUE

102ND AVENUE NE AND YARROW CREEK TRIBUTARY REPAIR AND RESTORATION

EMERGENCY REPAIR SITE PREPARATION AND GRADING PLAN

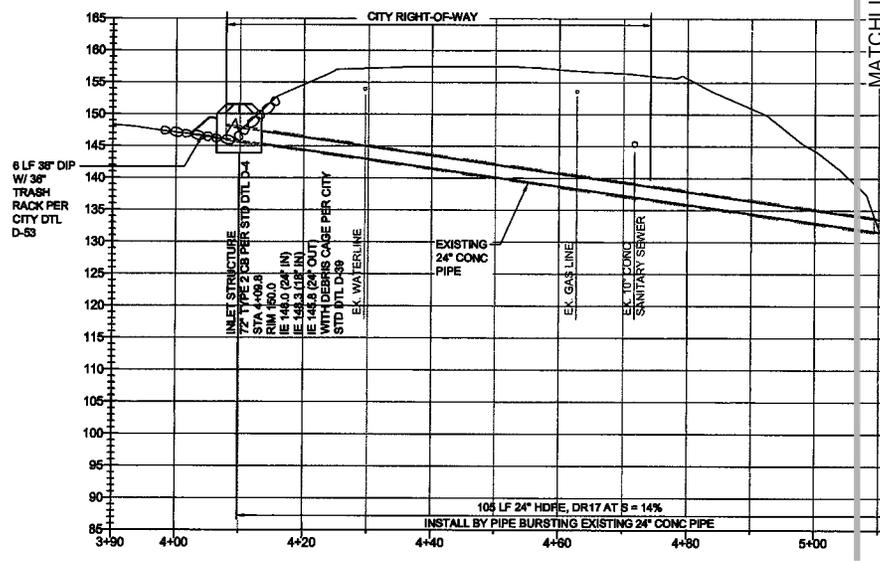
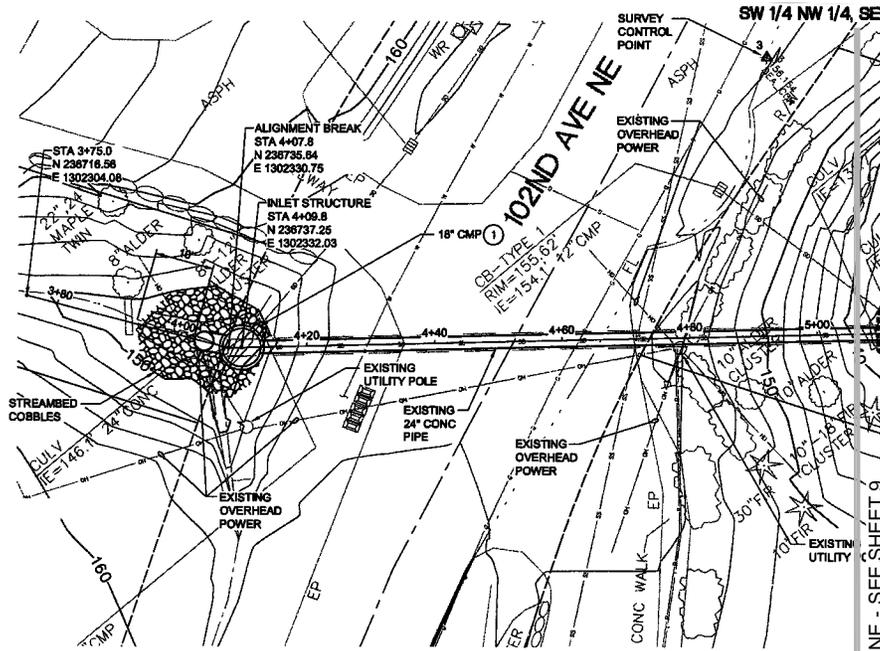
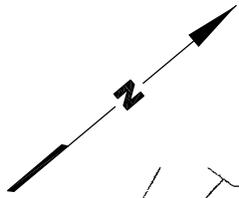
PROPOSED: RESTORATION OF APPROXIMATELY 220 LINEAR FEET OF STREAM.

IN: JURISDICTIONAL WATERS OF THE U.S.
AT: CITY OF BELLEVUE, KING COUNTY, WA

APPLICATION BY: CITY OF BELLEVUE UTILITIES DEPARTMENT.

DATE: 12-17-2010
SHEET: 7 OF 20

I:\V:\0680\007\060\061\JARPA\Sheet 6-10.dwg - 12/17/2010



- GENERAL NOTES:**
- REFER TO SPEC SECTION 7-01 FOR HDPE MATERIAL.
 - CONNECT PIPE TO MANHOLES WITH KOR-N-SEAL RUBBER BOOT PER SPEC SECTION 7-10.
- KEY NOTES:**
- EXTEND 18" CMP TO INLET STRUCTURE
 - EXTEND 12" CMP TO CULVERT OUTLET STRUCTURE
 - 60 LF 12" TEMPORARY CPE PIPE. CONNECT TO EXISTING CMP AND EXTEND PAST ENERGY DISSIPATER. SECURE PIPE TO SLOPE WITH PIPE STAKE ASSEMBLY PER STD DTL D-57.

I:\V:\060\007\060.061\JARPA\Sheet 6-10.dwg - 12/17/2010

PURPOSE: THIS PROJECT IS EMERGENCY REPAIR AND RESTORATION OF A ROADWAY CULVERT AND EMBANKMENTS THAT CONTAIN A TRIBUTARY OF YARROW CREEK.

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CITY OF BELLEVUE

102ND AVENUE NE AND YARROW CREEK TRIBUTARY REPAIR AND RESTORATION

EMERGENCY REPAIR PLAN

PROPOSED: RESTORATION OF APPROXIMATELY 220 LINEAR FEET OF STREAM.

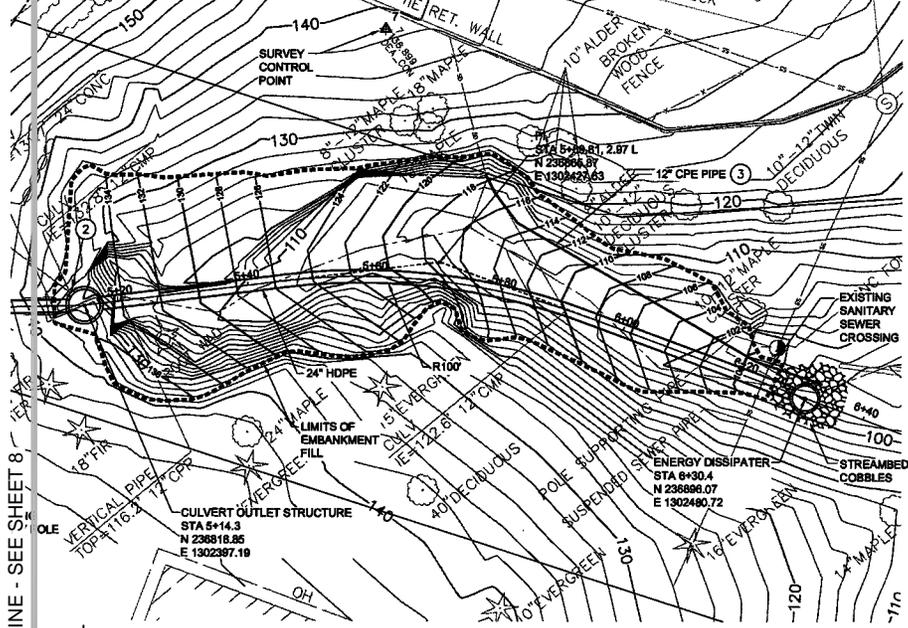
IN: JURISDICTIONAL WATERS OF THE U.S.
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APPLICATION BY: CITY OF BELLEVUE UTILITIES DEPARTMENT.

DATE: 12-17-2010

SHEET: 8 OF 20

1/4 SECTION 20, TOWNSHIP 25 NORTH, RANGE 5 EAST, W.M.

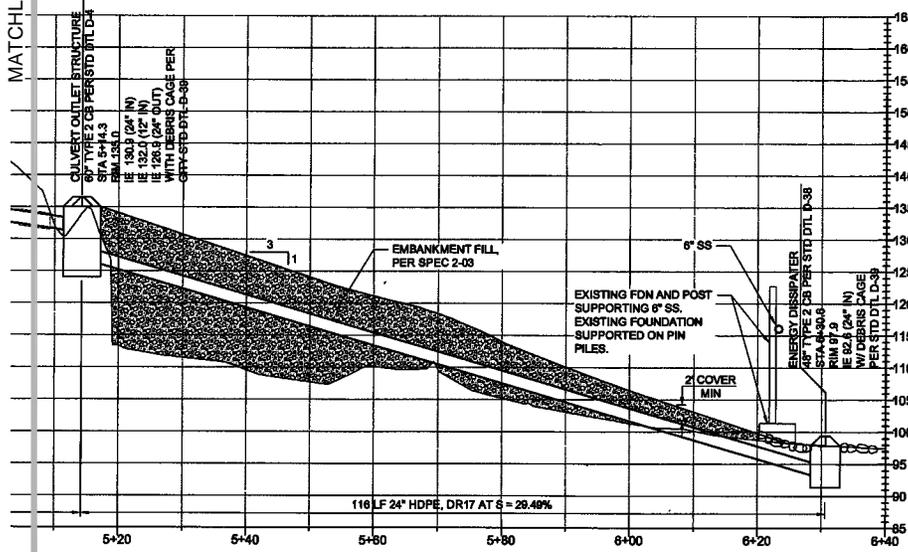


GENERAL NOTES:

1. REFER TO SPEC SECTION 7-01 FOR HDPE MATERIAL.
2. CONNECT PIPE TO MANHOLES WITH KOR-N-SEAL RUBBER BOOT PER SPEC SECTION 7-10.

KEY NOTES:

- ① EXTEND 18" CMP TO INLET STRUCTURE
- ② EXTEND 12" CMP TO CULVERT OUTLET STRUCTURE
- ③ 80 LF 12" TEMPORARY CPE PIPE. CONNECT TO EXISTING CMP AND EXTEND PAST ENERGY DISSIPATER. SECURE PIPE TO SLOPE WITH PIPE STAKE ASSEMBLY PER STD DTL D-67.



PURPOSE: THIS PROJECT IS EMERGENCY REPAIR AND RESTORATION OF A ROADWAY CULVERT AND EMBANKMENTS THAT CONTAIN A TRIBUTARY OF YARROW CREEK.

TOWNSHIP/RANGE: SEC 19 AND 20 TWP 25N RGE 05E
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CITY OF BELLEVUE

**102ND AVENUE NE
AND YARROW
CREEK TRIBUTARY
REPAIR AND
RESTORATION**

**EMERGENCY
REPAIR PLAN**

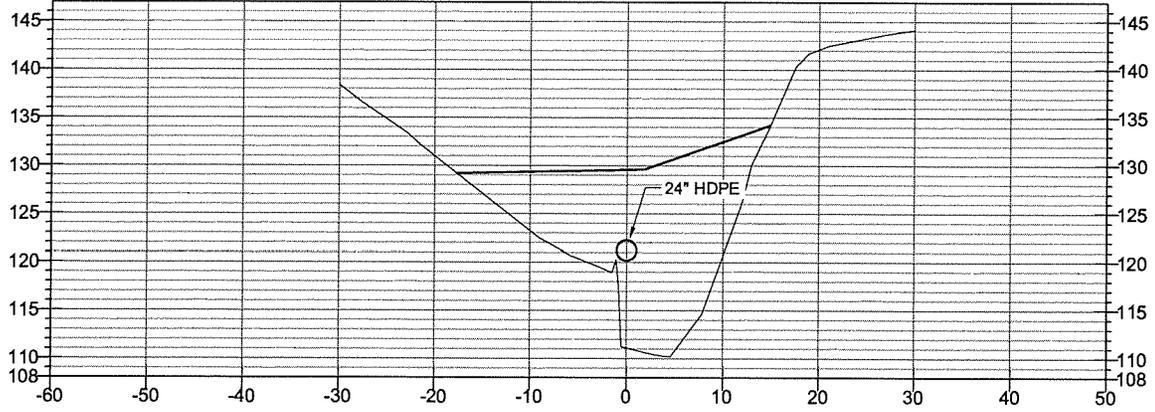
PROPOSED: RESTORATION OF APPROXIMATELY 220 LINEAR FEET OF STREAM.

IN: JURISDICTIONAL WATERS OF THE U.S.
AT: CITY OF BELLEVUE, KING COUNTY, WA

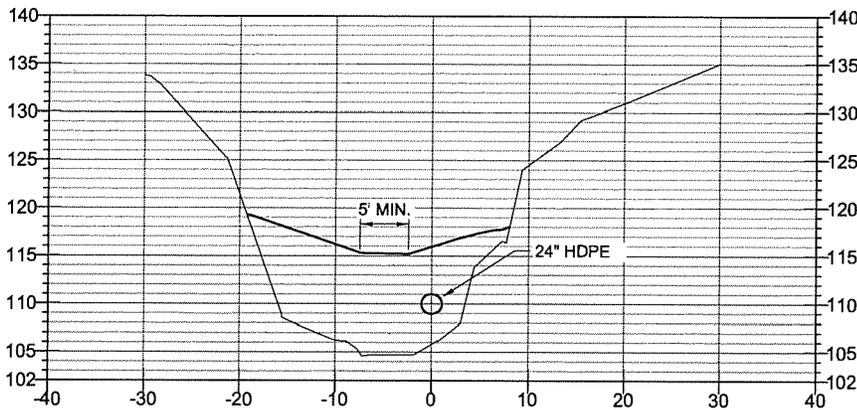
APPLICATION BY: CITY OF BELLEVUE UTILITIES DEPARTMENT.

DATE: 12-17-2010

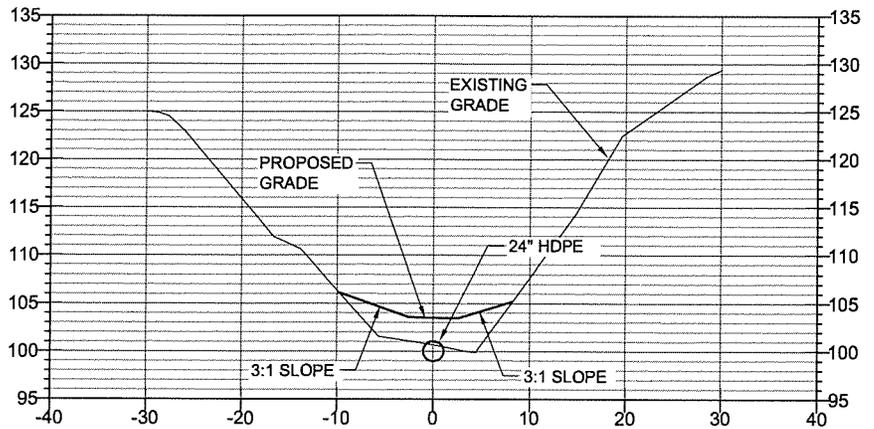
SHEET: 9 OF 20



SECTION A A
2



SECTION B B
2



SECTION C C
2

PURPOSE: THIS PROJECT IS EMERGENCY REPAIR AND RESTORATION OF A ROADWAY CULVERT AND EMBANKMENTS THAT CONTAIN A TRIBUTARY OF YARROW CREEK.

TOWNSHIP/RANGE: SEC 19 AND 20 TWP 25N RGE 05E
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CITY OF BELLEVUE

**102ND AVENUE NE
AND YARROW
CREEK TRIBUTARY
REPAIR AND
RESTORATION**

**EMERGENCY
REPAIR PROFILE**

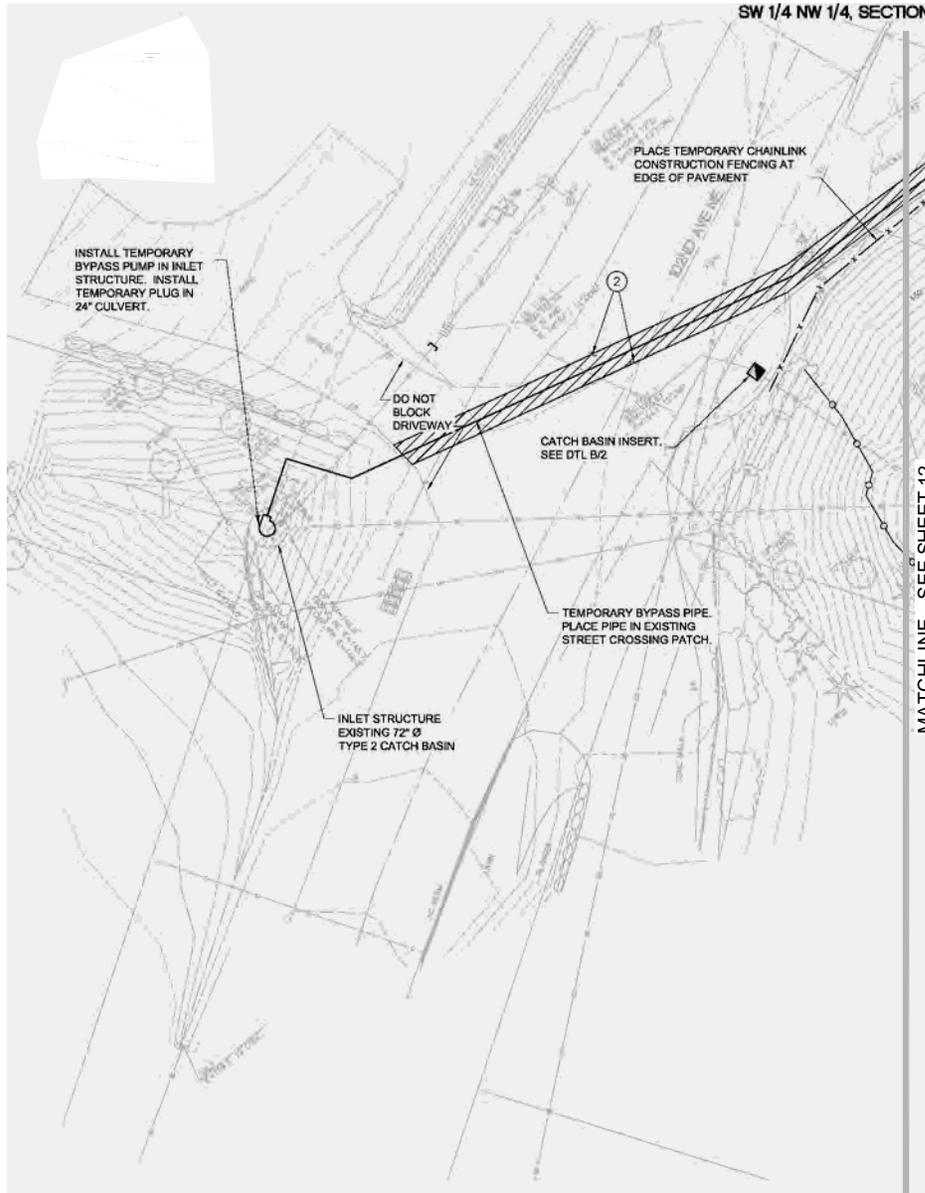
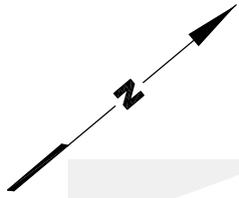
PROPOSED: RESTORATION OF APPROXIMATELY 220 LINEAR FEET OF STREAM.

IN: JURISDICTIONAL WATERS OF THE U.S.
AT: CITY OF BELLEVUE, KING COUNTY, WA

APPLICATION BY: CITY OF BELLEVUE UTILITIES DEPARTMENT.

DATE: 12-17-2010

SHEET: 10 OF 20



KEY NOTES:

- ① ROLL BACK EXISTING EROSION CONTROL BLANKET (ECB) FROM AREA OF WORK. MAINTAIN ECB IN PLACES OUTSIDE THE AREA OF WORK. REPLACE ECB DAMAGED DURING CONSTRUCTION PER DETAIL A/B. COORDINATE WITH INSTALLATION OF PLANT MATERIALS.
- ② APPROXIMATE LIMITS OF EXISTING PAVEMENT PATCH. RESTORE PAVEMENT TO MATCH EXISTING OR AS DIRECTED BY THE ENGINEER.

I:\V:\0680\007\060.061\JARPA\Sheet 11-20.dwg - 12/17/2010

PURPOSE: THIS PROJECT IS EMERGENCY REPAIR AND RESTORATION OF A ROADWAY CULVERT AND EMBANKMENTS THAT CONTAIN A TRIBUTARY OF YARROW CREEK.

TOWNSHIP/RANGE: SEC 19 AND 20 TWP 25N RGE 05E
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CITY OF BELLEVUE

102ND AVENUE NE AND YARROW CREEK TRIBUTARY REPAIR AND RESTORATION

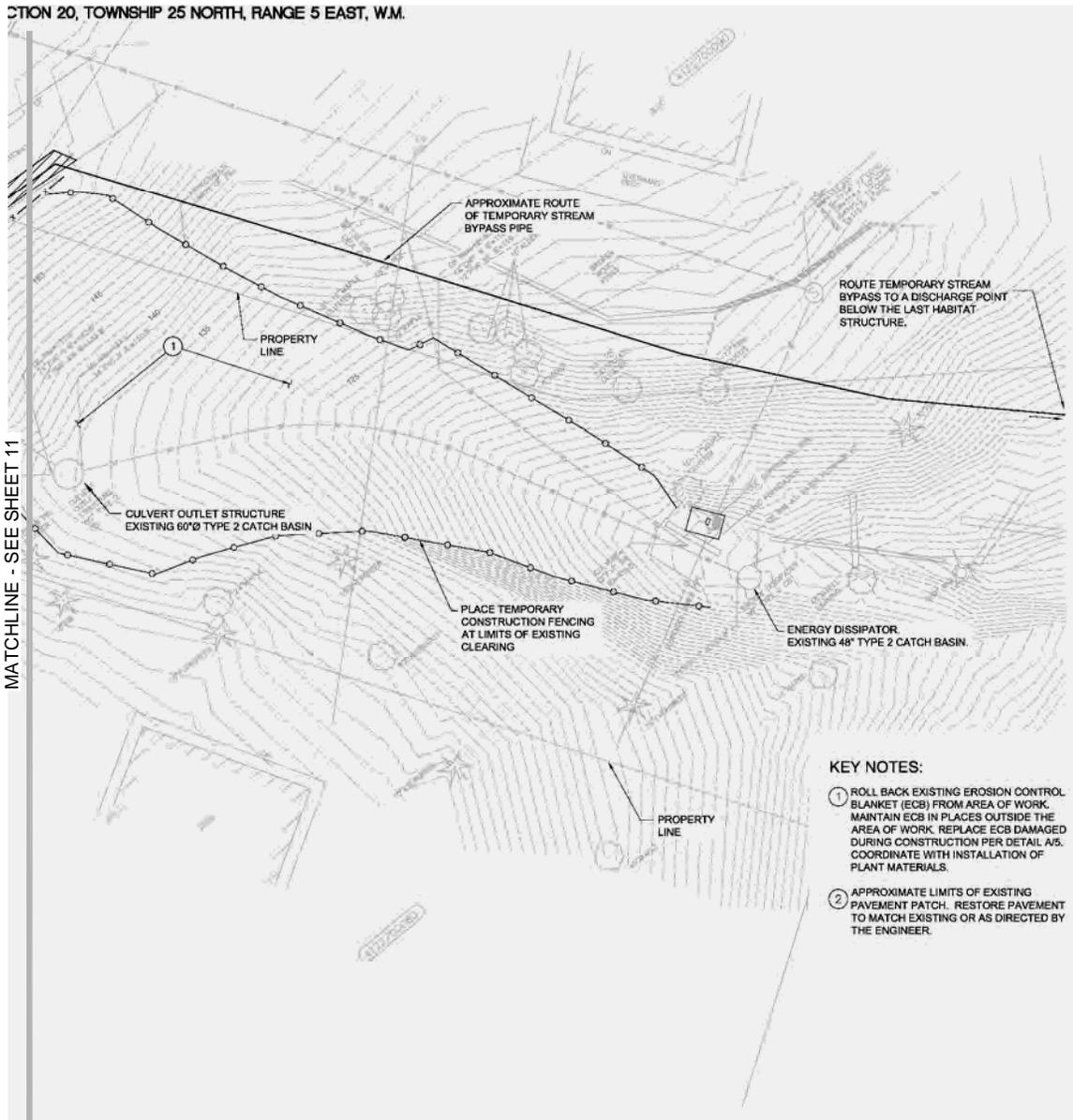
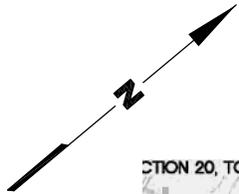
SITE PREPARATION AND TEMPORARY BYPASS/TESC PLAN

PROPOSED: RESTORATION OF APPROXIMATELY 220 LINEAR FEET OF STREAM.

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APPLICATION BY: CITY OF BELLEVUE UTILITIES DEPARTMENT.

DATE: 12-17-2010
SHEET: 11 OF 20



PURPOSE: THIS PROJECT IS EMERGENCY REPAIR AND RESTORATION OF A ROADWAY CULVERT AND EMBANKMENTS THAT CONTAIN A TRIBUTARY OF YARROW CREEK.

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CITY OF BELLEVUE

**102ND AVENUE NE
AND YARROW
CREEK TRIBUTARY
REPAIR AND
RESTORATION**

**RESTORATION SITE
PREPARATION AND
TEMPORARY BYPASS/TESS
PLAN**

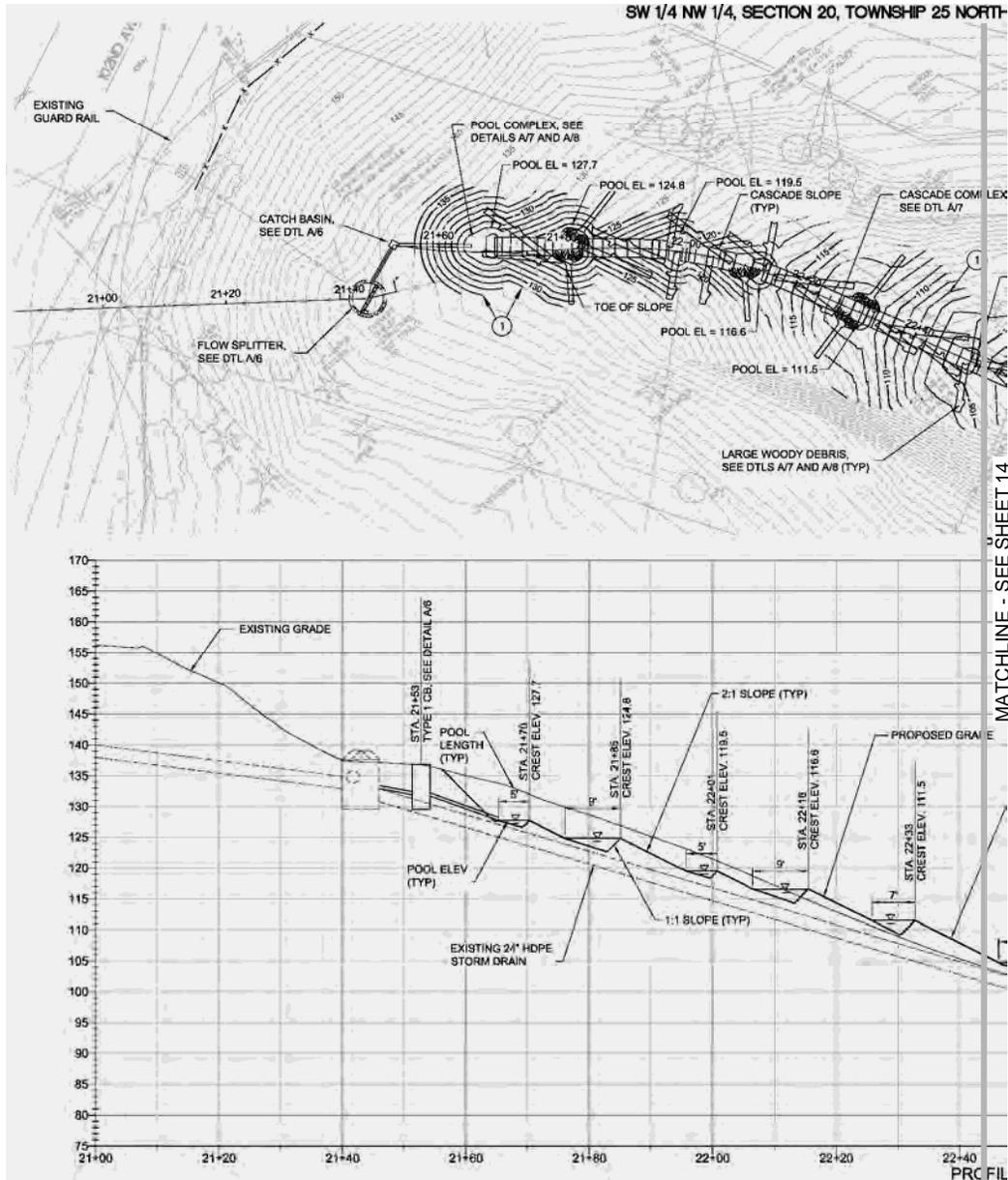
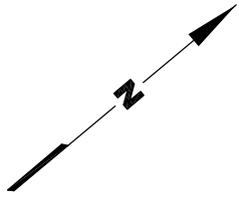
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APPLICATION BY: CITY OF BELLEVUE UTILITIES DEPARTMENT.

DATE: 12-17-2010

SHEET: 12 OF 20



KEY NOTES:
 ① 1:1 SIDESLOPES FROM STA 21+56 TO STA 22+17.
 4:1 SIDESLOPES FROM STA 22+17 TO STA 22+66

I:\V:\0680\007\060.061\JARPA\Sheet 11-20.dwg - 12/17/2010

PURPOSE: THIS PROJECT IS EMERGENCY REPAIR AND RESTORATION OF A ROADWAY CULVERT AND EMBANKMENTS THAT CONTAIN A TRIBUTARY OF YARROW CREEK.

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CITY OF BELLEVUE

102ND AVENUE NE AND YARROW CREEK TRIBUTARY REPAIR AND RESTORATION

RESTORATION PLAN AND PROFILE

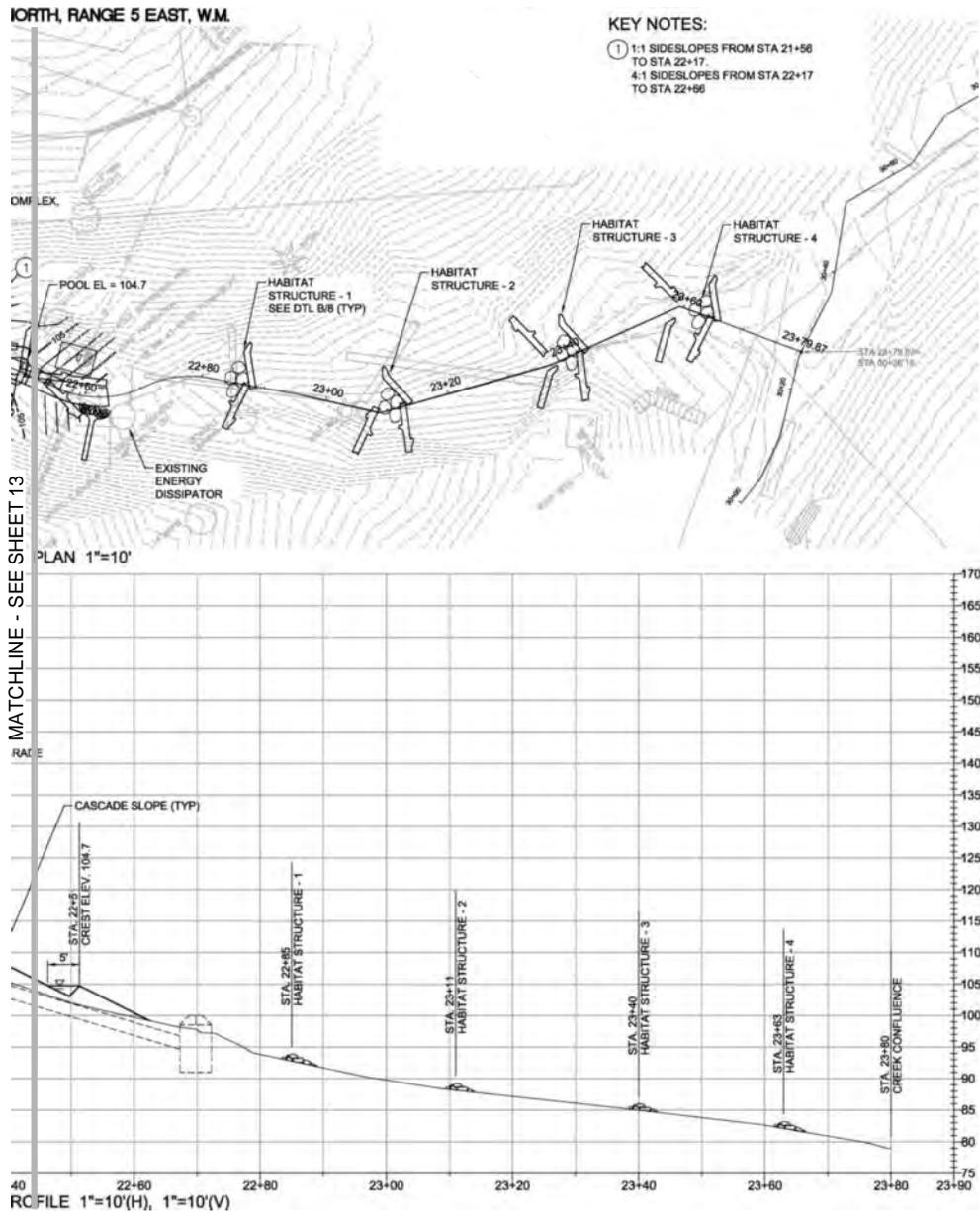
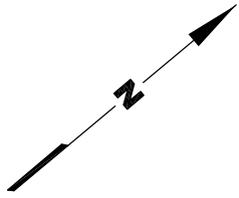
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DATE: 12-17-2010

SHEET: 13 OF 20



I:\V:\060\007\060.061\JARPA\Sheet 11-20.dwg - 12/17/2010

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CITY OF BELLEVUE

**102ND AVENUE NE
AND YARROW
CREEK TRIBUTARY
REPAIR AND
RESTORATION**

**RESTORATION PLAN AND
PROFILE**

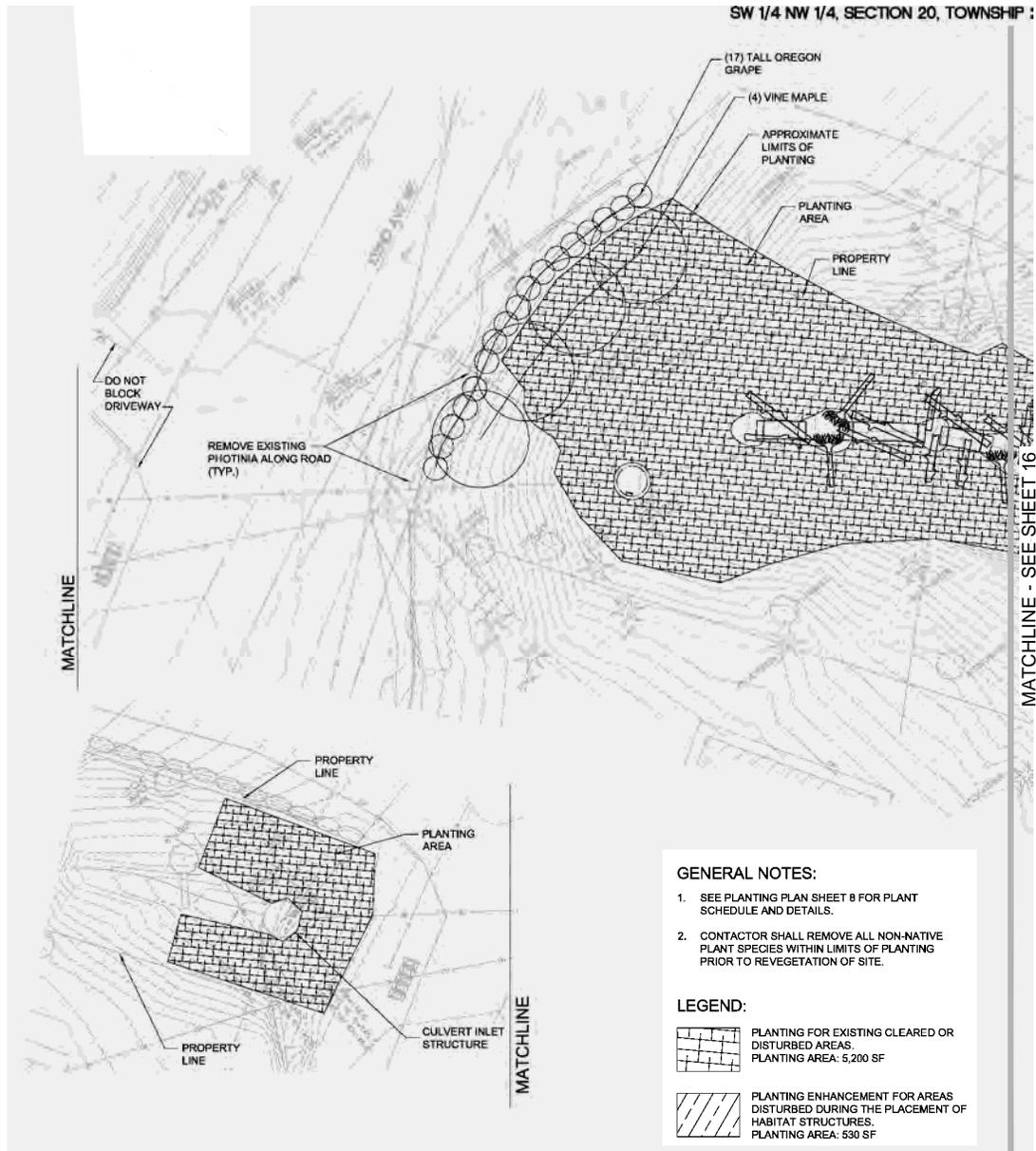
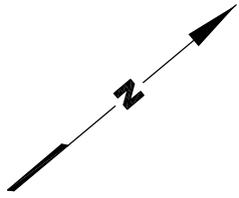
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APPLICATION BY: CITY OF BELLEVUE UTILITIES DEPARTMENT.

DATE: 12-17-2010

SHEET: 14 OF 20



I:\V:\0680\007\060.061\JARPA\Sheet 11-20.dwg - 12/17/2010

PURPOSE: THIS PROJECT IS EMERGENCY REPAIR AND RESTORATION OF A ROADWAY CULVERT AND EMBANKMENTS THAT CONTAIN A TRIBUTARY OF YARROW CREEK.

TOWNSHIP/RANGE: SEC 19 AND 20 TWP 25N RGE 05E
LAT/LONG: 47.641484°N, 122.204628°W; DATUM; NAD 83

ADJACENT PROPERTY OWNERS:

- HANLEY (4122700090)
- KOBLEIN (4122700080)
- LAWRENCE (4122300085)
- YANG (4122300080)

CITY OF BELLEVUE

102ND AVENUE NE AND YARROW CREEK TRIBUTARY REPAIR AND RESTORATION

RESTORATION PLANTING PLAN

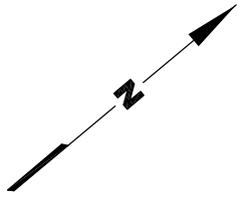
PROPOSED: RESTORATION OF APPROXIMATELY 220 LINEAR FEET OF STREAM.

IN: JURISDICTIONAL WATERS OF THE U.S.
AT: CITY OF BELLEVUE, KING COUNTY, WA

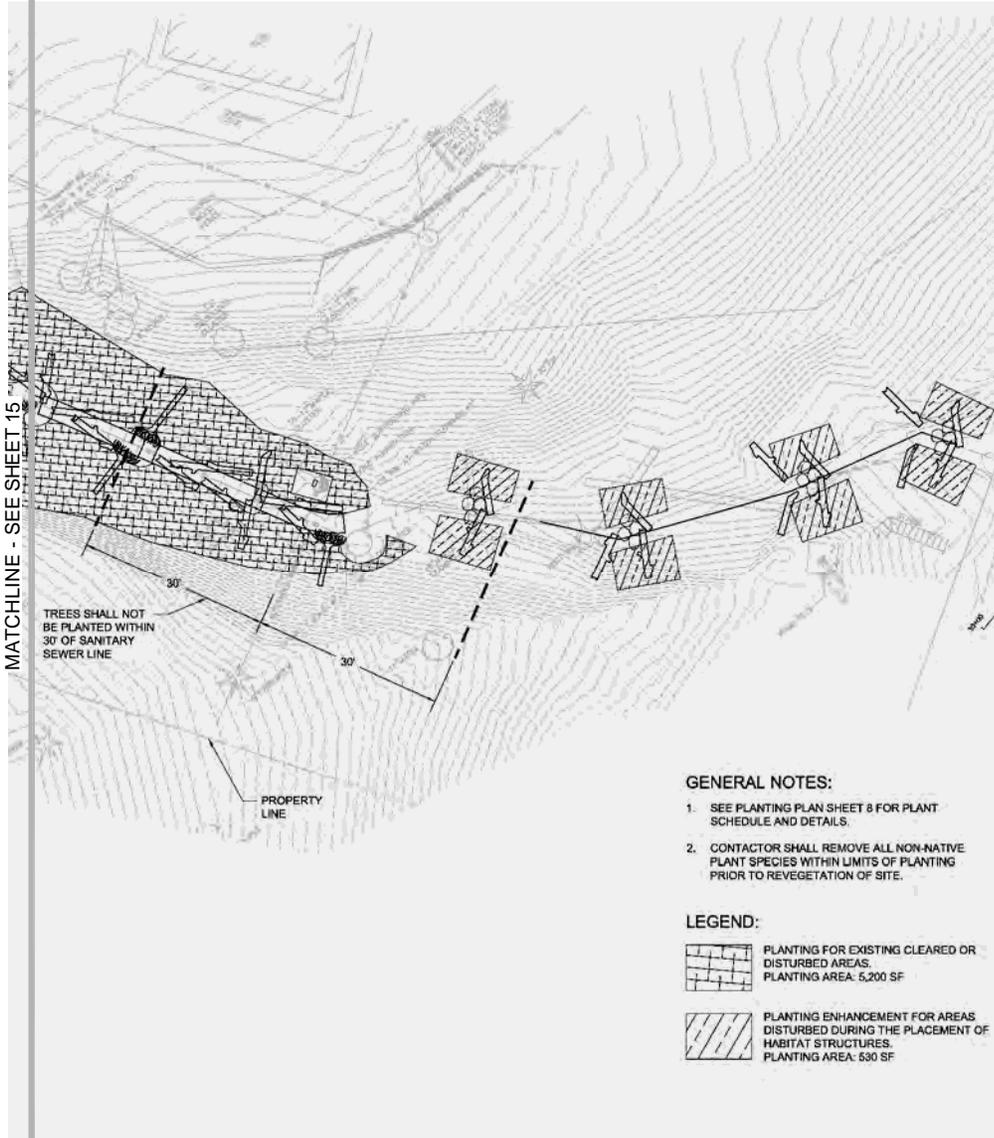
APPLICATION BY: CITY OF BELLEVUE UTILITIES DEPARTMENT.

DATE: 12-17-2010

SHEET: 15 OF 20



SHIP 25 NORTH, RANGE 5 EAST, W.M.



GENERAL NOTES:

1. SEE PLANTING PLAN SHEET 8 FOR PLANT SCHEDULE AND DETAILS.
2. CONTACTOR SHALL REMOVE ALL NON-NATIVE PLANT SPECIES WITHIN LIMITS OF PLANTING PRIOR TO REVEGETATION OF SITE.

LEGEND:

-  PLANTING FOR EXISTING CLEARED OR DISTURBED AREAS.
PLANTING AREA: 5,200 SF
-  PLANTING ENHANCEMENT FOR AREAS DISTURBED DURING THE PLACEMENT OF HABITAT STRUCTURES.
PLANTING AREA: 530 SF

| V:\0680\007\060\061\JARPA\Sheet 11-20.dwg - 12/17/2010

PURPOSE: THIS PROJECT IS EMERGENCY REPAIR AND RESTORATION OF A ROADWAY CULVERT AND EMBANKMENTS THAT CONTAIN A TRIBUTARY OF YARROW CREEK.

TOWNSHIP/RANGE: SEC 19 AND 20 TWP 25N RGE 05E
LAT/LONG: 47.641484°N, 122.204628°W; DATUM; NAD 83

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CITY OF BELLEVUE

**102ND AVENUE NE
AND YARROW
CREEK TRIBUTARY
REPAIR AND
RESTORATION**

**RESTORATION PLANTING
PLAN**

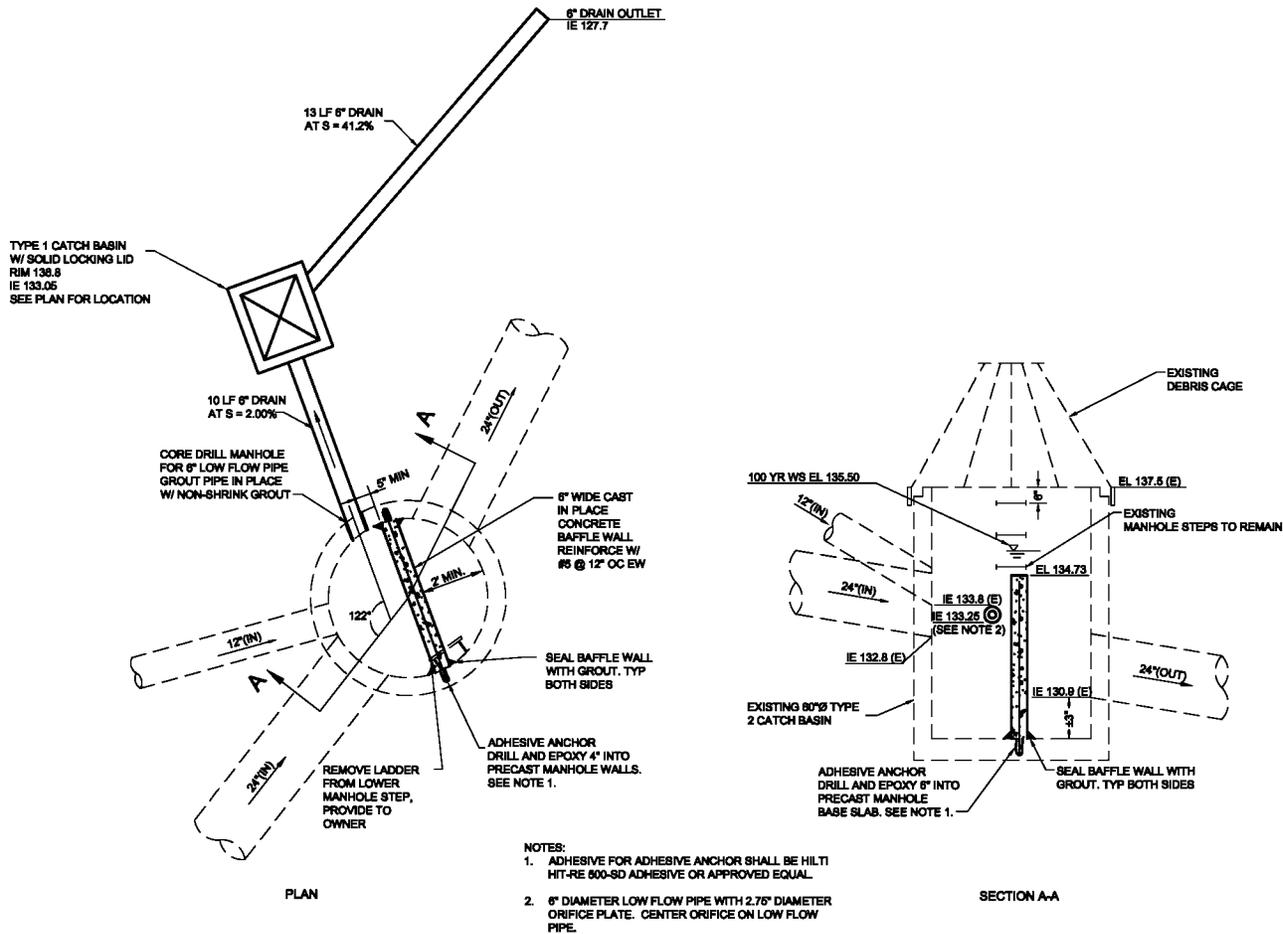
PROPOSED: RESTORATION OF APPROXIMATELY 220 LINEAR FEET OF STREAM.

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APPLICATION BY: CITY OF BELLEVUE UTILITIES DEPARTMENT.

DATE: 12-17-2010

SHEET: 16 OF 20



- NOTES:
- ADHESIVE FOR ADHESIVE ANCHOR SHALL BE HILTI HIT-RE 800-SD ADHESIVE OR APPROVED EQUAL.
 - 6" DIAMETER LOW FLOW PIPE WITH 2.75" DIAMETER ORIFICE PLATE. CENTER ORIFICE ON LOW FLOW PIPE.



PURPOSE: THIS PROJECT IS EMERGENCY REPAIR AND RESTORATION OF A ROADWAY CULVERT AND EMBANKMENTS THAT CONTAIN A TRIBUTARY OF YARROW CREEK.

TOWNSHIP/RANGE: SEC 19 AND 20 TWP 25N RGE 05E
LAT/LONG: 47.641484°N, 122.204628°W; DATUM; NAD 83

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CITY OF BELLEVUE

**102ND AVENUE NE
AND YARROW
CREEK TRIBUTARY
REPAIR AND
RESTORATION**

FLOW SPLITTER DETAIL

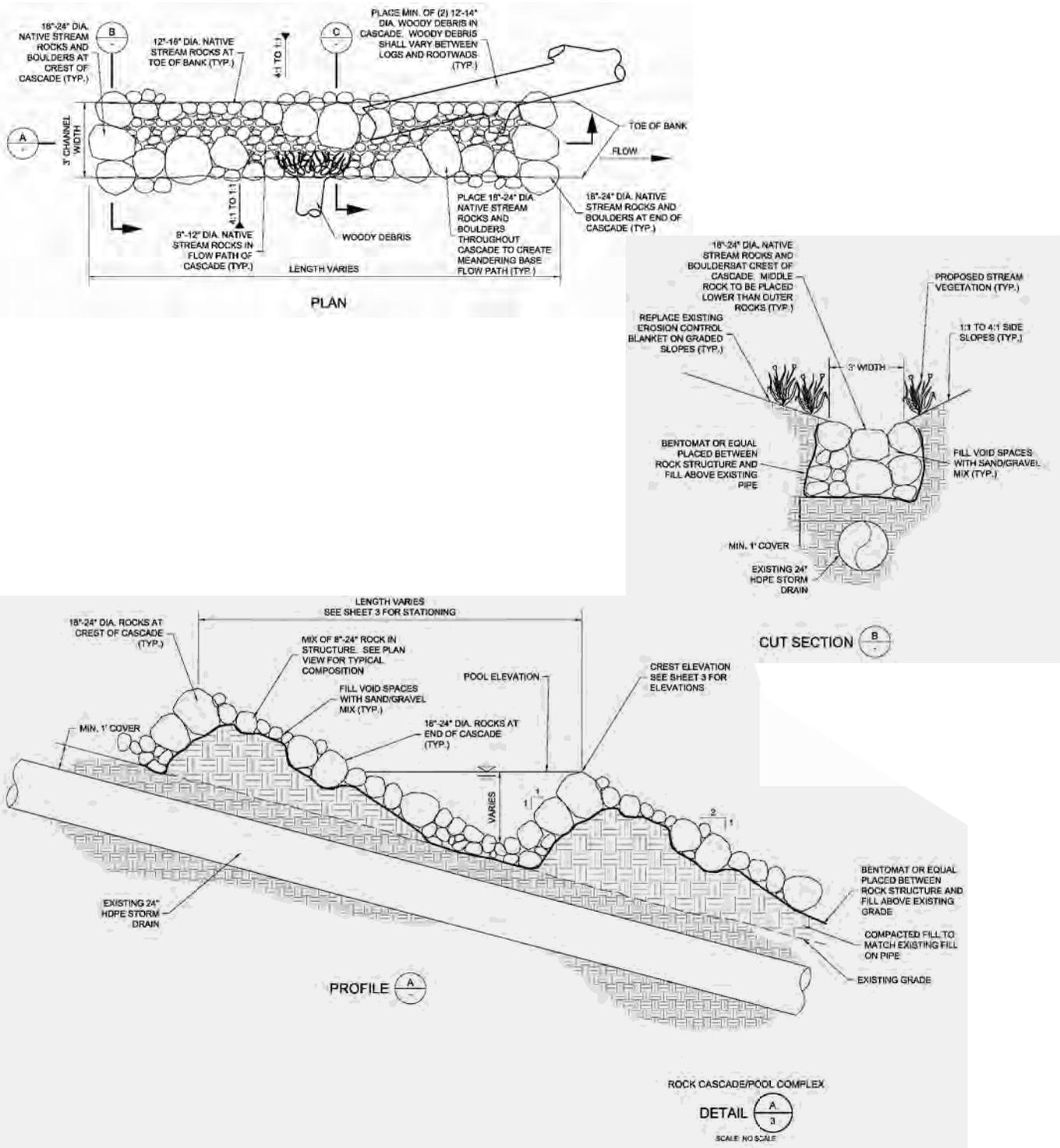
PROPOSED: RESTORATION OF APPROXIMATELY 220 LINEAR FEET OF STREAM.

IN: JURISDICTIONAL WATERS OF THE U.S.
AT: CITY OF BELLEVUE, KING COUNTY, WA

APPLICATION BY: CITY OF BELLEVUE UTILITIES DEPARTMENT.

DATE: 12-17-2010

SHEET: 17 OF 20



PURPOSE: THIS PROJECT IS EMERGENCY REPAIR AND RESTORATION OF A ROADWAY CULVERT AND EMBANKMENTS THAT CONTAIN A TRIBUTARY OF YARROW CREEK.

TOWNSHIP/RANGE: SEC 19 AND 20 TWP 25N RGE 05E
LAT/LONG: 47.641484°N, 122.204628°W; DATUM; NAD 83

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CITY OF BELLEVUE

102ND AVENUE NE AND YARROW CREEK TRIBUTARY REPAIR AND RESTORATION

STREAM CHANNEL DETAILS

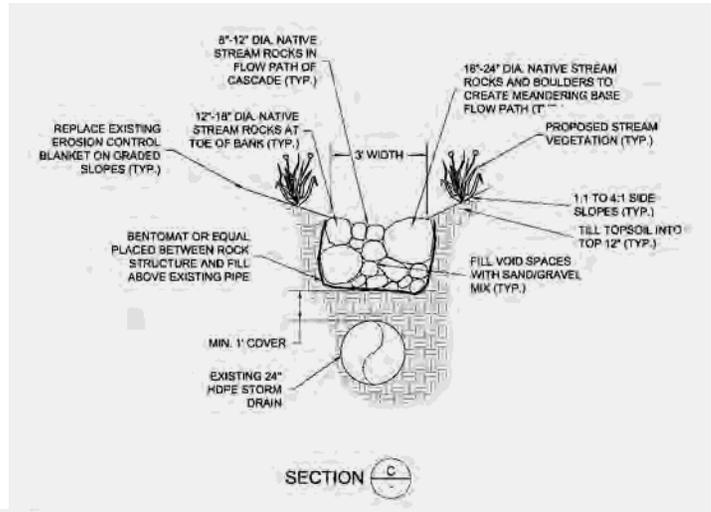
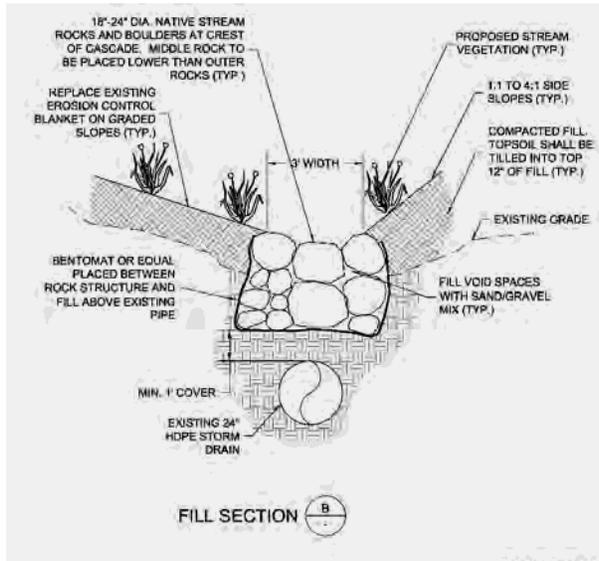
PROPOSED: RESTORATION OF APPROXIMATELY 220 LINEAR FEET OF STREAM.

IN: JURISDICTIONAL WATERS OF THE U.S.
AT: CITY OF BELLEVUE, KING COUNTY, WA

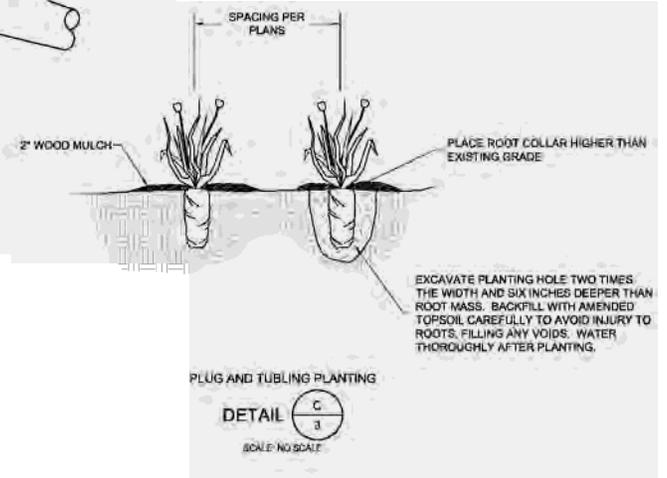
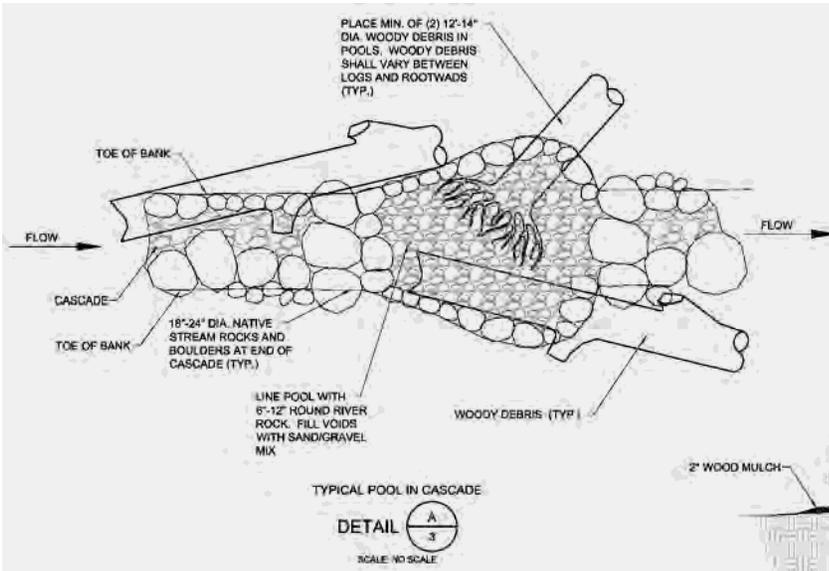
APPLICATION BY: CITY OF BELLEVUE UTILITIES DEPARTMENT.

DATE: 12-17-2010

SHEET: 18 OF 20



ROCK CASCADE/POOL COMPLEX
DETAIL A
SCALE: NO SCALE



PLUG AND TUBING PLANTING
DETAIL C
SCALE: NO SCALE

PURPOSE: THIS PROJECT IS EMERGENCY REPAIR AND RESTORATION OF A ROADWAY CULVERT AND EMBANKMENTS THAT CONTAIN A TRIBUTARY OF YARROW CREEK.

TOWNSHIP/RANGE: SEC 19 AND 20 TWP 25N RGE 05E
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CITY OF BELLEVUE

**102ND AVENUE NE
AND YARROW
CREEK TRIBUTARY
REPAIR AND
RESTORATION**

STREAM CHANNEL DETAILS

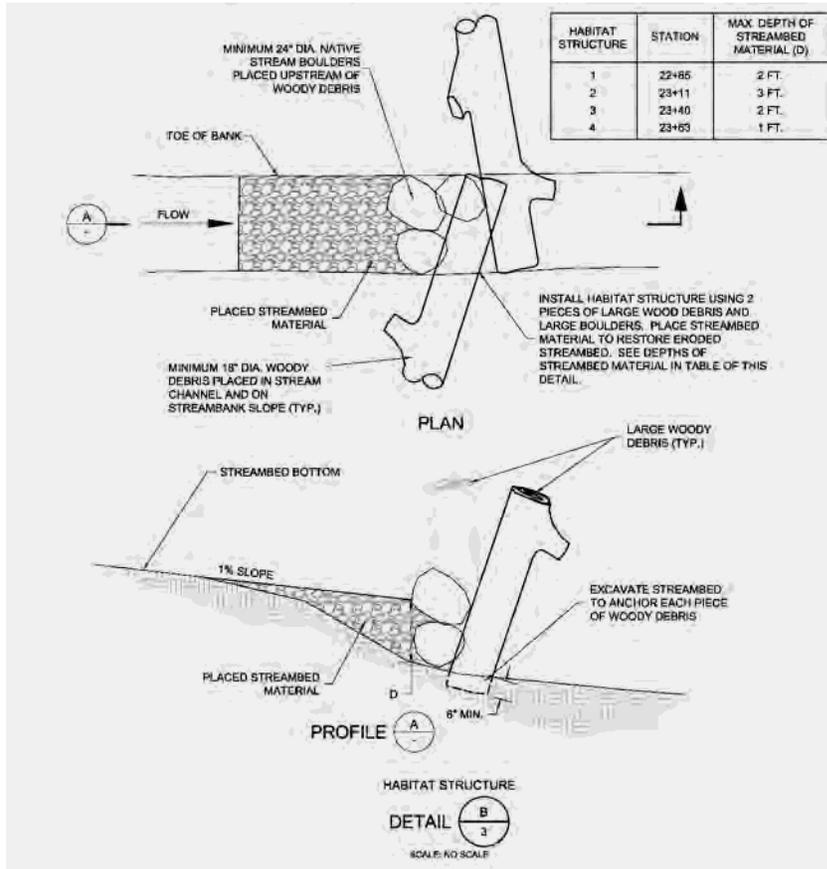
PROPOSED: RESTORATION OF APPROXIMATELY 220 LINEAR FEET OF STREAM.

IN: JURISDICTIONAL WATERS OF THE U.S.
AT: CITY OF BELLEVUE, KING COUNTY, WA

APPLICATION BY: CITY OF BELLEVUE UTILITIES DEPARTMENT.

DATE: 12-17-2010

SHEET: 19 OF 20



PLANT SCHEDULE:

QUANTITY	SCIENTIFIC NAME	COMMON NAME	TYPE	INDICATOR	SPACING	HABIT	NOTES
	ACER MACROPHYLLUM	BIG LEAF MAPLE	CONT.	FACU	20' O.C.	TREE	
	ALNUS RUBRA	RED ALDER	CONT.	FACU	20' O.C.	TREE	
	PSEUDOTSUGA MENZIESII	DOUGLAS FIR	CONT.	FACU+	20' O.C.	TREE	
	TSUGA HETEROPHYLLA	WESTERN HEMLOCK	CONT.	FACU-	20' O.C.	TREE	
	ACER CIRCINATUM	VINE MAPLE	CONT.	FAC-	8' O.C.	SHRUB	
	CORNUS SERICEA	REDSIER DOGWOOD	TUBLING	FACW	8' O.C.	SHRUB	PLANT WITHIN 2 FEET OF STREAM
	GAULTHERIA SHALLOON	SALAL	CONT.	FACU	8' O.C.	SHRUB	
	MAHONIA AQUIFOLIUM	TALL OREGON GRAPE	CONT.	UPL	8' O.C.	SHRUB	
	RUBUS PARVIFLORUS	THIMBLEBERRY	CONT.	FAC-	8' O.C.	SHRUB	
	RUBUS SPECTABILIS	SALMONBERRY	CONT.	FAC+	8' O.C.	SHRUB	
	SAUBUCULUS RACEMOSA	RED ELDERBERRY	CONT.	FACU	8' O.C.	SHRUB	
	SYMPHORICARPOS ALBUS	SNOWBERRY	CONT.	FACU	8' O.C.	SHRUB	
	ARCTOSTAPHYLOS LVA-URSI	BEARBERRY	CONT.	FACU-	8' O.C.	GROUNDCOVER	
	ELYMUS GLAUCUS	BLUE WILDRIE	SEED	FACU	-	GROUNDCOVER	SEED AT 20 LBS./AC OF PURE LIVE SEED
	FESTUCA IDAHOENSIS	IDAHO FESCUE	SEED	FACU+	-	GROUNDCOVER	
	JUNCUS ENSIFOLIUS	DAGGER-LEAF RUSH	PLUG	FACW	4' O.C.	GROUNDCOVER	PLANT IN CLUMPS OF 3 WITHIN 2 FEET OF STREAM
	POLYSTICHUM MUNITUM	SWORD FERN	PLUG	FACU	4' O.C.	GROUNDCOVER	PLANT IN CLUMPS OF 3
	SCIRPUS ACUTUS	HARDSTEM BULRUSH	PLUG	OBL	4' O.C.	GROUNDCOVER	PLANT IN CLUMPS OF 3

GENERAL NOTES:

- ALL PLANT MATERIAL TO MEET THE AMERICAN STANDARD FOR NURSERY STOCK.
- PLANT MATERIAL SHALL BE ESTABLISHED, MAINTAINED AND GUARANTEED AS PER SPECIFICATIONS.
- THE CONTRACTOR SHALL INSTALL TREES FIRST BEFORE SHRUBS WITHIN ANY PLANTING AREA.
- INSTALL CONTAINER PLANTS PER CITY OF BELLEVUE STD PLANS NO. 32 AND 33 IN THE SPECIFICATIONS APPENDIX.
- TREES SHALL NOT BE PLANTED WITHIN 30 FEET OF THE SANITARY SEWER LINE, AS SHOWN ON SHEET 4.

PURPOSE: THIS PROJECT IS EMERGENCY REPAIR AND RESTORATION OF A ROADWAY CULVERT AND EMBANKMENTS THAT CONTAIN A TRIBUTARY OF YARROW CREEK.

TOWNSHIP/RANGE: SEC 19 AND 20 TWP 25N RGE 05E
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CITY OF BELLEVUE

**102ND AVENUE NE
AND YARROW
CREEK TRIBUTARY
REPAIR AND
RESTORATION**

**RESTORATION STREAM
CHANNEL DETAILS AND
PLANTING NOTES AND
DETAILS**

PROPOSED: RESTORATION OF APPROXIMATELY 220 LINEAR FEET OF STREAM.

IN: JURISDICTIONAL WATERS OF THE U.S.
AT: CITY OF BELLEVUE, KING COUNTY, WA

APPLICATION BY: CITY OF BELLEVUE UTILITIES DEPARTMENT.

DATE: 12-17-2010

SHEET: 20 OF 20

Pyle, David

From: Karen Walter [KWalter@muckleshoot.nsn.us]
Sent: Thursday, February 24, 2011 2:54 PM
To: Pyle, David
Subject: City of Bellevue Utilities Yarrow Creek Stream Channel Restoration and Habitat Improvement Project, 10-130253-LO, Optional Determination of Non-Significance

David,

The Muckleshoot Indian Tribe Fisheries Division has reviewed the Optional Determination of Non-Significance Notice Materials for the above referenced project. We have some questions about this project and need some additional information to fully evaluate the project as noted below:

1. We need a copy of the proposed site plans, including figures that show the existing conditions;
2. As part of the site plans, we would also like a copy of the proposed planting plans with details about species, numbers, etc.
3. We would also like a copy of the critical areas report completed for this project referenced on page 8 as attached to the checklist. For whatever reason, we were unable to access these materials that are often available on the City's website.
4. What work was completed previously as part of an emergency repair? We would appreciate project details if work was done beyond the placing of 1245 cubic yards of gravel fill mentioned in the environmental checklist.
5. Is the existing 40 year old sewer above the stream channel or buried below it?
6. What is the scientific rationale for the number and size of proposed wood (i.e. 38 pieces ranging from 8 to 12 inches in diameter)? The size of the wood seems small for the stream conditions and the number may be too low.
7. It should be noted that resident trout have been found in stream gradients at or slightly greater than 30% in forestry area streams in Western Washington so a 30% stream gradient in the first segment may not preclude fish use, assuming they can access the site.

We appreciate the opportunity to review this proposal and look forward to the City's responses and the requested additional information.

Thank you,
Karen Walter
Watersheds and Land Use Team Leader

*Muckleshoot Indian Tribe Fisheries Division
39015 172nd Ave SE
Auburn, WA 98092
253-876-3116*

Pyle, David

From: Karen Walter [KWalter@muckleshoot.nsn.us]
Sent: Tuesday, March 15, 2011 9:32 AM
To: Pyle, David
Cc: Jensen, Bruce; Fisher, Larry D (DFW)
Subject: RE: City of Bellevue Utilities Yarrow Creek Stream Channel Restoration and Habitat Improvement Project, 10-130253-LO, Optional Determination of Non-Significance

David,

Thank you for sending the City's responses to our questions below. We have reviewed them, as well as the Critical Areas Study and project drawings. In addition, I spoke with Bruce Jensen yesterday via phone and obtained additional information about the previous emergency work and the proposed project. From all of this, we have follow-up comments as noted below:

From the project drawings, Sheet 3 of 8, the new project will daylight 85+feet of channel that was filled with the emergency project. As part of this work, the new project will create pools and cascades as shown in Sheets 7 and 8. The pool feature shown in Detail A/3 should be continued down into the portion of the project below the new stilling well as this is the area where the stream will receive all of the potential flows, is lower gradient and closest to the West Tributary of Yarrow Creek where we expect salmonids to be able to access once the downstream culverts are fixed. Pools in the upper reach above the stilling well may have limited access in the wet season for salmonids in the future because the majority of the flows (at least 2 year flows and greater) will be routed to the high flow by-pass pipe. This change in flow regime, combined with the steeper channel gradient may limit access for salmonids. As a result, there would be more value in creating pools below the stilling well that would likely be more accessible for salmonids. To achieve this objective, Bruce and I discussed adding additional wood to this downstream reach and vary the sizes to provide more wood diversity and increased wood loading than what is shown on Sheet 3. Bruce agreed that the project could be modified to add more wood provided it can be brought in by hand as the project is not proposing to use heaving equipment in this reach due to a lack of road access.

We would appreciate a copy of any revised plans that reflect this work as well as the final mitigation plan once it is available.

We appreciate the opportunity to work with the City on this project.

Thank you,
Karen Walter
Watersheds and Land Use Team Leader
Muckleshoot Indian Tribe Fisheries Division
39015 172nd Ave SE
Auburn, WA 98092
253-876-3116

From: DPyle@bellevuewa.gov [mailto:DPyle@bellevuewa.gov]
Sent: Monday, March 07, 2011 3:47 PM
To: Karen Walter
Cc: BJensen@bellevuewa.gov
Subject: RE: City of Bellevue Utilities Yarrow Creek Stream Channel Restoration and Habitat Improvement Project, 10-130253-LO, Optional Determination of Non-Significance

Karen-

I have included responses to your questions below. After you have had a chance to review the project files, please let me know if you have any additional questions.

1. We need a copy of the proposed site plans, including figures that show the existing conditions;

An electronic link to the requested documents was provided. See email below.

2. As part of the site plans, we would also like a copy of the proposed planting plans with details about species, numbers, etc.

Same as #1 above. Please note that per Luc 20.25H.210, Where an applicant is seeking modifications to this part or Part 20.25E LUC through a critical areas report pursuant to LUC 20.25H.230, the mitigation plan required for the proposal may be submitted in phases. A conceptual plan shall be submitted as part of the critical areas report and approved with the land use approval for the proposal. A detailed plan shall be approved prior to or with approval of the first permit or other approval required to perform work associated with the proposal. A complete planting plan has not been requested of the applicant at this time.

3. We would also like a copy of the critical areas report completed for this project referenced on page 8 as attached to the checklist. For whatever reason, we were unable to access these materials that are often available on the City's website.

Same as #1 above.

4. What work was completed previously as part of an emergency repair? We would appreciate project details if work was done beyond the placing of 1245 cubic yards of gravel fill mentioned in the environmental checklist.

This information was included in the materials posted to the weblink provided.

5. Is the existing 40 year old sewer above the stream channel or buried below it?

There are two sewer lines located in both the street (102nd Ave NE) and in an elevated stream crossing that is supported by post and pier.

6. What is the scientific rationale for the number and size of proposed wood (i.e. 38 pieces ranging from 8 to 12 inches in diameter)? The size of the wood seems small for the stream conditions and the number may be too low.

Response provided by the applicant:

The number of pieces of LWD in this trib to the West trib of Yarrow Creek meets the criteria established by Martin Fox in his 2003 dissertation regarding the quantity of large woody debris in natural stream systems and summarized in the Fact Sheet he prepared for The Water Center in 2004 (see link below). The figures in the Fact Sheet show percentile distributions of LWD and Key Pieces (not likely to move during bankfull flow). Since the peak flow in this trib is only about 12 cfs, all of the LWD will also serve as Key Pieces. The entire project length is 220 feet, so target wood quantities are 67% of the values shown in the figures, which are shown per 100 meters of stream length.

Dr. Fox states that "Since these data undoubtedly include both favorable and unfavorable habitat conditions related to instream wood, the central 50% of these data (i.e., as bounded by the 25th and 75th percentiles) are broadly taken to represent the median condition for basing targets for habitat restoration, enhancement, regulation, and evaluation. The 75th percentile is taken as the point where conditions clearly exceed the central range and is therefore the recommended base target value for instream wood loads."

This project will exceed the 75% percentile quantity shown in the LWD Quantity figure, and approximately quadruple the 75% percentile quantity shown in the Key Piece Quantity figure for streams of this size.

<http://water.washington.edu/outreach/FactSheets/lwd.pdf>

7. It should be noted that resident trout have been found in stream gradients at or slightly greater than 30% in forestry area streams in Western Washington so a 30% stream gradient in the first segment may not preclude fish use, assuming they can access the site.

Noted and forwarded to the applicant.

Thank you,

David Pyle
Senior Land Use Planner
City of Bellevue
dpyle@bellevuewa.gov
(425)452-2973 (Office)
(425)452-5225 (Fax)
www.bellevuewa.gov

From: Karen Walter [mailto:KWalter@muckleshoot.nsn.us]
Sent: Thursday, February 24, 2011 3:39 PM
To: Pyle, David
Subject: RE: City of Bellevue Utilities Yarrow Creek Stream Channel Restoration and Habitat Improvement Project, 10-130253-LO, Optional Determination of Non-Significance

Thanks David-

I was able to access it through the link you provided and will review the materials today or tomorrow.

Karen Walter
MITFD

From: DPyle@bellevuewa.gov [mailto:DPyle@bellevuewa.gov]
Sent: Thursday, February 24, 2011 3:21 PM
To: Karen Walter
Subject: RE: City of Bellevue Utilities Yarrow Creek Stream Channel Restoration and Habitat Improvement Project, 10-130253-LO, Optional Determination of Non-Significance

Karen-

The link has been fixed. Apologize for the inconvenience.

<http://www.bellevuewa.gov/pdf/land%20use/10-130253-LO.pdf>

David Pyle

From: Karen Walter [mailto:KWalter@muckleshoot.nsn.us]
Sent: Thursday, February 24, 2011 3:08 PM
To: Pyle, David
Subject: RE: City of Bellevue Utilities Yarrow Creek Stream Channel Restoration and Habitat Improvement Project, 10-130253-LO, Optional Determination of Non-Significance

Thanks!!!

Karen Walter
MITFD

From: DPyle@bellevuewa.gov [mailto:DPyle@bellevuewa.gov]
Sent: Thursday, February 24, 2011 3:06 PM
To: RDensley@bellevuewa.gov
Cc: Karen Walter
Subject: FW: City of Bellevue Utilities Yarrow Creek Stream Channel Restoration and Habitat Improvement Project, 10-130253-LO, Optional Determination of Non-Significance

Ruth-

Please fix the electronic link to this notice.

Karen-

Not sure what happened, but I will email you when the link is fixed and have answers to the remainder of your questions soon.

Thanks,

David Pyle

From: Karen Walter [mailto:KWalter@muckleshoot.nsn.us]
Sent: Thursday, February 24, 2011 2:54 PM
To: Pyle, David
Subject: City of Bellevue Utilities Yarrow Creek Stream Channel Restoration and Habitat Improvement Project, 10-130253-LO, Optional Determination of Non-Significance

David,

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8. We need a copy of the proposed site plans, including figures that show the existing conditions;
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10. We would also like a copy of the critical areas report completed for this project referenced on page 8 as attached to the checklist. For whatever reason, we were unable to access these materials that are often available on the City's website.
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14. It should be noted that resident trout have been found in stream gradients at or slightly greater than 30% in forestry area streams in Western Washington so a 30% stream gradient in the first segment may not preclude fish use, assuming they can access the site.

We appreciate the opportunity to review this proposal and look forward to the City's responses and the requested additional information.

Thank you,
Karen Walter
Watersheds and Land Use Team Leader

Muckleshoot Indian Tribe Fisheries Division
39015 172nd Ave SE
Auburn, WA 98092
253-876-3116

City of Bellevue File Number 10-130253-LO
02/09/2011
City of Bellevue Utilities Department Yarrow Creek Stream Channel
Restoration and Habitat Improvement Project
Project SEPA Checklist
3316 102nd Ave NE (Generally)

SEPA Checklist Reviewed By:
David Pyle, Land Use Planner
425-452-2973 - dpyle@bellevuewa.gov

WAC 197-11-960 Environmental checklist.

ENVIRONMENTAL

Purpose of checklist:

The State Environmental Policy Act (SEPA), chapter 43 environmental impacts of a proposal before making decisions. An environmental impact statement (EIS) must be prepared for all proposals with probable significant adverse impacts on the quality of the environment. The purpose of this checklist is to provide information to help you and the agency identify impacts from your proposal (and to reduce or avoid impacts from the proposal, if it can be done) and to help the agency decide whether an EIS is required.

Instructions for applicants:

This environmental checklist asks you to describe some basic information about your proposal. Governmental agencies use this checklist to determine whether the environmental impacts of your proposal are significant, requiring preparation of an EIS. Answer the questions briefly, with the most precise information known, or give the best description you can.

You must answer each question accurately and carefully, to the best of your knowledge. In most cases, you should be able to answer the questions from your own observations or project plans without the need to hire experts. If you really do not know the answer, or if a question does not apply to your proposal, write "do not know" or "does not apply." Complete answers to the questions now may avoid unnecessary delays later.

Some questions ask about governmental regulations, such as zoning, shoreline, and landmark designations. Answer these questions if you can. If you have problems, the governmental agencies can assist you.

The checklist questions apply to all parts of your proposal, even if you plan to do them over a period of time or on different parcels of land. Attach any additional information that will help describe your proposal or its environmental effects. The agency to which you submit this checklist may ask you to explain your answers or provide additional information reasonably related to determining if there may be significant adverse impact.

Use of checklist for nonproject proposals:

Complete this checklist for nonproject proposals, even though questions may be answered "does not apply." IN ADDITION, complete the SUPPLEMENTAL SHEET FOR NONPROJECT ACTIONS (part D).

For nonproject actions, the references in the checklist to the words "project," "applicant," and "property or site" should be read as "proposal," "proposer," and "affected geographic area," respectively.

A. BACKGROUND

1. Name of proposed project, if applicable:

Stream Reconstruction Project, Tributary to West Tributary of Yarrow Creek. 102nd Ave. NE

2. Name of applicant: Bruce Jensen, Senior Engineer, City of Bellevue Utilities Department.

Applicant is City of Bellevue Utilities Department

3. Address and phone number of applicant and contact person:

450 110th Ave NE.
Bellevue, Wa 98004

4. Date checklist prepared: December 16, 2010

5. Agency requesting checklist: City of Bellevue Development Services Department

City of Bellevue Development Services Department - Office of SEPA administrator.

6. Proposed timing or schedule (including phasing, if applicable):

Work is scheduled for July 2011 and August 2011

7. Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain.

No. Work will also include erosion control during construction and mitigation planting with native trees and shrubs after the work is completed.

Additional work in the Yarrow Creek stream channel is proposed and is in the design phase. Future work is related to the WSDOT SR 520 expansion project and includes the replacement of a downstream culvert. Future work may include additional habitat improvement within a segment of the stream located downstream from this proposed work. Additionally, an existing culvert that diverts the stream under an old segment of Lake Washington Boulevard may be removed, although this is contingent on funding at this point.

8. List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal.

Additional information related to this segment of stream is on file with the Development Services records department and includes past development activity within this stream segment as a result of the road embankment erosion.

Critical Areas Report and wetlands delineation. The wetlands delineation is described in the Critical Areas Report.

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.

The Joint Aquatic Permit Application has been submitted to the Army Corps of Engineers, Ecology and Washington State Department of Fish and Wildlife.

10. List any government approvals or permits that will be needed for your proposal, if known.

Project will require a Critical Areas Land Use Permit, Clearing and Grading Permit and a Right-of-Way permit from City of Bellevue. State and Federal permits are combined under the Joint Aquatic Permit Application (JARPA) process.

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.)

There are two segments or sections to the proposed project. The first segment is 120 long and includes daylighting a stream segment that was placed into a protective pipe as part of the emergency repair to support 102nd Ave. NE. The second segment starts at the downstream end of the first segment and involves adding rock and large woody debris to secure this 100 foot segment against erosion and to improve habitat.

A portion of the work has already been completed as an emergency repair due to the severity of the erosion.

Proposed work in the first segment includes installing a flow splitter into the outlet structure on the east side of 102nd Ave. NE. daylighting base flow of tributary onto fill placed this past summer as an emergency repair to 102nd Ave NE. The reconstructed stream segment will extend 120 feet to the stilling well installed with the culvert as part of the emergency repair. Daylighting the stream flow into a reconstructed stream segment that will include log and rock pools and cascades will improve water quality. During storms, flows above the 0.3CFS base flow will continue to use the recently installed stormdrain pipe as a high-flow bypass. A second segment from the bottom of the new reconstructed stream segment, extending another 100 feet downstream is designed to stabilize this section of creek against further damage by head cutting, erosion of side slopes, and the loss of habitat through the movement of existing small rock or the movement of existing unsecured woody debris. Two angled support arms will be added to an existing concrete base and support pole for the 40 year old elevated sewer line servicing the eight houses to the south along 102nd Ave NE. The new angled support arms will not prevent access to the ravine or use by wildlife.

The entire project, consisting of the two segments described above, will receive plantings of native species over 5,730 square feet of buffer area. Stream reconstruction in the first segment and stream stabilization and habitat enhancement in the second segment will include placement of 38 pieces of large woody debris (8 to 12 inches in diameter), 20 cubic yards of streambed cobble, 8 cubic yards of streambed boulders (18 to 24 inches in diameter) and 20 cubic yards of streambed aggregate and sediment. The stream reconstruction described in segment one, will be underlain with an impervious liner to keep the base flow on the surface. The stream reconstruction will also require the excavation of approximately 70 cubic yards of the fill placed this past summer.

Although the stream reconstruction, the first segment, will daylight the stream, the 30% grade will prevent use of this stream segment as fish habitat. The stream reconstruction, daylighting the base flow and replanting with native species will help

improve water quality, enhance habitat complexity, and provide habitat connectivity. The lower stream segment work is designed to both secure the stream segment and to enhance its fish habitat potential.

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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 proposed project is located on the east side of 102nd Ave NE. in a ravine located between 3316 and 3322 102nd AVE NE. See attached site plan.

B. ENVIRONMENTAL ELEMENTS

1. Earth

a. General description of the site (circle one): Flat, rolling, hilly, steep slopes, mountainous, other

The site is a steep ravine that falls from west to east. The west end of the ravine is 102nd Ave NE that was built in the 1960s as part of the development of the surrounding subdivision. A natural tributary to the west tributary of Yarrow Creek was directed under 102nd Ave NE into a 24" concrete culvert. Outflow from the culvert on the east side of the road has been actively eroding the ravine

b. What is the steepest slope on the site (approximate percent slope)? The ravine walls to the north and south are from 1/1 up to vertical walls. The fill placed during the summer of 2010 to support 102nd Ave NE was placed at a 30% angle of repose.

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.

Analysis of the site described in the Critical Areas Report includes three types of soils:

- Alderwood Series
- Kitsap series which are classified as hydric
- Urban Land which includes disturbed soils

d. Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe.

The stream segment has been eroded substantially over the 40 years since development of the surrounding subdivision and road network. The erosion of the stream segment starting at the end of the culvert under 102nd Ave NE eroded the stream segment to the point where the culvert and road embankment began to fail. An emergency was declared and the culvert was repaired and fill was placed in the upper stream segment to support 102nd Ave NE during the summer of 2010.

e. Describe the purpose, type, and approximate quantities of any filling or grading proposed. Indicate source of fill.

Most of the fill was placed under the emergency permit last summer. That work included placing 1,245 cubic yards of gravel fill. The current proposal includes approximately 70 cubic yards of river rock in varying sizes and 38 pieces of large woody debris 8" to 12" in diameter.

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f. Could erosion occur as a result of clearing, construction, or use? If so, generally describe.

The proposed project including installing native vegetation across the 5,370 square feet of affected stream buffer is designed to prevent future erosion or stream stability problems. Particular attention is being given to the design of the daylighting the base flow onto the 30% slope. The rock and large woody debris will be placed over a bed liner to prevent the base flow from undercutting the gravel fill that was placed this previous summer.

BMP's will be applied as conditions of approval and reviewed through the Clearing and Grading application.

g. About what percent of the site will be covered with impervious surfaces after project construction (for example, asphalt or buildings)?

None.

No change in impervious is expected.

h. Proposed measures to reduce or control erosion, or other impacts to the earth, if any:

Stream flow within the project area will be bypassed during construction. Use of equipment will be limited within the stream segment to placing the large woody debris and anchoring the debris into the stream bed or buffers. Erosion control barriers will be used during construction. Native vegetation will be planted within the entire affected area after construction is completed.

Site erosion control and discharge management practices must be in compliance with the City's Clearing and Grading Codes. Review of the final erosion control and discharge control practices will be completed as part of the Clearing and Grading plan review.

a. Air

a. What types of emissions to the air would result from the proposal (i.e., dust, automobile, odors, industrial wood smoke) during construction and when the project is completed? If any, generally describe and give approximate quantities if known.

Limited amounts of exhaust from construction equipment and trucks delivering materials will occur on site.

Automobile and heavy equipment emissions are not regulated by the City of Bellevue and are under the authority of the State of Washington.

b. Are there any off-site 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 to air, if any:

Turn off idling equipment when not in use.

3. Water

a. Surface:

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, wetlands)? If yes, describe type and provide names. If appropriate, state what stream or river it flows into.

Yes. The stream segment that will be worked on under this permit is a tributary to the West Tributary of Yarrow Creek. Yarrow Creek flows to the north into Lake Washington.

2) Will the project require any work over, in, or adjacent to (within 200 feet) the described waters? If yes, please describe and attach available plans.

Yes. The first segment includes reconstruction of a streambed on the 30% slope. The 0.3 CFS base flow of this tributary will be daylighted into this new stream segment. The lower stream segment will receive large woody debris and river rock to enhance fish habitat and to prevent future streambank erosion.

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- 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.

Approximately 70 yards of river rock of various sizes will be placed in the two segments. Approximately 50 cubic yards of material will be removed and replaced on site as part of re-constructing the stream in segment one of this project.

- 4) Will the proposal require surface water withdrawals or diversions? Give general description, purpose, and approximate quantities if known.

No.

- 5) Does the proposal lie within a 100-year floodplain? If so, note location on the site plan.

No.

- 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.

b. Ground:

- 1) Will ground water be withdrawn, or will water be discharged to ground water? Give general description, purpose, and approximate quantities if known.

No.

Not anticipated. Work is to be surface and channel related and no groundwater, except channel/ground water inter flow is expected. A secondary source of stream hydrology, ground water, when encountered, will be managed in the same manner as surface water.

- 2) Describe waste material that will be discharged into the ground from septic tanks or other sources, if any (for example: Domestic sewage; industrial, containing the following chemicals. . . ; agricultural; 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.

No waste materials are anticipated or allowed to be discharged from any source, except for those incidental to typical construction practices and are planned for management through project site management BMPs.

c. Water runoff (including stormwater):

- 1) Describe the source of runoff (including storm water) 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.

This small tributary will be diverted around construction. The tributary flows to the West Tributary of Yarrow Creek.

- 2) Could waste materials enter ground or surface waters? If so, generally describe.

No. Stream flow will be diverted around the project during construction.

d. Proposed measures to reduce or control surface, ground, and runoff water impacts, if any:

Divert stream flow around construction site. Replant stream buffer with native vegetation. Use erosion control fencing to prevent erosion from entering downstream tributary.

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4. Plants

a. Check or circle types of vegetation found on the site:

- _____ deciduous tree: alder, maple, aspen, other
- _____ evergreen tree: fir, cedar, pine, other
- _____ Shrubs, native shrubs and some non-native ornamentals including photinia fraseri.
- _____ grass
- _____ pasture
- _____ crop or grain
- _____ wet soil plants: cattail, buttercup, bullrush, skunk cabbage, other
- _____ water plants: water lily, eelgrass, milfoil, other
- _____ other types of vegetation

b. What kind and amount of vegetation will be removed or altered?

There is a limited amount of English Ivy in the buffer area that will have to be removed before planting native species.

c. List threatened or endangered species known to be on or near the site.

None.

Buffer areas surrounding the project limits are fairly degraded by urban development and have been colonized by invasive species. Part of this project scope is restoration of the buffers.

d. Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any:

The entire 5,370 square feet of the stream buffer will be replanted with a mix of native trees, shrubs and groundcover.

5. Animals

a. Circle any birds and animals which have been observed on or near the site or are known to be on or near the site:

- birds: hawk, heron, eagle, songbirds, other:
- mammals: deer, bear, elk, beaver, other:
- fish: bass, salmon, trout, herring, shellfish, other: None

b. List any threatened or endangered species known to be on or near the site.

c. Is the site part of a migration route? If so, explain.

No. Heavy tree cover prevents migrating birds from using the site.

d. Proposed measures to preserve or enhance wildlife, if any:

Reconstruct stream segment and daylight base flow. Plant native species within the 5,370 square foot stream buffer area.

Impacts to habitat associated with species of local importance must be mitigated in accordance with the requirements of LUC 20.25H.150 through LUC 20.25H.170.

6. Energy and natural resources

a. What kinds of energy (electric, 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. Would your project affect the potential use of solar energy by adjacent properties?

If so, generally describe.

No. Existing vegetation limits use of solar on adjacent residences. The proposed plantings will not further limit solar access.

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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:

None.

7. Environmental health

a. Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill, or hazardous waste, that could occur as a result of this proposal?

If so, describe.

None.

1) Describe special emergency services that might be required.

Limited potential for needing emergency response during construction.

2) Proposed measures to reduce or control environmental health hazards, if any:

No use of paints, solvents or other materials during construction. Refueling vehicles will occur outside the stream buffer area.

These potential hazards are addressed as part of the site management practices included as part of the project's Clearing and Grading Permit.

b. Noise

1) What types of noise exist in the area which may affect your project (for example: traffic, equipment, operation, other)?

There is some background noise from SR-520 to the north and normal residential noise from the surrounding houses and streets.

2) What types and levels of noise would be created by or associated with the project on a short-term or a long-term basis (for example: traffic, construction, operation, other)? Indicate what hours noise would come from the site.

Short term noise will be generated by use of diesel powered construction equipment, the travel of workers to and from the site, and the delivery of construction materials.

Construction and operation noise is regulated by BCC 9.18. The proposed construction must meet the requirements of this section.

3) Proposed measures to reduce or control noise impacts, if any:

Turn off idling equipment when not in use.

8. Land and shoreline use

a. What is the current use of the site and adjacent properties?

The site is currently used as a drainage way carrying the base stream flow and any additional runoff created by the surrounding residences and street.

b. Has the site been used for agriculture? If so, describe.

No.

c. Describe any structures on the site.

The first segment of work, just east of 102nd Ave NE includes a control structure at the outlet from the culvert under 102nd Ave NE. and a buried culvert that carries the entire flow east and downhill to a stilling well approximately 116 feet to the east.

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d. Will any structures be demolished? If so, what?

No. A flow diverter will be constructed within the control structure to daylight the base flow onto a reconstructed stream segment on the 30% slope. The existing pipe carrying the entire flow to a stilling well will remain and will carry flows from the culvert under 102nd Ave NE that are above the base flow.

e. What is the current zoning classification of the site?

R-2.5

f. What is the current comprehensive plan designation of the site?

SF-M

g. If applicable, what is the current shoreline master program designation of the site?

None.

Not in shoreline jurisdiction.

h. Has any part of the site been classified as an "environmentally sensitive" area? If so, specify.

Yes. Portions of the site have been classified as a critical area steep slope and a small area of wetland.

See attached critical areas report for stream and wetland typing.

i. Approximately how many people would reside or work in the completed project?

None.

j. Approximately how many people would the completed project displace?

None.

k. Proposed measures to avoid or reduce displacement impacts, if any:

Not Applicable

l. Proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any:

Re-vegetate site with native plants. Use of reconstructed stream segment to handle base flow only will reduce potential for future erosion that had started to undermine the road until the emergency fill was placed last summer.

9. Housing

a. Approximately how many units would be provided, if any? Indicate whether high, middle, or low-income housing.

None.

b. Approximately how many units, if any, would be eliminated? Indicate whether high, middle, or low-income housing.

c. Proposed measures to reduce or control housing impacts, if any:

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10. Aesthetics

a. What is the tallest height of any proposed structure(s), not including antennas; what is the principal exterior building material(s) proposed?

None.

b. What views in the immediate vicinity would be altered or obstructed?

None

c. Proposed measures to reduce or control aesthetic impacts, if any:

None.

11. Light and glare

a. What type of light or glare will the proposal produce? What time of day would it mainly occur?

None

b. Could light or glare from the finished project be a safety hazard or interfere with views?

No.

c. What existing off-site sources of light or glare may affect your proposal?

None.

d. Proposed measures to reduce or control light and glare impacts, if any:

None.

12. Recreation

a. What designated and informal recreational opportunities are in the immediate vicinity?

Walking on shoulder of residential streets.

b. Would the proposed project displace any existing recreational uses? If so, describe.

No.

c. Proposed measures to reduce or control impacts on recreation, including recreation opportunities to be provided by the project or applicant, if any:

None.

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.

None.

b. Generally describe any landmarks or evidence of historic, archaeological, scientific, or cultural importance known to be on or next to the site.

None.

c. Proposed measures to reduce or control impacts, if any:

None.

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.

The site is located on the east side of 102nd Ave NE.

b. Is site currently served by public transit? If not, what is the approximate distance to the nearest transit stop?

No.

c. How many parking spaces would the completed project have? How many would the project eliminate?

None.

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).

None.

e. Will the project use (or occur in the immediate vicinity of) water, rail, or air transportation? If so, generally describe.

No.

f. How many vehicular trips per day would be generated by the completed project? If known, indicate when peak volumes would occur.

None.

g. Proposed measures to reduce or control transportation impacts, if any:

None.

15. Public services

a. Would 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.

None.

16. Utilities

a. Circle utilities currently available at the site: electricity, natural gas, water, refuse service, telephone, sanitary sewer, septic system, other.

Cable TV.

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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 which might be needed.

The first segment of the proposed work includes installing a flow splitter in the control structure located at the downhill end of the culvert under 102nd Ave NE. The base flow 0.3 CFS will be daylighted to a reconstructed stream segment. The existing culvert below the control structure that connects to the stilling well at the base of the first stream segment will be retained to carry the storm flows above the base flow to prevent further damage or erosion.

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: 
Date Submitted: 12/29/2010