KELSEY CREEK WATERSHED AT

OVERLAKE VILLAGE

GOING GREEN BY RESTORING THE BLUE

Integrated
Sustainable
Capacity
Redevelopment
Parks
Rain Gardens
Green Roofs
Trails
Connectivity
Livability

IMPLEMENTATION PLAN

OVERLAKE VILLAGE STORMWATER AND PARK FACILITIES CONCEPTUAL DESIGN

City of Redmond
WASHINGTON

Submitted to:
City of Redmond
15670 NE 85th Street
Redmond, WA 98073

otak

Prepared by:
Otak, Inc.
in association with
The Berger Partnership

Otak Project No. 31470 JUNE 30, 2010

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Appendices

Abbreviations and Acronyms

BMP	Best Management Practices
City	City of Redmond
Ecology	Washington State Department of Ecology
EIS	Environmental Impact Statement
LID	Low Impact Development
NHC	Northwest Hydraulic Consultants, Inc.
Overlake Neighborhood Plan	*Overlake Master Plan and Implementation Strategy, December 2007*
OBAT	Overlake Business and Advanced Technology zone
ODD	Overlake Design District
OV	Overlake Village Design District
PARCC	Parks, Arts, Recreation, Culture & Conservation Plan
PGIS	pollutant generating impervious surface
PGPS	pollutant generating pervious surface
Phase II Permit	NPDES Phase II Municipal Stormwater Permit
RCDG	*City of Redmond Community Development Guide*
RSFP	*City of Redmond Regional Stormwater Facilities Plan*
Stormwater Technical Notebook	*City of Redmond Clearing, Grading and Stormwater Management Technical Notebook*

References

GeoEngineers. 2010. *Preliminary Geotechnical Design Services, Overlake Village Stormwater and Park Facilities, Redmond, Washington*, GeoEngineers, January 13, 2010.

Otak. 2010a. *Low Impact Development Feasibility Analysis, Overlake Village Stormwater and Park Facilities Conceptual Design*, Otak, Inc. in association with The Berger Partnership, January 29, 2010.

NOTE: Cost information of LID facilities in this technical memorandum has been superseded by the information in this Implementation Plan.

Otak. 2010b. *Site Feasibility and Alternatives Analysis, Overlake Village Stormwater and Park Facilities Conceptual Design*, Otak, Inc. in association with The Berger Partnership, February 19, 2010.

NOTE: More detailed hydrologic modeling was performed after completion of this technical memorandum which demonstrated that two facility sites rather than the three sites included in this technical memorandum would be adequate to provide needed flow control capacity for the project. The updated facility concept is provided in this Implementation Plan.

Troost. 2010. *Redmond-Overlake Basin Geological Mapping Project*, Troost Geological Consulting and the Pacific Northwest Center for Geological Mapping Studies at the University of Washington (GeoMapNW), Final, April 27, 2010.

Introduction

Goals/Vision

Overlake Village, designated as the City of Redmond's second urban center (in addition to downtown), is poised for significant growth and change over the next 20 years. Adopted City plans call for the Overlake Village urban center to attract greater growth in housing and to continue to attract employment growth. The Overlake Village Stormwater and Park Facilities Implementation Plan has been initiated by the City to develop a conceptual design that best integrates regional stormwater treatment, infiltration and detention facilities, and park facilities into the Overlake Village portion of the Overlake neighborhood. Collocated facilities are preferred in order to minimize land requirements and to offer users an enhanced experience through the melding of environmental protection and park and green space functions.

Public and Stakeholder Involvement Process

Involvement of the general public, property owners, and stakeholders from Overlake Village has been integral to the planning process. Three community meetings/public workshops have been held, along with a number of separate coordination meetings with property owners, stakeholders, and other agencies. Briefings of the Parks and Trails Commission, Planning Commission, and City Council have also been provided at key milestones in the process. In addition, newsletters have been mailed to neighborhood property owners and have been made available, along with other project information, on the City's website.

Policy Implementation

The proposed collocated stormwater and park facilities will result in the implementation of policies in the adopted Overlake Neighborhood Plan. Several of the key policies from the Overlake Neighborhood Plan that will be implemented by this project include:

N-OV-18—Encourage the use of green building techniques and low-impact development methods, such as green roofs, bio-swales, and rain gardens.

N-OV-19—Develop regional stormwater treatment facilities within Overlake to treat and detain stormwater. Integrate facilities with parks and open spaces where feasible. Offer incentives to encourage public and private partnerships to develop these facilities.

N-OV-20—Reduce the negative impact of Overlake stormwater runoff on the water quality of Lake Sammamish, Kelsey Creek, the Sammamish River, and other creeks

in the neighborhood. Protect downstream properties, streambeds, and receiving waters from erosion and other adverse impacts from the quantity of runoff.

N-OV-22—Promote the vision of the plazas, open spaces, parks, trails and pathways, and art in Overlake as being part of a cohesive system of public spaces that is integral to distinguishing Overlake as an urban "people place." Develop and maintain a variety of linkages, such as paths and way finding elements, among plazas, parks and open spaces in Overlake and in nearby neighborhoods that are within walking distance of each other.

N-OV-66—Integrate parks and open spaces with regional stormwater facilities where feasible. Connect any regional stormwater facilities with the park system in Overlake Village.

The adopted Overlake Neighborhood Plan includes broad goals and policies for the study area and proposes to create a sense of place in the Overlake Village through parks and open spaces connected by urban pathways, walkable streets, and landmark redevelopment projects, including key cornerstone sites in the neighborhood. The neighborhood plan encourages development of collocated stormwater and parks facilities to maximize public investment.

Stormwater Needs

Adopted City policies and the regulatory requirements of the Washington Department of Ecology (Ecology) establish the need for stormwater management in Overlake Village. Regional facilities and low impact development (LID) are proposed to meet flow control and runoff treatment standards established by Ecology and City policy. The needed size of these stormwater facilities is significant.

Park and Open Space Needs

The conceptual design for the collocated stormwater and park facilities closely follows and promotes the vision for Overlake Village. The design proposes two publicly accessible parks (in addition to other parks and open spaces that may be developed on private sites in the neighborhood), as well as a connecting system of urban pathways that will connect the two parks and other public spaces (plazas, transit station, etc.) in Overlake Village. The urban pathway system will link people and places throughout the neighborhood and will also provide stormwater management benefits through rain gardens and underground infiltration galleries under the pathways.

Feasibility and Conceptual Design

Focus in Village

This project focuses on the southerly Village area of the Overlake neighborhood, south of SR520 although its stormwater facilities also serve the employment area north of SR520.

Use of LID Elements

Project evaluations have demonstrated that a moderate level of LID implementation within urban pathways and local street systems for flow control is cost competitive with a no LID option, which would require a larger stormwater vault. The LID element achieves compliance with City LID goals and likely future regulatory mandates for LID implementation. LID is therefore a component of the preferred alternative of this plan. Treatment of runoff in redevelopment areas will be required locally for streets and private development areas. LID can be used for this purpose.

Comprehensive Analysis of Sites

A comprehensive analysis process was used to identify the best combination of sites for collocated facilities. Of the dozens of areas evaluated within the Village, a total of 20 areas were identified as potential areas for collocated facilities. These areas were all evaluated as a part of a comprehensive site selection and validation process. The 20 areas were evaluated first for stormwater feasibility, of which 13 were determined feasible. The feasible areas were further evaluated on the basis of stormwater function and implementation criteria and on neighborhood planning, urban design, and parks criteria. Based on this evaluation, seven areas were selected for formulation of alternative concept projects. Three project concepts were formulated from the seven areas and were evaluated and compared, and a preferred alternative identified.

Preferred Alternative

The preferred alternative includes three main components. The first two features are collocated stormwater and park facilities; the upper collocated facility would be located south of SR520, near the proposed NE 28th Street, and west of 152nd Avenue NE; and the lower collocated facility would be situated north of NE 20th Street, south of NE 22nd Street, and west of 151st Avenue NE. The two facilities would be connected by the third feature, an urban pathway containing LID facilities.

The lower collocated facility would be a regional detention facility that would detain stormwater that has been treated locally within public rights-of-way and private development areas and would therefore only provide flow control. Park facilities would be constructed on top of the stormwater vault. The park facilities concept envisions that this site would eventually serve as a primary community open space for programmed and unprogrammed activities with additional plaza and green space. The development of this park would occur in the future with other neighborhood redevelopment.

The upper collocated facility is a regional stormwater infiltration site that would treat and infiltrate runoff from the stormwater study area upstream of the facility. A Sound Transit light rail station and two new streets are planned to be constructed near this facility, so final location and design of this facility will be determined in coordination with these other projects. As with the lower facility, park facilities would be constructed on the top of the stormwater vault. The park facilities concept for this site envisions a primary plaza with significant green and open space for a variety of unprogrammed activities.

The urban pathway connecting the two sites is intended to be developed within dedicated easements adjacent to City rights-of-way, and would be designed to include LID components to reduce the size of the lower stormwater facility and provide treatment of runoff. Additional LID components would be located within local street rights-of-way and within private development areas. Stormwater conveyance improvements would be needed as a part of the project, as would some localized runoff treatment facilities.

Implementation Plan

Code Revisions

With further analysis of the City Code, it may be necessary to modify Code language, street standards, and site development standards to more clearly define the specific requirements for LID in circulation systems and onsite private redevelopment. As part of the next phase of work, a detailed review of Code provisions, street design standards, and site development standards will be conducted. Recommendations will be developed for:

- code language modifications that may be needed to implement the level of LID expected with the preferred option;
- additional street design standards and details needed to guide LID implementation in public rights-of-way; and
- additional site development standards and details needed to guide LID onsite.

Once the City has an opportunity to review these recommendations, specific Code language, detail drawings, and other provisions will be prepared for formal review and adoption. City documents that may require updating from this process include the *City of Redmond Community Development Guide* (RCDG), *Clearing, Grading and Stormwater Management Technical Notebook* (Stormwater Technical Notebook), and *Standard Specifications and Details*.

Schedule/Phasing

The City's intent is to phase the project to provide flow control and runoff treatment that responds to the timing of redevelopment in the stormwater study area. The immediate phase will address flow control and runoff treatment for existing capital facility charge area customers. The next phases, perhaps two or three in all, will address redevelopment in the Village area. For these later phases, the City's intent is to always have sufficient capacity available for development and redevelopment as it occurs through phasing of regional facilities.

In general, the elements in this plan are expected to be constructed over an approximate twenty year period (2010 – 2030) although full redevelopment of the Village may not be completed until later. The lower collocated site is planned to be constructed and in operation by February 2016. The upper collocated site would be constructed in coordination with the Sound Transit light rail station (scheduled to open in 2021). The urban pathway would be constructed as adjacent redevelopment occurs.

Project Costs

The 2010 estimated project costs of the stormwater elements of the project with LID are presented below.

Upper collocated facility without land costs	$13,200,000
Lower collocated facility with land lease/easement	$12,600,000
Lower service area LID facilities	$4,600,000
NE 24th/152nd NE runoff treatment facility	$1,300,000
Initial phase Bellevue bypass storm piping	$300,000
Final phase Bellevue bypass trunk line in Bel-Red Road	$1,600,000
North tributary areas initial phase runoff treatment system	$800,000
Intersection oil control treatment systems	$1,300,000
Total	$35,700,000

Land acquisition costs are not included for the upper collocated facility or the lower park facility as it is anticipated that the property would be acquired through partnering with Sound Transit and/or a private developer, and cost sharing cannot be established at this time.

Preliminary project costs for park facilities (in 2010 dollars) are assumed to be between $650,000 and $1,000,000 per acre for each of the parks. This cost is based on recent urban park projects of similar character.

Section 1—Introduction

Overlake Village Project Overview

The City's *Overlake Master Plan & Implementation Strategy, December 2007* (Overlake Neighborhood Plan) defines proposed actions for three districts within its boundaries: the Residential Area in the northeast, the Employment Area in the central-west area, and the Overlake Village in the southerly area. The locations of these districts are shown in Figure 1-1. The Comprehensive Plan and existing zoning regulations for the area offer opportunities for substantial growth in the Village to transform the area into a vibrant, mixed-use urban village.

The Overlake Village Stormwater and Park Facilities Conceptual Design project has been initiated by the City of Redmond (City) to develop a conceptual design that best integrates regional stormwater treatment, infiltration and detention facilities, and park facilities into the Overlake Village portion of the Overlake neighborhood. Collocated facilities are preferred to minimize land requirements and to offer users an enhanced experience through the melding of environmental protection and park and green space functions.

The stormwater study area for this project is Redmond's portion of the Sears Creek subbasin of the Kelsey Creek watershed tributary to the Overlake Village. The location of the stormwater study area within the Kelsey Creek watershed is shown in Figure 1-2. The stormwater study area makes up the large majority of the Sears Creek watershed, which is a tributary to Valley Creek, a major tributary to Kelsey Creek. Kelsey Creek discharges to Lake Washington via Mercer Slough on the west side of I-405 south of the Bellevue downtown area as shown in Figure 1-2. A portion of the City of Bellevue drains to Sears Creek via the stormwater study area from the east as shown in Figure 1-2. It is important to note that regional stormwater facility design requires a watershed-based approach as stormwater moves downgradient with the topographic slope irrespective of jurisdictional boundaries.

Purpose and Scope of the Implementation Plan

The purpose of this implementation plan is to describe the recommended conceptual design for the project and to provide the basis for land acquisition and subsequent construction documents for the project as well as project financing and phased implementation.

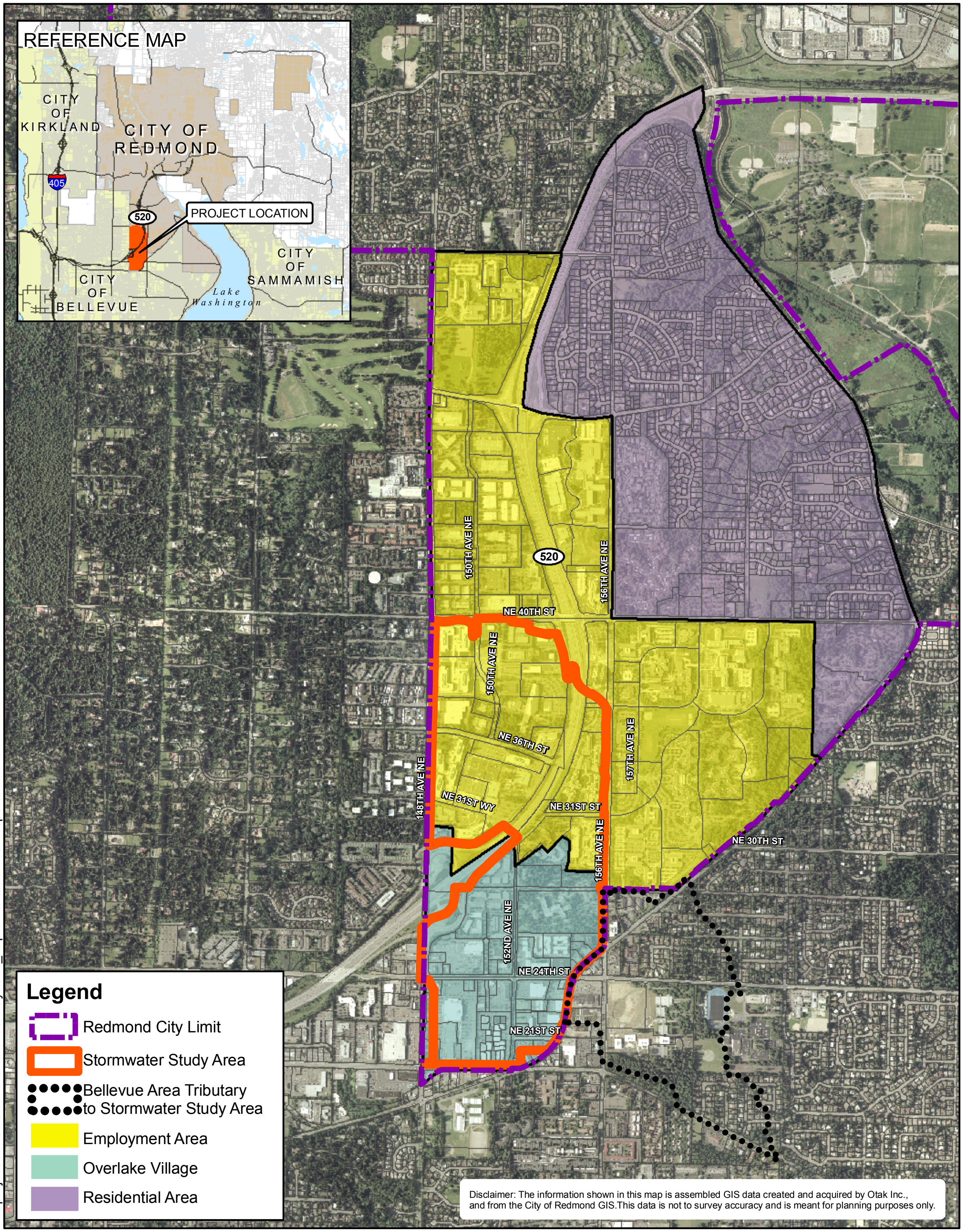

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Figure 1-1
Vicinity Map

Overlake Village Stormwater and Park Facilites Conceptual Design

City of Redmond WASHINGTON

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The Berger Partnership PS Landscape Architecture

0 1,000 2,000 4,000 Feet

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Date of Aerial Photography: 2005

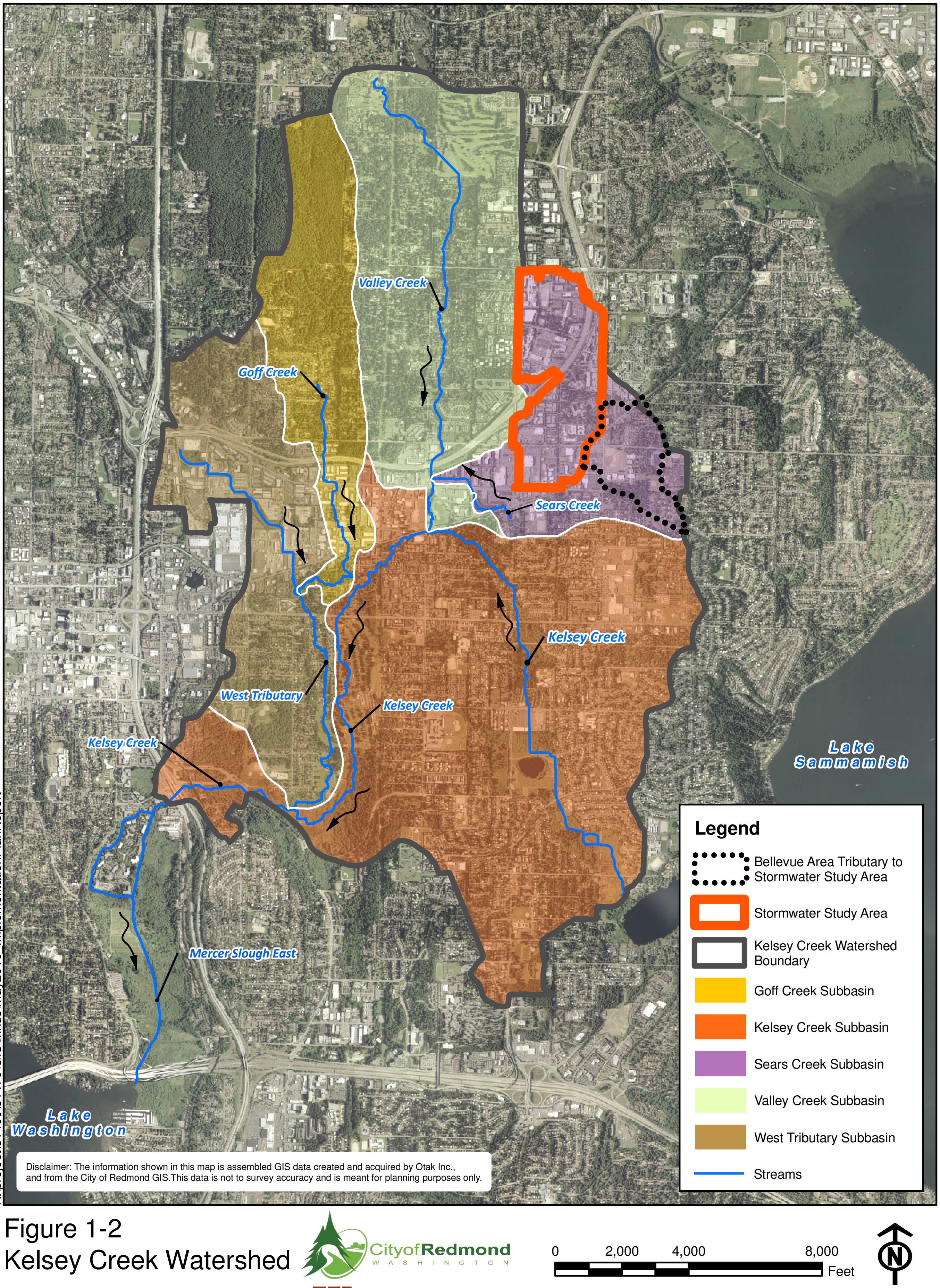

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Figure 1-2
Kelsey Creek Watershed

Overlake Village Stormwater and
Park Facilites Conceptual Design

City of Redmond WASHINGTON

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The Berger Partnership PS
Landscape Architecture

Date of Aerial Photography: 2006

Development of the Implementation Plan builds on previous tasks of the project including:
- Data collection and summary
- Field investigations
- LID feasibility analysis
- Site feasibility and alternative analysis
- Hydrologic/hydraulic modeling of the stormwater study area (Northwest Hydraulic Consultants, Inc.)
- Preliminary geotechnical investigations (GeoEngineers, Inc.)

Specific tasks of the implementation plan include:
- Summarize previous information and analyses performed for the project
- Develop design concepts for the collocated stormwater and park facilities for the preferred collocation sites selected from the alternatives analysis
- Evaluate LID alternatives as part of the design concept development
- Develop a plan for implementation of the design concept including project phasing, schedule and financing

Planning Process/Public and Stakeholder Involvement

The planning process for development of this implementation plan involved three stages of work (assessment, analysis, and evaluation) and specific steps within each stage. This process is discussed in Section 3 and illustrated in Figure 3-1.

Involvement of the general public, property owners, and stakeholders from Overlake Village has been integral to the planning process. Three community meetings/public workshops have been held, along with a number of separate coordination meetings with property owners, stakeholders, and other agencies. Briefings of the Parks and Trails Commission, Planning Commission and City Council have also been provided at key milestones in the process. In addition, newsletters have been mailed to neighborhood property owners and are available, along with other project information on the City's website. The schedule of community meetings and council/commission briefings relative to key project tasks and milestones are shown in Figure 1-3.

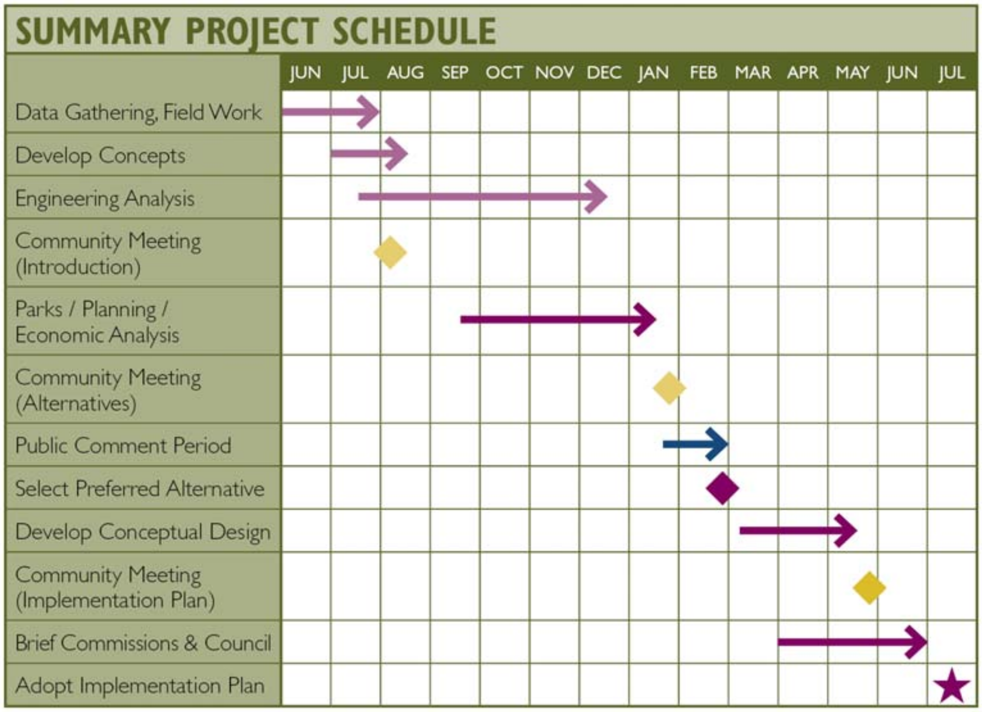


Figure 1-3: Project Schedule

Document Organization

This document is organized into five sections as follows:

- Section 1 provides an overview of the project, its objectives and the scope of the project tasks.
- Section 2 provides an overview of policy and regulatory drivers.
- Section 3 describes the feasibility analysis.
- Section 4 addresses the project design.
- Section 5 provides the implementation plan for the proposed stormwater and park facilities project.

Section 2—Policy and Regulatory Drivers

The collocated stormwater and park facilities project will implement specific Overlake Neighborhood plan and City of Redmond Comprehensive Plan policies. The project's relationship to several key neighborhood plan policies is summarized below. There are many other neighborhood plan and comprehensive plan policies that the collocated stormwater and park facilities project will implement, promote, and support. Additional related policies are listed in Appendix A. This section also includes a discussion of other City planning and zoning considerations related to project implementation, as well as planning requirements that will affect implementation.

Implementation of Overlake Neighborhood Plan Policies

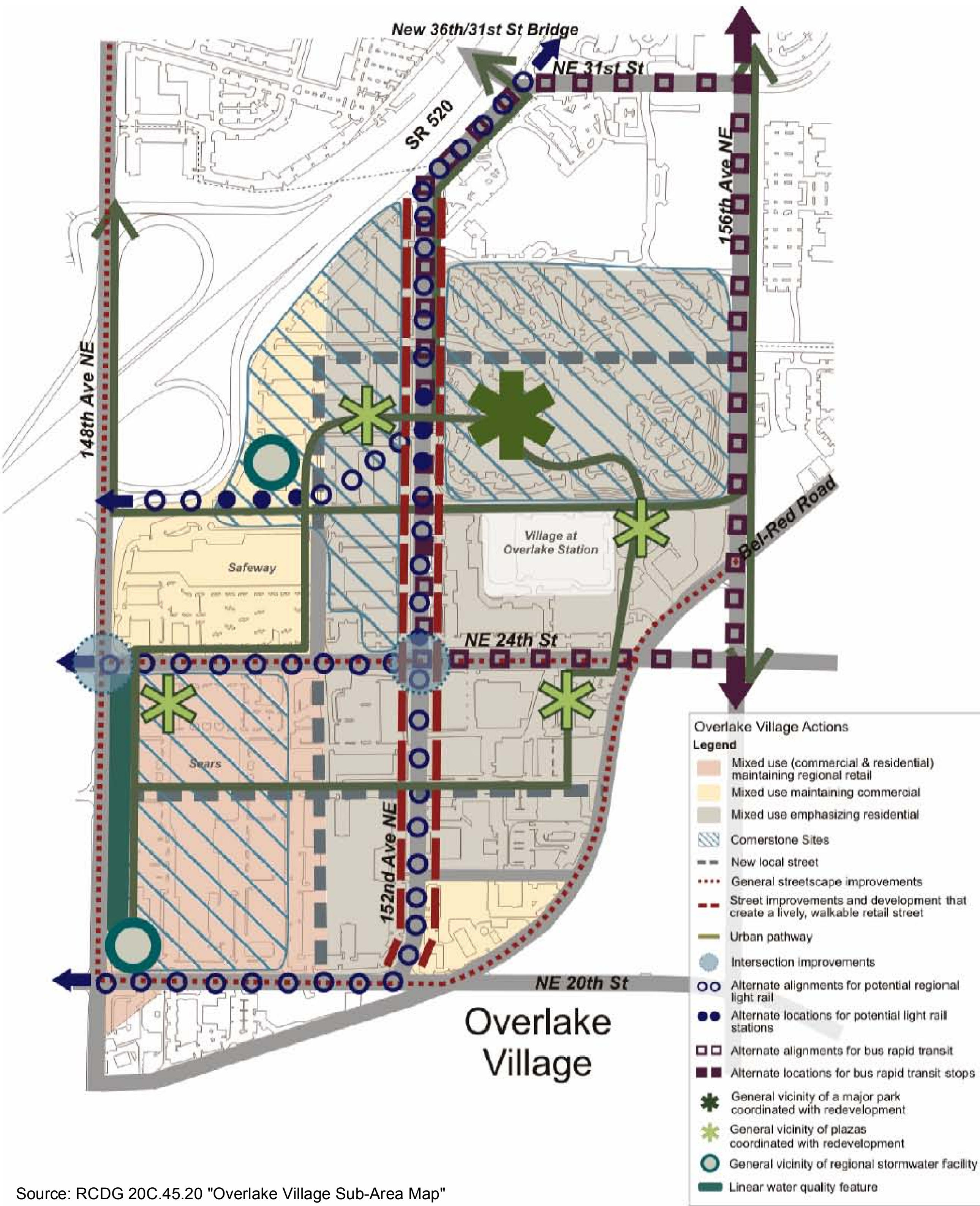
The adopted Overlake neighborhood plan includes broad goals and policies for the study area and proposes to create a sense of place in the Overlake Village through parks and open spaces connected by pathways, walkable streets, and landmark redevelopment projects, including key cornerstone sites in the neighborhood (as presented and illustrated in the *Overlake Master Plan and Implementation Strategy*). Figure 2-1 illustrates the key elements proposed for Overlake Village in the neighborhood plan. Figure 2-2 shows the three different types of zoning districts within the stormwater study area which include:

- Overlake Business and Advanced Technology zone
- Overlake Design District
- Overlake Village Design District

As the City's second designated urban center (in addition to downtown), Overlake Village is poised for significant growth and change over the next 20 years. Adopted City plans call for the Overlake Village urban center to attract greater growth in housing and continue to attract employment growth. The City estimates that there will be over 11,000 new residents and many additional businesses and employment opportunities in the neighborhood by 2030. The adopted neighborhood plan allows for a wide range of uses and activities now and the intent is to maintain and enhance this variety and intensity. Existing and new residents and employees will need new parks, open spaces, and pathways, and new development will need stormwater management facilities. The neighborhood plan encourages development of collocated stormwater and parks facilities to maximize public investment. Adopted land use policies in the City's comprehensive plan and the neighborhood plan will serve as a compass for future redevelopment in Overlake Village, guiding growth and change in a manner that serves the needs and desires of existing and future residents, businesses, and visitors and enhances the character and presence of the transforming urban center.

The proposed collocated stormwater and park facilities will directly implement policies of the adopted Overlake Neighborhood plan. Several of these key policies are listed below,

Overlake Village Sub-Area Map



Source: RCDG 20C.45.20 "Overlake Village Sub-Area Map"

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Figure 2-1
Overlake Village Sub-Area Map

Overlake Village Stormwater and
Park Facilites Conceptual Design

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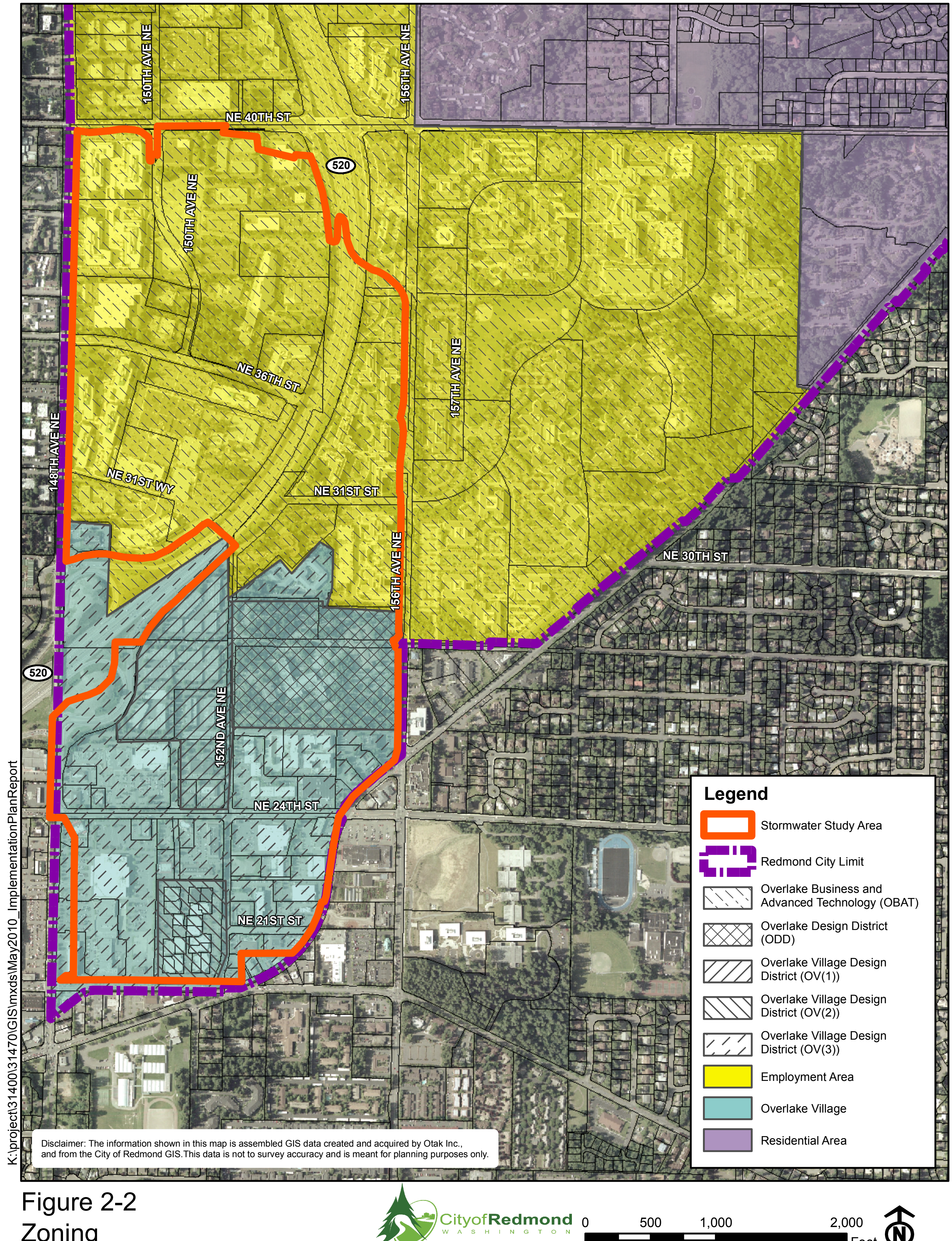

Figure 2-2
Zoning

Overlake Village Stormwater and
Park Facilites Conceptual Design

Date of Aerial Photography: 2005

followed by statements of how the project will support and implement them. This is only a partial list of the policies that the project will implement and support. Refer to Appendix A for a full list of policies that relate to the project.

N-OV-18—Encourage the use of green building techniques and low-impact development methods, such as green roofs, bio-swales, and rain gardens.
The project proposes low impact development (LID) methods and treatments integrated into local street and pathway development (such as rain gardens and infiltration galleries). LID treatments as part of redevelopment are also proposed and assume that property redevelopment will integrate LID treatments within the 15 percent pervious surface area currently required by city code. Cross-site (east-west) infiltration galleries that connect into the local street infiltration system are proposed, and it is assumed that these would be located beneath pedestrian and/or vehicular circulation ways (connectors between blocks).

N-OV-19—Develop regional stormwater treatment facilities within Overlake to treat and detain stormwater. Integrate facilities with parks and open spaces where feasible. Offer incentives to encourage public and private partnerships to develop these facilities.
The proposed Overlake Village collocated stormwater and park facilities will directly implement this policy. The proposed facilities will provide efficient use of public space by sharing stormwater management functions with sites that also provide parks and open spaces for public use. The project proposes development of underground stormwater vaults with parks space over the top of these facilities, as illustrated and described later in this report. The preferred locations for these features provide opportunities for public and private partnerships. The City will be working with property owners and potential future public partners such as Sound Transit to offer incentives that encourage partnership in the development of these facilities.

N-OV-20—Reduce the negative impact of Overlake stormwater runoff on the water quality of Lake Sammamish, Kelsey Creek, the Sammamish River, and other creeks in the neighborhood. Protect downstream properties, streambeds, and receiving waters from erosion and other adverse impacts from the quantity of runoff.
The proposed stormwater facilities will directly reduce impacts of Overlake stormwater runoff on erosion and water quality in the connecting systems by managing and treating stormwater within the neighborhood, ensuring that water is clean before infiltrating or being conveyed downstream. Restoring stormwater infiltration in the Sears Creek basin will supplement baseflowing in Sears and Kelsey Creek. Also, reducing peak flood flows will reduce channel erosion and deposition on downstream spawning beds.

N-OV-22—Promote the vision of the plazas, open spaces, parks, trails and pathways, and art in Overlake as being part of a cohesive system of public spaces that is integral to distinguishing Overlake as an urban "people place". Develop and maintain a variety of linkages, such as paths and way finding elements, among

plazas, parks and open spaces in Overlake and in nearby neighborhoods that are within walking distance of each other.

The conceptual design for the collocated stormwater and park facilities closely follows and promotes the vision for Overlake Village. The project proposes two publicly accessible parks (in addition to other parks and open spaces that may be developed on private sites in the neighborhood), as well as a connecting system of urban pathways that will connect the two parks and other public spaces (plazas, transit station, etc.) in Overlake Village. The urban pathway system will link people places throughout the neighborhood and also provide stormwater management benefits through underground infiltration galleries proposed beneath the pathway. Enhanced neighborhood streets will also provide pedestrian and bicycle connections between the proposed parks. Public art, trees, landscaping, wayfinding elements, streetscape treatments and furnishings, rain gardens, and various types of LID features are proposed within and adjacent to the parks, urban pathway corridors, and street systems of the neighborhood (which would be implemented as part of this and other proposed projects).

N-OV-66—Integrate parks and open spaces with regional stormwater facilities where feasible. Connect any regional stormwater facilities with the park system in Overlake Village.

The project directly implements this policy by proposing collocated, integrated stormwater and park facilities to serve the anticipated growth in the Overlake Village neighborhood.

Other City of Redmond Planning and Zoning Considerations

The RCDG contains specific regulations related to appropriate site design and dimensional standards required by code. The Overlake Village (OV) and Overlake Design District (ODD) zoning districts in the stormwater study area include incentives for implementing specific actions, amenities, and or improvements that site developers can provide, which in turn would grant them credits towards additional space, height, or other features increasing the value of their projects. The incentives table for the OV and ODD districts offers increased floor-area-ratios and an increased number of building stories (allowed height) in return for providing a minimum of two acres to be used for regional stormwater facilities. The incentive program also includes bonuses for master planning, as well as for providing plazas, parks, and open space with site redevelopment.

In review of the current zoning requirements, it may be necessary to amend the language to provide more specific guidance and provisions related to integration of LID treatments and urban pathway implementation on redeveloped sites (within the 15 percent required pervious surface area). At the discretion of the City, additional incentives could be offered to further encourage specific LID treatments with private development.

NPDES Permit for Municipal Separated Storm Sewer Systems

Besides the City's adopted policies, new regulatory requirements are an important driver for this project. The City of Redmond's NPDES *Western Washington Phase II Municipal Stormwater Permit* (Phase II Permit) became effective February 16, 2007. The Phase II Permit includes stormwater management requirements for new development and redevelopment including LID where feasible. The City's Stormwater Technical Notebook is currently being updated to reflect these new requirements. Full compliance with Phase II Permit requirements is expected to be complete July 2010.

From the regulatory requirements, the following are key stormwater management compliance standards for this project:

- Flow Control—Match flow durations to pre-development (forested) conditions from one-half of the forested 2-year peak flow through the forested 50-year flow
- Runoff Treatment Levels
  - Redevelopment areas—enhanced treatment
  - High traffic count intersections—oil water separation
  - High traffic count streets (>7,500 Average Annual Daily Traffic Count)—enhanced treatment
  - Low traffic count streets—basic treatment

Achieving flow control and runoff treatment standards utilizing LID techniques is increasingly being mandated by regulatory agencies. The Ecology is currently undergoing an advisory process in western Washington for future LID implementation for Phase II permittees. This is in response to the Pollution Control Hearings Board February 2009 ruling that requires Ecology to define in the Phase I Permit further steps to advance LID. The Phase II Permit will be updated in 2012, and is expected to follow language adopted within the Phase I Permit. The use of LID techniques in meeting the stormwater standards for the stormwater study area is an important element in the project development process.

Redmond Regional Stormwater Facilities Plan

The City of Redmond has adopted the *City of Redmond Regional Stormwater Facilities Plan* (RSFP), dated October 16, 2006, to guide development of regional stormwater facilities to support development and redevelopment in the highly urbanized City Center and Overlake planning areas. The RSFP was reviewed by Ecology, and on October 17, 2006, Ecology issued a letter of support for the RSFP. In February 2010, the City updated the RSFP to be more consistent with the Phase II Permit, and Ecology issued a letter supporting these changes. One significant element in the RSFP is that regional facilities may be constructed up to six years after redevelopment occurs. This project proposes to construct the first regional facility within six years of the effective date (February 16, 2010) of the redevelopment requirements within the Phase II Permit, or February 16, 2016.

The RSFP responds to policy UT-39 of the Redmond Comprehensive Plan, which states: *Evaluate the feasibility of regional detention and treatment facilities and support their use where the concept proves feasible.* Preliminary cost analyses performed as a part of this study show that it is substantially more economical to provide needed detention storage in large, regional facilities rather than numerous, smaller facilities. The RSFP also encourages LID techniques in stormwater management. This is responsive to policy UT-43 and UT-44 of the Redmond Comprehensive Plan, which encourage incorporation of natural systems for stormwater management in building and streetscape designs.

Overlake Storm Drainage Capital Facilities Charges

The City of Redmond adopted Ordinance No. 2443 in January 2009, which provides for a storm drainage capital facilities charge per impervious unit to be applied to redevelopment in the Overlake Capital Facilities Charge Area in lieu of construction of site-specific stormwater management facilities. The boundaries of the facilities charge area are shown in Figure 2-3. Charges collected under this ordinance will be used by the City to construct regional stormwater management facilities to treat and control stormwater generated in the stormwater study area. In some cases, the ordinance also requires construction of interim facilities to protect downstream properties until regional facilities are constructed.

Redmond Wellhead Protection Program

A portion of the City of Redmond residents and businesses receive their drinking water supplies from shallow groundwater wells operated by the City. The areas closest to the wells are identified as a regulated Critical Aquifer Recharge Area.

The stormwater study area is located outside the Critical Aquifer Recharge Area and has a low potential for impacting the City groundwater drinking water resource. In addition, the direction of the groundwater gradient/flow is from north to south (away from the Critical Aquifer Recharge Area) as determined from monitoring wells constructed as a part of this project. Because the direction of groundwater flow is away from the drinking water resource area, as well as the distance from the stormwater study area to the wells, the potential for contamination of the City's drinking water resource by activities within the stormwater study area is very low.

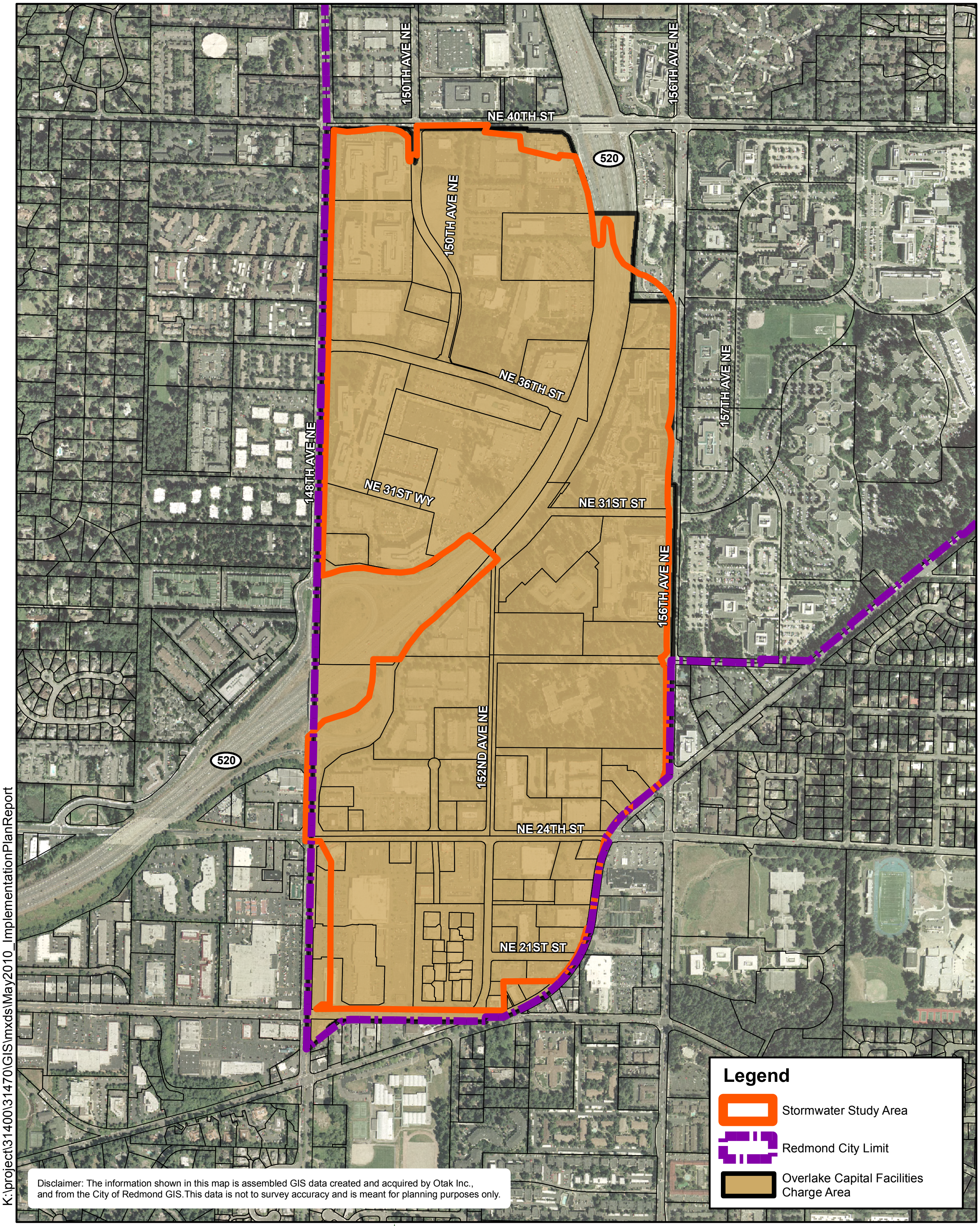

Figure 2-3
Overlake Capital Facilities Charge Area
Overlake Village Stormwater and Park Facilites Conceptual Design

City of Redmond WASHINGTON

0 500 1,000 2,000 Feet

otak

The Berger Partnership PS Landscape Architecture

Date of Aerial Photography: 2005

Redmond Parks, Arts, Recreation, Culture & Conservation Plan

The City recently adopted an update to the Parks, Arts, Recreation, Culture & Conservation (PARCC) Plan. This plan provides an inventory of the parks system; projects the future park systems needs for the next six, ten, and 20 years based on extensive analysis and public involvement; and prioritizes projects in a capital improvement program that is adopted by City Council. This plan complies with the Growth Management Act and thereby, the City of Redmond's Comprehensive Plan and contributes to the Parks Element of the Comprehensive Plan.

The PARCC Plan identifies three future parks within Overlake Village, including two collocated stormwater and park facilities. A Level of Service (LOS) Analysis is used to determine when these parks will be needed. The LOS is based on five factors:

- Demand—Current usage rates, and requests for services and facilities from the community
- Need—Meeting needs of the community for recreation services
- Geographic Equity—Striving to have a more equitable amount of parks and trails in every neighborhood
- Walkability—Planning new parks and trails to improve the ability of community members to walk a quarter-mile or less to a park or trail from their home or workplace
- Function—Striving for a balance of projects

As the residential and employee populations in the Overlake neighborhood grow, Overlake will develop a great need for more neighborhood parks. By tracking the population growth and other LOS factors, and the development of major new features such as the light rail station, it is possible to determine appropriate timing of development of the parks in Overlake.

Using residential and employment growth projections, the PARCC Plan projected a need in the Overlake neighborhood of 3.4 additional acres of neighborhood park land by 2020, and 5.4 acres of additional park land by 2030. If population shifts occur at a different rate, or if other opportunities arise, this schedule may be revised. Development of park land may also be effective in stimulating the kind of development the City wishes to see in the Overlake neighborhood.

Efficiency of delivery of public projects and environmental sustainability are other considerations that recommend the development of the parks in close coordination with the stormwater projects, if possible.

Section 3—Feasibility Analyses

This section describes the results of engineering, planning and park analyses leading to the identification of feasible site concepts for collocated facilities; and the selection of the preferred site concept for conceptual design in Section 4. The process followed in the feasibility and site concept analyses is shown in Figure 3-1. In the paragraphs to follow, site feasibility elements are discussed first followed by the results of a parks programming and functional analysis, LID implementation assessment, and coordination considerations with other study area projects. Alternative site concepts are then identified and the preferred approach summarized. All alternative site concepts necessarily include more than one site to achieve stormwater functions.

Site Feasibility Elements

Study Area Soils

Based on both existing and newly developed subsurface information available to the project geotechnical engineer, GeoEngineers, Inc., the stormwater study area soils include large areas of weathered and unweathered glacial till, and recessional outwash deposits. The higher elevation areas in the study area are mostly underlain by weathered and unweathered glacial till. The lower elevation areas in the study area are largely underlain by recessional outwash deposits.

The available information included recent soils mapping that was performed for the Overlake area and documented in *Redmond-Overlake Basin Geological Mapping Project*, by Troost Geological Consulting and the Pacific Northwest Center for Geological Mapping Studies at the University of Washington (GeoMapNW), Final, April 27, 2010 (Troost. 2010). The soils information is illustrated in Figure 3-2.

Glacial till in its unweathered condition is sometimes referred to as hardpan, and is very dense and relatively impermeable when considering stormwater infiltration. Infiltration rates into unweathered glacial till are generally less than 0.10 inches per hour.

Weathered glacial till is also dense and relatively impermeable when considering stormwater infiltration; however, it is slightly more permeable than the unweathered till. Infiltration rates into weathered glacial till may range from 0.20 to 0.50 inches per hour.

Recessional outwash deposits consist of sand and gravel with areas of silty sand and silt. The sandy outwash deposits should be relatively permeable with infiltration rates of about 2 inches per hour. Infiltration rates into silty outwash deposits will be much lower.

Test borings were completed as a part of GeoEngineers services adjacent to two areas identified as possible stormwater management/infiltration areas. The northernmost boring

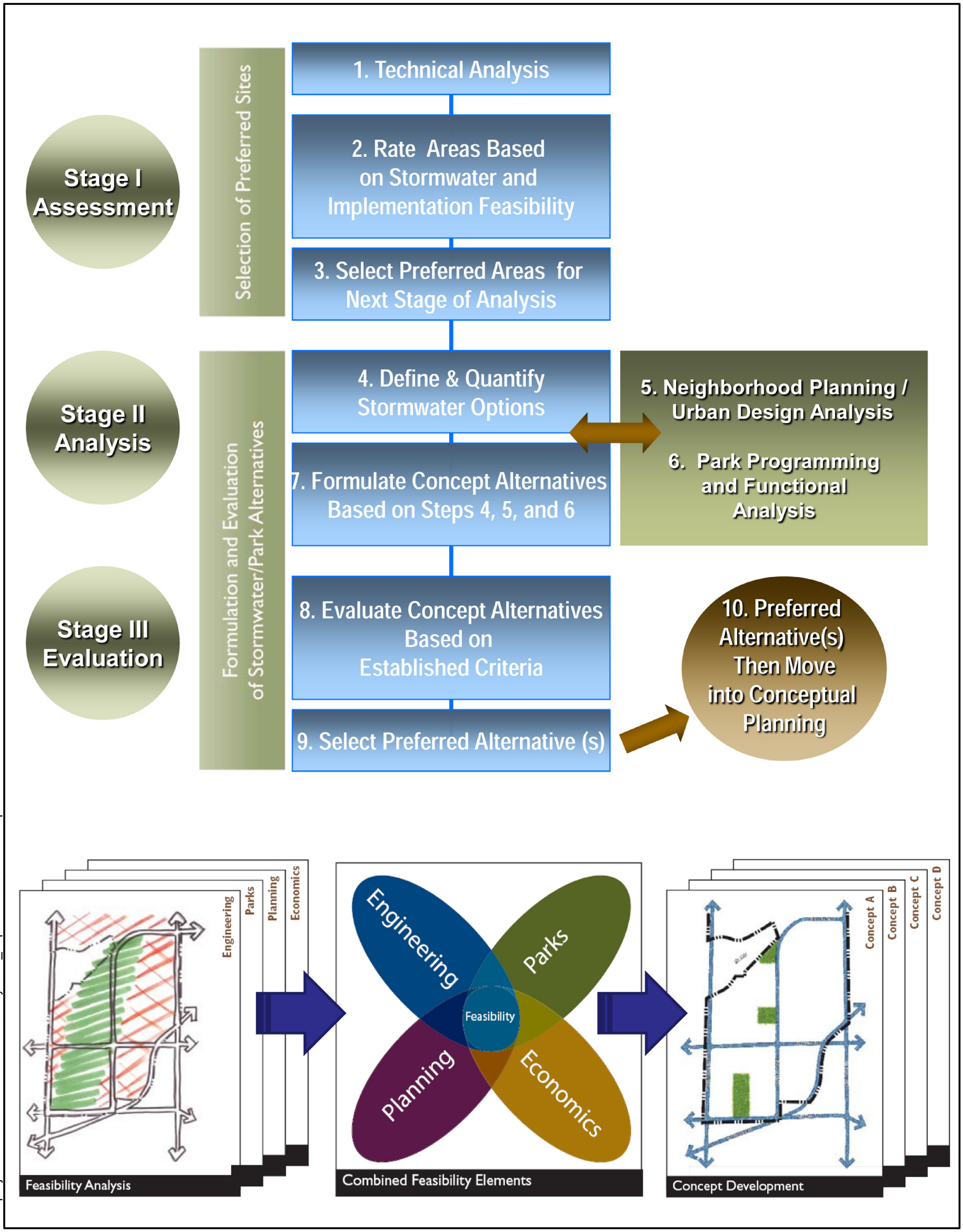

Figure 3-1
Feasibility and Alternatives Analysis Process

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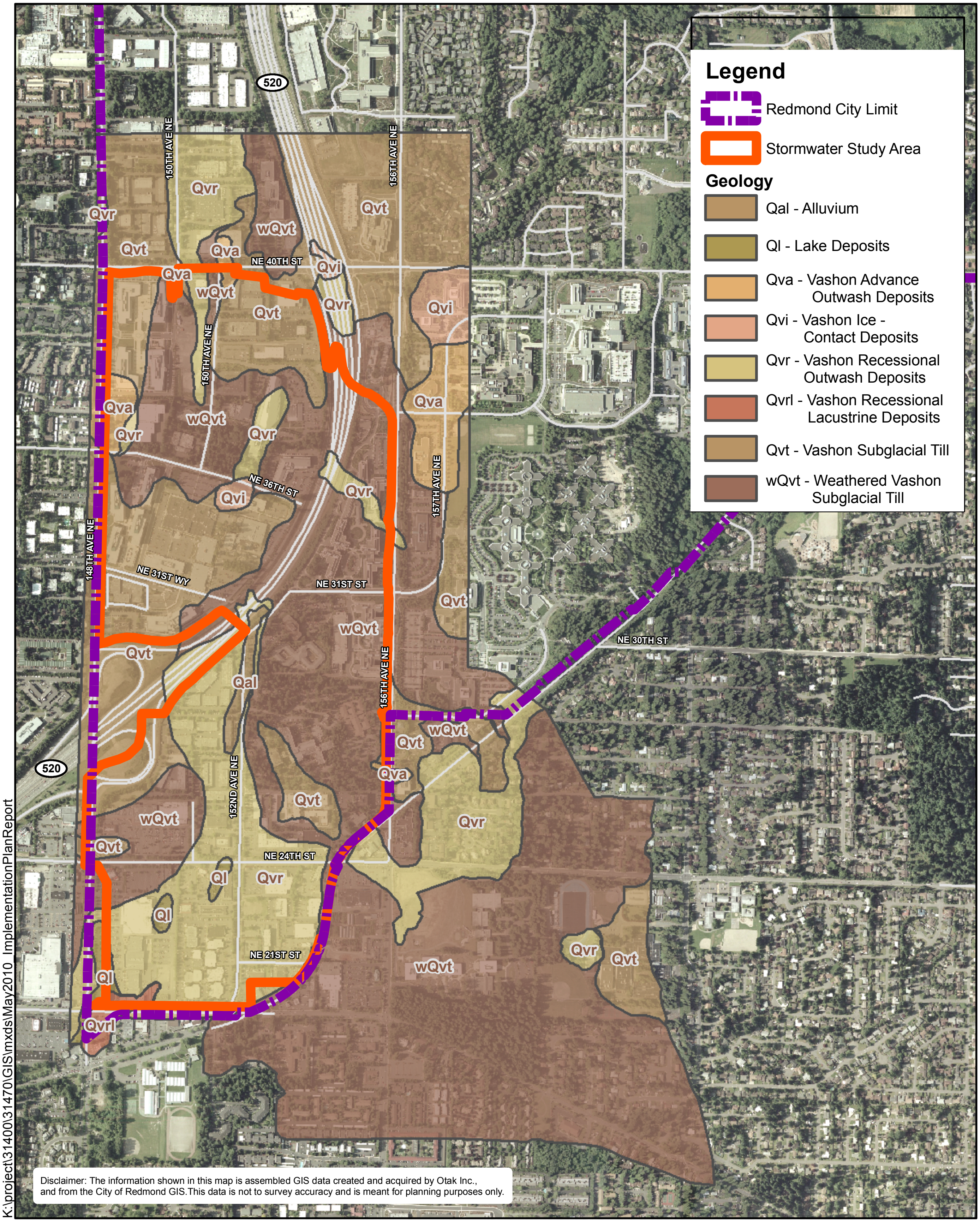

Figure 3-2
Overlake Geologic Map

Overlake Village Stormwater and Park Facilites Conceptual Design

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was drilled at approximately the 3000 block of 152nd Avenue NE. That boring encountered fill over glacial till that extended to approximately 17 feet below the ground surface (bgs).

Advance outwash sand and gravel underlies the till and extended to below 52 feet bgs, the full depth explored in the boring. Groundwater was measured in this boring (piezometer) at a depth of 38.7 feet bgs. Long term infiltration rates into the advance outwash sand and gravel that is above groundwater may be on the order of 2.0 inches per hour.

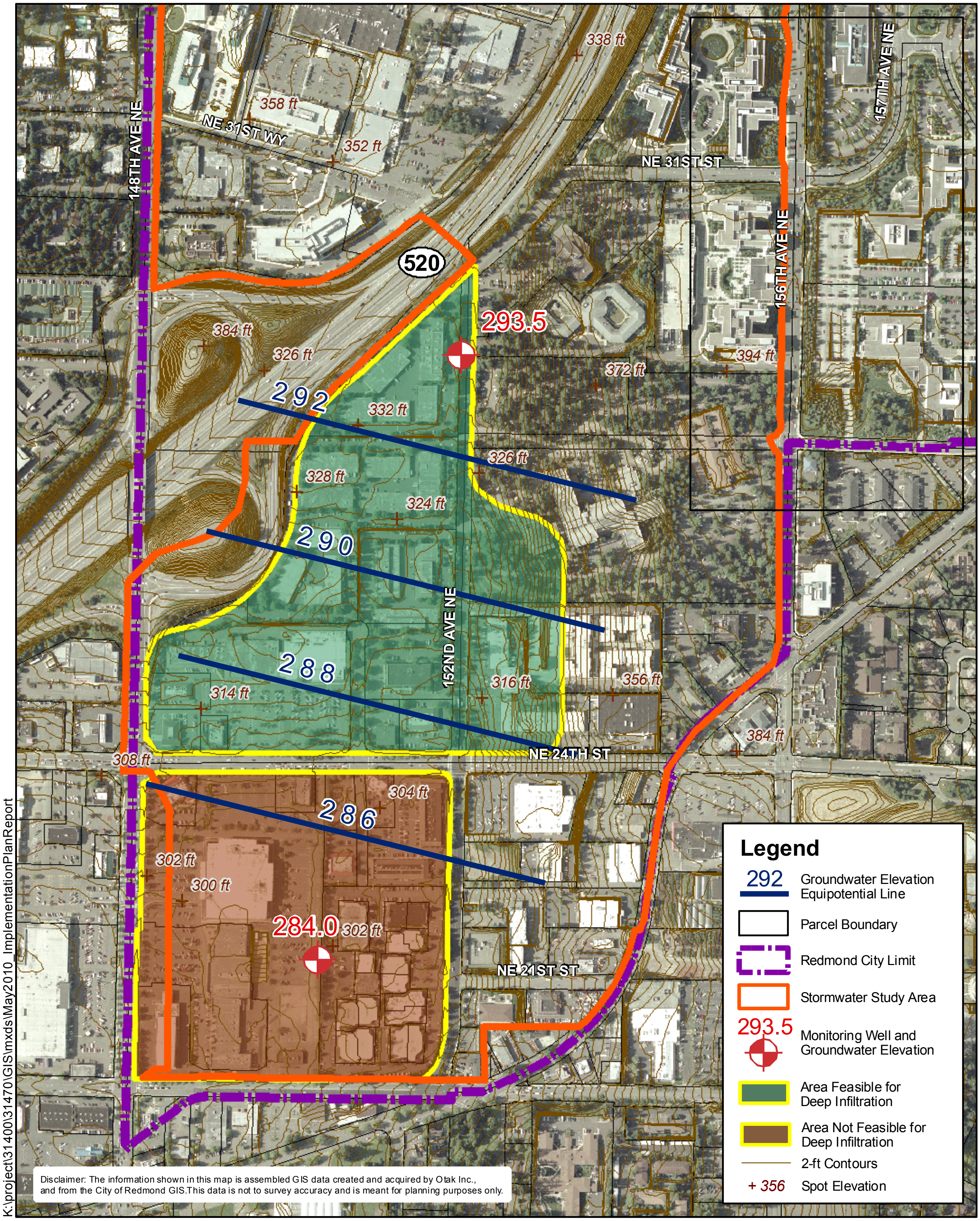
The second boring was completed in the parking lot of Overlake Fashion Plaza. This boring encountered stratified organic silt, silt, and silty sand over glacial till to a depth of approximately 23 feet bgs. Advance outwash sand and gravel underlies the till and extended to 39 feet bgs. Below the advance outwash, the boring encountered glacial deposits of very dense silty sand with occasional silt lenses grading to sand with silt. This lowest layer extends to below 51 feet bgs, the maximum depth explored in the boring. Groundwater was measured in this boring (by piezometer) at a depth of 18.2 feet bgs.

Monitoring wells were installed at each of these boring locations to measure fluctuations in groundwater levels. The groundwater elevations between the two areas were linearly interpolated from the readings in the monitoring wells. From this interpolation it was determined that in order to infiltrate a 20-foot deep stormwater facility (allowing for three feet of separation between the bottom of the facility and the groundwater level) the infiltration facility would need to be located north of NE 24th Street. The areas considered feasible for deep infiltration of stormwater from the preliminary geotechnical work are shown in Figure 3-3. Although the groundwater elevations are higher in the southern part of the Village than in the northern part, the groundwater elevations are not high enough to inhibit the infiltration by typical LID techniques in the surfical soils.

The geotechnical investigation is documented in *Preliminary Geotechnical Design Services, Overlake Village Stormwater and Park Facilities, Redmond, Washington*, GeoEngineers, January 13, 2010 (GeoEngineers. 2010).

Topography and Drainage Patterns

The stormwater study area is generally bounded by NE 40th Street to the north, NE 20th Street to the south, 148th Avenue NE to the west, and 156th Avenue NE and NE Bel-Red Road to the east as shown in Figure 1-1. The area slopes from north to south and has a total fall of about 38 feet. Within the Village area south of NE 31st Street, east-west grades on the west side of 152nd Avenue are mild. On the east side of 152nd Street the east-west grades are more significant with the terrain sloping downward from 156th Avenue NE to 152nd Avenue NE. The street-to-street fall from the north end of the Village to NE 24th Street is about 29 feet; and from NE 24th Street to NE 20th Street is about 9 feet. Differences in grade between public streets and adjacent development vary throughout the Village, with some street grades being higher than adjacent development grades and others being lower.



Source: GeoEngineers

Figure 3-3
Deep Infiltration Potential Map

0 250 500 1,000 Feet

Vertical Datum: NAVD 1929

Overlake Village Stormwater and
Park Facilites Conceptual Design

Date of Aerial Photography: 2002

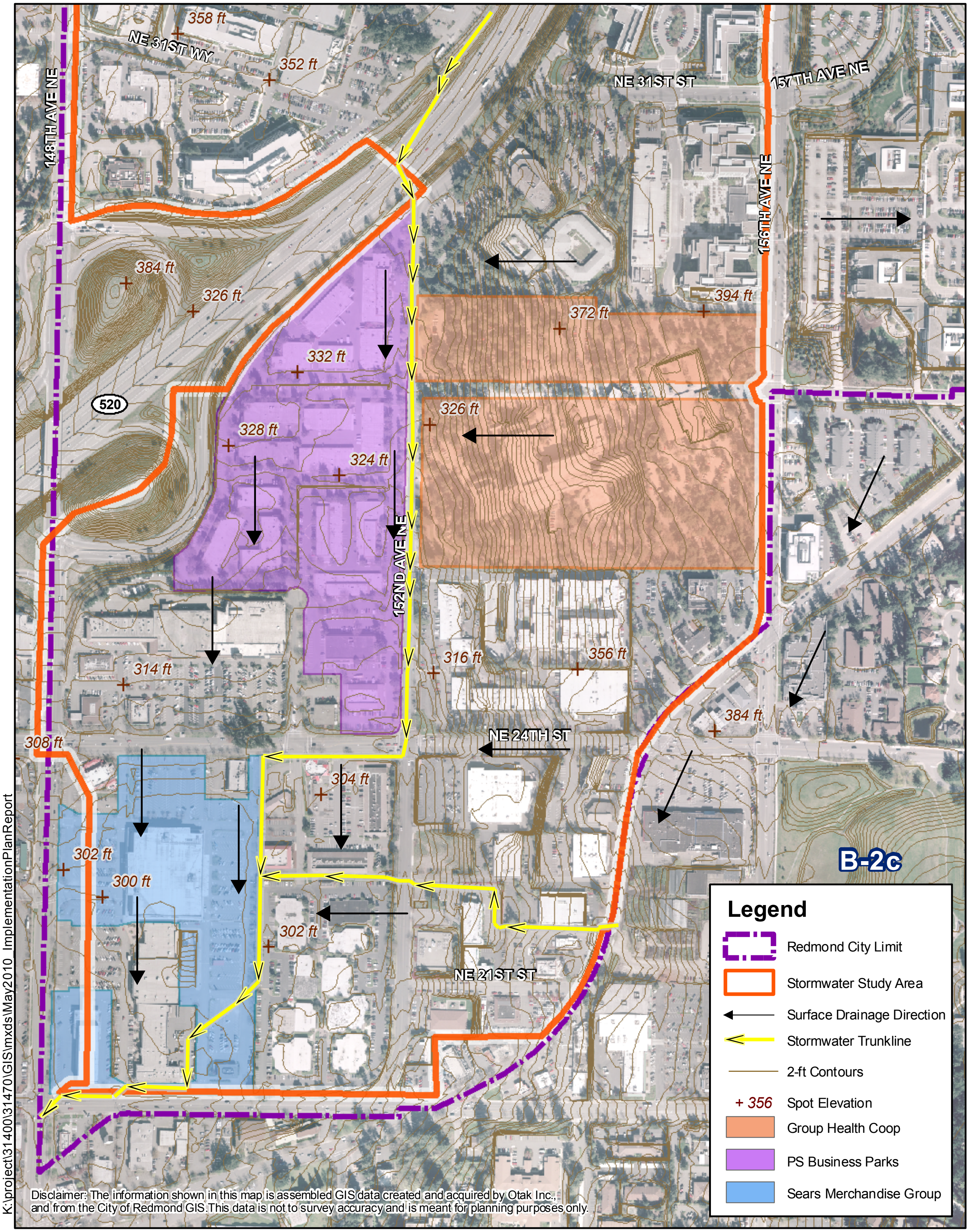


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Figure 3-4
Topography & Drainage Patterns

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Vertical Datum: NAVD 1929

0 250 500 Feet

N

Date of Aerial Photography: 2002

The topography and principal directions of drainage flow are shown by the arrows in Figure 3-4. The alignments of the main stormwater conveyance trunk lines within the Village are also shown in Figure 3-4. The size of stormwater trunk lines range from 30 inches to 48 inches in diameter.

The City's point of compliance for flow control for the project's Kelsey Creek watershed is the last downstream City storm manhole located at the northeast corner of the intersection of 148th Avenue NE and NE 20th Street. The total tributary area to this point is about 464.7 acres of which about 322.7 acres is from the City of Redmond. The remaining 142 acres is tributary from the City of Bellevue. Flow control for the Bellevue tributary area is not the responsibility of the City of Redmond, although the City of Redmond has expressed interest in partnering with Bellevue as these regional facilities are construction. Agreements would need to be made early in the implementation process..

Site Economics

In support of the feasibility analysis, an appraisal consulting assignment was performed for the project by Allen, Brackett, Shedd to estimate the relative cost of acquiring alternative collocation areas. A total of 15 areas were reviewed as a part of the consulting assignment, and ranked as high, medium or low in cost on the basis of both total cost and cost per square foot for individual area. The results of this preliminary evaluation work are shown graphically in Figure 3-5, and are used in the evaluation of alternative site concepts.

The acquisition cost rankings reflect the cost of relocating existing tenants where areas contain occupied buildings. Where only pavement for parking exists at a site, the option of an easement may be feasible for an underground vault with the parking function reestablished after construction of the vault.

Operations and maintenance costs associated with future facilities were not considered as the costs would be the same irrespective of where facilities are located.

Partnership Opportunities

In the evaluation of sites, the opportunity to partner with other public projects was an important factor. Areas that accommodate multiple project needs such as transit and stormwater/park functions can reduce the overall cost of public investment and are therefore highly rated.

Stormwater Feasibility

In the collocation area selection process, potential areas were first screened for stormwater function and implementation and then evaluated relative to planning and urban design

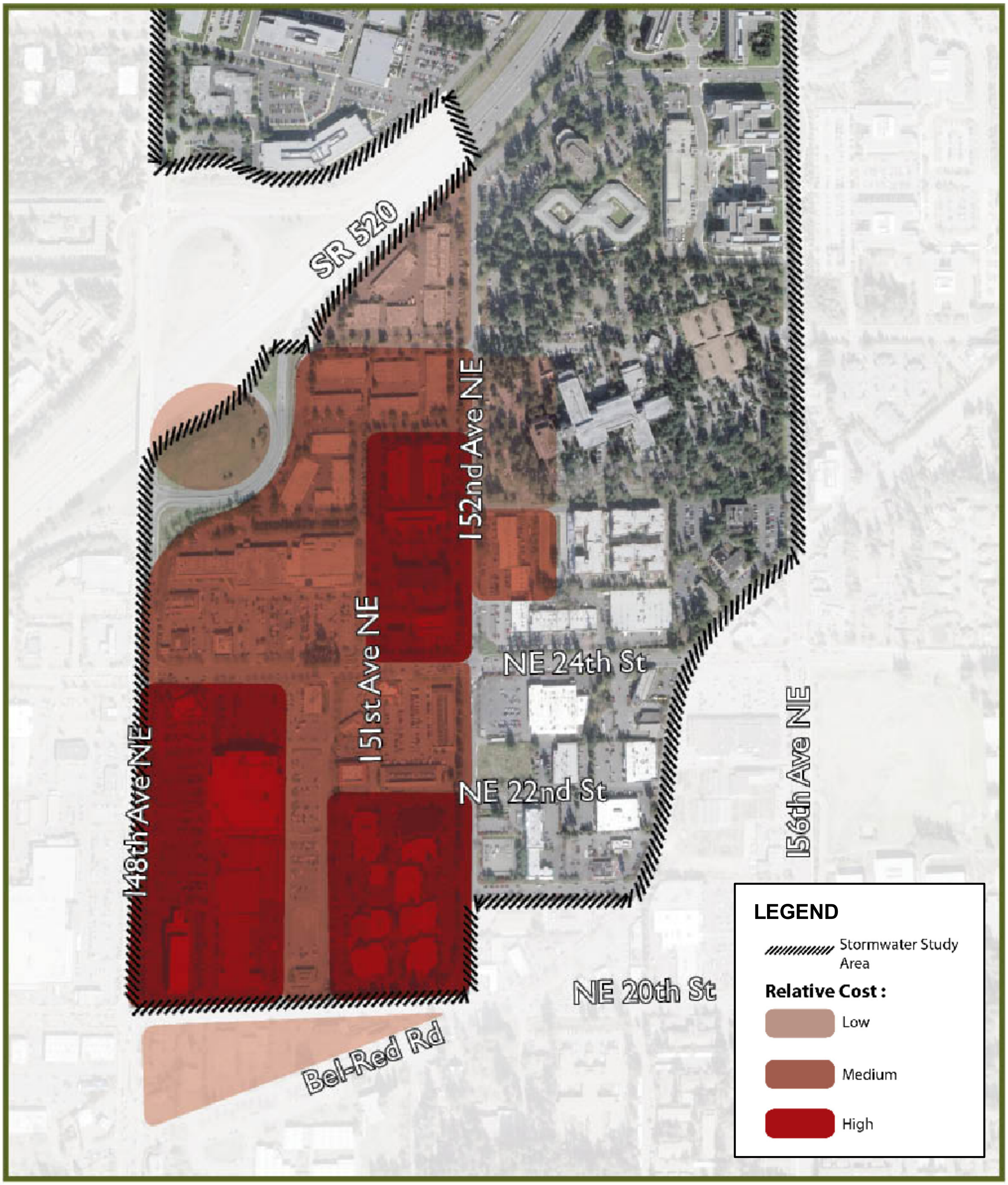

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Figure 3-5
Relative Property Values (2010)

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Date of Aerial Photography: 2004

considerations and park feasibility considerations. The stormwater/implementation factors by which potential areas were evaluated included:

- Detention volume available
- Detention efficiency/active depth available
- Additional pipe length required off existing conveyance line
- Suitability for stormwater pond
- Grade allowance for water quality features
- Collectable stormwater study area drains to collocated facility area
- Area soils and groundwater table allow for deep infiltration
- Area cross slope accommodates pond or vault
- Relative cost per unit area
- Opportunity for cost sharing/partnership

A scoring system was established for each factor and the potential areas were scored based on each factor. Those areas with the highest score were then evaluated further for stormwater feasibility and for planning and park feasibility. These feasibility analyses are described in the paragraphs that follow.

Planning Feasibility

Feasible areas from the stormwater/implementation evaluation were further analyzed based on several key neighborhood planning and urban design considerations that directly relate to the adopted Overlake Neighborhood Plan. The neighborhood planning/urban design analysis included the following steps:

1. Review Neighborhood Plan elements
2. Analyze key influencing factors
3. Define planning framework

The following influencing factors were established to further analyze and evaluate feasible areas from a neighborhood planning and urban design standpoint:

- **Consistency**—with neighborhood planning policies, objectives, and provisions, including opportunities associated with identified cornerstone sites and overall anticipated timeframes for implementation.
- **Proximity and Visibility**—to/from neighborhood/village core areas.
- **Accessibility and Connectivity—**to/from neighborhood/village core area secondary streets and urban pathway network (secondary streets and future streets, including green streets and proposed pathway will receive high pedestrian and bicycle use) and to/from

existing and future transit routes; park areas need to be located in areas that are easy to walk and bicycle to/from the neighborhood (1/4-mile walking radius considered).

- **Compatibility and Cohesiveness—**stormwater park development needs to be compatible with adjacent land uses proposed in the neighborhood plan, including near term catalyst redevelopment opportunities. Park development needs to be cohesive with the proposed urban form and supportive of surrounding uses. Park areas should be buffered from busy primary streets and incompatible uses and park development should not negatively affect the vision for urban form and density in Overlake Village.
- **Distribution and Variety—**parks should be distributed throughout neighborhood area (geographic equity) and designed to provide a variety of experiences, functions, and purposes to best serve the people (residents, employees, visitors, etc.) who will be using them. The remaining area (after stormwater development) should provide a functional area for park use.
- **Neighborhood Identity—**park locations should help to reinforce a sense of gateway and neighborhood presence and identity.

Planning Analysis Summary

With reference to the framework of planning elements of the adopted Overlake neighborhood plan, a planning analysis specific to the considerations affecting collocated stormwater and parks facilities site selection was conducted. The analysis considered various factors, including proposed land uses and densities of the Neighborhood Plan, designated cornerstone sites, neighborhood core areas, the street network, and future light rail alignment and station location. The composite analysis of these factors, as shown in Figure 3-6, was then overlaid with the stormwater and economic analysis results and the parks programming and functional analysis (see below). The results of this combined analysis yielded the preferred areas and conceptual alternatives for collocated stormwater and parks use.

The planning analysis was coordinated with the 152nd Avenue NE corridor study and the East link light rail transit project, currently in planning and design. During the analysis, the City and Sound Transit made a decision to relocate the light rail alignment to SR520 corridor with the Overlake Village station being relocated to the north end of the Overlake Village core area, west of 152nd Avenue NE. This change was assessed, and it was determined that the same potential partnership opportunities would occur with the relocated station area as were previously identified with the original station location. The preferred upper site for stormwater and park facilities is immediately south of the new proposed station location. This site provides deep infiltration potential. If, however, the City determined that the stormwater and park facilities should not be located adjacent to the transit station, another suitable location for collocated stormwater/park use immediately south of the preferred upper site could be pursued.

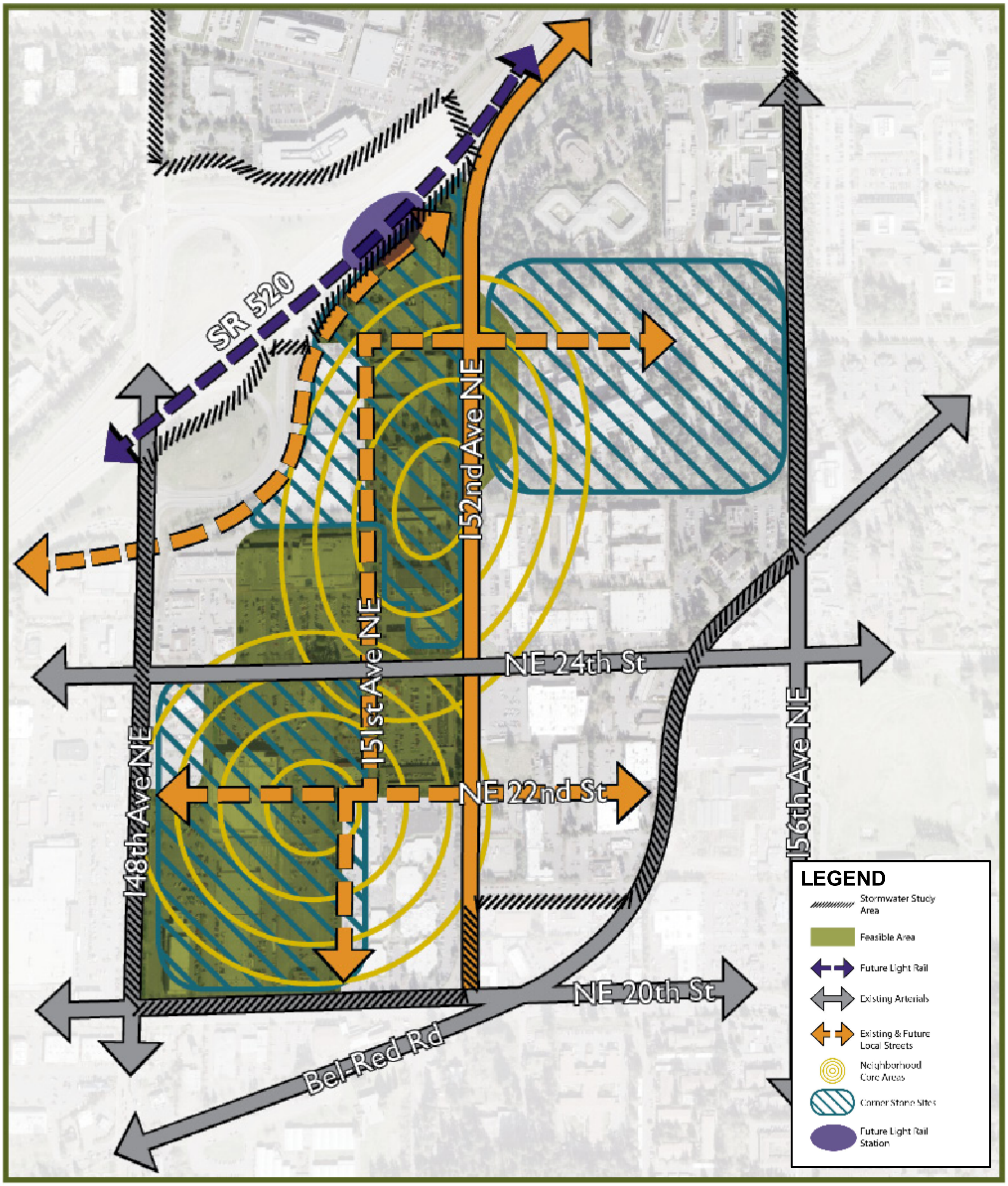

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Figure 3-6
Planning and Parks Overlay

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Date of Aerial Photography: 2004

All through the feasibility and alternatives analysis process, reference to the policies and planning provisions of the adopted Overlake Neighborhood Plan guided decision-making. As a result, the proposed collocated stormwater and park facilities will directly implement, support, and promote the adopted policies and provisions of the neighborhood plan (as well as the overall comprehensive plan for the City of Redmond).

Parks Programming and Functional Analysis

Concurrent with the feasibility analysis, a study was performed to identify the types of parks that may be appropriate for Overlake Village. This process included a public meeting at which attendees were given the opportunity to place dots on character image boards to identify which park characteristics and features they would like to see in Overlake Village.

Character images that received a high positive response were placed in groups based on common characteristics. From these groups, three park types emerged and were termed Plaza, Green, and Refuge. To further define the character and function of each park type, a variety of park precedents were identified and analyzed in greater detail. This analysis resulted in a set of specific qualities and criteria for each park typology which helped determine preferred park sites and their potential characteristics and function. The results of this analysis are shown in Figures 3-7, 3-8 and 3-9 for Plaza, Green and Refuge typologies, respectively. A fourth typology, the Urban Pathway, is shown in Figure 3-10. Although not a specific collocation area for stormwater park development, it has the potential to reduce regional stormwater facility sizes through implementation of LID within the urban pathway section. These typologies will be evaluated and considered further in developing the master plan design in Section 4.

LID Analysis

LID is a land use development strategy that emphasizes protection and utilization of onsite, natural features integrated with small-scale Best Management Practices (BMPs) at the parcel and sub-division level to manage stormwater and to mimic the natural, pre-developed watershed hydrologic function. In addition to reducing runoff volumes and pollutants, LID techniques such as rain gardens/bioretention facilities and open space preservation, including tree retention/preservation, provide benefits which include aesthetic amenities, improved habitat and improved quality of life.

The use of LID techniques in the stormwater study area is consistent with the City's concept and vision for the Overlake Neighborhood. The Employment and Village areas within the study area are highly urbanized and will continue to be highly urbanized through future redevelopment. This degree of urbanization, and the presence of slowly-infiltrating underlying soils in much of the area, generates stormwater runoff substantially in excess of what can be handled at the source by LID facilities traditionally considered feasible in such

The Village Plaza

A Place To...

Gather

See

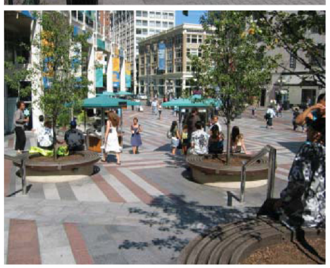
Be Seen

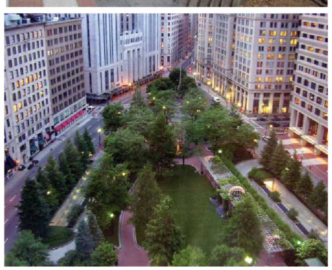
Shop

Stroll

Get Where You're Going






Precedents


Pioneer Courthouse Square, Portland
.9 Acres

open water	***2% (.02 Acres)***
green space	***1% (.01 Acres)***
hardscape	***97% (.87 Acres)***

Feature/ Characteristic	Emphasis: Low	Med.	High	Notes
Accessible Edges			■	All (4) sides accessible at grade
Visible			■	All (4) sides
Connected to Active Uses			■	Fronted by active streets and retail
Proximity to Residential or Employment			■	At heart of retail and business district
Development Cap. (Usable Proportion of Site)			■	2% Open Water, 1% Green, 97% Hardscape
Improves Connectivity			■	Extensive hardscape provides cross-site connection to adjacent uses
Proximity to Village Core			■	Located at heart of district
Proximity to Existing and Future Transit			■	Light rail on 2 sides, buses on 1 side, streetcar within 3 blocks blocks
Frontage to Potential Development/ Catalyst			■	Has helped maintain and spur further interest in district
Size Requirement	■			.9 acres


Westlake Park, Seattle
.8 Acres

open water	***2% (.02 Acres)***
green space	***1% (.01 Acres)***
hardscape	***97% (.77 Acres)***

Feature/ Characteristic	Emphasis: Low	Med.	High	Notes
Accessible Edges			■	All (3) sides accessible at grade
Visible			■	All (3) sides
Connected to Active Uses			■	Fronted by active streets and retail
Proximity to Residential or Employment			■	At heart of retail and business district
Development Cap. (Usable Proportion of Site)			■	2% Open Water, 1% Green, 97% Hardscape
Improves Connectivity			■	Extensive hardscape provides cross-site connection to adjacent uses
Proximity to Village Core			■	Located at heart of district
Proximity to Existing and Future Transit			■	Buses, light rail, and monorail within 1/2 block
Frontage to Potential Development/ Catalyst			■	Has helped maintain and spur further interest in district
Size Requirement	■			.8 acres

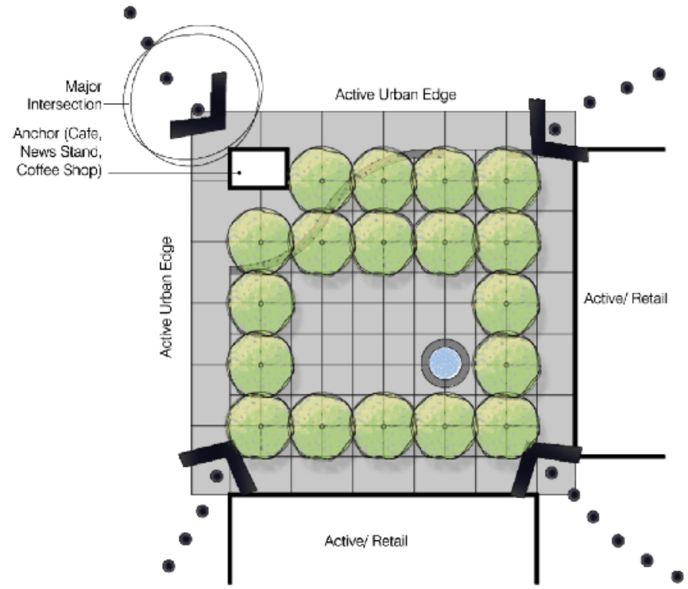
Figure 3-7 (Page 1 of 2)
Park Typology - Plaza

The Village Plaza

Prototypical

The Plaza is the focal point of the neighborhood's urban activity. The success of its urban character comes from being highly visible and seamlessly connected to a variety of adjacent uses. Predominantly consisting of hard surfaces, the square is suitable for spill out from active uses such as regional transit stations, shops, restaurants, and civic buildings. As a mixing zone of uses this space serves as an "urban living room" where residents, local employees, patrons, and commuters gather for a range of impromptu and organized civic events.

Criteria	Priority: Low	Priority: Med.	Priority: High
Accessible Edges			■
Visible			■
Connected to Active Uses			■
Proximity to Residential or Employment		■	
Development Cap.(Usable Proportion of Site)			■
Improves Connectivity			■
Proximity to Village Core			■
Proximity to Existing and Future Transit			■
Frontage to Potential Development/ Catalyst			■
Size Requirement	■		



At A Glance

Character of Open Space
- Most Urban
- Hub of Activity
- Centrally Located
- Iconic Space of Overlake Village's Urban Character
- Regional Draw (Large Event Gatherings)
- Dynamic, Diverse Uses and Adjacencies
- Highly Visible
- Minimal Grade Separation (At Grade)
- Presence on Major Intersection
- Most Suitable for Vaulted Stormwater System
- Approximately 75% Hardscape (75/25 Hard/ Softscape Preferable)

Pedestrian Function
- Closest to Transit
- Connection to Primary Village Pedestrian Circulation
- Activated by Anchor (Café/ News Stand, Coffee Shop)
- Active Retail Edges
- Larger Organized Events (Farmer's Market)
- Wayfinding
- Small Impromptu Gathering

A Place To...
- Gather
- See
- Be Seen
- Shop
- Stroll
- Enjoy
- Get Where You're Going

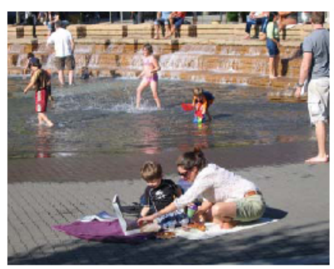


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Figure 3-7 (Page 2 of 2)
Park Typology - Plaza

Overlake Village Stormwater and
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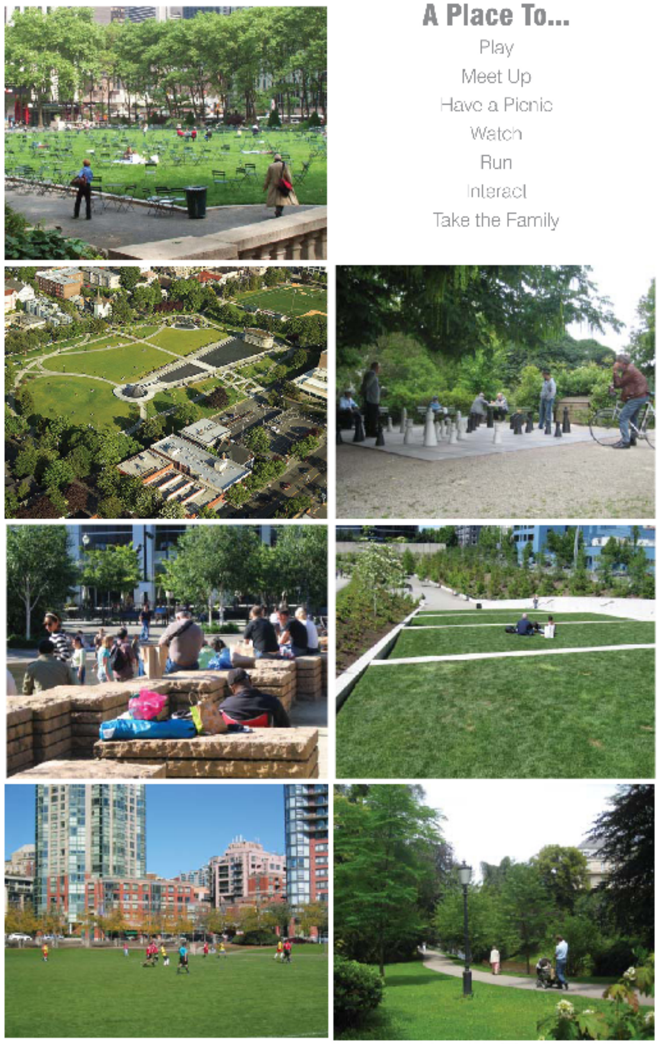
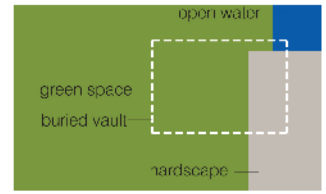
The Village Green



A Place To...

Play
Meet Up
Have a Picnic
Watch
Run
Interact
Take the Family

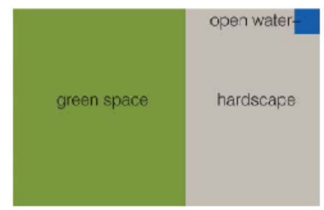
Precedents



Cal Anderson Park, Seattle
11.6 Acres

open water	***4% (.5 Acres)***
green space	***77% (8.9 Acres)***
hardscape	***19% (2.2 Acres)***
buried vault	***+22% (2.5 Acres)***

Feature/ Characteristic	Emphasis: Low	Emphasis: Med.	Emphasis: High	Notes
Accessible Edges		●		All (4) sides accessible
Visible			●	All (4) sides
Connected to Active Uses		●		Fronted by active streets and cross-street retail/ residential
Proximity to Residential or Employment			●	Adjacent to Broadway retail, Residential (2 sides) commercial (2 sides)
Development Cap. (Usable Proportion of Site)			●	5% Open Water, 77% Green, 19% Hardscape
Improves Connectivity			●	Cross-site paths improve connection to and from adjacent uses
Proximity to Village Core		●		Adjacent to neighborhood core
Proximity to Existing and Future Transit			●	Buses on 1 side, future transit potentially on 3 sides
Frontage to Potential Development/ Catalyst			●	Has helped revitalize neighborhood and spur further development
Size Requirement			●	11.6 acres



David Lam Park, Vancouver B.C.
8 Acres

open water	***1% (.02 Acres)***
green space	***56% (4.53 Acres)***
hardscape	***43% (3.45 Acres)***

Feature/ Characteristic	Emphasis: Low	Emphasis: Med.	Emphasis: High	Notes
Accessible Edges			●	All sides accessible
Visible			●	All sides
Connected to Active Uses		●		Fronted by active streets and adjacent mixed-use/ condo towers
Proximity to Residential or Employment			●	Adjacent to mixed-use condo towers
Development Cap. (Usable Proportion of Site)			●	1% Open Water, 56% Green, 43% Hardscape
Improves Connectivity		●		Cross-site paths improve connection to adjacent uses & waterfront
Proximity to Village Core		●		Locate on edge of town amongst dense waterfront residential
Proximity to Existing and Future Transit		●		Bus and Skytrain within 3 blocks
Frontage to Potential Development/ Catalyst		●		Part of waterfront development plans
Size Requirement			●	8 acres

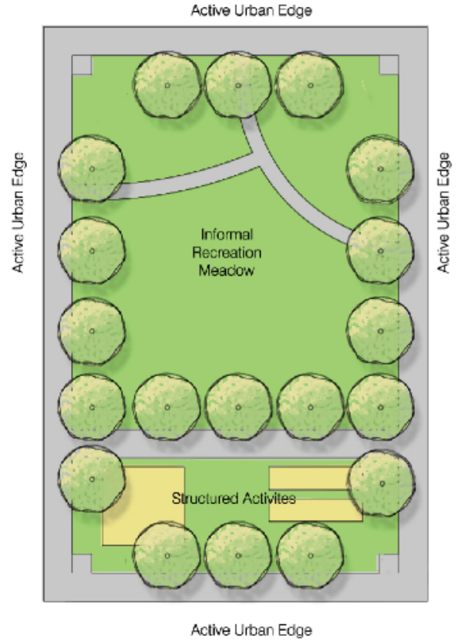
Figure 3-8 (Page 1 of 2)
Park Typology - Green

The Village Green

Prototypical

A clearing amongst the cityscape; the Green provides a bit of everything for everyone. Typically organized around a large, open lawn the park is characterized by a mix of soft and hard surfaces that define a variety of spaces both large and small for recreation and gathering.

Criteria	Priority: Low	Priority: Med.	Priority: High
Accessible Edges			[green]
Visible		[yellow]	
Connected to Active Uses		[yellow]	
Proximity to Residential or Employment		[yellow]	
Development Cap.(Usable Proportion of Site)			[green]
Improves Connectivity		[yellow]	
Proximity to Village Core	[red]		
Proximity to Existing and Future Transit		[yellow]	
Frontage to Potential Development/ Catalyst		[yellow]	
Size Requirement			[green]



At A Glance...

Character of Open Space
- Less Urban
- More Passive (Green) Open Space Feel
- Strong Connection to Active Urban Edge
- Semi-Buffered Edges With Strong Connections to Urban Core
- Approximately 50% Green/ Open Water (35/65 hard/ softscape preferable)

Pedestrian Function
- Transition Between Urban Functions
- Connected to Primary Pedestrian Routes
- Activated by Anchor (Café/ Coffee Shop, or Interactive Iconic Feature)
- Minimal Retail Spill Out
- A Place for Village Activities and Events
- Provides Variety of Small and Large Gathering Spaces
- Larger Organized/ Gathering "Events in the Park"
- Wayfinding
- Informal Recreation (Frisbee, Soccer, Basketball, Bocce, Chess)

A Place To...
- Play
- Meet Up
- Have a Picnic
- Watch
- Run
- Interact
- Take the Family

Figure 3-8 (Page 2 of 2)
Park Typology - Green

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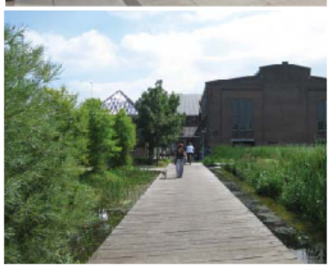
The Village Refuge

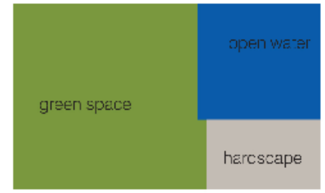
A Place To...

Get away
Think
Read
Learn
Talk
Walk
Relax



Precedents



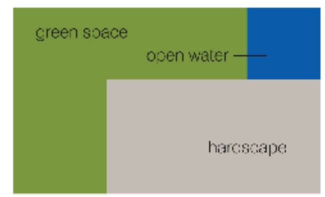
High Point Pond, Seattle

4.2 Acres

open water	*25% (1.1 Acres)*
green space	*60% (2.5 Acres)*
hardscape	*15% (.6 Acres)*

Feature/ Characteristic	Emphasis Low	Med.	High	Notes
Accessible Edges		yellow		2 sides with significant points of access
Visible		red		One side with 2 other visual corridors, sunken pond area
Connected to Active Uses	red			Buffered from adjacent housing and street
Proximity to Residential or Employment		yellow		Residential on 3 sides
Development Cap. (Usable Proportion of Site)			green	25% Open Water, 60% Green, 15% Hardscape
Improves Connectivity		yellow		No significant/ desireable cross-site connections
Proximity to Village Core	red			
Proximity to Existing and Future Transit	red			
Frontage to Potential Development/ Catalyst	red			
Size Requirement	red			1.1 acres

aerial photography courtesy of bing, microsoft corporation



Tanner Springs, Portland

1 Acre

open water	*10% (.1 Acres)*
green space	*47% (.47 Acres)*
hardscape	*43% (.43 Acres)*

note: figures provided are % of total park SF.

Feature/ Characteristic	Emphasis Low	Med.	High	Notes
Accessible Edges		yellow		3 sides (1 at grade, 2 w/ grade transitions)
Visible			green	All sides w/ sunken pond area at one end
Connected to Active Uses		yellow		Active streets w/ cross street retail and public open space.
Proximity to Residential or Employment		yellow		Mixed-use on 4 sides
Development Cap. (Usable Proportion of Site)			green	10% Open Water, 47% Green, 43% Hardscape
Improves Connectivity	red			No significant/ desireable cross-site connections
Proximity to Village Core		yellow		Located towards edge although surrounded by development
Proximity to Existing and Future Transit			green	Street car on 2 sides
Frontage to Potential Development/ Catalyst			green	Has helped spur interest in surrounding blocks
Size Requirement	red			1 acre

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Figure 3-9 (Page 2 of 2)
Park Typology - Refuge

Overlake Village Stormwater and
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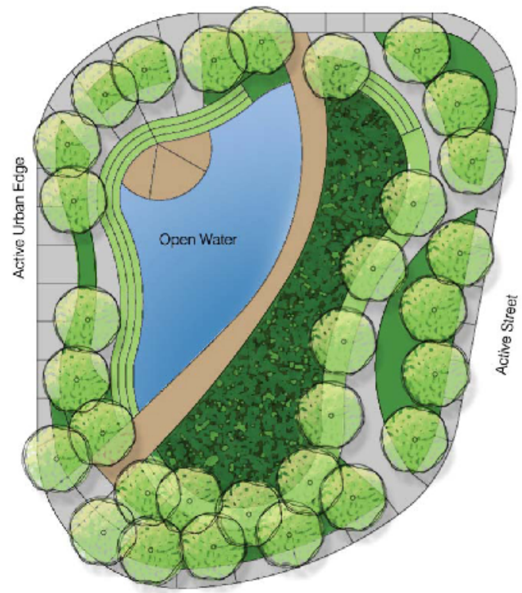
The Village Refuge

Prototypical

Defined by smaller contemplative spaces, the Refuge provides relief from the urban scene. Vegetation, open water, and soft surfacing create a series spaces organized around a central focal point such as a water feature. Because the refuge offers a place for individuals and small groups to get away, this type of space is often located along urban core edges, away from the hustle and bustle or heavily buffered from it.

Criteria	Priority: Low	Priority: Med.	Priority: High
Accessible Edges		● (yellow)	
Visible	● (red)		
Connected to Active Uses	● (red)		
Proximity to Residential or Employment	● (red)		
Development Cap.(Usable Proportion of Site)			● (green)
Improves Connecity	● (red)		
Proximity to Village Core	● (red)		
Proximity to Existing and Future Transit	● (red)		
Frontage to Potential Development/ Catalyst	● (red)		
Size Requirement		● (yellow)	



At A Glance...

Character of Open Space
- Least Urban/ Most Natural
- Urban Relief
- "Natural" Features Define Space (Including Open Water)
- Sense of Separation
- Seclusion Achieved Through Grade and Screening (Vegetation or Constructed)
- Most Suitable for Open Water Stormwater System
- Approximately 50% Green/ Open Water (15/85 Hard/ Softscape Preferable)

Pedestrian Function
- Small/ Personal Gathering
- Residents/ Locals Retreat
- Ability to Move Away from Active Edges
- Series of Spaces Centered with Common Focal Feature (Water)
- Garden Edges
- Contemplative Spaces
- Small Productive Gardens/ Urban Agriculture (Outside of Vault Area)
- Interpretive Signage
- Community Programs (P-Patch/ Garden House)

A Place To...
- Get away
- Think
- Read
- Learn
- Talk
- Walk
- Relax

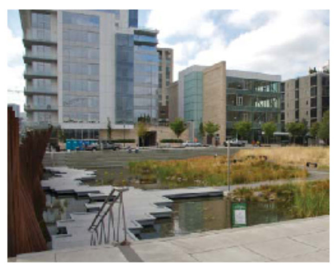



Figure 3-9 (Page 1 of 2)
Park Typology - Refuge

Overlake Village Stormwater and
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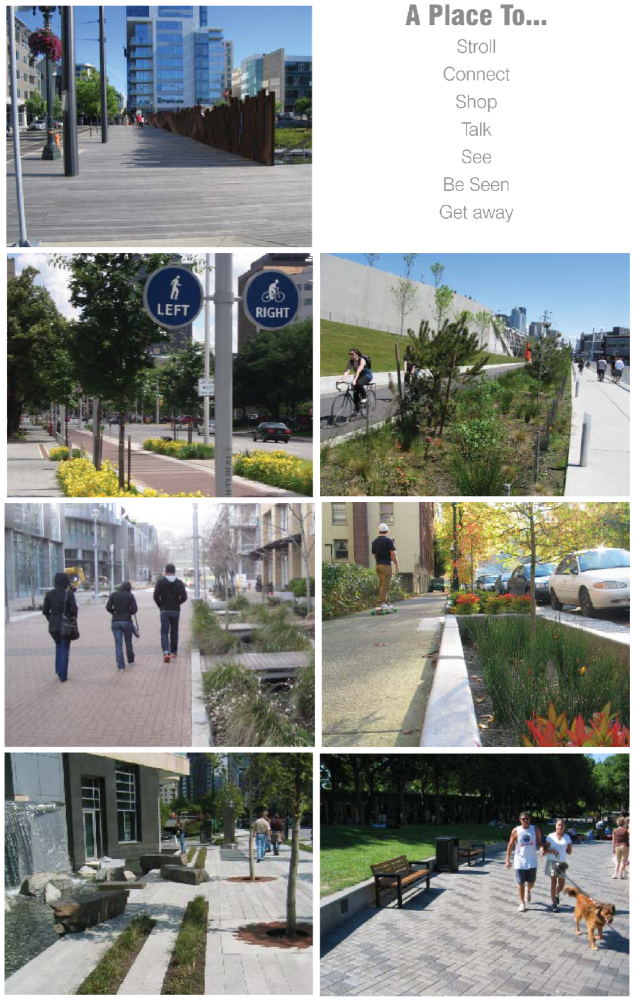
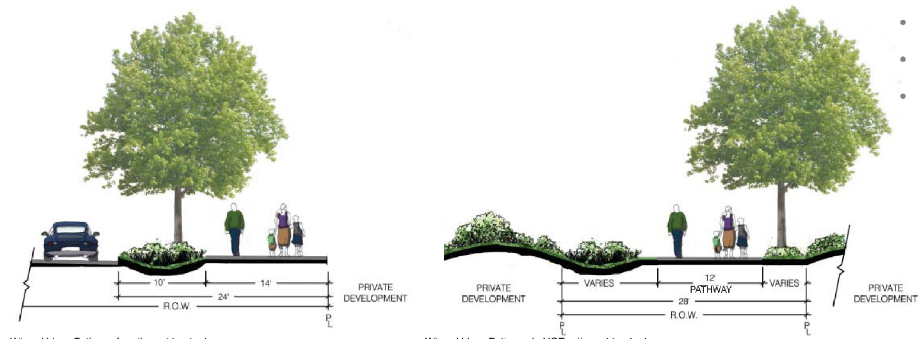
The Urban Pathway



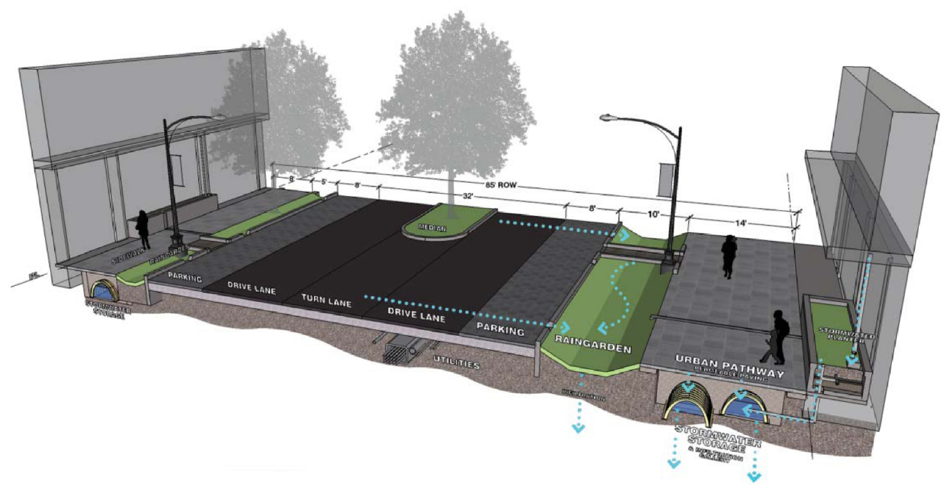
A Place To...

Stroll
Connect
Shop
Talk
See
Be Seen
Get away



When Urban Pathway is adjacent to steet:
Pathway/ sidewalk width is 24'-0" (14' sidewalk & 10' landscape)

When Urban Pathway is NOT adjacent to steet:
Pathway/ sidewalk width is 28'-0" (12' sidewalk & 16' landscape)



Prototypical

At A Glance...

Character of Open Space
- Variable Urban Character
- Linear Park

Pedestrian Function
- Connections to village ammenities
- Series of "events" and spaces
- Eddies of rest, engagement and activity
- Variety of edges (buildings, streets, parks, and green space)

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Figure 3-10
Park Typologies - Urban Pathway

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development. Therefore, major regional stormwater detention and treatment facilities will be required for the study area; however, the use of LID facilities can dramatically reduce the size of these regional facilities. A melding of both regional and LID stormwater management strategies best mimics hydrology similar to the predeveloped, forested conditions.

Existing City Policies for LID

While City of Redmond planning documents support LID, there are few regulations that require LID techniques or specific incentives to encourage development to use LID techniques. While there are steps to encourage green building and infrastructure for residential development (RCDG 20.30.57), there is no such program for commercial development. The only regulatory requirement for an LID technique within the RCDG is significant tree protection.

The Overlake Neighborhood Plan does, however, contain specific implementation strategies that address the need for an LID incentives program to promote the use of LID features in this area. Specific strategies within the plan include:

- **OS-3:** Encourage the use of bioretention features as a stormwater management technique and as an aesthetic amenity when designing open space.
- **OS-10**: Create an LID incentive program for the Overlake Neighborhood.

The RCDG provides an incentive program that details specific actions, amenities, or improvements a site in the Overlake Village can provide to be eligible for credits towards additional floor area, height or other features. Currently, this incentives program does not address LID techniques directly as a stand-alone incentive, but rather as elements that may be included in a Master Plan or as part of LEED certification of a proposed building.

Recommended LID Program

Various LID techniques were evaluated on the basis of the benefits they can offer for stormwater flow reduction, stormwater runoff treatment, community benefit, and cost benefit as part of the *Low Impact Development Feasibility Analysis,* Otak, Inc., January 29, 2010 (Otak 2010a). The following is a summary of the recommended LID elements to be implemented where feasible and the locations where these elements would be best implemented:

- Green roofs (location: park and private development)
- Bioretention for runoff treatment and/or flow control by infiltration (location: street rights-of-way, parks and urban pathway, private development)
- Permeable pavers/impermeable sidewalks with underground infiltration systems (location: street right-of-way, parks and urban pathway, private development)

LID and regional stormwater detention facility costs have been compared in the analysis of this project (refer to Appendix B-2). A moderate level of LID implementation with a smaller detention volume was found to be essentially the same cost as a large, regional detention facility with no LID installed. Considering the cost and the City's support for LID and regulatory mandates for LID which are soon to be in place, a moderate level of LID implementation has been selected of Overlake Village. The elements of this level of LID are described in Section 4.

Project Coordination

There are a number of transportation-related projects in the study area that are being planned and need to be acknowledged or addressed as a part of this project's conceptual design process. These projects are described below and shown in Figure 3-11.

City of Redmond

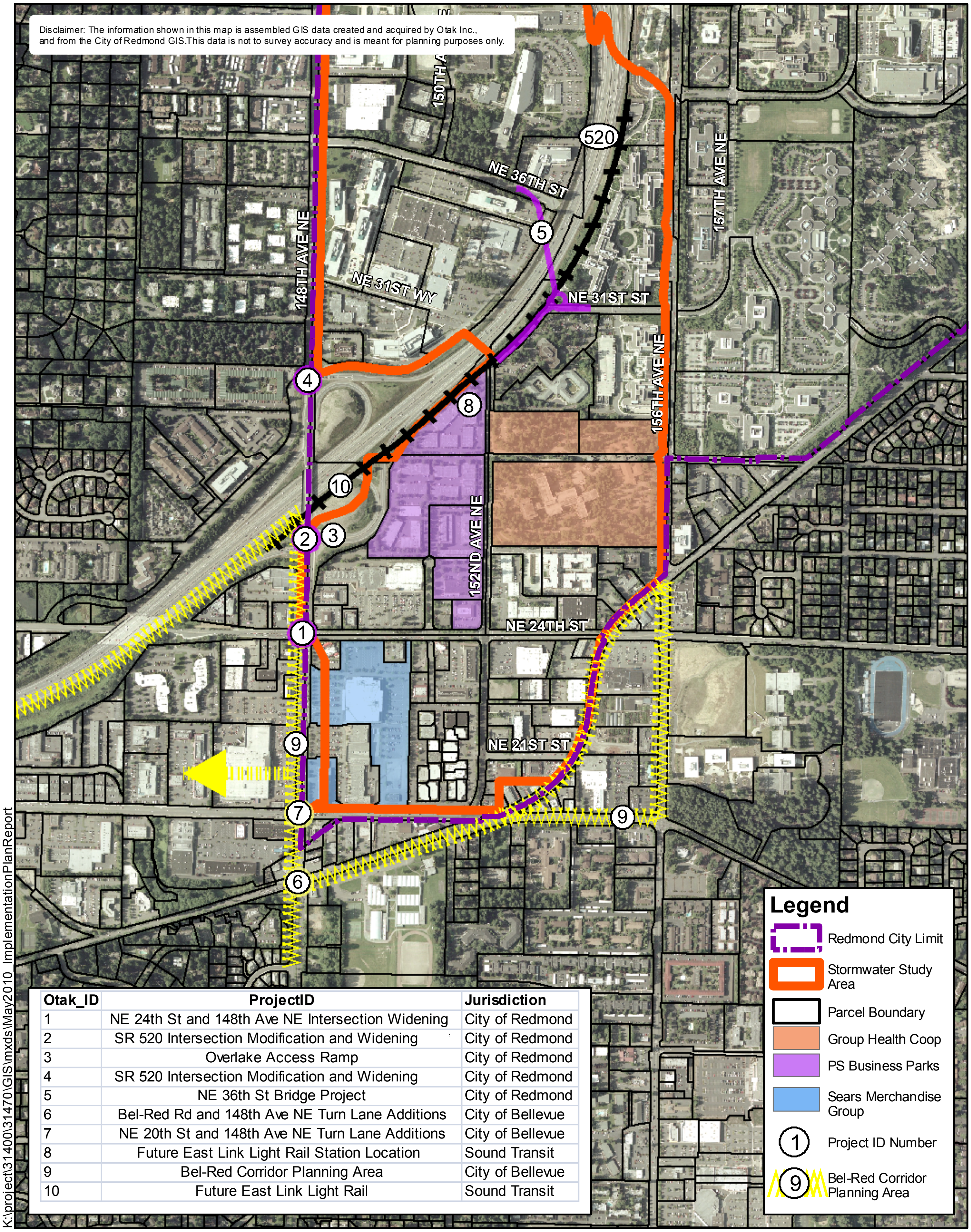
NE 36th/31st Street Bridge. This project provides a connection between 148th Avenue NE and 156th Avenue through an overpass across SR520 at NE 31st Street to the east and NE 36th Street to the west. This project is currently under construction and will increase accessibility to the Overlake Village area.

Overlake Access Ramp. This project, which provides access from SR520, currently does not have funding, but the City is working during the 2010 legislative session to have it placed on a WSDOT project list.

148th Avenue NE/SR520 Intersection Modification and Widening. This project is expected to start in 2012 and involves modifying the channelization and signalization between SR520 eastbound off-ramp to SR520 westbound on-ramp and adding northbound sidewalk.

NE 24th Street and 148th Avenue NE Intersection Widening. This project is planned to start in 2012 and involves increasing the intersection's capacity by widening the intersection to accommodate dual left-turn lanes, curb, gutter, sidewalk, street lights and storm drainage.

152nd Avenue Corridor Study. This study involves developing cross-sections for 152nd Avenue NE and NE 24th Street addressing urban design, and coordinating with Sound Transit to identify the preferred light rail alignment and station location along the corridor in order to arrive at preferred options for each of those areas. This corridor study held a design charrette in February 2010. Results from this charrette helped lead to the new proposed alignment for Sound Transit's East Link project. Further study is underway to evaluate how this area will meet the needs for future development, provide necessary transportation infrastructure, support the new Sound Transit station, and provide for the stormwater and park needs that have been identified.



Otak_ID	ProjectID	Jurisdiction
1	NE 24th St and 148th Ave NE Intersection Widening	City of Redmond
2	SR 520 Intersection Modification and Widening	City of Redmond
3	Overlake Access Ramp	City of Redmond
4	SR 520 Intersection Modification and Widening	City of Redmond
5	NE 36th St Bridge Project	City of Redmond
6	Bel-Red Rd and 148th Ave NE Turn Lane Additions	City of Bellevue
7	NE 20th St and 148th Ave NE Turn Lane Additions	City of Bellevue
8	Future East Link Light Rail Station Location	Sound Transit
9	Bel-Red Corridor Planning Area	City of Bellevue
10	Future East Link Light Rail	Sound Transit

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Figure 3-11
Study Area Projects

Overlake Village Stormwater and
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NE 40th Street Corridor Study. This project is looking at improving the corridor for pedestrians and bicyclists through improvements along and across NE 40th Street; identifying improvements for all modes of transportation at the SR520 interchange; enhancing the corridor aesthetics by identifying a corridor design theme; and improving the function and safety at the 172nd Avenue NE intersection.

City of Bellevue

Bel-Red Corridor. The City of Bellevue is looking to transform the Bel-Red Corridor, which runs between downtown Bellevue and the Overlake neighborhood, into a mixed-use, transit oriented development while daylighting and restoring parts of Kelsey Creek and its tributaries. The goal is to have higher density development centered around transit stations that will be located throughout the Bel-Red Corridor and connected by high capacity transit lines.

Sound Transit East Link Project

Anticipated to begin construction in four years (2013), light rail service is expected in downtown Bellevue by 2020. Ultimately, service will travel from downtown Seattle across I-90 to downtown Bellevue, then to Overlake and downtown Redmond. The line is anticipating up to 48,000 passengers daily, with Overlake Transit Center service beginning in 2021. Alternative alignments within the Overlake Village have been considered as a part of Sound Transit's planning process. On April 6, 2010, the Redmond City Council approved Resolution No. 1325 which expresses the City's preference for an alignment and station along SR 520 in the Overlake Village area of Segment D of the East Link project. Sound Transit's Board subsequently approved the preferred alignment for further study.

King County Metro Transit RapidRide Project

Funded by the 2006 Transit Now initiative, Metro transit is beginning RapidRide service to Bellevue and Redmond in 2011. Running from Bellevue and Redmond Transit Centers via Crossroads and Overlake, this bus system is designed to move people quickly between these active destinations. Within the Overlake Village there is one proposed stop at the corner of NE 24th Street and 156th Avenue NE, one proposed station stop on 152nd Avenue NE near the Group Health facility and another proposed stop at the corner of 156th Avenue NE and 31st Street.

Alternatives Developed

Collocated Site Selection Process

A stepwise analysis process was used to identify the best combination of sites for collocated facilities. The analysis process used in this effort is shown in Figure 3-1. A total of 20 areas within the Village were identified as potential areas for collocated facilities. These areas were all evaluated as a part of a comprehensive site selection and validation process. The 20 areas were evaluated first for stormwater feasibility, of which 13 areas were determined feasible. The feasible areas were further evaluated on the basis of stormwater function and implementation criteria and on neighborhood planning, urban design and parks criteria. Based on this evaluation, seven areas were selected for formulation of alternative concept projects. Three project concepts were formulated from the seven areas and identified as Site Alternatives A, B and C. These alternatives were evaluated using the following criteria:

- Engineering feasibility
- Adequate runoff treatment and flow control to protect Kelsey Creek
- Partnership opportunities
- Capital cost (design, construction, land acquisition)
- Operation and maintenance costs
- Support for Neighborhood Plan policies and land use assumptions
- Geographic distribution of park facilities
- Accessibility and connectivity (1/4 mile walking distance, good bicycle access, located along Green Streets)
- Visibility – location within neighborhood core areas or as anchors to redevelopment sites
- Urban pathway connections

Of the three alternatives developed (illustrated in Figure 3-12), Site Alternative A was viewed as the best option for advancing into more detailed conceptual planning and implementation. The upper and lower sites are considered to be anchor stormwater sites by virtue of their locations. The middle site provided supplemental stormwater capacity to the upper and lower sites.

Preferred Approach

Refined hydrologic modeling performed subsequent to the alternatives analysis demonstrated that flow control compliance could be achieved using only the upper and lower sites without the middle site. Therefore the resulting preferred plan for master plan design includes only the upper and lower sites.

The preferred approach uses site alternative A and a moderate level of LID implementation, which together provide the preferred alternative for the project. The preferred alternative is shown in Figure 3-13. Should future planning determine that use of the triangular upper site is not desirable, then the upper site alternative also shown in Figure 3-13, or some variation of these two alternatives should be pursued.

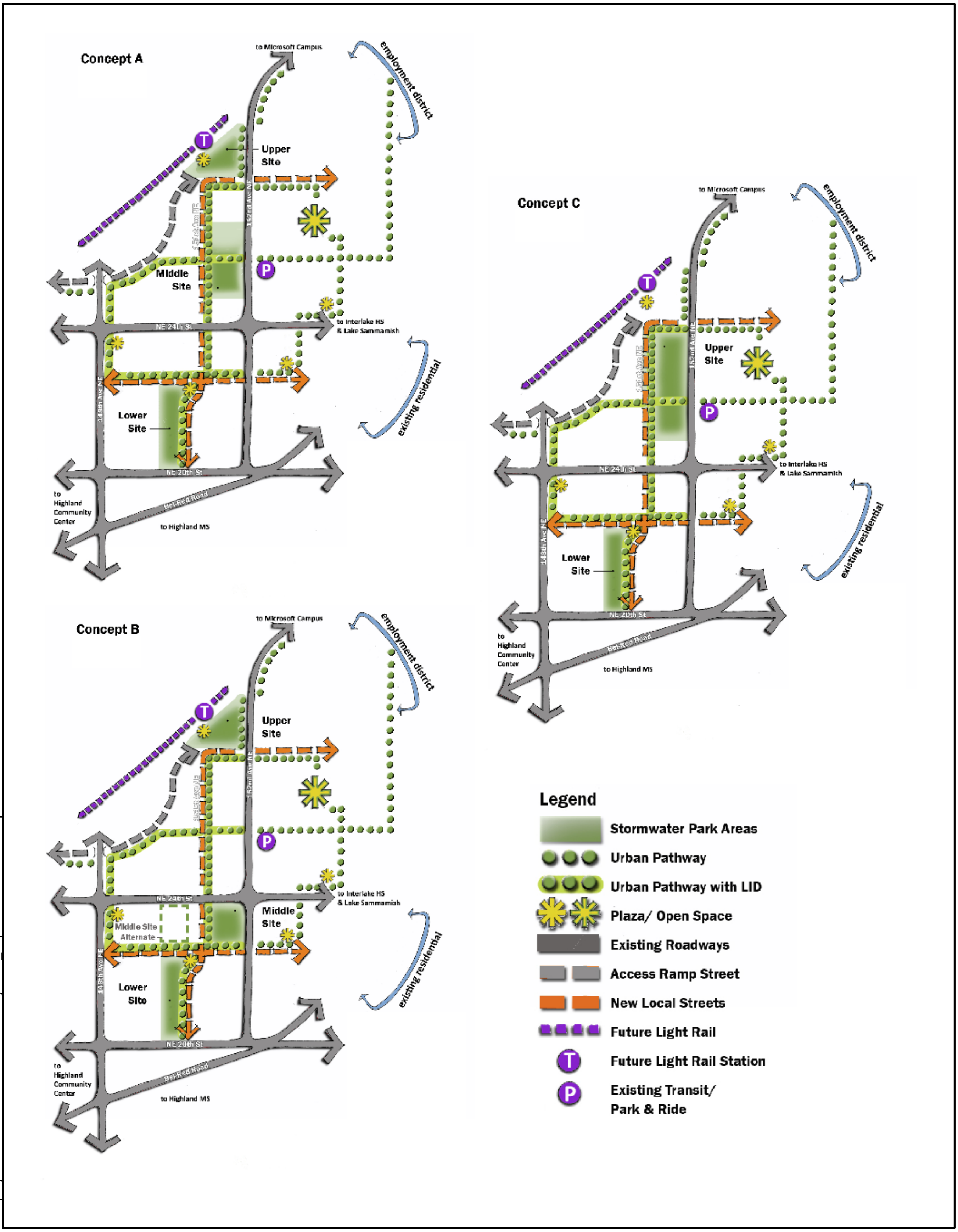

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Figure 3-12
Site Alternatives A, B and C

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NTS

Date of Aerial Photography: 2004

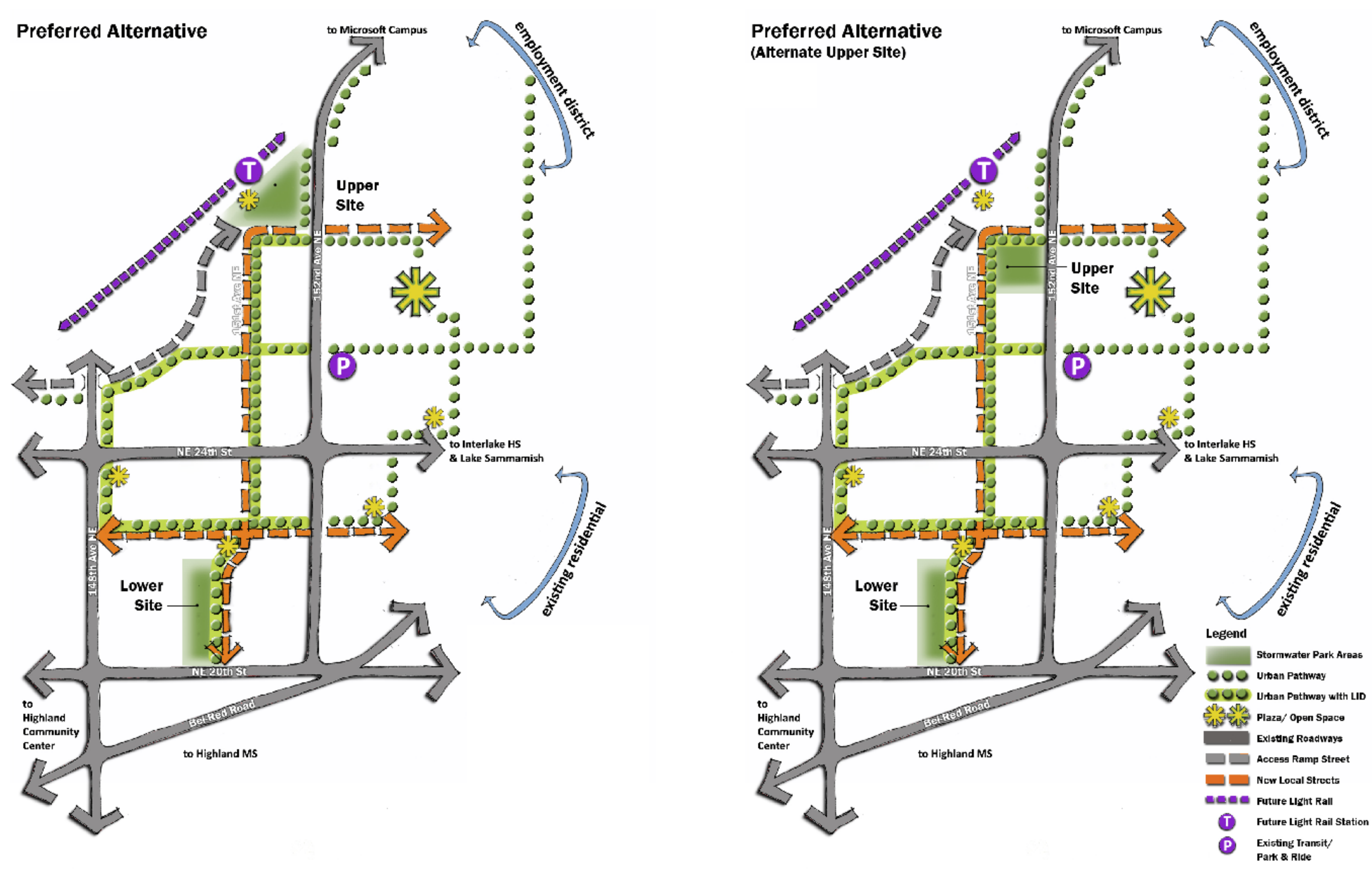

Figure 3-13
Preferred Site Alternative

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Section 4—Conceptual Design

This section describes the conceptual design of the proposed collocated stormwater and park facilities based on the preferred alternative identified in Section 3.

Proposed Collocation Concept

The proposed stormwater and park facilities collocation concept with the LID component is shown in Figure 4-1 and consists of the following elements:

- Lower Collocated Facility: A regional underground stormwater detention vault facility that provides flow control and a park facility on a rectangular site located east of the existing Sears building, north of NE 20th Street, and west of the extension of 151st Avenue NE. Runoff treatment is not provided at this facility as treatment will be provided by separate local treatment systems constructed as part of private redevelopment, construction of new streets, and retrofit of existing streets.

  The City intends to use this facility initially to serve properties that have purchased capacity through the City's Capital Facilities Charge Program described in Section 2. This need represents the initial service area of the project as shown in Figure 4-2. In the initial service area phase, the footprint of the vault facility will be paved and returned to parking lot use by the retail businesses. By taking this step, the project is able to meet the existing stormwater demand without great hardship to the existing businesses in the area. In the final service area phase, the paved parking will be removed and a park will be built over the lower collocated facility. This phasing allows for the park to be constructed when there is demand for the park.

  The park will be the southern terminus of the urban pathway, which will provide an opportunity for a clearing amongst the cityscape and cater to a variety of uses and experiences for visitors. There could be an opportunity for redevelopment along the north edge of this site, which could include mixed-use with an emphasis on regional retail as well as civic uses, such as a community center.

- Upper Collocated Facility: A regional underground stormwater infiltration vault facility that provides flow control and runoff treatment as well as a plaza park facility located south of SR520, west of 152nd Avenue NE, and bounded to the west by the proposed extension of 151st Avenue NE. The facility would provide runoff treatment to Ecology's enhanced treatment standard.

  The upper facility would be constructed sometime after completion of the lower facility in response to capacity needs. As mentioned, demands for flow control and runoff

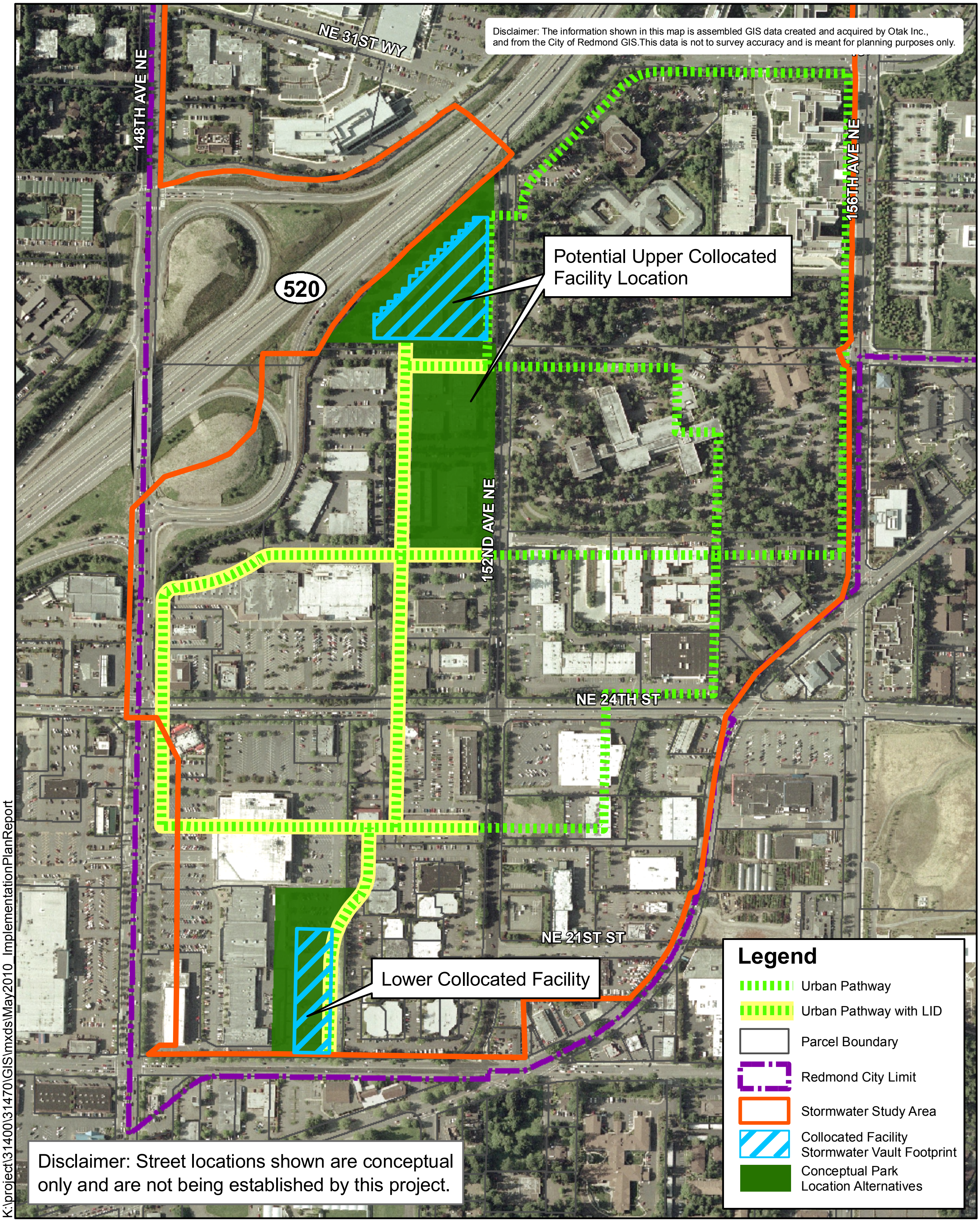

Figure 4-1
Collocation Concept Plan
(Preferred Alternative)

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Date of Aerial Photography: 2002

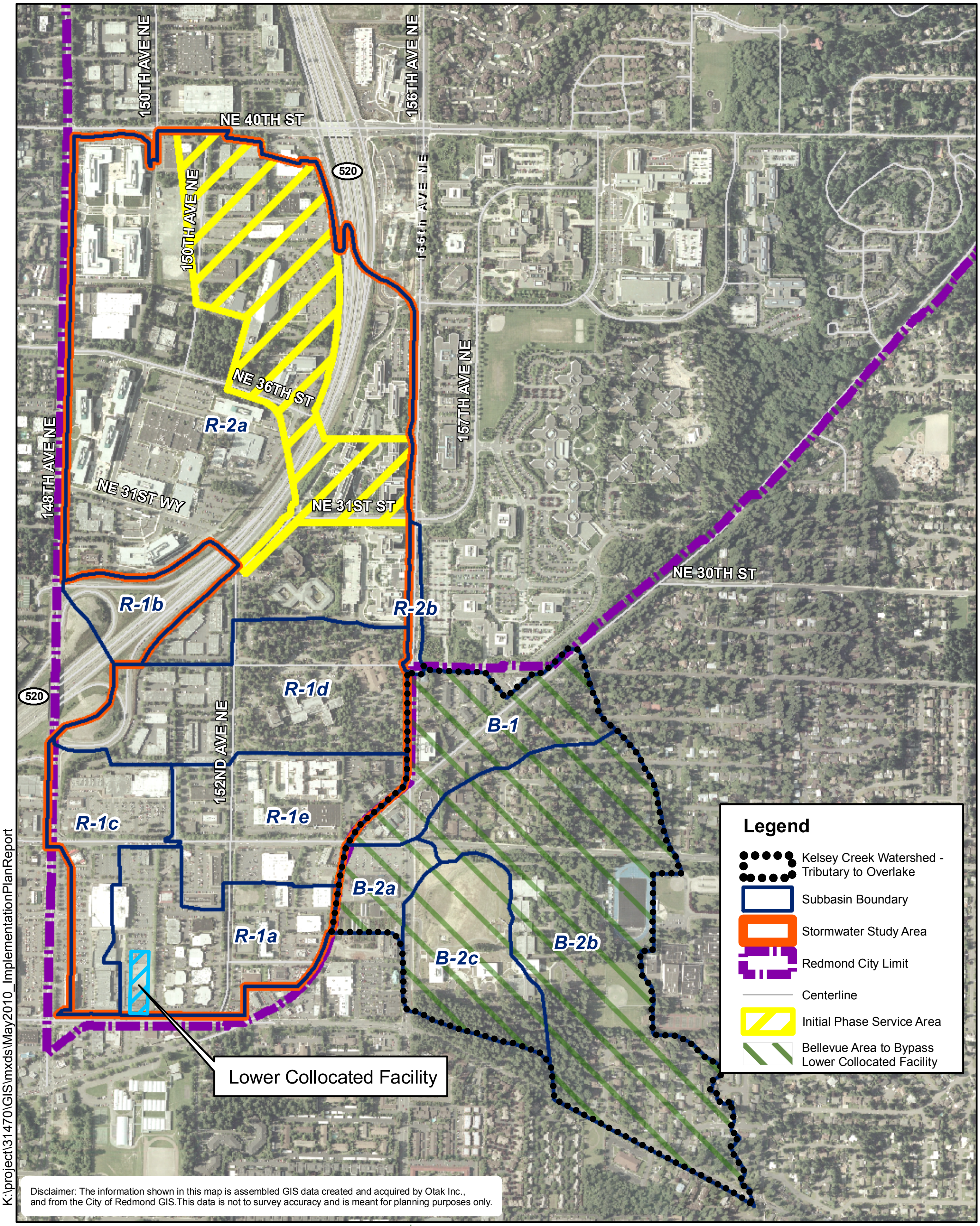

Figure 4-2
Initial Phase Service Areas

Overlake Village Stormwater and
Park Facilites Conceptual Design

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0 500 1,000 2,000 Feet

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Date of Aerial Photography: 2002

treatment exist in the upper facility's tributary watershed by existing capital facility service area customers. These demands will be met by interim facilities until construction of the upper facility is complete.

The park may be the northern terminus of the urban pathway. As such, the upper collocated facility would provide an opportunity to create a vibrant hub of activity with a variety of park experiences to serve future Overlake residents, employees, shoppers, and visitors. Many of these people will be traveling to and from the Village through the park to access the light rail as well as traveling back and forth to the station and across SR520 over a proposed pedestrian bridge that connects the light rail station with employment uses to the north. Adjacent mixed-use redevelopment in the neighborhood, including retail, restaurants and other uses at the street level with residential and/or office uses above, would face the park. Park pathways and design features would maximize accessibility and connectivity to and from the neighborhood and the station. Lines of visibility between adjacent uses and the station would be preserved.

- Urban Pathway/LID: The preferred alternative includes local stormwater infiltration by LID methods for flow control and runoff treatment within the urban pathway system of the Village. These include bioretention/rain garden facilities within landscaped areas and underground infiltration facilities within the urban pathway hardscape areas. LID infiltration facilities associated with local streets and sidewalks are also included. These local LID facilities are located south of the upper collocated facility; and west of 152nd Avenue NE where flat to moderate grades are available to support their design without frequent drop structures. The result of the local LID infiltration facilities is to reduce the volume requirement for detention storage within the lower collocated facility.

  The urban pathway is not just a connection between the two parks; rather it is an extension of the parks. Plantings, rain gardens, paving treatments, public art features, wayfinding elements, landscaping, lighting, seating, furnishings, and other unique features are envisioned along the corridor. Additionally, the pathway, via the upper park, provides a connection to the SR520 regional trail system. As the pathway fronts along buildings, there will be opportunities for active corner plazas, pocket parks, connecting corridors across the block, and other features articulated along the edges. The pathway would be wide enough to accommodate shared pedestrian and bicycle use, as well as opportunities to pause, rest, socialize, and interact with other pathway users along the way. The street level public spaces along adjacent redevelopment will add to the corridor's width. These "eddies in the stream" will be places of interest, surprise, and discovery along the pathway. Along the village stroll or busy promenade, the urban pathway will be more than just a wide sidewalk—it will be a linear park corridor that accommodates shared uses (pedestrians and bicyclists) and functions as an important amenity in the neighborhood.

In combination, the lower and upper collocated facilities and the LID component will serve the needed capacity for the final service areas that are shown in Figure 4-3 for flow control and Figure 4-4 for runoff treatment.

Stormwater Design

LID Facilities in Regional Facility Design

In developing the stormwater facilities design concept, LID facilities have been used to achieve two purposes:

- Reduce the size of regional flow control facilities through infiltration by bioretention/rain garden and infiltrator LID systems
- Eliminate runoff treatment at the lower collocated facility by providing runoff treatment from new streets and private redevelopment (which will have low pollutant generating impervious surface [PGIS] and pollutant generating pervious surface [PGPS] areas) by LID methods.

Conceptual plans for using LID facilities have been developed for a variety of design situations for Overlake Village. These include conceptual plans for the urban pathway as shown in Figure 4-5; conceptual plans for local street bioretention as shown in Figure 4-6; conceptual plans for local street bioretention and infiltration as shown in Figure 4-7; and conceptual plans for cross site connections bioretention and infiltration as shown in Figure 4-8.

Three levels of local LID implementation have been evaluated as a part of the LID analysis for this project as described in Appendix B-1. From this analysis a moderate level of LID was selected that uses the urban pathway and bioretention along new streets for flow control (via infiltration) and runoff treatment from PGIS/PGPS areas. The flow control volume reduction that this LID level can provide is discussed in the Flow Control Facilities section.

Much of the stormwater study area north of SR520 is newly developed with limited areas remaining that will be redeveloped. Soils in that area are also substantially low permeability till (Figure 3-2). Therefore the analysis of reduction of regional flow control volumes though LID implementation has focused on the Village area south of SR520, and specifically the feasibility of reducing the size of the lower collocated facility. The LID service areas proposed for the Village are shown in Figure 4-9.

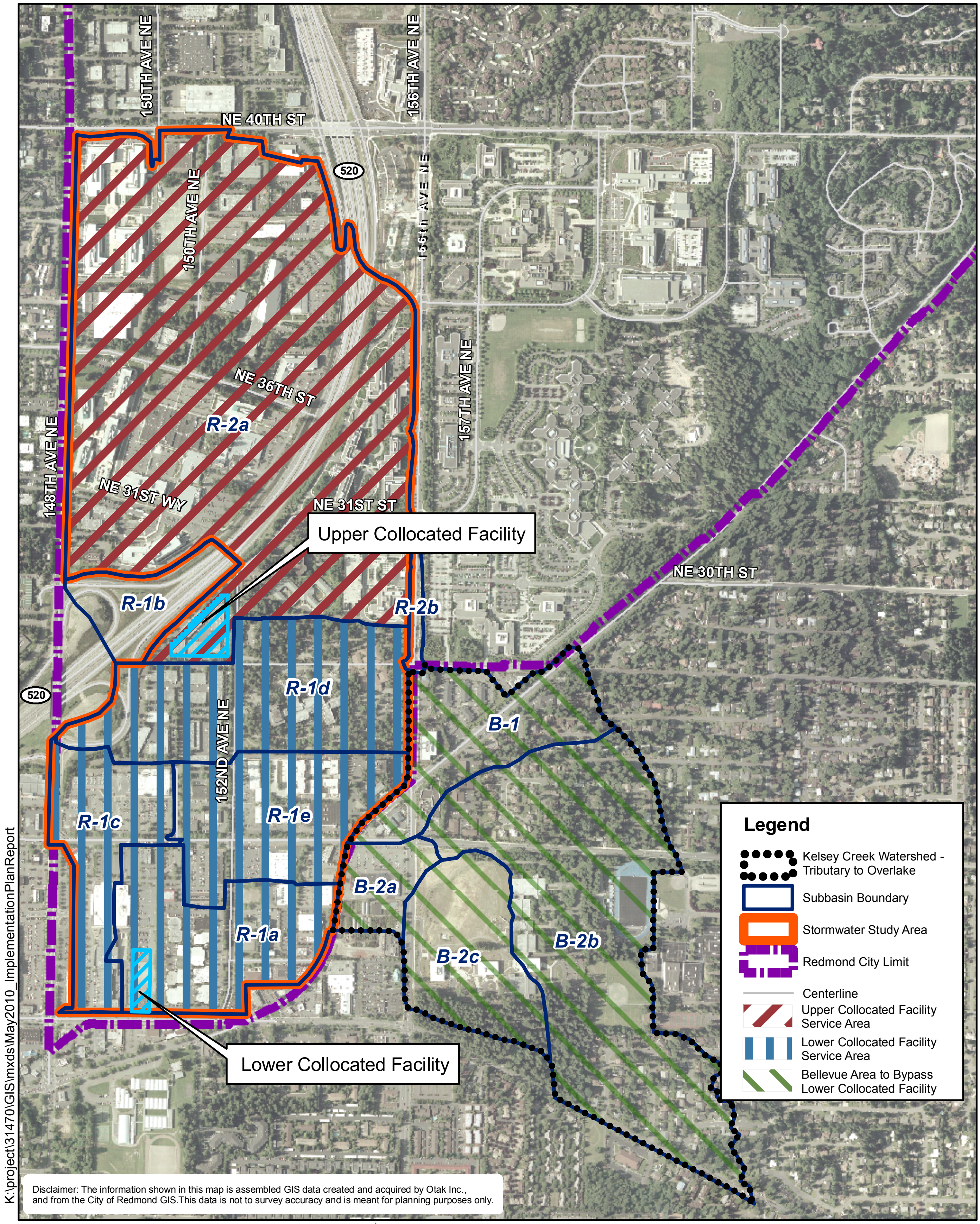

Figure 4-3
Final Phase Service Areas (Flow Control)

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Date of Aerial Photography: 2005

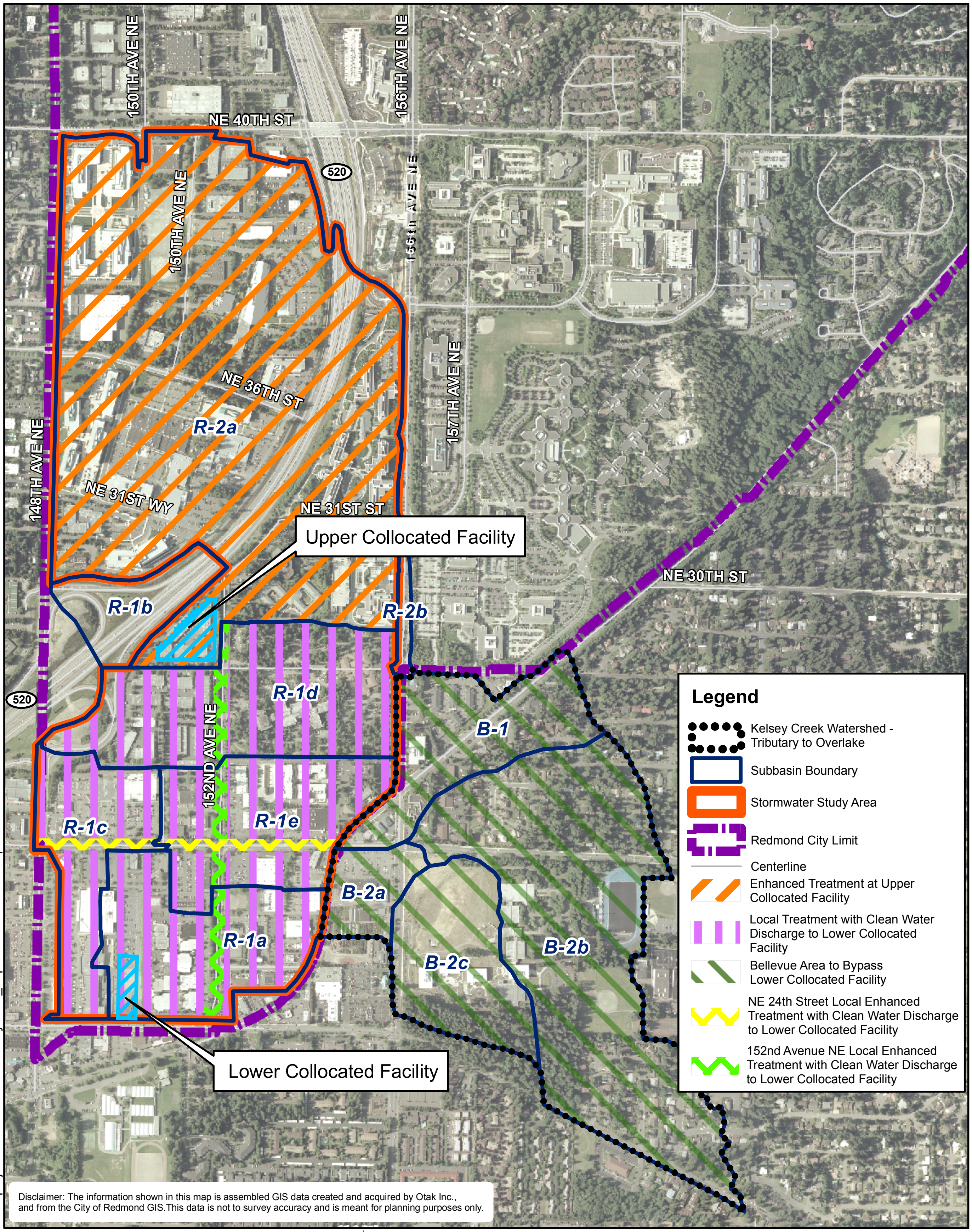

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Figure 4-4
Final Phase Service Areas (Runoff Treatment)

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Date of Aerial Photography: 2002

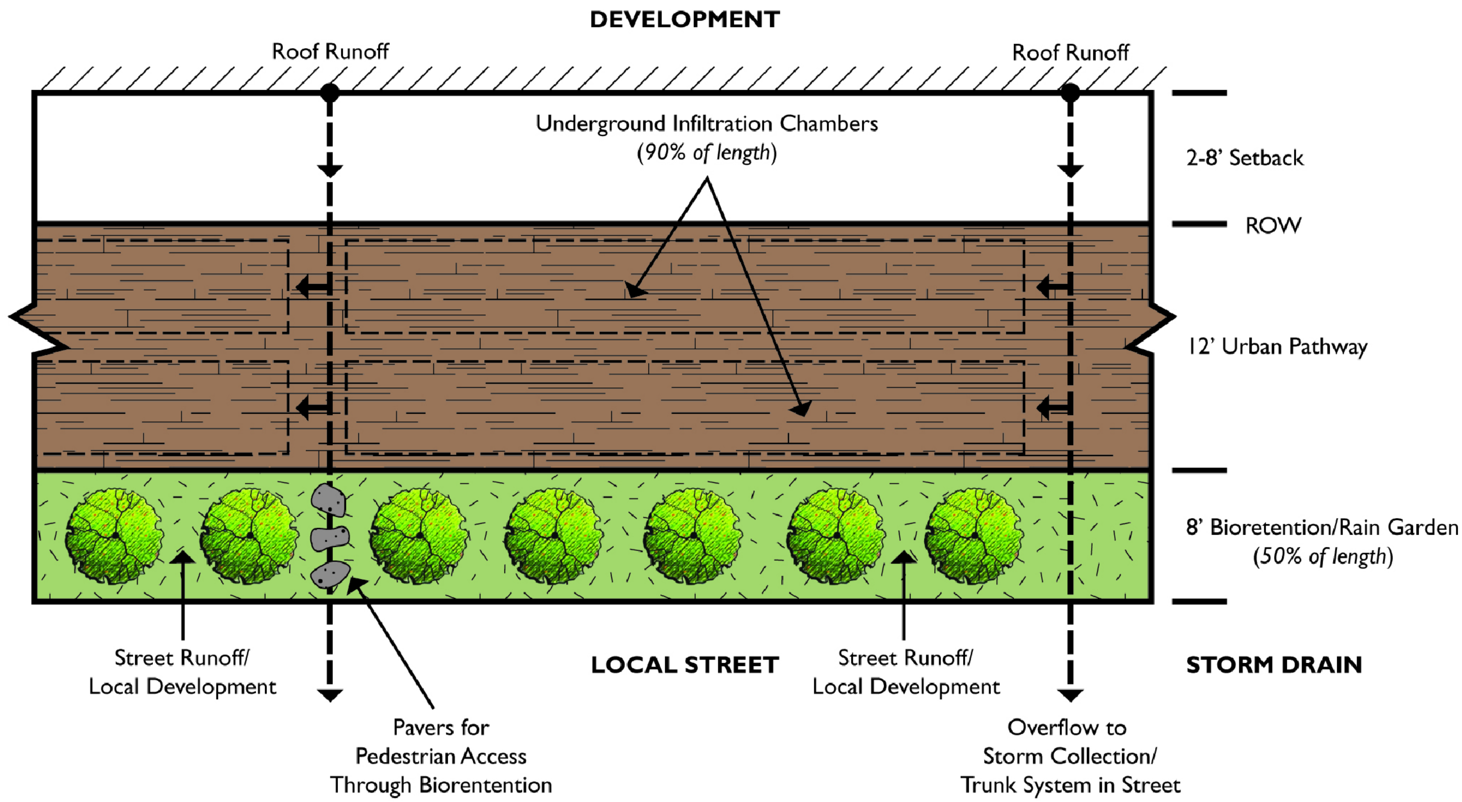

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Figure 4-5
Urban Pathway LID Concept

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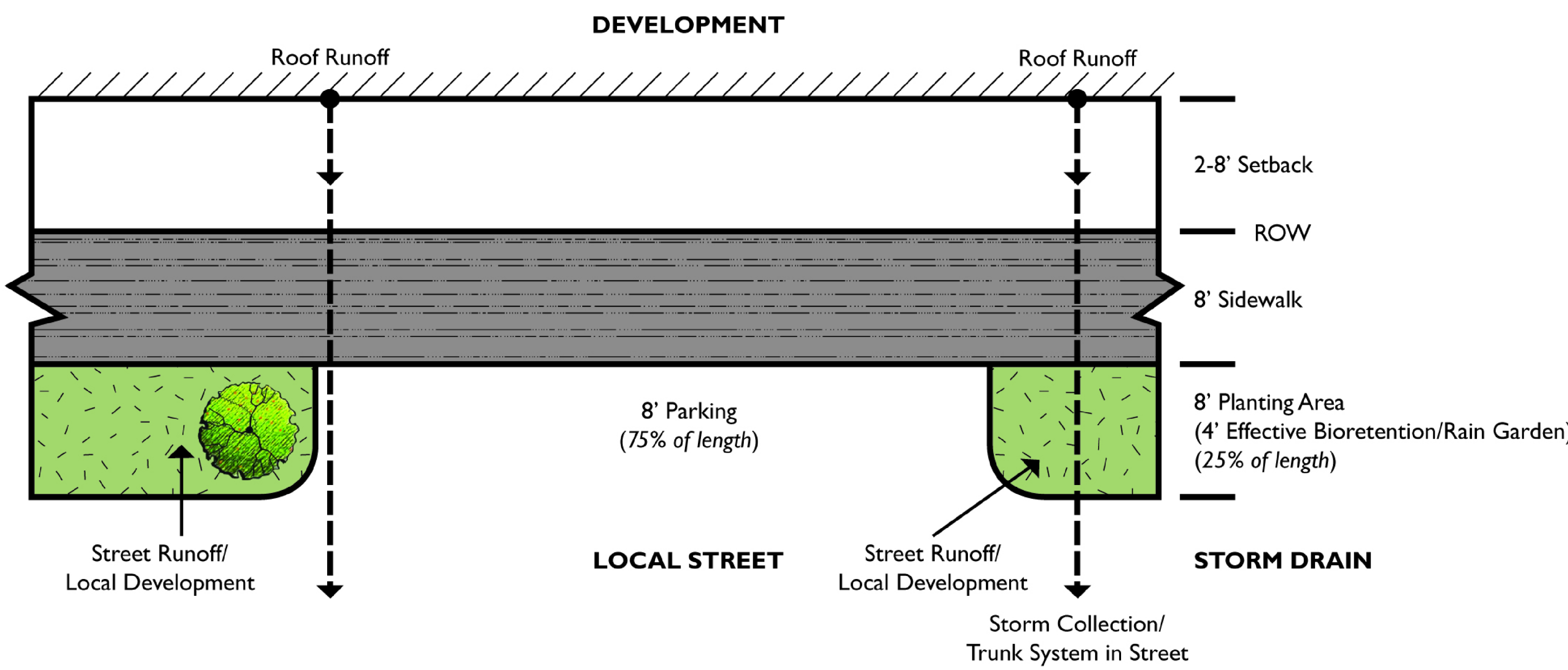

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Figure 4-6
Local Street Bioretention LID

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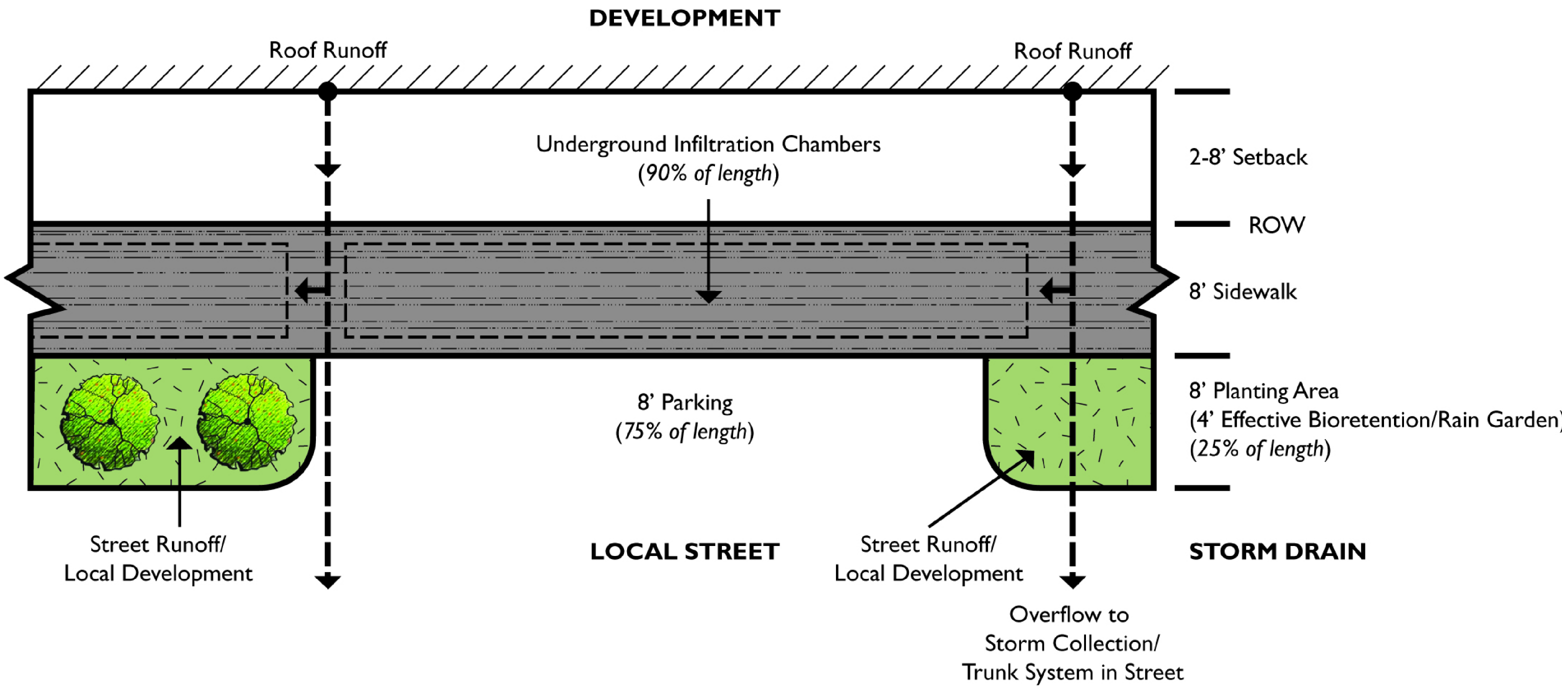

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Figure 4-7
Local Street Bioretention and Infiltration LID

Overlake Village Stormwater and
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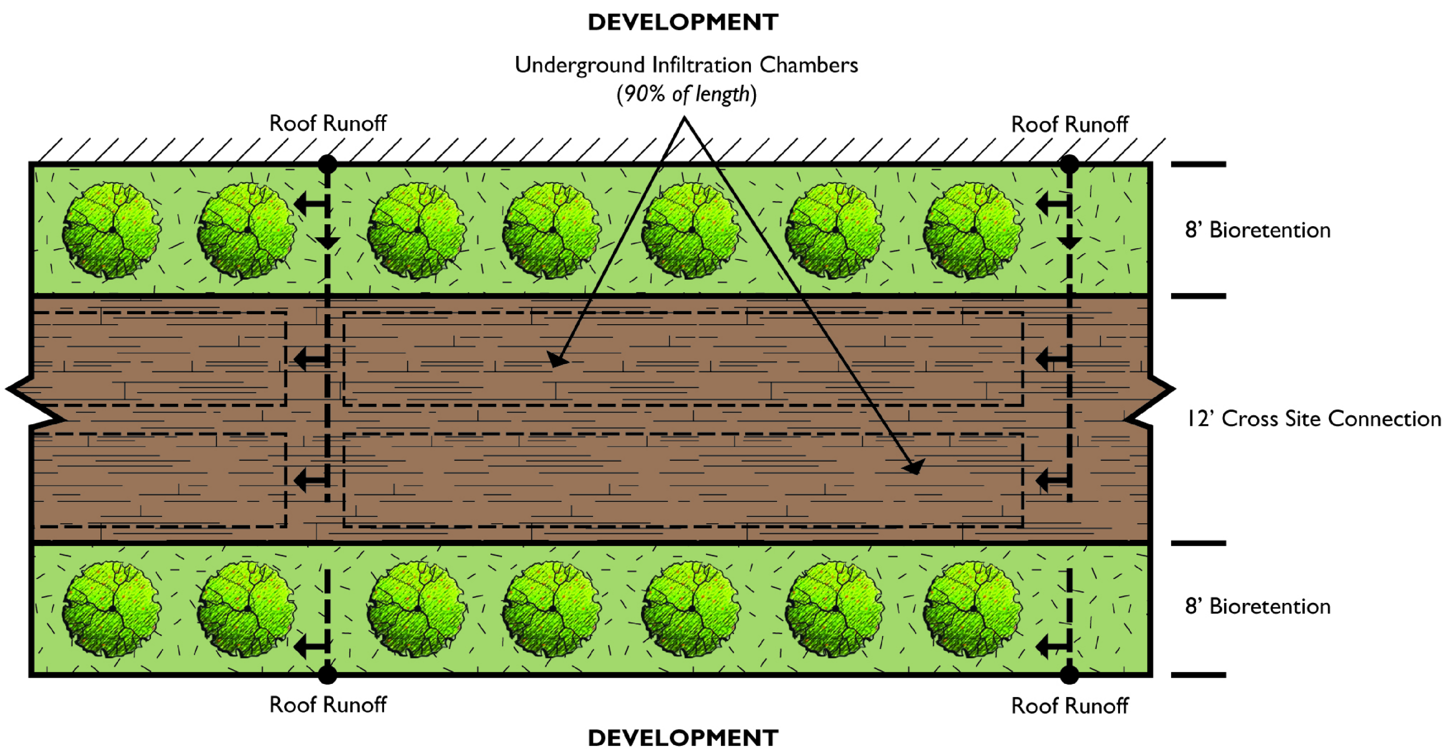

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Figure 4-8
Mid-Block Connector LID

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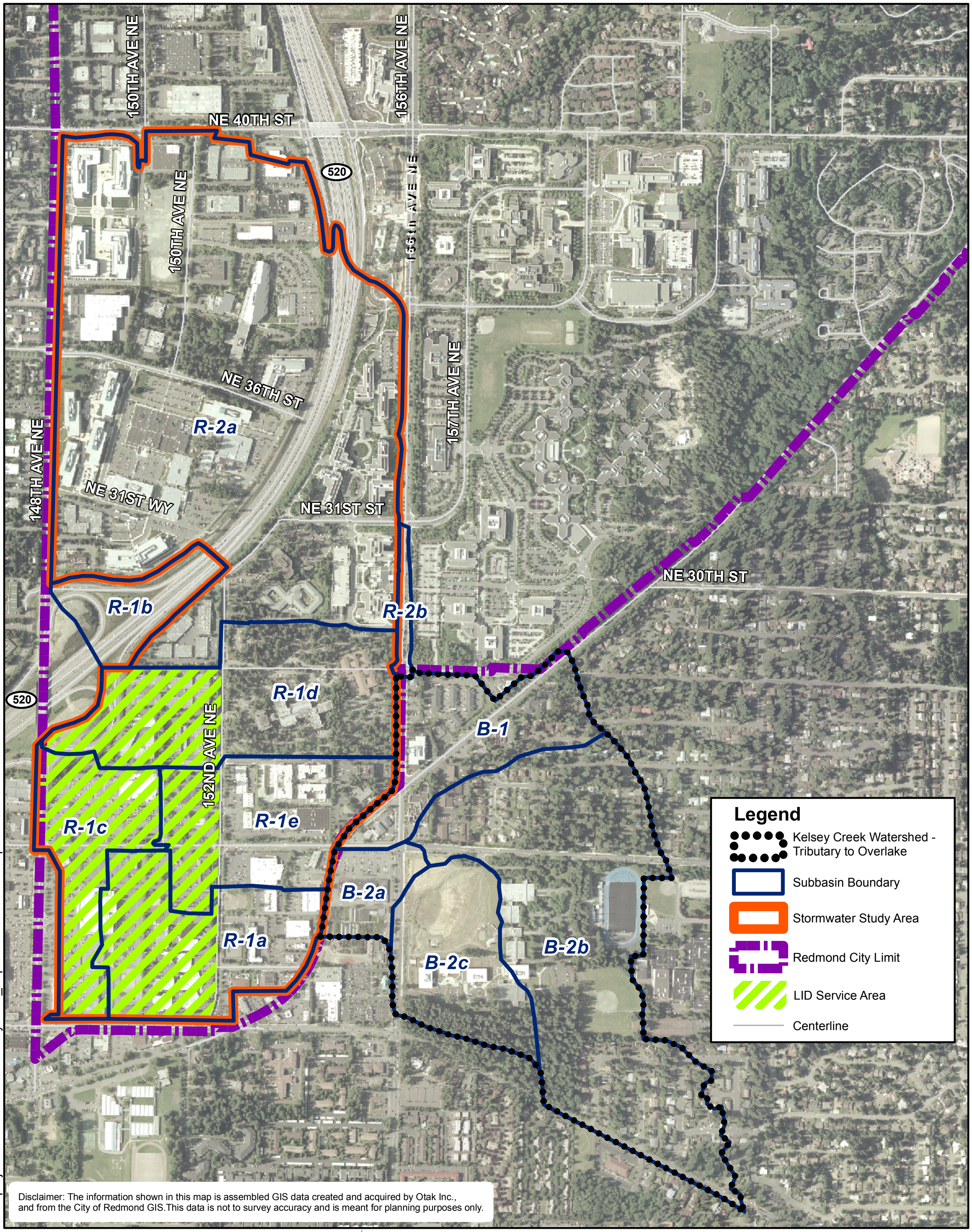

Figure 4-9
LID Service Areas

Overlake Village Stormwater and
Park Facilites Conceptual Design

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Date of Aerial Photography: 2002

Flow Control Facilities

Regional Collocated Flow Control Facilities

The flow control objective for the stormwater study area is to control City of Redmond flows so they mimic pre-developed forested conditions after redevelopment. The soils in the study area include outwash, weathered till, and till soils. Very little runoff occurs in forested outwash soils because nearly all of the precipitation that falls on this soil unit infiltrates. Under current flow control standards for redevelopment, predevelopment land use is set to a forested condition for purposes of determining the allowable runoff rates from the redevelopment area. Areas with outwash soils results in a very low allowable discharge rate and very large detention volumes and flow control by infiltrating runoff becomes the preferred flow control method.

Refined flow control modeling by Northwest Hydraulics Consultants, Inc. (NHC), after the completion of the *Draft Site Feasibility and Alternatives Analysis,* Otak, Inc., February 19, 2010 (Otak. 2010b) determined that flow control could be accomplished at the two sites shown in Figure 4-1. A summary of NHC's recent modeling activities and results are provided in Appendix C. Drainage basin and design district area and development timing analyses performed as a part of this study are summarized in Appendix B-2.

Vault Design Depth Analysis

An analysis was performed to determine the most economical design depth for the collocated vaults. The objective of the analysis was to consider the cumulative cost impacts of structures, shoring, dewatering, and property acquisition with each vault depth. The more shallow the vault, the less the shoring and dewatering costs will be, but property acquisition costs will increase with the larger vault footprint. The lower collocated vault was analyzed for this purpose and the same total vault volume was used while the vault depth was varied. The maximum depth analyzed was Ecology's recommended maximum depth of 20 feet from finish grade to vault invert. This depth provides for a maximum water depth of 15 feet after subtracting allowances for fill above the vault to support park construction, vault top slab thickness, and freeboard above the maximum operating surface water level. Two lesser depth alternatives were considered: an operating water depth of ten feet and an operating water depth of five feet. A preliminary structural design was prepared for each option to support the preparation of vault costs. Project cost summary sheets for this analysis are provided in Appendix D.

Table 4-1 Vault Depth Analysis Results	
Vault Depth/Maximum Water Depth, Feet	Estimated Base Vault Cost Per Cubic Foot*
20/15	$5.70
15/10	$6.10
10/5	$8.70

*Without contingencies, property acquisition, engineering, etc. Refer to Appendix D for cost opinion details.

From the results of Table 4-1, the 20-foot deep vault is the most economical of the three options and will be used for both the upper and lower collocation facilities. As the deeper vault's footprint is smaller than the shallower vault depth, it is the most economical option from a property acquisition standpoint.

Lower Collocated Facility—Stormwater Facility Concept

The lower collocated facility, as shown in Figure 4-1, will be a concrete detention vault facility with cast-in-place footings, columns, floor and walls, pre-cast concrete roof panels, a 1.35-acre footprint, a maximum water depth of 15 feet, a total depth from ground surface to invert of 20 feet, and a maximum operation volume of 20.5 acre-feet. The preliminary plan and sections for the lower facility is shown in Figure 4-10.The preliminary structural design of the vault assumes a three-foot soil depth on top of the vault and a HS-20 live loading. Future grading design of the park facility may increase the soil depth to 4 feet in certain areas, and this would be addressed structurally during final design of the facility. This facility has an estimated 2010 project cost excluding park costs, but including land leasing costs of about $12,600,000, as detailed in Appendix D.

Upper Collocated Facility—Stormwater Facility Concept

The upper collocated facility, as shown in Figure 4-1, will be a concrete infiltration vault facility with cast-in-place footings, columns and walls, pre-cast concrete roof panels, a 2.7-acre footprint, a long-term infiltration rate of two inches per hour, a maximum water depth of 13.5 feet, a total depth from ground surface to invert of 20 feet, and a maximum operating volume of 36.5 acre-feet. The facility will have an open bottom to allow infiltration into the soils beneath the vault. The preliminary plan and sections for this facility are shown in Figure 4-11. As with the lower facility, the preliminary structural design of the vault assumes a three-foot soil depth on top of the vault and an HS-20 live loading. Future grading design of the park facility may increase the soil depth to four feet in certain areas, and this would be addressed structurally during final design of the facility. This facility has an estimated 2010 project cost, excluding land acquisition and park facilities, of about $13,200,000, as detailed in Appendix D. This concept design is subject to adjustment as further soils information is collected and as this facility design is coordinated with the proposed light rail station and new streets nearby.

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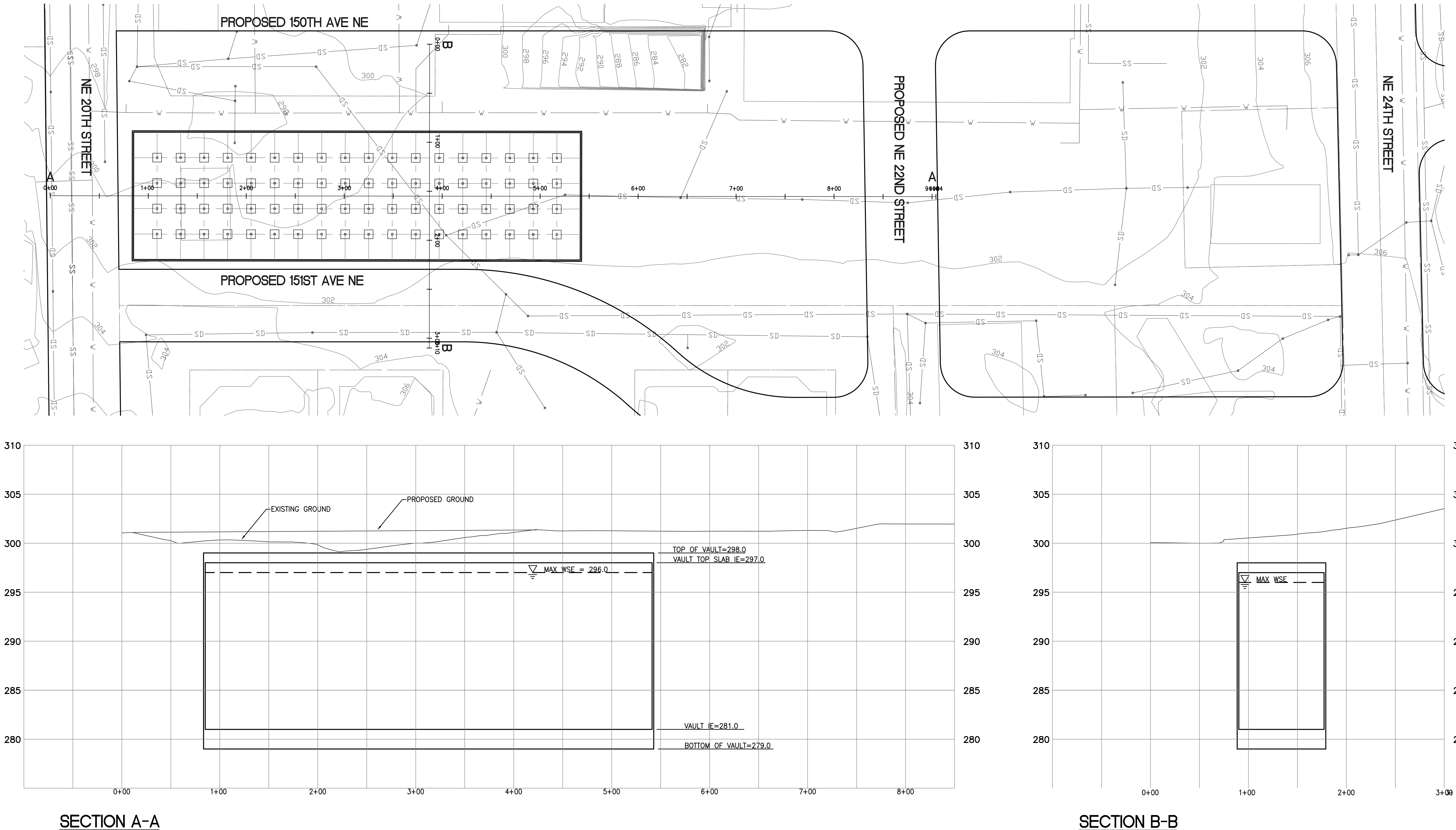

PRELIMINARY — NOT FOR CONSTRUCTION

Figure 4-10
Lower Site Plan, Profile & Section

Overlake Village Stormwater and Park Facilities Conceptual Design

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HORZ. 50' 0' 50' 100' SCALE IN FEET

VERT. 5' 0' 5' 10' SCALE IN FEET

SHEET

1 of 1

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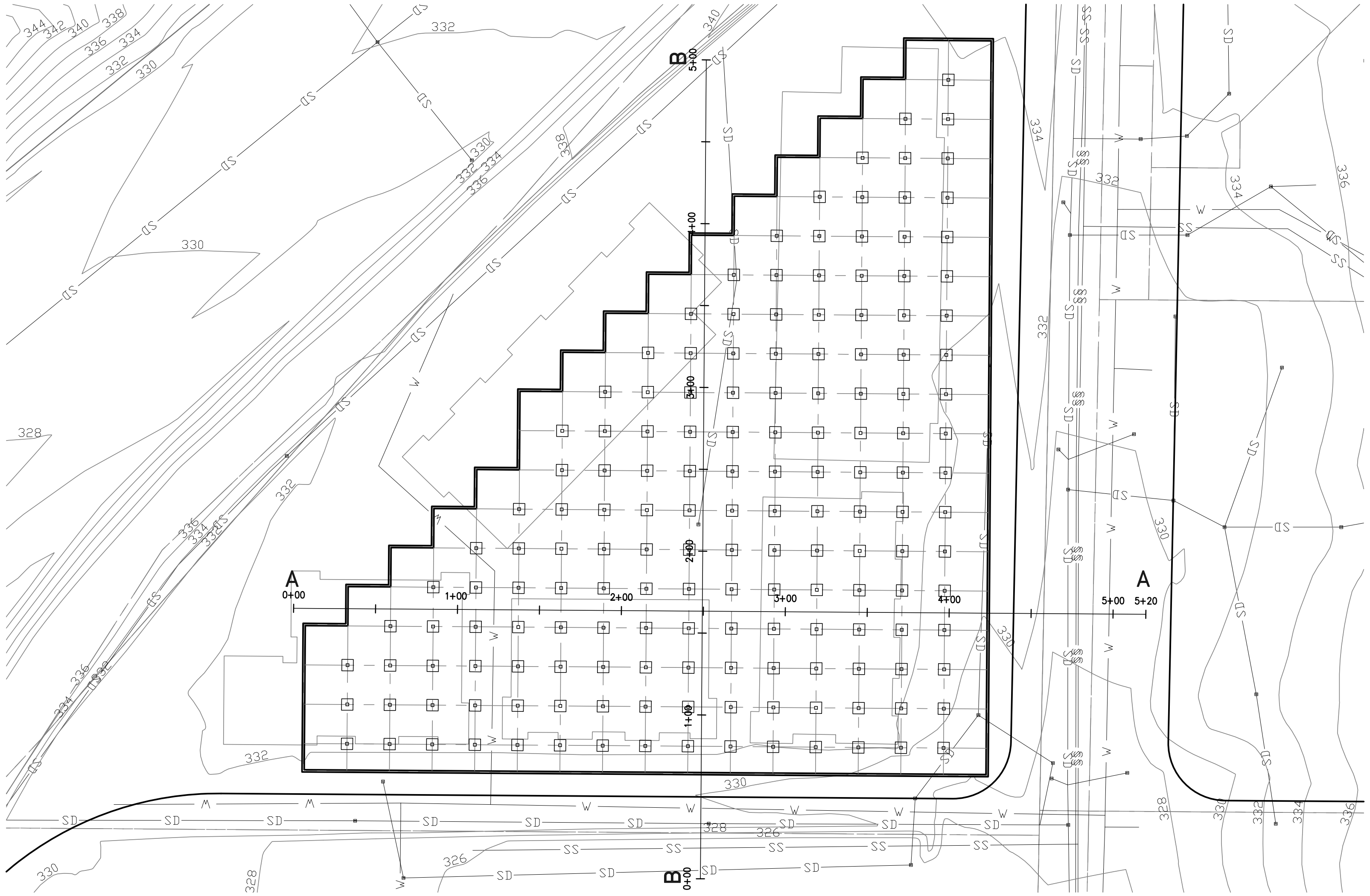
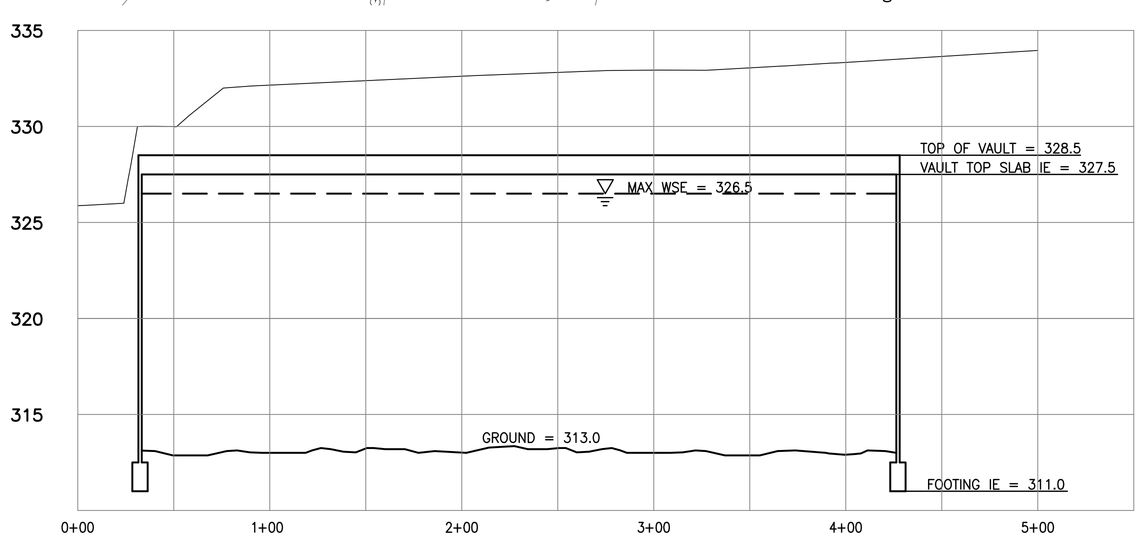
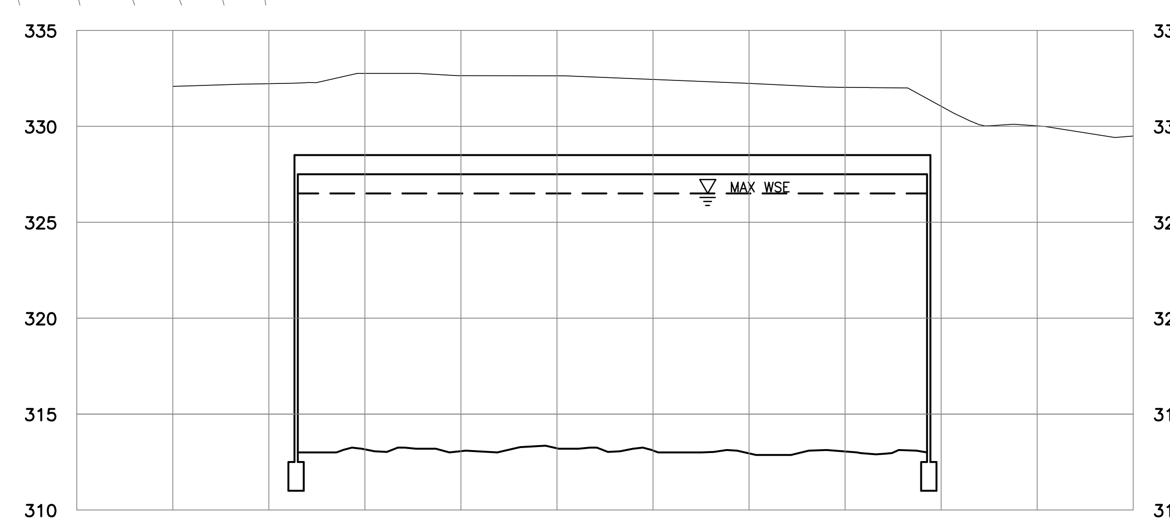




SECTION A-A



SECTION B-B

PRELIMINARY — NOT FOR CONSTRUCTION

Figure 4–11
Upper Site Plan, Profile & Section

Overlake Village Stormwater and Park Facilities Conceptual Design

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HORZ. 50' 0' 50' 100' SCALE IN FEET

VERT. 5' 0' 5' 10' SCALE IN FEET

SHEET

1 of 1

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LID Facilities

LID facilities will be constructed in the service area, shown in Figure 4-9, and will include:

Urban Pathway (in City right-of-way)

- Bioretention (infiltrating) at eight feet wide assumed along 50 percent of total pathway length, one side only (Figure 4-5)
- Infiltrators at 12 feet wide assumed along 90 percent of total pathway length (Figure 4-5)

Local Streets

- Bioretention (infiltrating) at four feet wide assumed along 25 percent of total local street length (both sides)

The effect of these LID facilities is to reduce the needed detention capacity of the lower collocated facility from 27.0 acre-feet to its current design capacity of 20.3 acre-feet, a reduction of about 25 percent. These LID facilities have an estimated 2010 project cost, excluding land acquisition, of $4,600,000, as detailed in Appendix D.

Runoff Treatment Facilities

The runoff treatment standards for the stormwater study area have been identified in Section 2. The proposed overall runoff treatment plan for the project is as follows:

Final Phase Facilities

- Lower Collocated Facility: Runoff treatment from PGIS and PGPS areas would be provided locally rather than at this regional facility. The limited amount of PGIS and PGPS surfaces associated with urban redevelopment (i.e., due to covered or underground parking structures, limited pavement, large roof areas discharging clean roof runoff, etc.) renders local treatment more cost effective than treatment of all runoff at a regional facility. Runoff from new streets would also be treated locally. Runoff from existing streets would be retrofitted to be treated by systems dedicated to those streets. At completion of redevelopment within the lower facility's tributary area, all flows detained would be "clean water" flows.

- Upper Collocated Facility: All tributary runoff would be treated to the enhanced treatment standard by pretreatment followed by treatment though infiltration. If the existing soils do not have the required physical and chemical suitability to provide treatment, the existing soils would be replaced to a depth of 18 inches with engineered soils that are suitable for treatment.

- Retrofit of Existing Streets: Runoff from the future reconstruction of NE 24th Street between 156th Avenue NE and 148th Avenue NE and 152nd Avenue NE between NE 31st Street and NE 20th Street will need to be treated to the enhanced treatment standard. As this street reconstruction will be independent of private development actions, and LID is not proposed for the street retrofits, local treatment of street runoff is proposed. After evaluation of the profiles of these streets, two treatment options were developed and compared. These included:
  - Option 1—Collection and treatment of NE 24th Street runoff in a stand alone runoff treatment system and 152nd Avenue NE runoff in Filterra bioretention units (enhanced treatment standard) with discharge to the trunk line. Figure 4-12 shows the basic features of the Filterra bioretention system.
  - Option 2—Collection and treatment of both the NE 24th Street runoff and 152nd Avenue NE runoff in a stand alone runoff treatment system.

    The stand alone treatment system would preferably be a rain garden or water quality wetland associated with the urban pathway or lower collocated park facilities, both capable of providing an enhanced level of runoff treatment. If grades are not feasible to allow either of these two options, then runoff would be provided by a wet vault followed by treatment in a filter media treatment unit (enhanced treatment standard). For the purposes of comparing costs of Options 1 and 2, the wet vault/filter media unit system was used because this system is feasible with respect to grades.

    Treatment of NE 24th Street runoff in Filterra units was not considered because of the steep grade of NE 24th Street east of 152nd Avenue NE. The estimated project cost of both options is $1,300,000, as presented in Appendix D. With the estimated costs being the same, selection of the option can be made on the basis of relative maintenance costs and City operational preferences. However, if a rain garden or water quality wetland design proves feasible, the costs of the options should be re-evaluated.

- Intersections: Runoff from many new or existing intersections will be subject to oil control treatment. This treatment would be addressed with oil water separators located near the intersections when these intersections are constructed. Filterra treatment systems may be a good alternative to traditional vault type oil water separators. Costs to provide treatment for these intersections is estimated to be $140,000 per intersection. For nine intersections the total cost would be about $1,300,000.

- Private Redevelopment Areas: Runoff from private redevelopment areas would be treated locally to the enhanced treatment standard as discussed above for the lower collocated facility. Figure 4-13 illustrates potential PGIS/PGPS treatment concepts in a private redevelopment area.

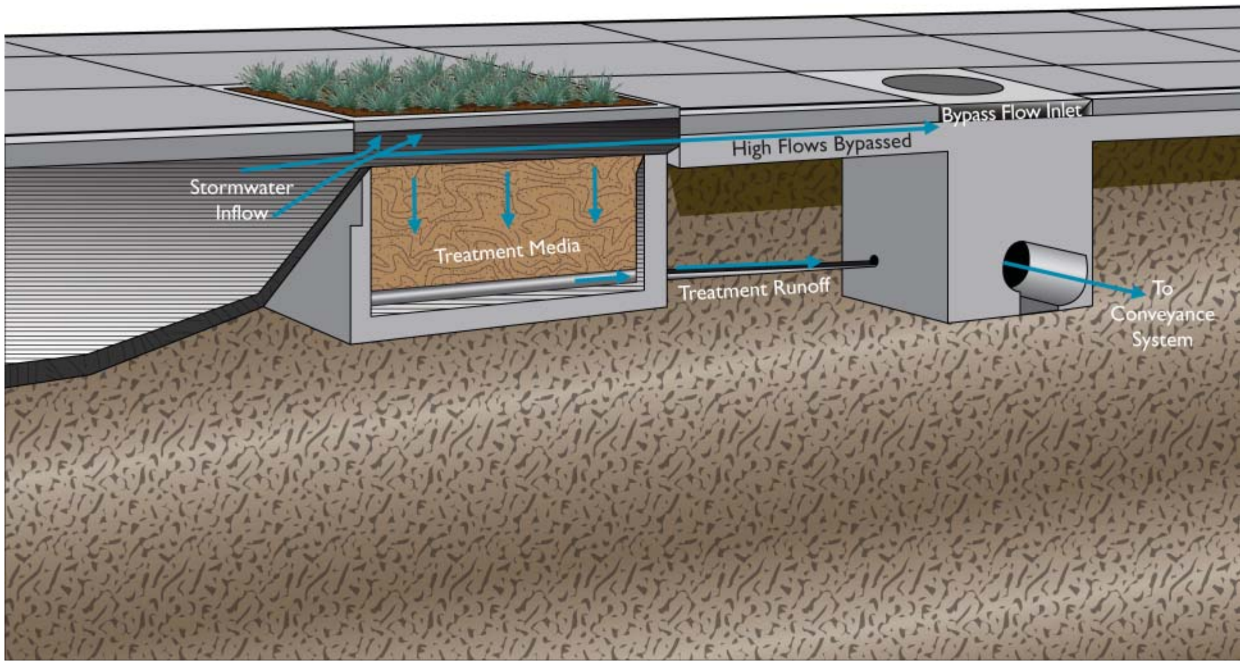

Figure 4-12
Filterra Bioretention System

Overlake Village Stormwater and
Park Facilites Conceptual Design

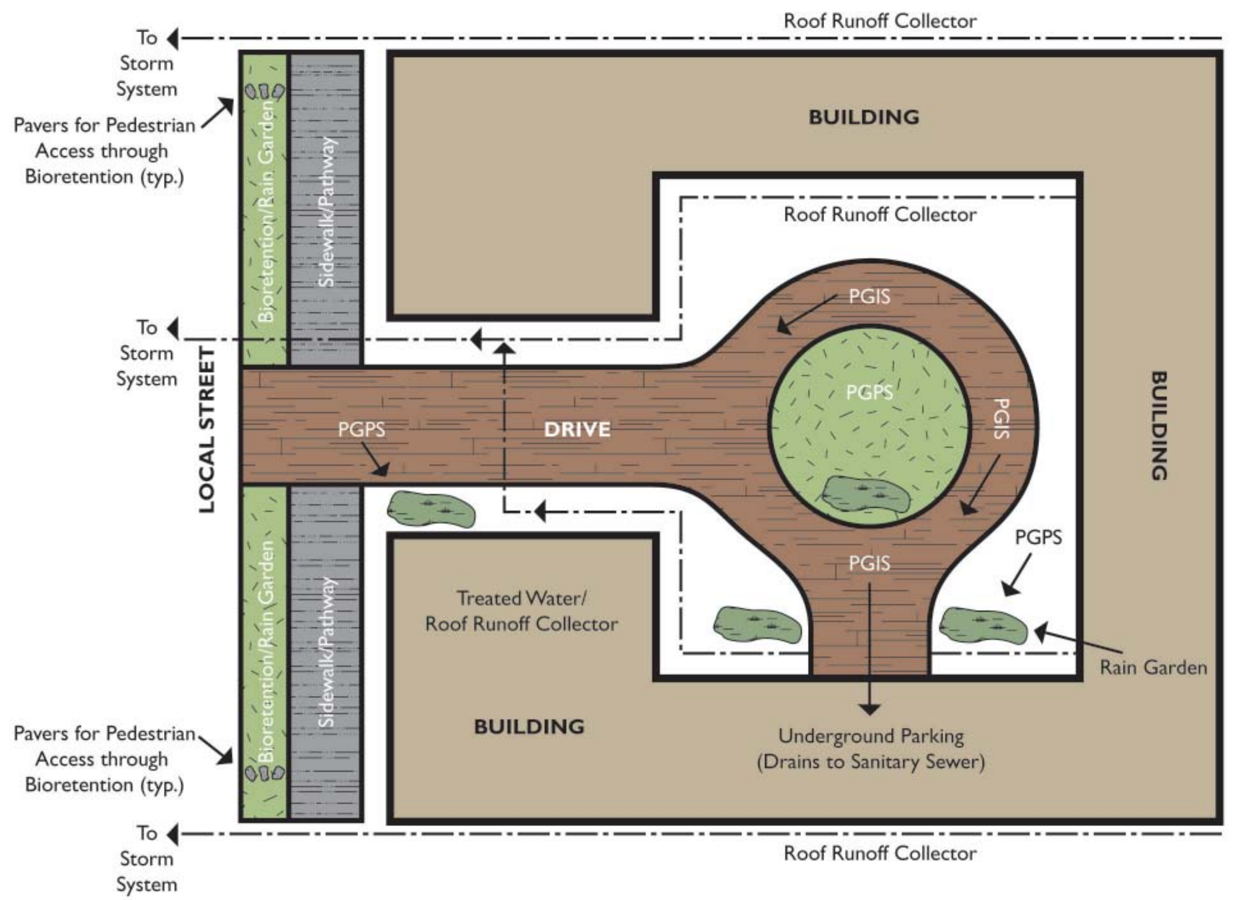

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Figure 4-13
Private Development PGIS / PGPS Treatment Concept

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Park Facilites Conceptual Design

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Initial Phase Runoff Treatment Facilities

The City intends to provide runoff treatment for some areas that have paid capital facilities charge area fees as discussed previously. All of these areas will eventually drain to the upper collocated facility and will be treated in that facility when it is operational. Until that occurs, runoff treatment will need to be provided by initial phase runoff treatment facilities. Several options have been identified to provide initial phase treatment:

- Option 1—Impervious area substitution treatment in lower watershed on private property. This option would entail construction of Filterra treatment units to treat retail parking lot runoff. Catch basins now collecting runoff would be removed and replaced by curbed islands containing Filterra units and landscaping. The curbed islands would be configured to accommodate the Filterra unit design requirements. Treated runoff would discharge into the existing storm drain serving the removed catch basin. High flows from the unit would be conveyed to a new drainage structure on the existing storm drain. This option would need to provide enhanced treatment for 5.25 acres. Retail parking areas not expected to redevelop until after completion of the upper collocated facilities would be sought for this option. The estimated cost of Option 1 is $800,000.

- Option 2—Filterra treatment units at northerly location along public street right-of-way. The estimated cost of Option 2 is $780,000.

- Option 3—Wet vault followed by filter media unit (for 5.25 acres) located within public right-of-way or within a public easement on private property. The estimated cost of this option is $400,000 without property acquisition costs. The City's preference would be to locate such a facility out of the right-of-way to allow for maintenance access, which would greatly increase the cost of the facility.

Cost details for each option are provided in Appendix D. Each of the three options requires public right-of-way or private easements for implementation. These requirements will be evaluated as a part of the pre-design report activities and an interim treatment option selected as a part of that process.

The alternative of treating the initial phase runoff needs at the lower facility was also reviewed. This runoff would comingle with other runoff tributary to the lower facility as it does now. To achieve treatment of the initial phase runoff, all flows to the lower facility would need to be treated (unless otherwise approved by Ecology), which would require a substantial wet vault, and a large filter cartridge system that would be located more than 20 feet below finished grade. Because of this the initial phase runoff treatment options described above are preferred.

Conveyance System Improvements

The overall concept for conveyance is to use the existing stormwater trunk system to the maximum extent possible and to add local collector storm drains as necessary to convey street and private development areas to trunk lines.

Trunk System

During the initial phase, the stormwater trunk line system consists of the existing stormwater trunk system and the new Bellevue stormwater pipeline system around the lower collocated facility as shown in Figure 4-14 and is discussed in more detail later in this section. The proposed stormwater trunk system for the final phase is shown in Figure 4-14 and Figure E-1 in Appendix E. The proposed system uses the existing trunk line system in 152nd Avenue NE south of NE 31st Street to NE 24th Street, then the NE 24th Street trunk line from 152nd Avenue NE to west of 151st Avenue NE, then the north-south trunk line south of NE 24th Street where it is joined by the east-west trunk line north of NE 21st Street from 152nd Avenue NE to the east. The portion of trunk line in 152nd Avenue NE adjacent to the upper collocated facility can be removed from service unless future plans have a local collector system discharging to this segment. The portion of the trunk line through the lower collocated facility will need to be removed from the facility's footprint area. A new trunk line routed around the lower collocated facility on its east and south sides to a point of connection with the existing storm system will likely be necessary for two purposes: (1) to route Redmond and Bellevue flows around the vault construction site by gravity (vs. pumping) and (2) bypass Bellevue flows around the vault after its construction. A flow splitter structure will be necessary to bypass City of Bellevue flows around the lower facility.

Existing Street Collection System

The existing street collection system addresses future reconstruction of NE 24th Street and 152nd Avenue NE as discussed in the runoff treatment section. This system is shown in Figure 4-14 and separately in Figure E-2 in Appendix E. Runoff to be treated by a rain garden, water quality wetland, or wet vault/filter cartridge media system, would be collected by dedicated catch basin and storm drain lines to the treatment unit. Discharge from the treatment unit would be to the trunk line discharging to the lower collocation facility. Runoff treated in Filterra bioretention systems would be discharged to the trunk line system conveying flow to the lower collocated facility.

Local Collection Systems

Local collection systems are proposed to convey treated flow from local streets and private development areas to trunk lines for conveyance to the lower collocated facility. The general layout and features of the proposed local collection system are shown in Figure 4-14 and separately in Figure E-3 in Appendix E. The systems would also receive overflows in excess of the capacity of the LID flow control facilities.

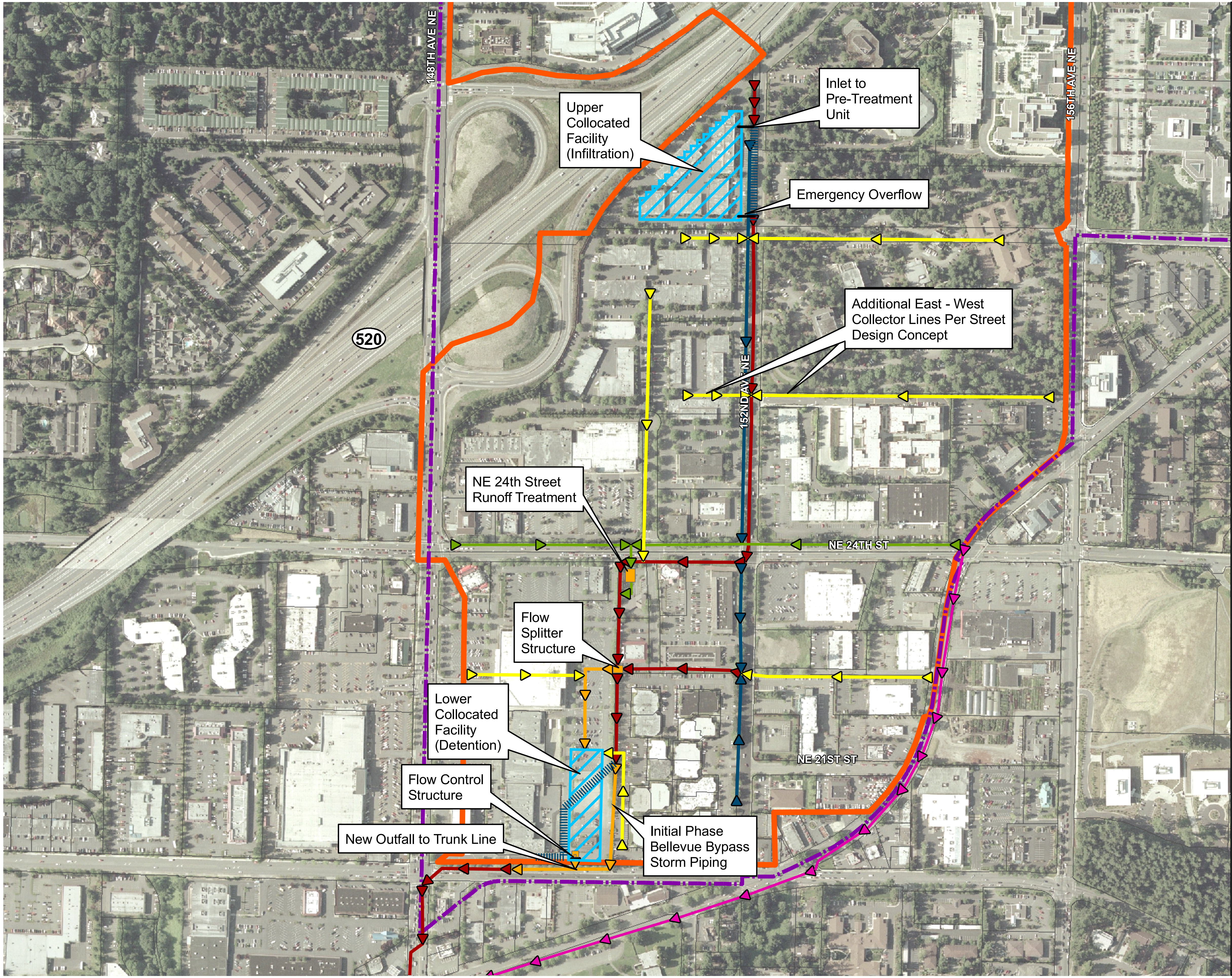

Figure 4-14
Proposed Conveyance System

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Date of Aerial Photography: 2005

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Bellevue Bypass System

A future bypass system is proposed to convey City of Bellevue flows now tributary to the City of Redmond system in a new trunk line located within the City of Bellevue along Bel-Red Road. The proposed bypass follows the alignment of the existing storm drain system on the south side of Bel-Red Road. A preliminary plan and profile for this system is provided in Appendix C. The estimated project cost for the system is about $1,600,000 as presented in Appendix D.

Coordination with City of Bellevue

Coordination is planned between the City of Redmond and the City of Bellevue on tributary flows from Bellevue and the Overlake Village Stormwater and Park Facilities Conceptual Design features. Bellevue flows will need to bypass the lower collocated facility if Bellevue does not desire to participate/contribute to the lower collocated facility. If the Bellevue bypass system in Bel-Red Road is constructed at the same time as the lower collocated facility, the bypass line around the lower collocated facility shown in Figure 4-14 may not be built. If not, the bypass line at the lower collocated facility would be abandoned after construction of the new system in Bel-Red Road. There is also the potential for expansion of the lower collected facility for flow control of a portion of Bellevue flows. Providing flow control in the City's vault for Bellevue's stormwater would require negotiations between the City of Bellevue, City of Redmond and private property owner. Treated runoff from Bellevue would be required if the lower expanded collocated facility were to remain a single vault.

Park Facility Design Concepts

A key goal of this plan is to provide a vision of how the stormwater facilities could serve the community as valued public open space in the future, urbanized Overlake Village.

The *City of Redmond Park, Arts, Recreation, Culture Conservation Plan* lists both of the Overlake Village collocated stormwater facility parks as neighborhood parks. Neighborhood parks are defined as:

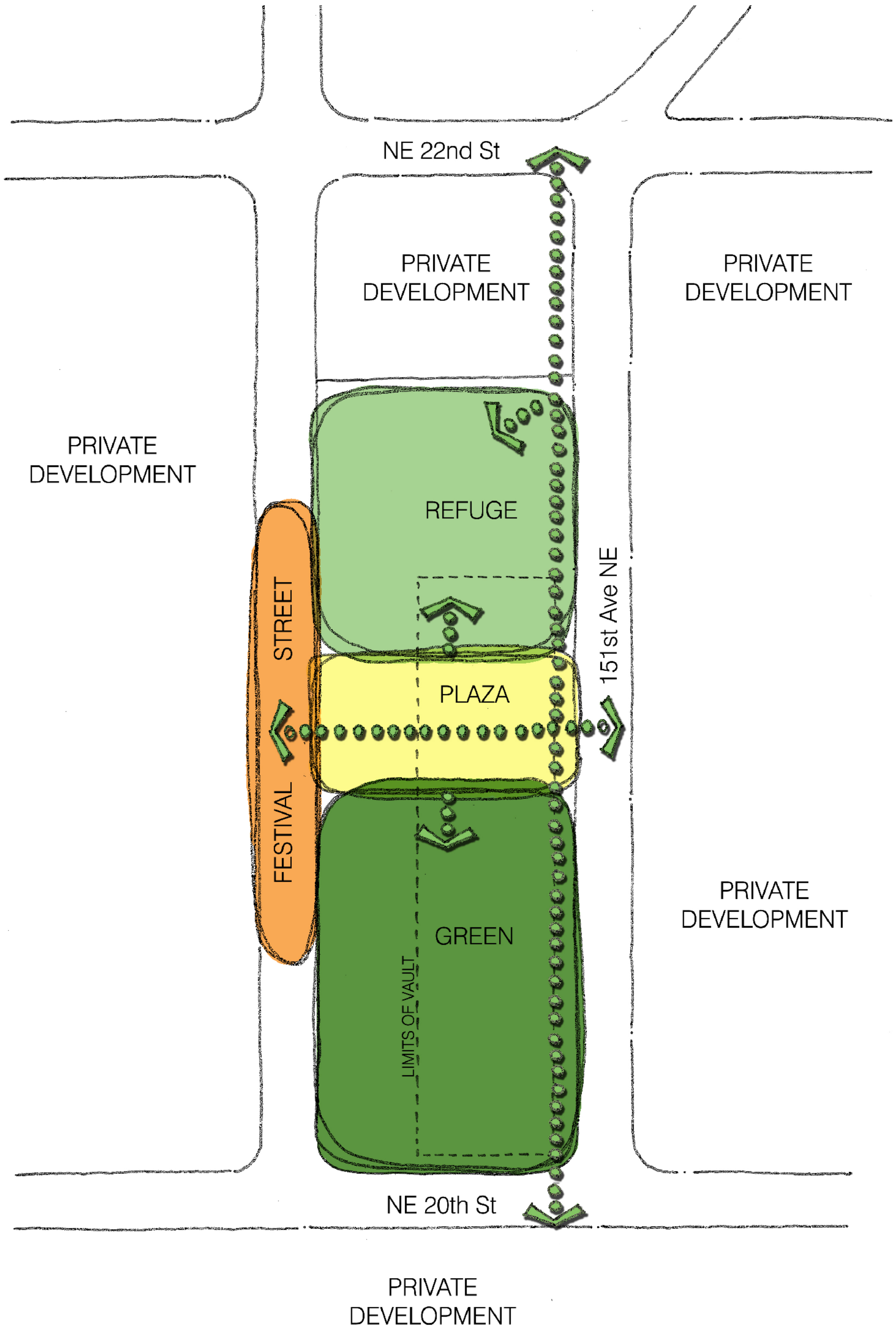
> *Neighborhood Parks provide space for active and/or passive recreation. These parks are accessible to nearby residents and business people primarily by walking and bicycling. Neighborhood parks are the smallest parks and vary in size from pocket parks to 20 acres, and typically have fewer activities or amenities than community parks. The unique character of each site will help determine appropriate amenities, which may include: children's playgrounds, small scale active recreation amenities, open fields, open space, trails, environmental preservation areas, picnic areas, urban plazas, passive areas for reflection and gathering, and occasionally restrooms or other small structures.*

According to the Overlake Neighborhood Plan, the collocated stormwater/parks facilities slated for Overlake Village will be between two and four acres. In the plan however, these parks are envisioned as open, stormwater ponds which, through the development of this plan, was considered not feasible or desirable to maximize usable open space for the community. Therefore, in order to better define the range of parks desired by the community and feasible for these vaulted sites, three typologies were developed to articulate fundamental components, key characteristics, and types of activities typically associated with these spaces. These three typologies include: Plaza, Green, and Refuge. In addition to characterizing the different park options, these typologies assisted in the selection of sites that were feasible for both stormwater use and for a certain type of park within a specific urban context. With stormwater, planning, and park considerations assessed, two collocated park sites emerged for the proposed plan with the urban pathway between.

In developing design concepts for the upper and lower park sites, the Plaza, Green, and Refuge typologies were utilized once again to diagram options. Although each site had been characterized throughout the site selection process as one of the three typologies, it was recognized that elements of each would be integrated into the conceptual design/vision. With its adjacency to future light rail transit, the upper site was characterized as a Plaza with significant Green space and a smaller, urban Refuge. In contrast, the lower site has been characterized primarily as large Green space with smaller Plaza spaces and elements of a Refuge. Three conceptual typology diagrams were developed for each site, each with their own qualities that presented different options for access and proportions of park spaces. The options for the lower site are shown in Figures 4-15, 4-16, and 4-17. The options for the upper site are shown in Figures 4-19, 4-20, and Figure 4-21. An alternative upper site is located south of NE 28th Street between 151st Avenue NE and existing 152nd Avenue NE and the conceptual typology diagrams for this site are shown in Figures 4-23, 4-24 and 4-25. The alternative upper site is intended to provide flexibility in the design process as transportation and rail transit elements in the upper Village area advance in their planning. These diagrams served as the basis for developing conceptual park visions. The vision for each park site is described below:

Lower Collocated Facility—Park Concept

Located within the busiest retail destination of the Village at the southern end of the urban pathway, the lower park site is characterized by its expansive Green. A significant open space amongst the cityscape, this park provides something for everyone. The concept for this park is shown in Figure 4-18. Within the Green are pockets of passive uses such as perennial gardens, p-patches or rain gardens, and more active areas for kicking a soccer ball, throwing a Frisbee, picnicking, playing a game of chess, shooting hoops, or swinging at the play area. The urban flavor reaches into the park at the Plaza, which serves as a transition or mixing zone between on- and off-site activities. It is the hub of community events that spill out across the Green or into the pedestrian street. Tucked along the edge of the park, the Refuge is a quieter zone that provides relief from the urban scene for individuals or small groups.



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Disclaimer: Street locations shown are conceptual only and are not being established by this project.

Figure 4-15
Park Typology Diagram Lower Site: Option 1

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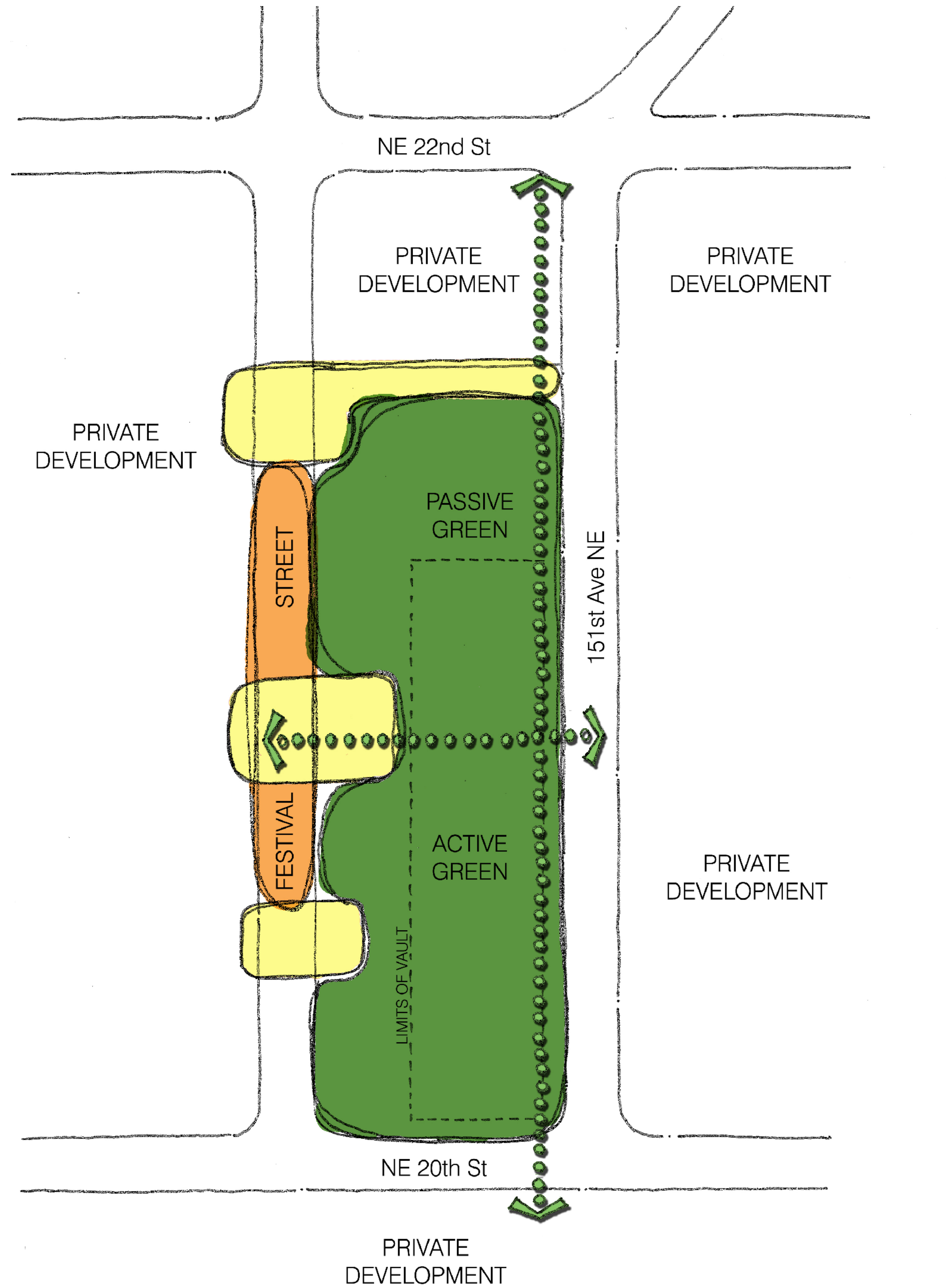

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Figure 4-16
Park Typology Diagram Lower Site: Option 2

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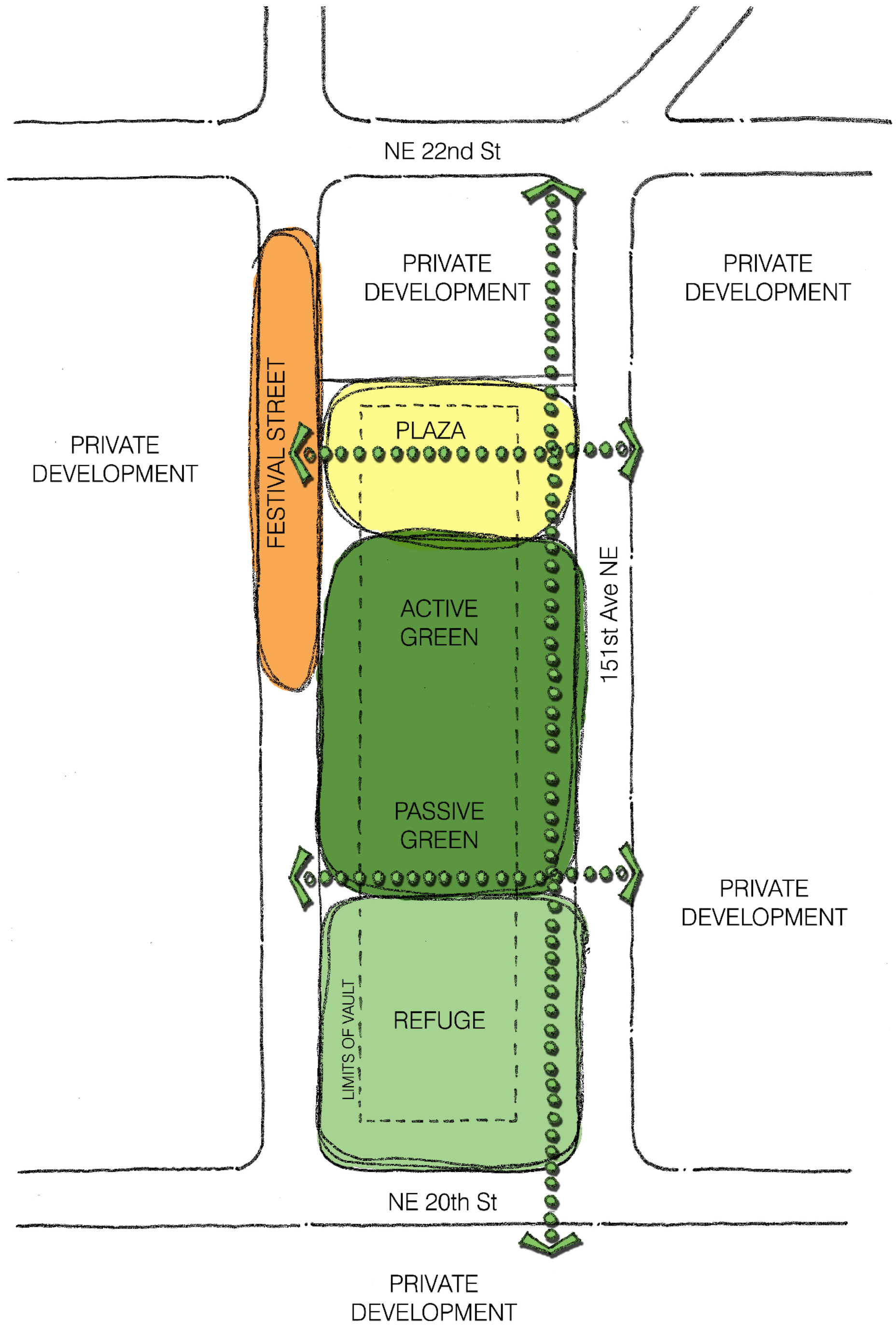

Disclaimer: Street locations shown are conceptual only and are not being established by this project.

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Figure 4-17
Park Typology Diagram Lower Site: Option 3

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Disclaimer: Streets and development shown are conceptual only and are not being established by this project.

Figure 4-18
Park Concepts Lower Site

Overlake Village Stormwater and
Park Facilites Conceptual Design

Disclaimer: Upper Site park concepts are subject to development of the proposed light rail station, street grid, and further soils investigation.This graphic shows a concept with the stormwater and park facilities north of NE 28th Street.

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Figure 4-19
Park Typology Diagram Upper Site: Option 1

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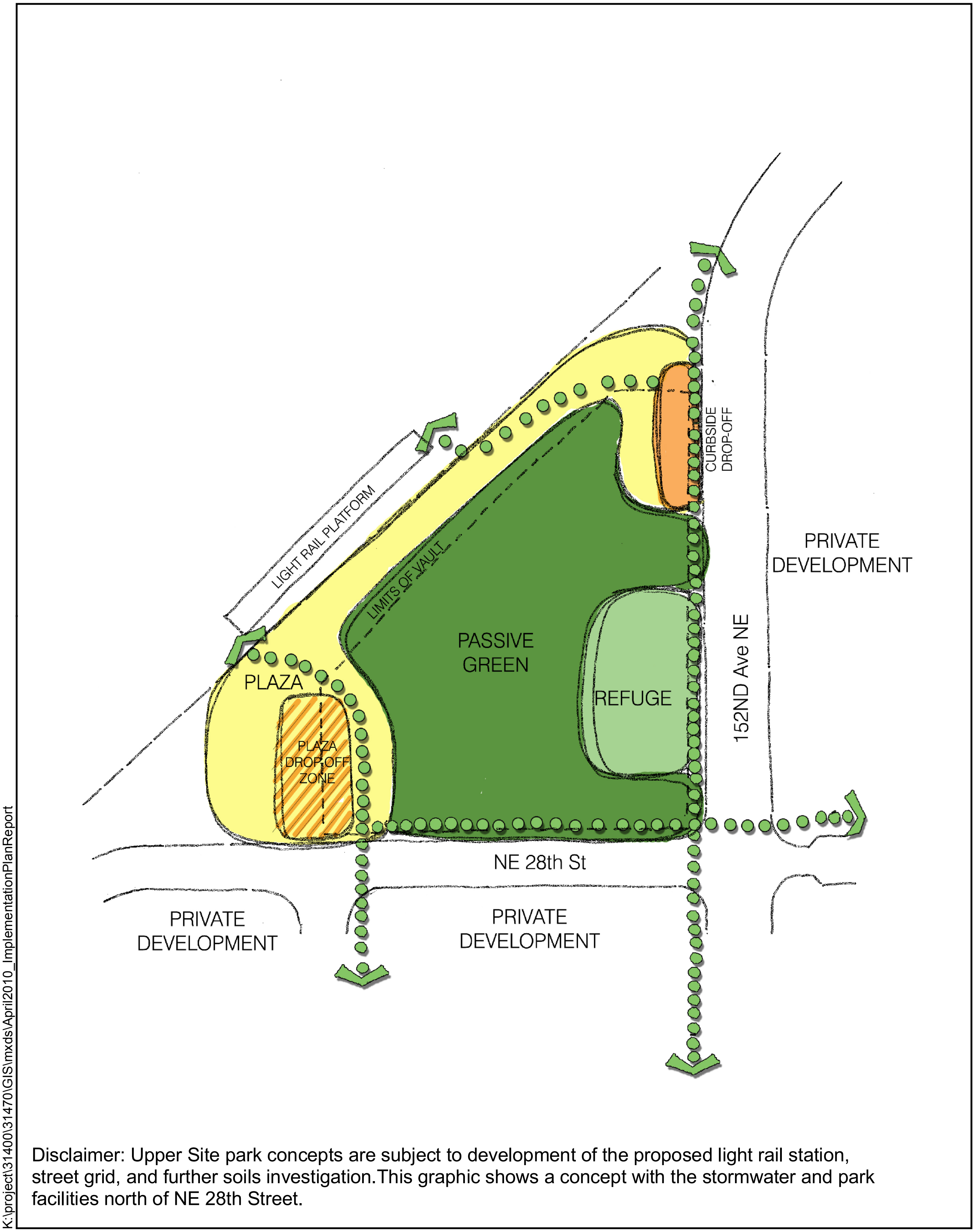

Figure 4-20
Park Typology Diagram Upper Site: Option 2

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Park Facilites Conceptual Design

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Disclaimer: Upper Site park concepts are subject to development of the proposed light rail station, street grid, and further soils investigation.This graphic shows a concept with the stormwater and park facilities north of NE 28th Street.

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Figure 4-21
Park Typology Diagram Upper Site: Option 3

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Disclaimer: Streets and development shown are conceptual only and are not being established by this project.

Figure 4-22
Park Concepts Upper Site

Overlake Village Stormwater and
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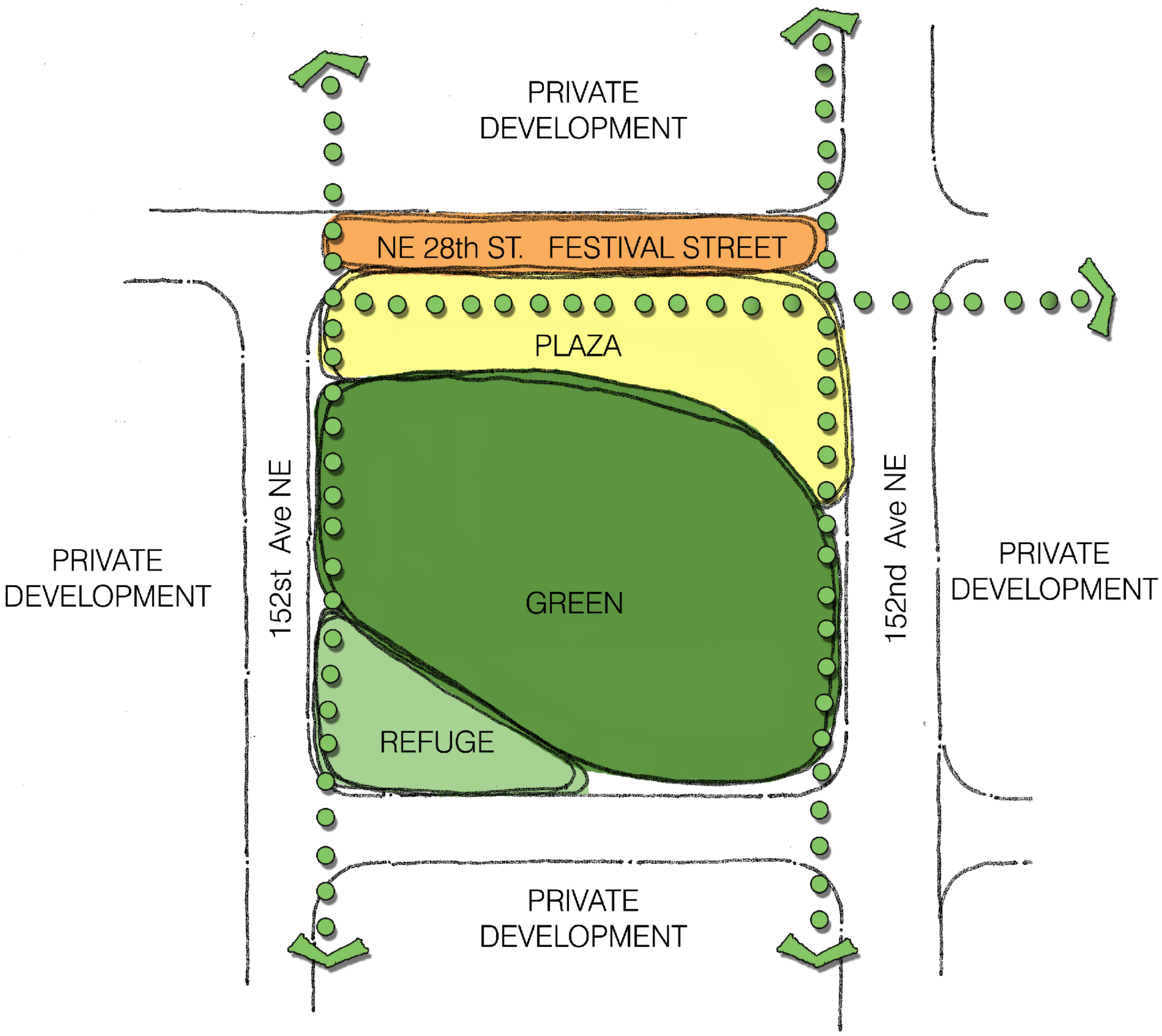

Disclaimer: Upper Site park concepts are subject to development of the proposed light rail station, street grid, and further soils investigation.This graphic shows a concept with the stormwater and park facilities south of NE 28th Street.

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Figure 4-23
Park Typology Diagram Alternative Upper Site: Option 1

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Disclaimer: Upper Site park concepts are subject to development of the proposed light rail station, street grid, and further soils investigation.This graphic shows a concept with the stormwater and park facilities south of NE 28th Street.

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Figure 4-24
Park Typology Diagram Alternative Upper Site: Option 2

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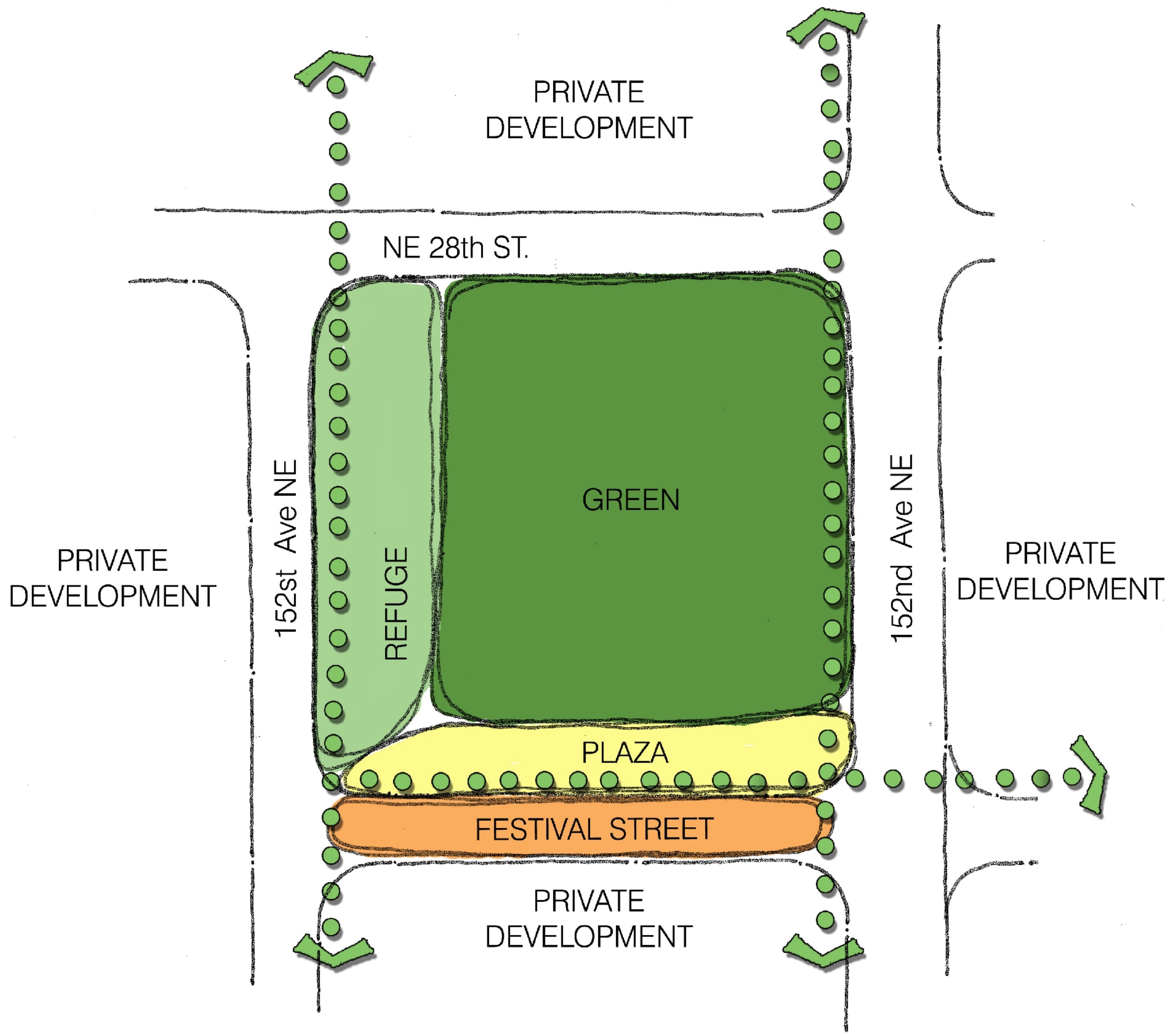

Disclaimer: Upper Site park concepts are subject to development of the proposed light rail station, street grid, and further soils investigation.This graphic shows a concept with the stormwater and park facilities south of NE 28th Street.

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Figure 4-25
Park Typology Diagram Alternative Upper Site: Option 3

Overlake Village Stormwater and
Park Facilites Conceptual Design

Without a vault below, there is opportunity to create significant grading for rain gardens to both increase stormwater capacity and enhance the character of the Refuge. The lower park will become the backyard for residents and visitors alike. Beyond the dynamic range of uses a well-designed open space can provide, it is also exciting to imagine a shared use like a community center located on one of the adjacent development sites.

Upper Collocated Facility—Park Concept

As the northern terminus of 151^{st} Avenue NE adjacent to dense residential development, commercial uses, and Sound Transit light rail station, the future upper park site will be an icon of Overlake Village and define its urban character. This site also presents a unique opportunity to reach across the future rail line and SR520 via a sculptural pedestrian bridge linking the Employment Area to the Village.

The park, conceptually shown in Figure 4-22, is envisioned as a vibrant, public space anchored by a bustling corner Plaza. The end of the urban pathway and near the primary drop-off/pick-up for the light rail, it is here where people meet up to hang out or wander through the Village for an afternoon of shopping. Activating the space is a newsstand café with outdoor movable tables and chairs, terrace seating and small performance stage, and public art. Flanking the Plaza are softer, planted open spaces that define the Green and Refuge portions of the park. The Green's expansive lawn area is adaptive, activated by impromptu play, picnics, or other organized events. The Refuge provides an escape for a more contemplative park experience where visitors go for a respite, to read a book, or find a small slice of nature during lunch, before catching a train, or on their way home from work. No matter the time of day or year, there is something for everyone in what will truly become Overlake's "living room".

The final location of this proposed park will be coordinated with stormwater requirements for the proposed stormwater facilities, along with needs for the proposed light rail station and urban planning of new proposed redevelopment.

Urban Pathway

Another primary component to Overlake Village's parks and open space is the urban pathway. In addition to its stormwater function, this feature addresses a key strategy identified in the Overlake Neighborhood Plan for improving walkability and providing an interconnected system of parks. Serving as the pedestrian spine within the village from which additional spurs connect, the primary section of the pathway is located along 151^{st} Avenue NE connecting the upper and lower collocated facilities. More than just a network of wide sidewalks, the urban pathway is an extension of the park experience, a destination in and of itself, where people can go to stroll or linger. A variety of conditions defined by plantings, hardscape, art, and site amenities creates a dynamic park-like experience. Eddies of activity or respites in corner plazas and mid-block connections create events where commercial and residential development spills out into the public realm. Additionally, creative expressions of stormwater management functions are coordinated with private development and public art providing integrated amenities such as stormwater planters and rain gardens that enhance the park-like quality of spaces along the pathway.

Neighborhood Planning and Urban Design Considerations

The proposed concept is consistent with the adopted neighborhood plan for Overlake and would implement specific policies for Overlake Village, including the creation of collocated stormwater and park facilities and an urban pathway system. The concept respects and reinforces the proposed urban form and land uses adopted in the neighborhood plan and key objectives, such as:

- Transforming the village from low density development with surface parking to compact mixed-use buildings with underground parking
- Accommodating residential growth close to jobs and amenities;
- Installing park and open space areas to serve the residential growth and other uses
- Encouraging creative approaches to conserve water and treat stormwater, as well as LID and green building techniques so that as Overlake transitions—it will grow greener and the impact of growth on the environment will be minimized

The project's consistency with adopted City policies of the neighborhood plan and comprehensive plan is discussed in more detail in Section 2. In addition, Appendix A includes a full listing of adopted policies that the project will either directly implement or support.

SEPA Compliance/Environmental Checklist

In 1995, the Washington State Legislature authorized a new category of project action in SEPA called a planned action. Designating specific types of projects as planned action projects shifts environmental review of a project from the time a permit application is made to an earlier phase in the planning process. The City of Redmond has completed a Planned Action Final Supplemental Environmental Impact Statement (FSEIS) for the Overlake Village area (2007). The intent is to provide a more streamlined environmental review process at the project stage by conducting more detailed environmental analysis during planning. Early environmental review through the planned action process provides more certainty to permit applicants with respect to what will be required and to the public with respect to how the environmental impacts will be addressed.

For this planning study, a non-project action SEPA checklist was prepared that summarizes the proposed concept and key considerations related to environmental elements. The purpose of the checklist is to provide formal documentation that the study is a non-project action for the project file and determine that there are no new significant impacts from those covered by the previous FSEIS.

This Implementation Plan:

1. provides technical studies for alternative location and facility types;
2. identifies conceptual design characteristics of future facilities;
3. identifies policies that would be implemented by future provision of the stormwater and park facilities; and
4. identifies preferred sites and types of stormwater and park facilities that will require additional planning, design, and acquisition.

As a non-project action, the City has performed an evaluation for consistency of the Plan with the previous Planned Action FSEIS. The City has performed that analysis, and an addendum has been prepared to incorporate the information from this study into the existing environmental documentation.

Future design or development proposals for projects will be subject to additional SEPA review. At that time, the City may require additional environmental analysis, in accordance with SEPA, as discussed above. This analysis could be limited to addressing only those impacts not addressed previously in the EIS via analysis presented in a supplemental EIS or other type of SEPA documentation as determined appropriate by the City as the lead agency.

Section 5—Project Implementation Plan

The Overlake Village Stormwater and Park Facilities Conceptual Design project has undergone extensive engineering, urban form, and park analyses to define the optimum collocation facility concept to meet defined stormwater and park objectives for the Overlake Village. This section describes the key activities and the timing necessary to implement the project concept.

Proposed Project

The proposed project involves two collocated stormwater and park facility sites connected by an urban pathway. The locations of these sites and the general location of the urban pathway are shown in Figure 5-1.

The lower collocated facility is a regional detention facility that will detain stormwater that has been treated locally within public rights-of-way and private development areas. During the initial phase, parking will be reconstructed on the top of the stormwater vault. In the final phase, park facilities will be constructed on top of the stormwater vault. The park facilities concept envisions that this site will serve as a primary community open space for programmed and unprogrammed activities with additional plaza and green space.

The upper collocated facility is a regional stormwater facility that will treat and infiltrate runoff from the stormwater study area upstream of the facility. A Sound Transit light rail station and two new streets are planned to be constructed near the facility. These ongoing projects and any proposed private redevelopment will be closely coordinated with design of this upper facility. Available geotechnical information suggests that the more northerly the site (south of SR520), between the proposed 151st and 152nd Avenues NE, the greater the potential for high-rate deep infiltration of stormwater. Because of this and its influence on the stormwater vault, volumes, and capital costs, the further north the vault is located (south of SR520, north of future NE 26th Street), the better it is from a stormwater design perspective. Additional geotechnical investigation is proposed to better determine the flexibility for location of this upper stormwater vault. As with the lower facility, park facilities will be constructed on the top of the stormwater vault. The park facilities concept for this site includes a primary plaza with significant green and open space for a variety of unprogrammed activities. From a park design standpoint, the site should include a minimum area of two acres for park facilities, located between 151st and 152nd Avenues NE, and have a length to width ratio that is needed for efficient park design.

The urban pathway connecting the two sites is intended to be within dedicated easements adjacent to City rights-of-way, and will be designed to include LID components to reduce the size of the lower regional stormwater facility and provide treatment of runoff. Additional LID components will be located within new street rights-of-way and within private

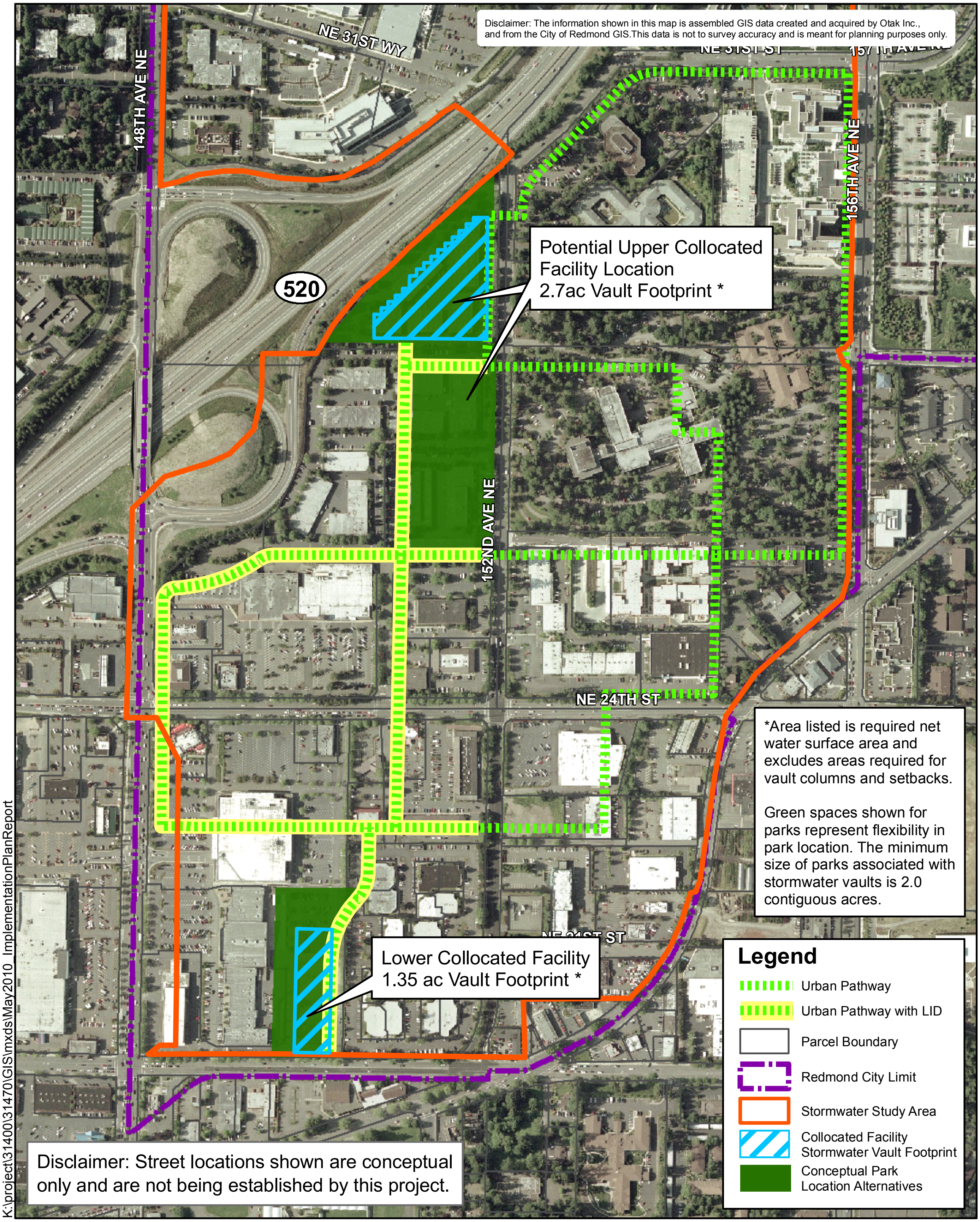

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Figure 5-1
Regional Collocated Facilities and Urban Pathway

Overlake Village Stormwater and Park Facilites Conceptual Design

City of Redmond WASHINGTON

otak

The Berger Partnership PS Landscape Architecture

0 250 500 1,000 Feet

N

Date of Aerial Photography: 2002

development areas. Stormwater conveyance improvements will be needed as a part of the project, as will initial phase runoff treatment facilities to serve existing capital facility charge area customers. Treatment facilities for oil control at some intersections and for retrofitting treatment of some existing streets will also be required.

Project Phasing

The City's intent is to phase the project to provide flow control and runoff treatment that responds to the timing of redevelopment in the stormwater study area. The initial phase is to address flow control and runoff treatment for existing capital facility charge area customers. Future phases will address redevelopment in the remainder of the study area. For these later phases, the City's intent is to maintain sufficient capacity available for redevelopment as it occurs through phasing of regional facilities.

In general, the elements in this plan are expected to be constructed over an approximate 20-year period (2010 – 2030) although full redevelopment of the Village may not be completed in that period. The initial phase of the lower collocated site is planned to be constructed and in operation by February 2016. The project schedule showing key project activities needed to implement the first regional facility as well as longer term activities is provided in Figure 5-2. The upper collocated site would be constructed in coordination with the Sound Transit light rail station (opening in 2021). The urban pathway would be constructed as adjacent redevelopment occurs. Proposed phasing for the preferred project concept is shown in Figures 5-3, 5-4, and 5-5 for Phases 1, 2, and 3 respectively. The key project activities are discussed below.

Phase 1 Activities

Phase 1 activities focus on the construction of the lower collocated facility stormwater elements and placing them in operation. These activities include code revisions, pre-design field work, property acquisition, stormwater facility design, urban form considerations and park facilities considerations.

Code Revision Recommendations

- With further analysis of the City Code, it may be necessary to modify code language, street standards, and site development standards to more clearly define the specific requirements for LID in circulation systems and onsite. As part of the next phase of work, a detailed review of Code provisions, street design standards, and site development standards will be conducted. Recommendations will be developed for:

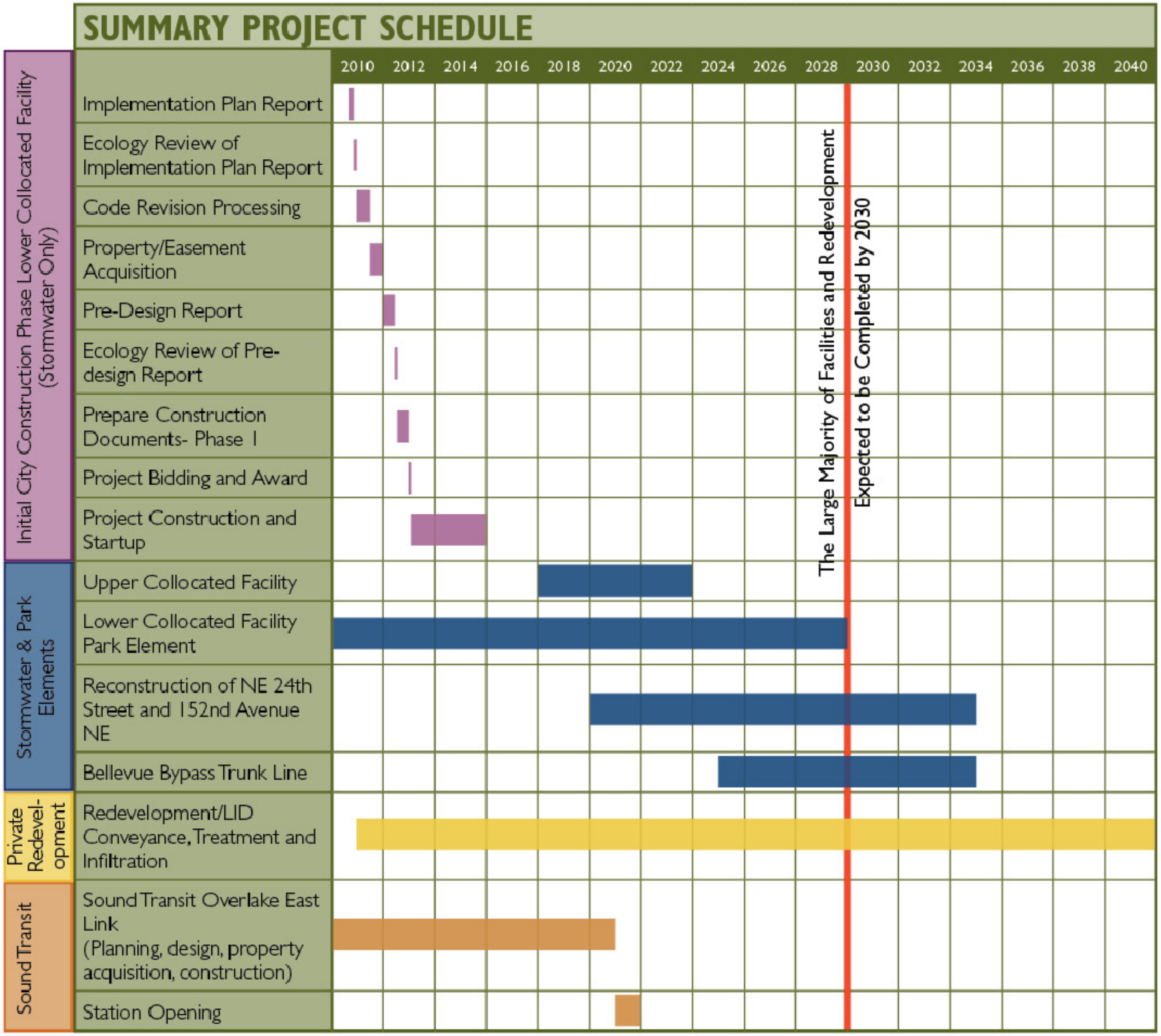

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Figure 5-2
Preliminary Implementation Schedule

Overlake Village Stormwater and
Park Facilites Conceptual Design

City of Redmond WASHINGTON
The Berger Partnership PS Landscape Architecture
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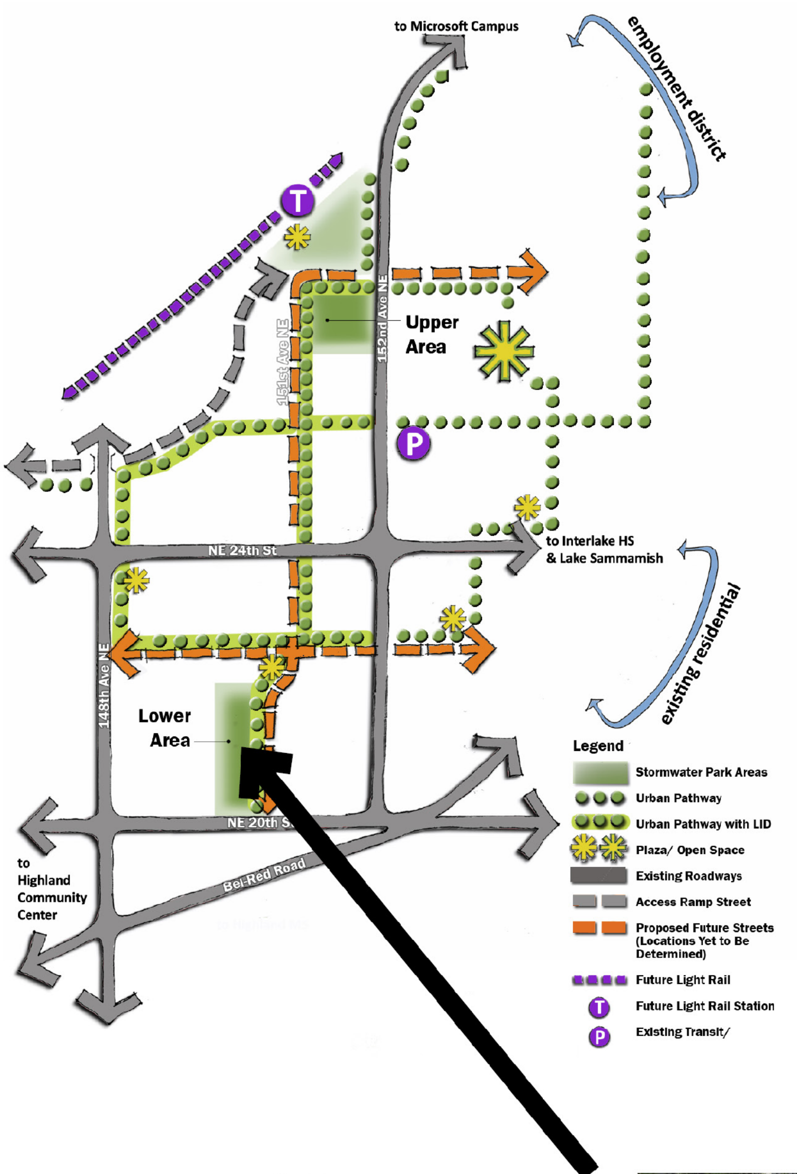


0-20 years
Site of future park
(with redevelopment)

0-5 years
Detention vault
under parking lot

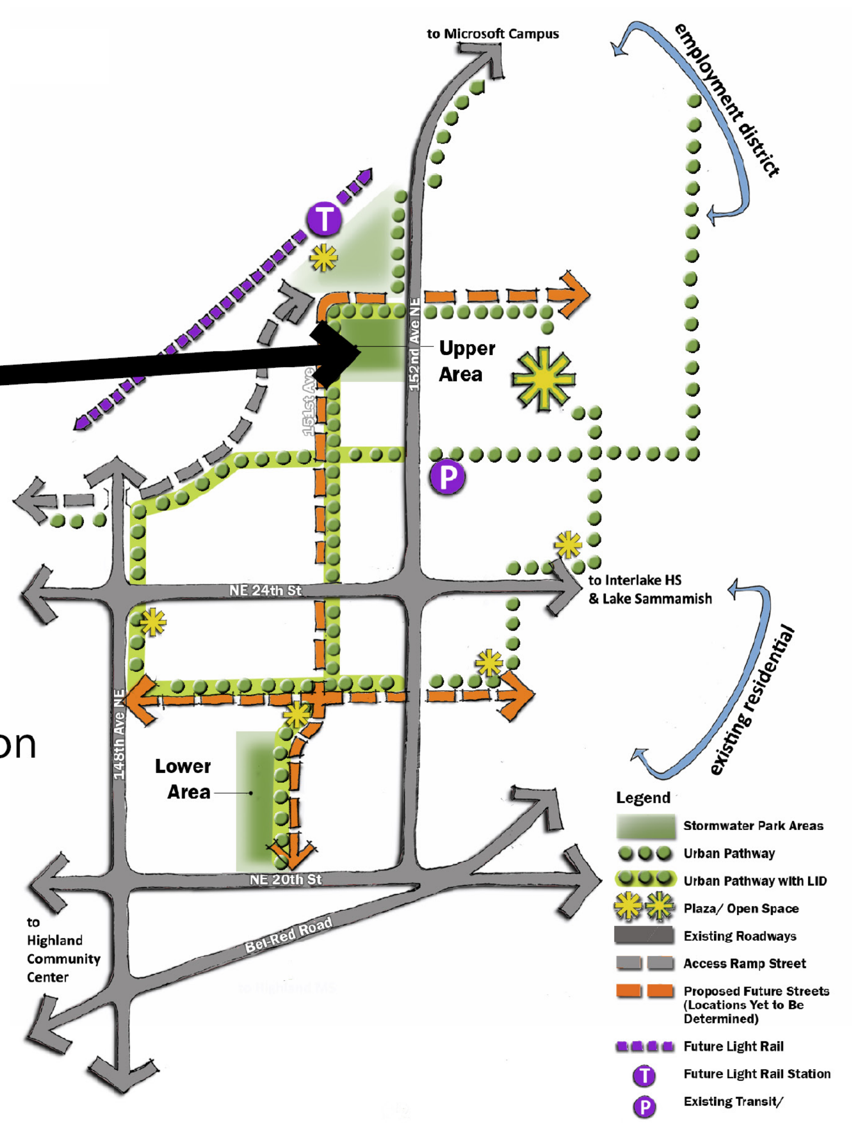
Disclaimer: Street locations shown are conceptual only and are not being established by this project.

Figure 5-3
Preferred Concept Phase 1

Overlake Village Stormwater and
Park Facilites Conceptual Design

2-5 years
Begin soil studies

5-10 years
Infiltration vault
and park and
Sound Transit station



Disclaimer: Street locations shown are conceptual only and are not being established by this project.

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Figure 5-4
Preferred Concept Phase 2

Overlake Village Stormwater and
Park Facilites Conceptual Design

City of Redmond WASHINGTON

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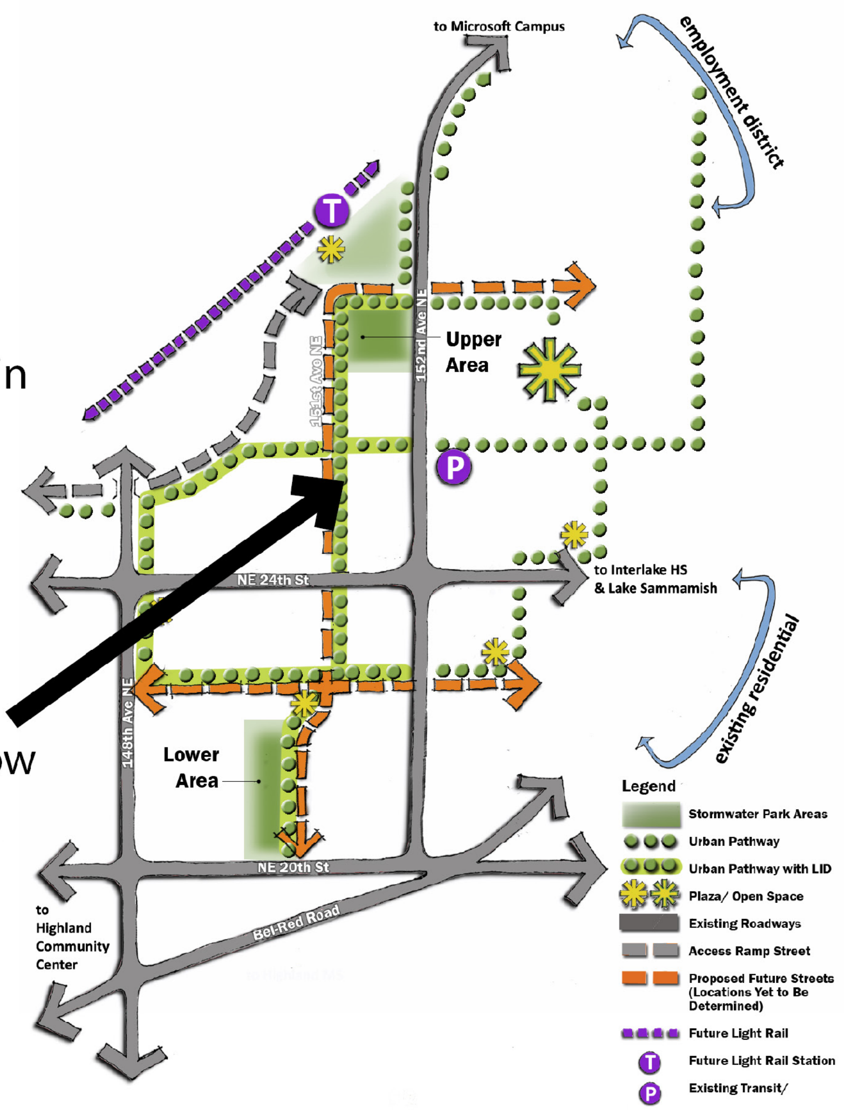
The Berger Partnership PS Landscape Architecture

1-20 years

New streets are developed with rain gardens and roof infiltration under urban pathway

Redevelopment treats stormwater onsite with overflow to City infiltration or detention



Disclaimer: Street locations shown are conceptual only and are not being established by this project.

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Figure 5-5
Preferred Concept Phase 3

Overlake Village Stormwater and
Park Facilites Conceptual Design

City of Redmond
WASHINGTON

otak

The Berger Partnership PS
Landscape Architecture

- Code language modifications that may be needed to implement the level of LID expected with the preferred option
- Additional street design standards and details needed to guide LID implementation in public rights-of-way
- Additional site development standards and details needed to guide LID onsite

Once the City has an opportunity to review these recommendations, specific Code language, detail drawings, and other provisions can be prepared for formal review and adoption. City documents that may require updating from this process include the RCDG, Stormwater Technical Notebook, and Standard Details.

Pre-design Field Activities

Several field activities are needed to support project design, including geotechnical, hydrogeologic, and utility inventory and field surveys.

Geotechnical Exploration and Infiltration Field Testing Program

A geotechnical and hydrogeologic field investigation and design report is necessary to support project design. This would include exploratory borings to define subsurface conditions including soil properties and groundwater levels. Monitoring of groundwater levels should be included as a part of the program. Field testing of infiltration rates should be performed for the upper regional facility to determine the infiltration rate for final design. Additionally, field infiltration testing should be performed in areas proposed for flow control LID by infiltration to determine infiltration rates for final design of those facilities. It is recommended that this work be initiated as early in the project schedule as practicable, as this information can confirm design assumptions within this plan that may impact sizing of both of the large stormwater facilities. The hydrogeologic scope of work should include an assessment of potential groundwater impacts associated with the stormwater infiltration elements of the project. The assessment should be sufficiently detailed for the purposes of project-specific SEPA analyses.

Utility Inventory and Field Surveys

This project has included a preliminary utility mapping element based on City data, data developed by NHC, and limited field survey work by Otak. This information base needs to be expanded to provide topographic mapping and utility inventory and field survey to support design of the first regional facility and supporting stormwater conveyance design.

Property Acquisition Activities

Retail Parking Study

A retail parking study would be undertaken to support property acquisition information needs for the lower collocated facility. The purpose of the study would be to define a preferred construction sequence, schedule and possible restriping for the lower collocated facility that provides minimal level of impact to retail sales in the area.

Property Acquisition

Property acquisition activities would include continuing discussions and evaluations with the lower collocated facility property owner leading to acquisition of an easement, purchase, or long-term lease that would allow construction of the facility. The net required stormwater vault surface area for the lower collocated facility is estimated to be as little as 1.35 acres as shown in Figure 5-1. To this area the area requirements of setbacks, area taken up by vault columns, etc. need to be added to define gross site area for acquisition. For the lower collocated facility the gross area needed for acquisition is likely in the range of 1.5 to 1.6 acres. This area may be increased to as much as 2 acres, depending on additional geotechnical investigation within the study area.

The upper collocated facility, is anticipated to require a net stormwater vault area of 2.7 acres as shown in Figure 5-1. The gross area for acquisition at this site would likely be in the range of 2.9 to 3.1 acres. Final determination of these areas would come with additional design.

Stormwater Facilities Considerations

After the City completes the needed Code revisions and arrangements for property acquisition, it is recommended that a pre-design report be prepared for the lower collocated stormwater facility. The pre-design report would update and refine the stormwater design proposal based on City decisions, and the results of the geotechnical and hydrogeologic/infiltration investigations. A project-specific SEPA Checklist would be prepared and included with the report. Once the City has reviewed and approved the pre-design report, final design and preparation of construction documents could proceed followed by construction of the facility.

Park Facilities Considerations

Determining where City of Redmond Public Works and Parks Departments scope of work begins and ends with a collocated stormwater/park facility is an important consideration. As the stormwater facilities are developed, coordination between departments will be needed to define the conditions Parks will have to work with once the stormwater facility is complete (i.e., Public Works planning up to grade, Parks planning at the surface). As pre-design and design occurs, Parks input and a master planning effort with strong public input should take place in tandem to ensure that the community's needs for open space are met and the highest level of facility integration is achieved to minimize conflicts and maximize the end human experience.

Generally, the more separated the park and stormwater facilities can be from one another, both horizontally and vertically, the more flexible each facility can be and opportunities for conflict are minimized. For example, if maintenance access for service vehicles and utility hatches can be located outside active recreation zones, that helps to greatly reduce impacts. Typically a host of site furnishings (i.e., benches, fence posts, signage, etc.) need to be located on or around recreational facilities. If the sub-surface vault can be buried deep enough below finished grade, it would eliminate the need to coordinate the exact location of footings for these site furnishings with the vault lid, which can be complex and costly. The goal with collocation is to allow both infrastructure and park elements to be coordinated with the other, but not overly complicate or impede either one.

Another challenge with this plan, especially for Phase 1, is that as the neighborhood grows, the community needs and input through the process will evolve. Therefore, the master plan needs to be specific enough to provide a plan, but flexible enough to grow and evolve with the community it will serve. Actual implementation of the park could occur as the need arises, typically as the neighborhood redevelops and demand for the park facilities grows, or as a stimulus to redevelopment of Overlake Village as envisioned in the City's Comprehensive Plan and other adopted plans.

Urban Form Considerations

A major objective of the planning effort was to ensure that the proposed plan for collocated stormwater facilities and parks remained consistent with the adopted neighborhood plan. This includes consistency with adopted policies, as well as with proposed land uses and associated urban form (proposed densities, building heights, and site development provisions). The City is planning for a specific framework of change in density, urban form, and population in this neighborhood. The proposal for the collocated stormwater/park facilities will not alter this planned framework for growth and change.

The recommended LID provisions can be accomplished within the proposed framework of streets, urban paths, and site development (consistent with the various impervious and pervious surface area percentages allowed in the zones). The planning effort has assumed that there would be a finer-grain network of circulation beyond the arterial and collector streets shown in the neighborhood plan. This circulation could occur through a combination of private access ways and public local streets or pedestrian/urban path corridors. The proposed concept assumes that all new public or private streets and cross site connections (vehicular or pedestrian) would incorporate at least enough LID to treat the new amount of impervious surface from these streets/connections.

Given that the proposed collocated stormwater and park facilities can be implemented within the framework and policies of the adopted comprehensive plan and neighborhood plan, no modifications to these plans would be needed. However, as previously mentioned, modifications to City Code may be needed to better guide the level of LID implementation desired. As a part of this process, it will be important to maintain discussions with the 152nd

Avenue NE corridor design team and other planning activities in the area to help coordinate those efforts.

Phase 2 Activities

Phase 2 stormwater facilities will include the upper collocated facility and supporting conveyance improvements. Phase 2 will also include implementation of LID flow control and runoff treatment with the urban pathway, new streets, and private development improvements, and runoff treatment to retrofit NE 24th Street and 152nd Avenue NE, when those streets are reconstructed.

Upon completion of the upper stormwater facility, those upper tributary areas receiving flow control at the lower facility on a interim basis, and runoff treatment on an interim basis (refer to Section 4), will then discharge to the upper facility for flow control and runoff treatment. The released flow control capacity at the lower facility will then be available for use by private redevelopment and street reconstruction in that facility's service area.

Phase 2 planning and design of the upper collocated stormwater and park facility will include coordination and collaboration with Sound Transit light rail station on the north side of the upper facility, the 152nd Avenue NE street design, and the master plan elements of the private redevelopment on adjacent and nearby properties. Park facilities at the upper site will be molded through that process; and through development of a site-specific park master plan for the upper site. Multiple upper sites in lieu of a single site may result from the planning process as discussed in Section 4.

Phase 3 Activities

Phase 3 stormwater facilities will include the remainder of the LID flow control and runoff treatment facilities and will be constructed with continued redevelopment in the lower service area, including urban pathway, local streets, and private facilities. Phase 3 stormwater facilities would include the Bellevue Bel-Red Road bypass trunk line, and runoff treatment facilities for any roadway reconstruction not completed during Phase 2.

Phase 3 park facilities will include the park facilities at the lower collocated facility, and will likely be triggered by redevelopment in the area around the facility. The park facility would be planned through a site-specific park master plan process. The park design would be developed in collaboration with the master plan and development agreement for the private redevelopment south of NE 24th Street and placement of local streets and the urban pathway in that area.

Permitting and Environmental Processing

Permitting requirements for the project will need to meet City of Redmond requirements. The pre-design report will need to be submitted to Ecology for comment/concurrence. As the project does not involve work in a stream, environmental permits will not be needed. A project-specific SEPA Checklist to City of Redmond standards will be required for project construction.

Project Costs

Stormwater Facilities

The 2010 estimated project costs of the stormwater elements of the project with LID are presented below. These costs include design, permitting, construction, sales tax, administration, legal, and construction management costs. Land acquisition costs are included where noted.

Upper collocated facility without land costs	$13,200,000
Lower collocated facility with land lease/easement	$12,600,000
Lower service area LID facilities	$4,600,000
NE 24th/152nd NE runoff treatment facility	$1,300,000
Initial phase Bellevue bypass storm pipeline	$300,000
Final phase Bellevue bypass trunk line in Bel-Red Road	$1,600,000
North tributary areas initial phase runoff treatment system	$800,000
Intersection oil control treatment systems	$1,300,000
Total	**$35,700,000**

Land acquisition costs are not included for the upper collocated facility as it is anticipated that the property would be acquired through partnering with Sound Transit and/or a private developer, and cost sharing cannot be established at this time.

Park Facilities

Preliminary project costs for park facilities (in 2010 dollars) are assumed to be between $650,000 and $1,000,000 per acre for each of the parks. This cost is based on recent urban park projects of similar character. These costs do not include infrastructure or other work associated with the stormwater systems. Additionally, it is assumed that a minimum of three feet of soil coverage is provided by stormwater work prior to park development. Further considerations that will influence costs include the degree to which a park site is developed, the type of elements incorporated into the designs, and materials and finishes selected.

Property Acquisition

Property acquisition could be by direct purchase or through development incentives. For the lower facility, a lease arrangement or easement, which would allow parking to continue above the vault for an interim period until there is local demand for a park, is possible and has been assumed in the project costs.

For the upper facility, property acquisition could be through partnering arrangements with public agencies or by direct purchase or through development incentives by private property owners.

Final areas for property acquisition are dependent upon final design constraints and additional geotechnical investigation confirming the conceptual design described in this plan.

Project Funding Plan

The stormwater facilities would be financed through fees collected from properties participating in the City's Regional Stormwater Facility Plan. If those funds are inadequate, other funding sources could be used including other City funds such as the City's Stormwater CIP, or bonds issued by the City for the project. Park improvements would be funded with Parks CIP, park impact fees and the general fund. Additionally, outside loans and grants could be sought for project funding.

Policies Implemented

As discussed in Section 2 of this report, the collocated stormwater and park facilities project will implement a number of existing policies adopted by the City. These are adopted policies of the Overlake Neighborhood Plan, as well as the City of Redmond Comprehensive Plan (refer to Appendix A for a complete list). There will not be a need to amend or expand upon existing adopted policies in this plan for this project. The project will directly implement many of the policies and will support several others.

Appendix A: Summary of Applicable Policies

Redmond Comprehensive Plan Policies Implemented and Supported

Urban Centers – Overlake Neighborhood

LEGEND	
Tier 1 = Adopted City of Redmond policies that the project will directly Implement (in bold text and underlined)	Tier 2 = Other adopted policies that the project supports or has a relationship to (non-bold text/not underlined).

N-OV-10
Continue to collaboratively plan with Bellevue to address common challenges and capitalize on common opportunities. Work together to implement jointly agreed-to plans and strategies. Consult on significant development approvals, plan amendments and development regulations, and address mitigation of potential adverse impacts through consultation. Systematically coordinate on transportation and other public facilities, such as regional stormwater treatment facilities that impact both cities.

N-OV-17
Create gateways at the City border that welcome residents, employees and visitors to Redmond. Consider the NE 31st/36th Street Bridge across SR 520 as a gateway. Consider the creation of a regional stormwater facility at the corner of 148th Avenue NE and NE 20th Street as a "green gateway."

N-OV-18
Encourage the use of green building techniques and low-impact development methods, such as green roofs, bio-swales, and rain gardens.

N-OV-19
Develop regional stormwater treatment facilities within Overlake to treat and detain stormwater. Integrate facilities with parks and open spaces where feasible. Offer incentives to encourage public and private partnerships to develop these facilities.

N-OV-20
Reduce the negative impact of Overlake stormwater runoff on the water quality of Lake Sammamish, Kelsey Creek, the Sammamish River, and other creeks in the neighborhood. Protect downstream properties, streambeds, and receiving waters from erosion and other adverse impacts from the quantity of runoff.

N-OV-22
Promote the vision of the plazas, open spaces, parks, trails and pathways, and art in Overlake as being part of a cohesive system of public spaces that is integral to distinguishing Overlake as an urban "people place." Develop and maintain a variety of linkages, such as paths and way finding elements, among plazas, parks and open spaces in Overlake and in nearby neighborhoods that are within walking distance of each other.

N-OV-23
Recognize the urban park and open space system in Overlake Village as the neighborhood's highest-priority park and recreation need. Achieve the park and open space system through a strategy of City investment together with encouraging future development to include plazas, artwork, and other recreation opportunities that augment and enhance public park infrastructure.

N-OV-24
Identify and create public places in Overlake that:

- Offer activities and uses that attract people;
- Include details such as good seating and bike racks;
- Are easy to see and to access, and are safe and welcoming;
- Foster interactions among visitors; and
- Have a sense of permanence.

N-OV-32
Encourage pedestrian activity within Overlake, including informal gatherings, through public and private investment in improvements along the streetscape, such as:

- Street furniture, such as benches and kiosks, that provide a unifying element;
- Parks, plazas, and other "people places";
- Visual features, such as fountains, squares, and sculptures; and
- Signage and markers to assist with way finding.

N-OV-34
Develop multi-use pathways that accommodate pedestrians and bicyclists adjacent to multi-modal corridors as an efficient and cost-effective means of meeting pedestrian and bike standards.

N-OV-46
Create and implement facility plans for Overlake to provide adequate utilities, transportation, and other infrastructure to accommodate anticipated growth. Carry out a capital improvement strategy to implement these improvements, as well as pedestrian improvements, bikeways, beautification projects, parks, trails, and civic facilities in Overlake. Use the Overlake Master Plan and Implementation Strategy to guide public and private investments so that new projects fit the community's vision and accomplish public as well as private objectives.

N-OV-48
Encourage public and private partnerships to meet public facilities and service needs, such as transportation, stormwater, parks, open space, pedestrian corridors, and other improvements. Encourage public and private partnerships to meet human services needs as well.

N-OV-63
Orient buildings to the streets and include design features that encourage walking and biking to the area, and between stores and shopping centers. Locate parking beside, behind or

underneath buildings. Include street trees and landscaping to provide green space between buildings and the street.

N-OV-64
Establish a park plan specific to Overlake Village in recognition of the neighborhood's urban character. Include criteria related to size, function and desired location of plazas, open spaces, parks, and other public places.

N-OV-65
Size and design plazas and open spaces to meet the needs of those who live, work and shop in the area. Include among the facilities a place to gather, rest, eat and engage in active recreational activities that do not require large amounts of space. Provide trees and places for shade and relief.

N-OV-66
Integrate parks and open spaces with regional stormwater facilities where feasible. Connect any regional stormwater facilities with the park system in Overlake Village.

Other Comprehensive Plan Policies advanced and supported

Natural Environment

NE-2
Utilize Best Management Practices (BMPs) and technology in City projects and practices to achieve effective environmental stewardship while striving towards long-term fiscal responsibility.

NE-4
Minimize and, where practical, eliminate the release of substances into the air, water, soil and groundwater that may degrade the quality of these resources or contribute to global atmospheric changes.

NE-5
Encourage the judicious use of renewable natural resources and conserve non-renewable resources.

NE-7
Promote and lead education and involvement programs to raise public awareness of environmental issues, encourage respect for the environment and show how individual actions and the cumulative effects of a community's actions can have significant effects on.

NE-9
Encourage environmentally friendly construction practices such as the build green program and low-impact development.

NE-10
Encourage projects which utilize alternative technologies, engineering, and plans which emphasize low-impact development strategies through incentives and flexibility in application of regulatory requirements.

NE-11
Cooperate with other local governments, State, federal and international agencies and non-profit organizations to protect and enhance the environment, especially for issues that affect areas beyond Redmond's boundaries.

NE-41
Strive towards no net loss of the structure, value, and functions of natural systems constituting Frequently Flooded Areas.

NE-53
Explore new methods to limit impervious surface to protect environmental resources such as streams and allow for groundwater recharge, allow for efficient land use, and accommodate the level of development intensity planned for the area.

NE-64
Control the flow of nutrients (especially phosphorus), heavy metals and other pollutants into streams, rivers, Lake Sammamish and other area lakes, and natural wetlands. Require treatment measures where the development results in discharges to surface or groundwaters.

NE-65
Cooperate with King County and other local governments and State agencies in developing and implementing Watershed Action Plans, Water Quality Management Plans, and other types of basin plans for basins which include or are upstream or downstream from the City of Redmond.

NE-66
Complete and maintain Watershed Action Plans for all watersheds in the City. Address water quality, stormwater runoff and flooding issues. Review each plan for effectiveness at least once each five years.

NE-67
Incorporate the applicable and effective recommendations of Watershed Action Plans (basin plans) into the City's Comprehensive Plan, development regulations and Capital Facilities Plan.

Land Use

LU-14
Encourage the provision of needed facilities that serve the general public, such as facilities for education, libraries, parks, cultural and recreational facilities, police and fire, transportation, and utilities. Ensure that these facilities are located in a manner that is compatible with the City's preferred land use pattern.

Parks

PR-1
Provide a parks, recreation, arts, trails, and open space system to serve existing development and planned growth.

PR-4
Acquire land and develop parks in areas which are: Target for significant growth, such as the Downtown and Overlake Urban Centers…

PR-9
Coordinate park planning and land acquisition with other City plans for street, utilities and buildings, thereby maximizing the benefits available from public lands for parks, arts and cultural programs and recreational activities.

PR-26
Encourage the development of outdoor plazas and squares within parks and private developments in the Downtown and in other City neighborhoods in order to have places for community and civic events as well as informal gatherings.

PR-42
Coordinate planning of trails, bike lanes, and other non-motorized modes ... to ensure safe and efficient use and encourage convenient travel within neighborhoods and local activity centers.

Utilities

UT-38
Maintain, use, and require development to use stormwater design and construction standards that:

- Address rate of discharge, water quality, and method of storm drainage.
- Incorporate the principles of "Best Management Practices."
- Address methods to control runoff during construction to limit erosion, siltation, and stream channel scouring.
- Minimize adverse impacts to natural watercourses.

UT-39
Evaluate the feasibility of regional detention and treatment facilities and support their use where the concept proves feasible.

UT-43
Encourage incorporation of natural systems into building designs to minimize runoff. Examples of such designs are sod roofs or rainwater capture to provide on-site landscape watering.

UT-44
Pursue the development of streetscapes that incorporate natural systems for detention and water quality improvements into the design of the streetscape. Examples of this are swales planted with native vegetation such as the "Green Street" project in Seattle. Offer incentives to developers for incorporating such streets into subdivisions.

Capital Facilities

CF-1

Develop and regularly update functional plans and comprehensively assess capital facility needs and strategies for addressing such needs. As part of the functional plan development process, provide opportunities for public involvement appropriate to the nature of the update. Use functional plans to guide the development of capital priorities and investment decisions within each of the following functional areas:

- Fire protection and emergency management response;
- Police protection;
- Stormwater and surface water management;
- Water and sewer systems;
- Parks, recreation, arts, and open space;
- Transportation; and
- General government facilities.

CF-6

Require that properties, when they develop or redevelop, construct or contribute to improvements as identified in adopted plans.

CF-13

Use capital facilities to attract growth to centers by:

- Giving priority to funding for public facilities and services within the Downtown Redmond and Overlake Urban Centers;
- Creating a mechanism to provide ongoing capital funds for Redmond's Urban Centers;

CF-19

Identify lands useful for public purposes in functional plans and in the appropriate elements of the Comprehensive Plan. Identify alternative sites or lands more generally where acquisition is not immediate.

Neighborhoods

NP-6

- Implement the neighborhood plans' vision, policies, and improvements by:
- Using discretionary land use reviews;
- Identifying capital facility improvements needed in a neighborhood and ways of funding them;
- Providing follow-up communication among interested parties and the members of the neighborhood;
- Offering the Neighborhood Spotlight Fund to complete appropriate projects; and
- Using other implementing measures.

Appendix B: Engineering Analyses

B1: LID Analyses

LID Facility Option Analysis

Three different levels of LID were analyzed, and their costs along with the reduced cost of the stormwater facility were compared in order to determine the most cost effective level of LID. The LID options include no LID referred to as Option 1, a moderate level of LID referred to as Option 2, and a level that was considered to be a maximum level referred to as Option 3. The assumptions associated with each option are listed in the following.

<u>Option 1: No LID</u>

- No LID facilities are installed that provide flow control capacity reduction

<u>Option 2: Moderate LID</u>

Urban Pathway (in City ROW)

- Bioretention (infiltrating) at 8' wide assumed along 50% of total path length (one side only)
- Infiltrators at 12' wide assumed along 90% of total trail length

Local Streets

- Bioretention (infiltrating) at 4' effective width assumed along 25% of total local street length (both sides)

<u>Options 3: Maximum LID</u>

Urban Pathway (in City ROW)

- Bioretention (infiltrating) at 8' wide assumed along 50% of total path length (one side only)
- Infiltrators at 12' wide assumed along 90% of total trail length

Local Streets

- Bioretention (infiltrating) at 4' effective width assumed along 25% of total local street length (both sides)
- Infiltrators under local sidewalks 8' wide assumed along 50% of total local sidewalk length (both sides)

Cross Site Connections

- Bioretention (infiltrating)at 8' wide assumed along 50% of cross site connections (both sides of connection, 16' total)
- Infiltrators at 12' wide assumed along 90% of cross site connections

Assumptions for the location of LID for Options 2 and 3 have been developed from the proposed urban pathway, street sections, and conceptual Village circulations prepared as a part of this study. These assumptions may need to be updated as the design of this project and other projects in the vicinity establish street sections and the Village circulation pattern. Once the location of the LID was determined, the area of each LID method was quantified in order to determine through hydrologic modeling the vault capacity reduction for the lower collocated facility. The LID area quantification detailed by subbasin are presented in Table B1-1 and Table B1-2 for Options 2 and Option 3 respectively. The degree of LID implementation along with the percent of area served by the LID is shown graphically for Option 2 in Figure B1-1 and for Option 3 in Figure B1-2. Summaries of the LID area quantification for Options 2 and 3 are provided in Tables B1-3 and B1-4, respectively.

Table B1-1
Option 2: Moderate LID

			Subbasin				
			R-1a	R-1c	R-1d	R-1e	R-2a
URBAN PATHWAY	Bioretention	Available Length(ft)	1329	1641	734	1235	41
		Percent Built (%)	50%	50%	50%	50%	50%
		Built Length (ft)	665	821	367	618	21
		Total Width (ft)	8	8	8	8	8
		Total Area (sf)	**5316**	**6564**	**2936**	**4940**	**164**
	Infiltrators	Available Length(ft)	1329	1641	734	1235	41
		Percent Built (%)	90%	90%	90%	90%	90%
		Built Length (ft)	1196	1477	661	1112	37
		Total Width (ft)	12	12	12	12	12
		Total Area (sf)	**14353**	**17723**	**7927**	**13338**	**443**
LOCAL STREETS	Bioretention	Available Length(ft)	5463	3709	3413	1267	397
		Percent Built (%)	25%	25%	25%	25%	25%
		Built Length (ft)	1366	927	853	317	99
		Total Width (ft)	4	4	4	4	4
		Total Area (sf)	**5463**	**3709**	**3413**	**1267**	**397**

Table B1-2
Option 3: Maximum LID

			Subbasin				
			R-1a	R-1c	R-1d	R-1e	R-2a
URBAN PATHWAY	Bioretention	Available Length(ft)	1329	1641	734	1235	41
		Percent Built (%)	50%	50%	50%	50%	50%
		Built Length (ft)	665	821	367	618	21
		Total Width (ft)	8	8	8	8	8
		Total Area (sf)	**5316**	**6564**	**2936**	**4940**	**164**
	Infiltrators	Available Length(ft)	1329	1641	734	1235	41
		Percent Built (%)	90%	90%	90%	90%	90%
		Built Length (ft)	1196	1477	661	1112	37
		Total Width (ft)	12	12	12	12	12
		Total Area (sf)	**14353**	**17723**	**7927**	**13338**	**443**
LOCAL STREETS	Bioretention	Available Length(ft)	5463	3709	3413	1267	397
		Percent Built (%)	25%	25%	25%	25%	25%
		Built Length (ft)	1366	927	853	317	99
		Total Width (ft)	4	4	4	4	4
		Total Area (sf)	**5463**	**3709**	**3413**	**1267**	**397**
	Infiltrators	Available Length(ft)	5463	3709	3413	1267	397
		Percent Built (%)	50%	50%	50%	50%	50%
		Built Length (ft)	2732	1855	1707	634	199
		Total Width (ft)	8	8	8	8	8
		Total Area (sf)	**21852**	**14836**	**13652**	**5068**	**1588**
CROSS-SITE CONNECTIONS	Bioretention	Development Area(sf)	603791	668687	306758	271981	0
		Percent of Area (%)	8%	8%	8%	8%	8%
		Total Con. Length (ft)	1725	1911	876	777	0
		Percent Built (%)	50%	50%	50%	50%	50%
		Built Length (ft)	863	955	438	389	0
		Total Width (ft)	16	16	16	16	16
		Total Area (sf)	**13801**	**15284**	**7012**	**6217**	**0**
	Infiltrators	Development Area(sf)	603791	668687	306758	271981	0
		Percent of Area (%)	8%	8%	8%	8%	8%
		Total Con. Length (ft)	1725	1911	876	777	0
		Percent Built (%)	90%	90%	90%	90%	90%
		Built Length (ft)	1553	1719	789	699	0
		Total Width (ft)	12	12	12	12	12
		Total Area (sf)	**18631**	**20634**	**9466**	**8393**	**0**

Table B1-3 Option 2 Totals (acres)					
	Subbasin				
	R-1a	R-1c	R-1d	R-1e	R-2a
Bioretention	0.25	0.24	0.15	0.14	0.01
Infiltrators	0.33	0.41	0.18	0.31	0.01

Table B1-4 Option 3 Totals (acres)					
	Subbasin				
	R-1a	R-1c	R-1d	R-1e	R-2a
Bioretention	0.56	0.59	0.31	0.29	0.01
Infiltrators	1.26	1.22	0.71	0.62	0.05

Using the above areas, NHC modeled the stormwater study area, and determined the detention requirements for the lower collocated facility for each LID option which are presented in Table B1-5. Note that the capacity requirement for the upper collocated facility was kept constant for each option at 36.5 acre-feet which is equivalent to a footprint area of 2.7 acres.

Table B1-5
Lower Collocated Facility Capacity Reduction by LID

Option	Required Detention Capacity, Acre-feet	Equivalent Vault Footprint Area, Acres	Detention Capacity Reduction from no LID, Acre-feet	Detention Capacity Reduction from no LID, Percent
No.1 – No LID	27.0	1.80	0	0
No.2 – Moderate LID	20.3	1.36	6.8	25
No. 3 – Maximum LID	9.8	0.65	17.2	64

The detention reduction effects of Options 2 and 3 may appear to be larger than one might anticipate for LID. However, it needs to be considered that the LID facilities are adding significant volumes of distributed storage (which are more efficient than at the lower collocated facility because of the infiltration) elsewhere in the basin, 4.9 acre-feet for Option 2 and 13.6 acre-feet for Option 3. Thus the net storage reduction in the lower basin is just 7 to 14 percent for Options 2 and 3 respectively, which is in line with modeling expectations for LID effectiveness.

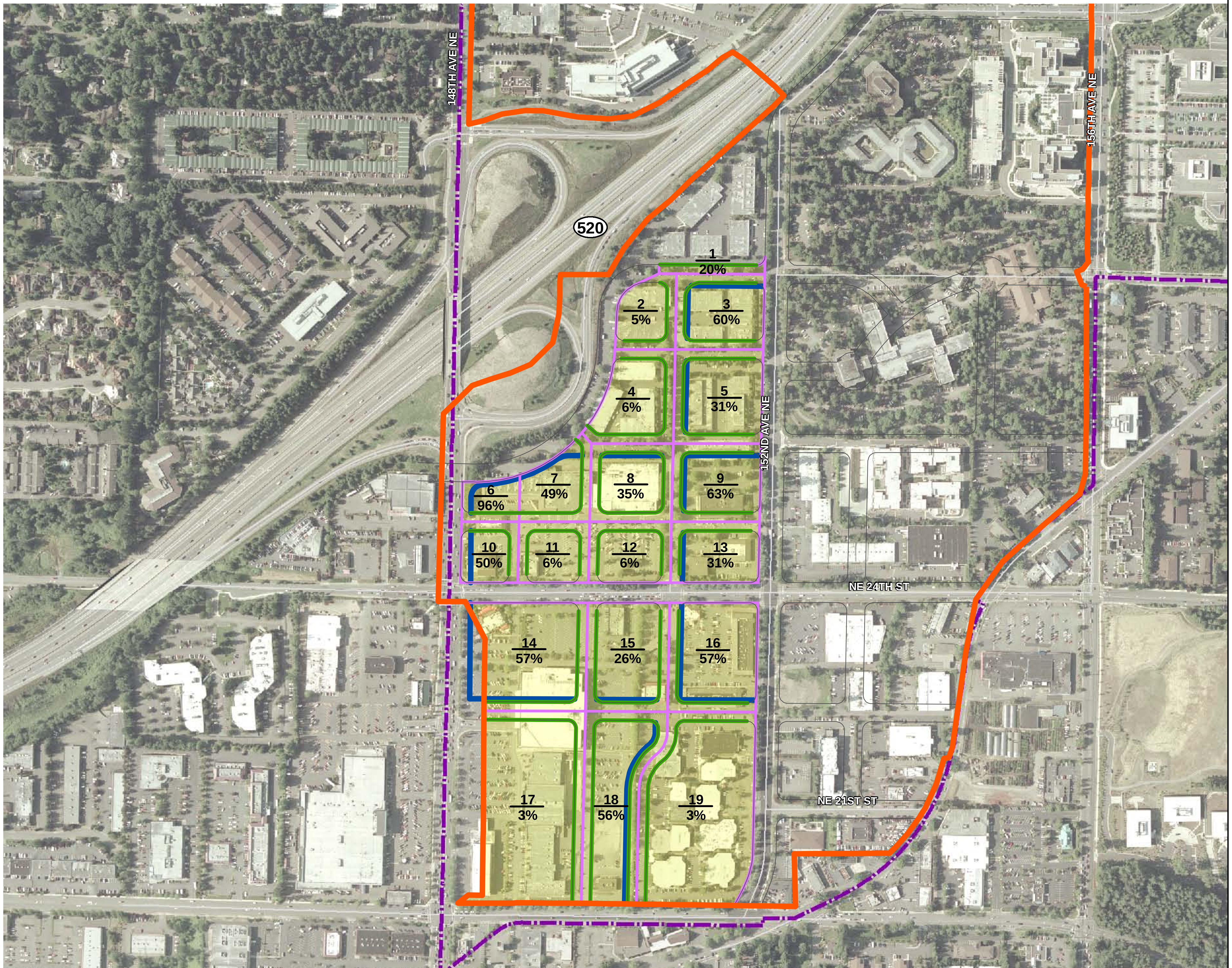
Cost Analysis of Detention and LID Implementation Options

Estimated project costs have been prepared for each option including the detention vault and associated level of LID. These costs are provided in Table B1-6 and are totaled to provide a cost comparison between the three options. Details for the cost estimates are provided in Appendix D.

Table B1-6
Lower Collocated Facility Capacity Reduction by LID – Project Costs

Option	Detention Vault Cost	LID Facility Cost	Option Total Cost
No.1 – No LID	$16,700,000	-0-	$16,700,000
No.2 – Moderate LID	$12,600,000	$4,600,000	$17,200,000
No. 3 – Maximum LID	$6,400,000	$13,200,000	$19,600,000

Option 1 is the least cost option; however, it is only slightly lower (four percent) in cost than Option 2. Option 3, maximum LID, is the most expensive option. Evaluation of these different LID options and recommendation of the preferred option are addressed in Section 3 of the report.



0 400 800
Feet
1 in = 400 ft

N

Legend

- Urban Pathway LID (bioretention and infiltrators)
- Circulation LID (bioretention)
- Conceptual Circulation (Pedestrian, Bicycle and/or Vehicular)
- LID Block No. & Percent Block Served by LID (1 / 26%)
- Redmond City Limit
- Stormwater Study Area

Figure B1-1
Option 2: Moderate LID Implementation

Overlake Village Stormwater and Park Facilites Conceptual Design

City of Redmond WASHINGTON
The Berger Partnership PS Landscape Architecture
otak

Date of Aerial Photography: 2002

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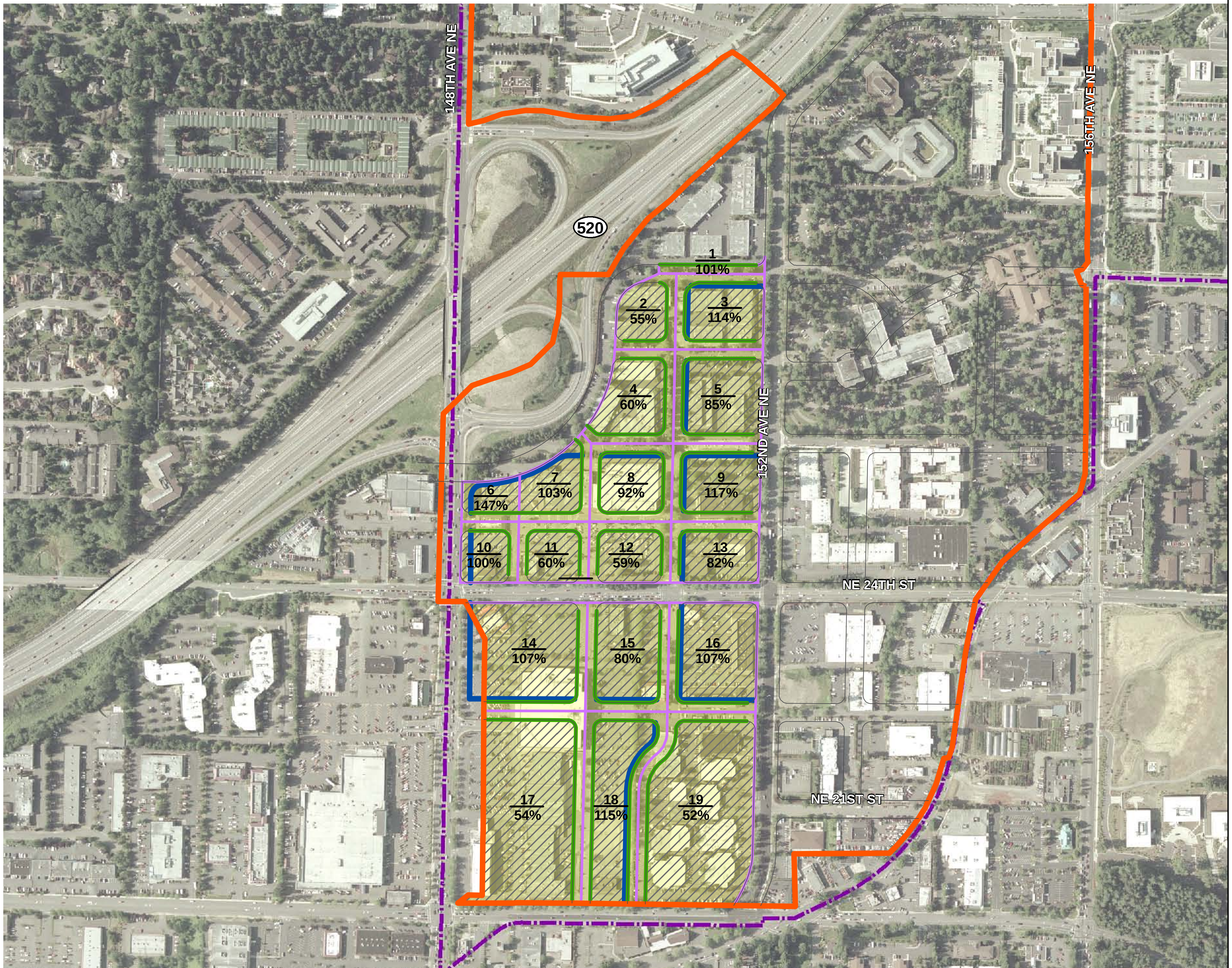

Figure B1-2
Option 3: Maximum LID Implementation

Overlake Village Stormwater and Park Facilites Conceptual Design

City of Redmond WASHINGTON
The Berger Partnership PS Landscape Architecture
otak

Date of Aerial Photography: 2002

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B2: Drainage Basin and Zoning District Analyses

Drainage Basin and Zoning District Areas

Drainage subbasin boundaries for the stormwater study area have been established by NHC as shown in Figure B2-1. They include Redmond "R" subbasins that drain to Kelsey Creek, Lake Sammamish and west along SR520, and Bellevue "B" subbasins that drain to Kelsey Creek via the Redmond conveyance system in the "R" subbasins. These subbasin areas are summarized by zoning district areas in Table B2-1. Zoning district areas by district are summarized in Table B2-2.

Table B2-1
Overlake Village Zoning District Area by Subbasin

Subbasin	Overlake Village Zoning District	District Area, Acres
Tributary to Kelsey Creek		
Redmond		
R-1a	OV(2)	9.0
	OV(3)	24.3
	Subbasin Total	**33.3**
R-1c	OV(1)	0.2
	OV(3)	23.5
	Subbasin Total	**23.7**
R-1d	OBAT	0.5
	ODD	27.3
	OV(1)	13.2
	OV(3)	5.0
	Subbasin Total	**46.0**
R-1e	ODD	0.1
	OV(1)	4.8
	OV(3)	27.6
	Subbasin Total	**32.5**
R-2a	OBAT	175.3
	OV(1)	5.4
	OV(3)	6.5
	Subbasin Total	**187.2**
Redmond Kelsey Creek Watershed Total		**322.7**
Bellevue		
B-1	n/a	26.9
B-2a	n/a	8.9
B-2b	n/a	81.3
B-2c	n/a	24.9
	Bellevue Watershed Total	**142.0**
Tributary to Lake Sammamish		
Redmond		
R-2b	OBAT	2.4

Table B2-1 Overlake Village Zoning District Area by Subbasin		
Subbasin	Overlake Village Zoning District	District Area, Acres
	Subbasin Total	**2.4**
Tributary to area west along SR520		
Redmond		
R-1b	OBAT	5.0
	OV(3)	7.3
	Subbasin Total	**12.3**

Table B2-2 Overlake Village Zoning District Areas within Kelsey Creek Watershed	
Zoning District	Area, Acres
OBAT	175.8
ODD	27.4
OV(1)	23.6
OV(2)	9.0
OV(3)	86.9
Total	**322.7**

Timing of Study Area Redevelopment

The timing of development and redevelopment within the stormwater study area is information needed to develop phasing plans for regional collocated facilities. Projections by City of Redmond staff were used to estimate the timing of redevelopment for each major proposed land use category. This data is organized by Overlake zoning district as presented in Table B2-3. The assumptions reflect the age and extent of existing development as well as other considerations. These projections are for planning purposes only and actual redevelopment time may vary.

Table B2-3 Overlake Village Development and Redevelopment Timing					
	Assumed Timing by Zoning District				
	OBAT	ODD	OV(1)	OV(2)	OV(3)
Existing Public Streets	<10	<10	<10	20+	10-20
New Public Streets	<10	<10	<10	20+	10-20
Private Development	<10	<10	<10	20+	50%: 10-20 50%: 20+
Park/Public Access	N/A	<10	<10	20+	10-20

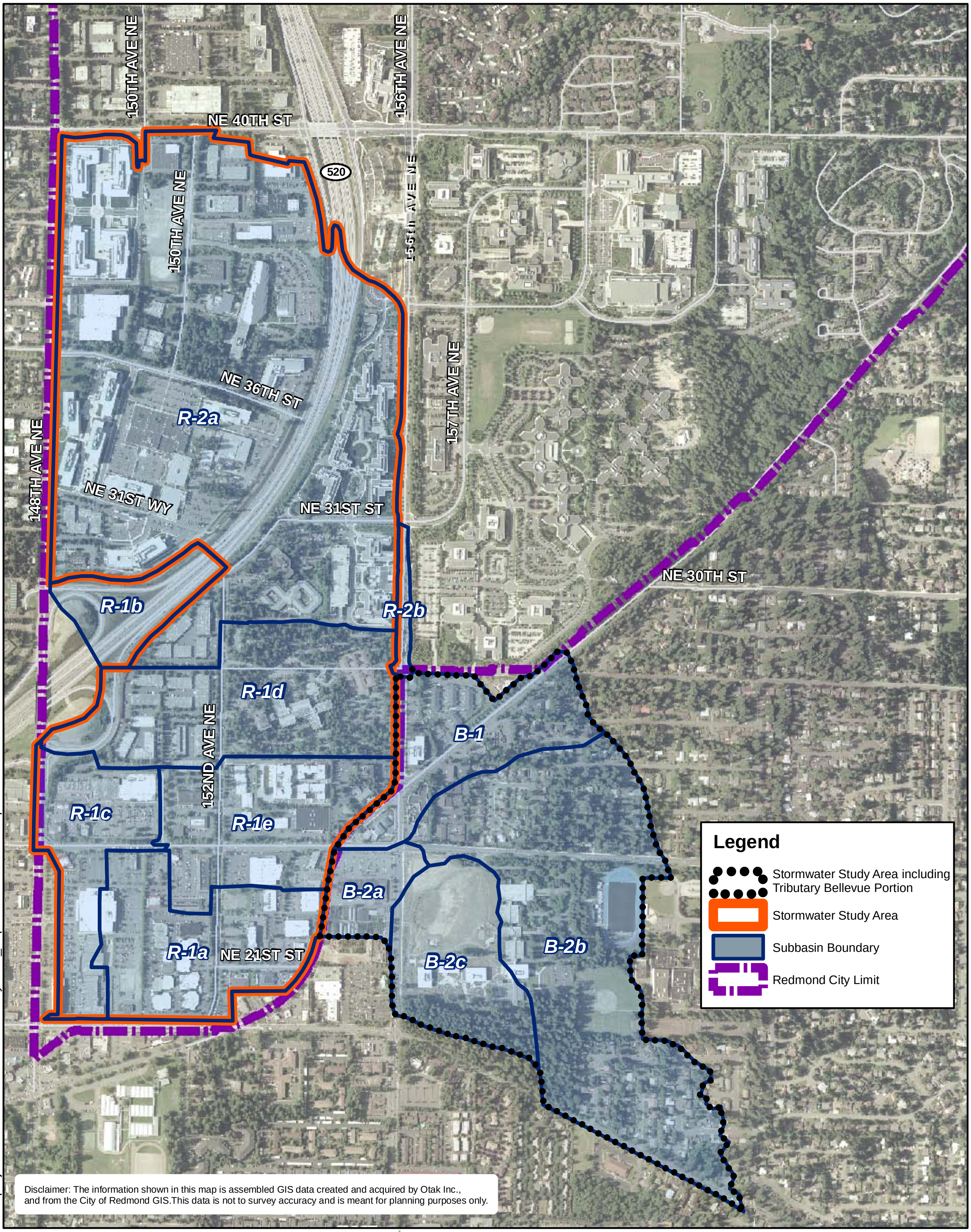

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Figure B2-1
Drainage Subbasins

Overlake Village Stormwater and
Park Facilites Conceptual Design

City of Redmond WASHINGTON

otak

The Berger Partnership PS Landscape Architecture

Date of Aerial Photography: 2005

Appendix C: Northwest Hydraulic Consultants Memoranda

Summary of Hydrologic and Hydraulic Modeling
and Analysis of the Overlake Watershed
May 28, 2010

Overlake Detention Pond Sizing
April 27, 2010

Memorandum

Northwest Hydraulic Consultants
16300 Christensen Road, Suite 350
Seattle, WA 98188
206.241.6000
206.439.2420 (fax)

DATE: May 28, 2010 NHC PROJECT#: 21658 & 21776

TO: Steve Hitch

COMPANY/AGENCY: City of Redmond

FROM: David Hartley

SUBJECT: Summary of Hydrologic and Hydraulic Modeling and Analysis of the Overlake Watershed

Introduction

Northwest Hydraulic Consultants (NHC) was retained by the City of Redmond (City) to develop hydrologic and hydraulic models for the City's Overlake Watershed - a highly urbanized, commercial basin that is tributary to Sears Creek, part of the greater Kelsey Creek basin (Figure 1). The purpose of these models is to assist the City with the planning of capital improvement projects that prevent flooding and assure compliance with the City's NPDES stormwater permit requirements related to flow control and water quality treatment. A major objective of the City's planning activities for the Overlake Watershed is to develop enhanced stormwater infrastructure that facilitates major commercial redevelopment with a cost-effective combination of regional, on-site, and infiltration-based BMP facilities (also known as Low Impact Development or LID techniques). These facilities are part of a larger design process that integrates parks and recreational facilities, aesthetics, and stormwater management. The models developed and applied by NHC support both the City and its Overlake Village Concept Plan consultant team led by Otak.

In order to develop all of the necessary hydrologic and hydraulic data required for capital planning and conceptual design, NHC developed both an HSPF hydrologic model and a PCSWMM runoff and hydraulic routing model. The primary function of the HSPF model was to determine the volumes and footprints of different combinations of regional detention, regional infiltration, and distributed LID measures for controlling stormwater flow. The key criterion for these combinations was flow duration matching to forested, pre-developed conditions at the watershed outlet in compliance with the 2010 Department of Ecology flow control standard. The primary function of the PCSWMM model was to test the capacity of the watershed's stormwater conveyance system and provide storage-discharge relationships for routing tables in the HSPF model. Both models were calibrated and validated with flow data from a site near the watershed outlet where Redmond's stormwater pipe connects to the portion of Bellevue's stormwater system that directs flow to the Overlake detention pond on Sears Creek.

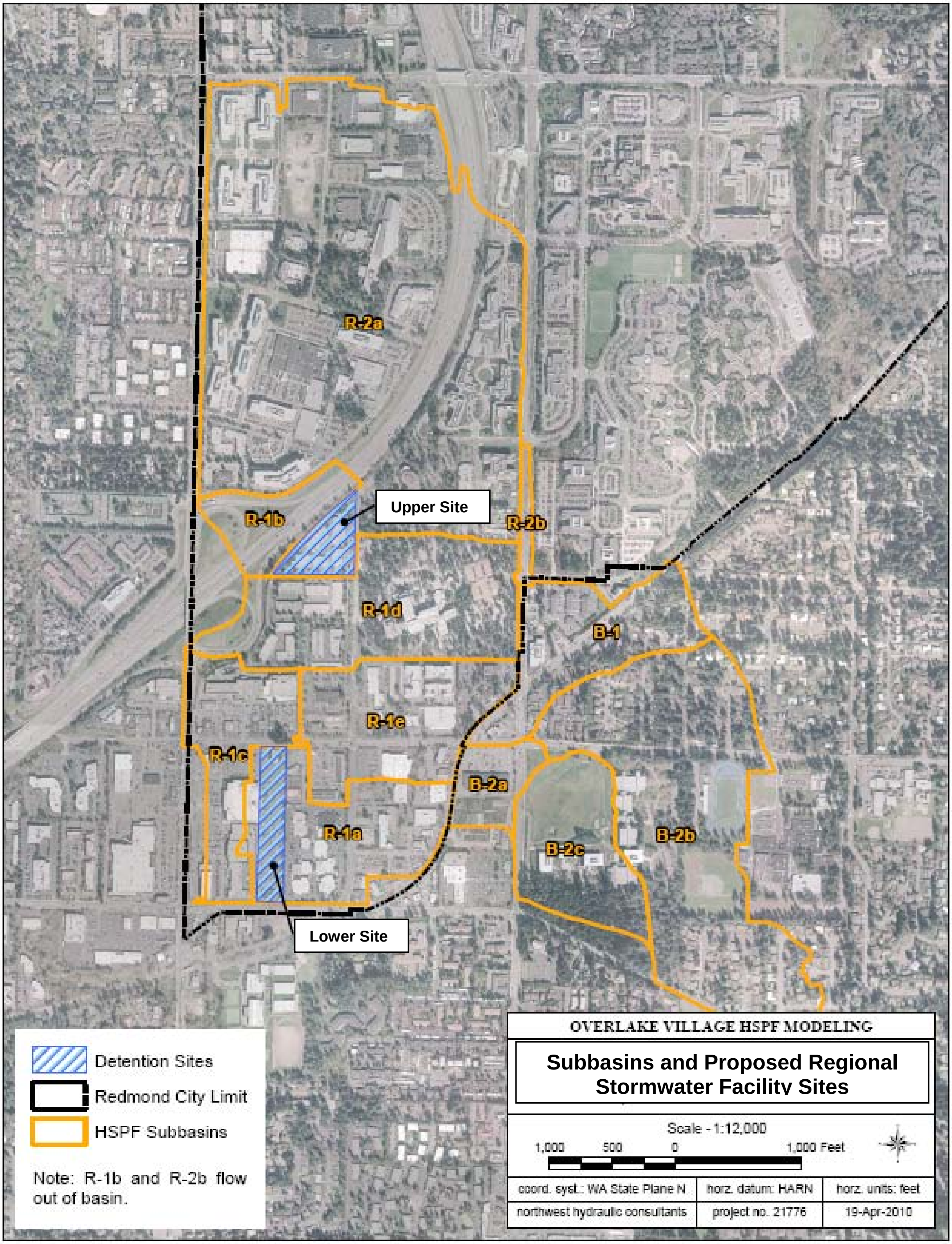
R-2a
R-1b
Upper Site
R-2b
R-1d
B-1
R-1e
R-1c
B-2a
R-1a
B-2b
B-2c
Lower Site
Detention Sites
Redmond City Limit
HSPF Subbasins
Note: R-1b and R-2b flow out of basin.
OVERLAKE VILLAGE HSPF MODELING
Subbasins and Proposed Regional Stormwater Facility Sites
Scale - 1:12,000
1,000 500 0 1,000 Feet
coord. syst.: WA State Plane N
horz. datum: HARN
horz. units: feet
northwest hydraulic consultants
project no. 21776
19-Apr-2010

Figure 1

HSPF and PCSWMM model development and application have been documented over a twelve month period in two reports and five memoranda as shown in Table 1. These documents reflect both the evolution of the models in response to the accumulation of more complete and accurate field data as well as a range of model applications in response to requests by the City and Otak for specific data to support capital planning and the Concept Plan. Figure 1 summarizes the concept design which includes two regional flow control facilities.

The remainder of this memorandum summarizes the key modeling assumptions and findings that are further detailed in the documents previously submitted to the City. This summary includes few figures or tables from the original documents; however, the documents themselves are provided in attachments 1 through 7.

Table 1. HSPF and PCSWMM Documentation Delivered to the City

	Title	Document Type	Document Date
1	Overlake Drainage Basin Hydrologic Modeling	Report	5/8/09
2	HSPF Model Update with Revised Surface Geology	Memo	9/2/09
3	SWMM Model Backwater Analysis	Memo	9/8/09
4	Existing SWMM Conveyance Analysis	Memo	9/25/09
5	Overlake HSPF Model Validation	Memo	1/12/10
6	Overlake Basin PCSWMM Model Documentation	Report	1/21/10
7	Overlake Detention Pond Sizing	Memo	4/27/10

1 Overlake Drainage Basin Hydrologic Modeling

This report documents the original HSPF models developed for the Overlake Watershed during early 2009 prior to the kick-off of the Overlake Village Concept Plan project led by Otak. Three HSPF models representing three land use/cover conditions were developed: existing land use, future land use at buildout, and forested, pre-developed cover. These HSPF models used the best available soils information at the time which was prior to the surficial geologic re-mapping conducted by GeoMapNW under a subcontract to NHC. Based on this earlier information, basin soils were assumed to be almost exclusively glacial till. This assumption had little effect on the simulation of storm discharges under existing or future conditions because of the high level of basin imperviousness; however, it did affect estimation of pre-developed hydrologic response and resultant detention pond sizing. The models were also calibrated using available precipitation and storm flow data from the tail end of the 2009 water year runoff season.

Scenarios studied with these HSPF models and documented in this report included full buildout assuming the construction of regional detention facilities at two proposed sites. The sites include an upper site located in the north end of the Overlake Village (referred in memos as Site A) and a lower site located in the south end of the Overlake Village (referred in memos as Site R). At the time of this modeling, it was not known that the upper site would be suitable for an infiltration facility. In addition, the relative flow control benefits of conventional detention were compared with LID techniques including green roofs, bioretention facilities, and pervious pavement. These techniques were compared to each other based on the necessary footprint required to achieve a unit of flow control mitigation. While these comparisons are instructive, it should be noted that the infiltration rates assumed for bioretention facilities at the time of this modeling were lower than subsequently estimated based on later re-mapping of watershed surficial geology.

Key findings:

- On a per-square-foot basis, for conditions of low soil infiltration capacity consistent with till soil areas, detention ponds provide at least 10 times as much flow control as any LID technique;

- Among the LID techniques reviewed, pervious pavement underlain by two feet of rock was slightly more effective than bioretention, but both of these techniques were three to four times as effective as green roofs.

2 HSPF Model Update with Revised Surface Geology

This memo documents updates to the original HSPF models described under heading 1 above. The changes included:

- Revision of hydrologic parameters for pervious areas that reflect re-mapping of watershed surficial geology by GeoMapNW including weathered till and substantial areas of outwash which were previously mapped as till;

- Minor revision of the subbasin boundaries resulting in a slightly smaller size of subbasin R-2A in the northern portion of the watershed;

- Incorporation of FTABLES for each HSPF subbasin representing existing subbasin storage in pipes and detention vaults as determined by the PCSWMM model;

- Validation of the revised existing condition model using additional data from larger storms occurring in May, 2009 which were not included in the original model calibration.

The updated model was shown to match observed hydrographs in the pipe near the basin outlet with simulated peaks matching observed peaks within a 10% margin of error.

3 SWMM Model Backwater Analysis

This memo documents the application of the PCSWMM model to a backwater analysis of proposed regional facilities at the upper site and the lower site. PCSWMM was used to determine the impact of these proposed facilities on upstream pipes because it is by far the more competent model for determination of water velocities and depths in pipes and channels compared to HSPF. Three scenarios were analyzed:

Scenario 1 - Existing pipe network without regional stormwater facilities.

Scenario 2 - Proposed conditions with 2 regional facilities. The upper facility is assumed to discharge to a separate line that conducts treated runoff out of the basin.

Scenario 3 - The same as Scenario 2 except that Bellevue subbasin runoff is assumed to be excluded from the Overlake Watershed; therefore, a smaller facility is assumed at the lower site.

The PCSWMM model was run with a 50-year design storm for all scenarios, and manhole overflows and street flooding were mapped. In addition, water surface profiles were provided to show maximum water levels in the drainage pipes upstream of each proposed regional facility. Results of this analysis indicated that construction and operation of the facilities would result in very minor increases in extents of flooding during the design storm. This additional flooding was predicted to occur along the margin of SR-520.

4 Existing SWMM Conveyance Analysis

This memo describes the application of the PCSWMM model to analyze the existing stormwater storage and conveyance system throughout the Overlake Watershed. The model was run with nine design storms reflecting 10-year, 25-year, and 50-year recurrence intervals at three durations: 15-minutes, 30-minutes, and 60-minutes. Based on the results of the model it was determined that the stormwater conveyance system was generally most sensitive to the 30-minute duration storms - i.e., for a given recurrence interval, flooding was maximized for this duration over the shorter and longer durations tested. Results of the conveyance analysis were summarized in the form of a tabulation showing the percent of total pipe length with sufficient surcharging to cause manhole overflows. For the 10-year recurrence, only 2% of all pipe length surcharged to this extent, while the percent of pipe length that surcharges to the ground level is 4% and 6% for the 25-year and 50-year events, respectively.

Apparently, the City is not aware of any historical flooding within the watershed; however, flooding may be very transitory or may have occurred during the middle of the night when few observers were present. It is also possible that the model's assumption of spatially uniform rainfall over the basin may result in higher simulated peak flows than have occurred. Finally, it should be noted that the PCSWMM model (as well as the HSPF model) were well calibrated and checked against the available storm precipitation and flow data; however, only limited data are available and the calibration storms are all smaller than a 2-year event.

5 Overlake HSPF Model Validation

This memo documents further updates of HSPF model FTABLES and validation with larger, recorded storm events. During September and October of 2009, two storms occurred that were larger than any recorded during the previous calibration period in the spring and summer of 2009. Therefore, NHC thought it would be prudent to re-check the HSPF model against these storms. Additionally, since the previous HSPF model update, adjustments had been made to the PCSWMM model to account for new data on some of the existing detention vaults within the basin. These PCSWMM updates were in turn incorporated into the HSPF model through PCSWMM-generated, revised FTABLES for several HSPF model subbasins. The initial check of the HSPF model against data for the larger October 17, 2009 storm event indicated that the updated model was significantly over-estimating the recorded peak discharge. This was perplexing because the HSPF model had tracked previous, although smaller recorded storm hydrographs and peaks quite well. This led NHC to investigate the spatial pattern of the October event using NEXRAD radar data. The data indicated that the storm had in fact been more intense in the vicinity of the City's Overlake rain gage than it was over the entire basin. A correction to the rain data record was made using the NEXRAD data and the model was found to match the event peak within 10% when input with the revised rainfall data. This memo also discussed the effect of revised FTABLES on sizing regional detention ponds for future build-out conditions and concluded that the impact would be minimal.

6 Overlake Basin PCSWMM Model Documentation

This report provides detailed documentation of the Overlake Watershed PCSWMM model including data sources, data gaps, modeling assumptions, model configuration, model parameters, calibration, and validation testing. During the nearly one year period following initial development of the model, additional data on existing system topology, flow control structures, pipe sizes, and inverts above and beyond what was available in the City's GIS database continued to trickle in as a result of NHC and City field checks and examination of as-built plans. Updates were made to continually improve the model's accuracy and while data gaps still remain, the model has continued to match recorded flows near the basin outlet with a high level of accuracy. This suggests that the model is a good tool for analyzing runoff and routing flows in this highly urbanized basin.

7 Overlake Detention Pond Sizing

This memo details the applications of the HSPF model to simulating scenarios for the Overlake Village Concept Plan in cooperation with Otak. A primary focus of these applications was to determine the size of the proposed regional detention facility at the lower site that would result in conformance with the Ecology duration control standard at the downstream margin of Redmond's Overlake Watershed where stormwater enters the City of Bellevue system. Scenarios examined included:

- Three different levels of LID implementation at basin build-out with a large regional infiltration facility at the upper site infiltrating at a constant rate of 2 iph.
- A phasing option in which partial redevelopment of the watershed is mitigated solely by detention at the lower site.

Additionally, the sensitivity of the required detention volume at the lower site to the assumed infiltration rate at the upper site was evaluated.

LID techniques incorporated into modeled scenarios included bioretention and pervious pavers. The physical configuration of bioretention and pervious paver modules were provided to NHC by Otak, as were the assumptions regarding the acreage and spatial distribution of these LID BMPs to the watershed's various subbasins.

Key results of these model applications include:

- The highest level of LID implementation reduces the footprint of the lower site by 65% compared to no LID implementation.
- The use of the lower site alone (without construction of the upper site) to fully mitigate a list of development areas identified by Otak for Phase 1 development, requires a footprint and volume that is 10% higher than would be required at the lower site under full buildout with the upper site infiltration and zero basin LID implementation. This suggests that either the upper site should be constructed first, or Otak should reconsider the list of development areas considered for inclusion in Phase 1 development.
- A 50% reduction in infiltration rate at the upper site (2.0 iph to 1.0 iph) results in only a 10% increase in the required footprint and volume at the lower site; however, for

infiltration rates lower than 1.0 iph, the required footprint and volume at the lower site increases more rapidly. For example, an infiltration rate at the upper site of 0.5 iph would increase the required volume at the lower site by 33% compared to the assumed volume when the upper site infiltration is assumed to be 2.0 iph.

Attachments 1 through 6
Not Included Here

Attachment 7
Overlake Detention Pond Sizing

Memorandum

northwest hydraulic consultants
16300 Christensen Road, Suite 350
Seattle, WA 98188-3418
Phone: 206-241-6000
Fax: 206-439-2420

Date: April 27, 2010

To: Larry Grimm and Michelle Claassen, Otak

cc: Steve Hitch, City of Redmond

From: Patty Dillon and David Hartley

Subject: Overlake Detention Pond Sizing

Pages: 8

Northwest Hydraulic Consultants (NHC) was contracted by the City of Redmond (City) to provide hydrologic and hydraulic modeling services in support of Otak's Overlake Village stormwater design, also for the City. This memorandum documents hydrologic modeling to determine detention storage requirements for several alternatives. The applicable requirement for this basin is the Washington State Department of Ecology (DOE) flow duration standard, which calls for matching flow durations to pre-development (forested) conditions from one-half of the forested 2-year peak flow through the forested 50-year peak flow.

NHC used an HSPF model of the Overlake basin developed and calibrated in previous work for the City. Figure 1 shows a map of the basin, including HSPF model subbasins. With the exception of forested and Phase 1 (partial redevelopment) scenarios, the model used future land use conditions, assuming 85 percent effective impervious area (EIA) for the Overlake Village areas and 70 percent EIA for the OBAT-zoned area. The following assumptions also apply to all future land use alternatives:

- Runoff from the Bellevue portion of the Overlake basin will bypass Redmond facilities in the future and was not included in the model.
- Storage in the existing stormwater system (primarily on-site facilities in the upper basin (subbasin R-2a) and mainline pipe/pipe vault storage in the lower basin (subbasins R-1x)) remains in the future system.
- Local groundwater is accounted for in all simulations. This is discussed further in the following section.

The point of compliance for this analysis is assumed to be the basin outlet, essentially where the existing Redmond stormwater pipe system terminates near Bel-Red Road. At this location, Redmond's Overlake stormwater enters the City of Bellevue drainage system and eventually outfalls to Sears Creek.

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Phase 1 alternative are based on partial redevelopment and are discussed in the Phase 1 modeling section.

Table 1. Overlake Forested Flow Quantiles (flows in cfs)

Location	½ of 2-year	2-year	10-year	50-year	100-year
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The DOE manual does not specifically address whether groundwater flows should be included in the duration analysis. Groundwater flows are often neglected in site analyses on the basis that local groundwater is contributing to a regional groundwater system that does not emerge on-site. For this basin-scale analysis, we opted to include groundwater flows, as it seems likely that groundwater historically would have emerged at Sears Creek. This assumption is also supported by the relatively high water table at the lower end of the basin. Inclusion of groundwater has the advantage, design-wise, of producing higher target flows but also requires careful tracking and inclusion of all groundwater in the developed condition duration analysis. Particular attention is required for regional projects such as this one that rely substantially on infiltration facilities. If all groundwater is not accounted for in the developed condition analysis, then facilities are likely to be incorrectly under-sized.

Flow Control Alternatives

The flow control alternatives for the Overlake basin involve an infiltration facility near 152nd Avenue NE and NE 28th Street (Site A) and a detention facility in the current Sears parking lot along NE 20th Street (Site R), along with variable levels of distributed Low Impact Development (LID) treatments (porous pavers and bioretention swales). Initial detention-only modeling suggested that a third site might be required, but the infiltration capacity at Site A is expected to be high enough to allow the two sites to meet the entire flow control requirement. Maximum vault sizes for each site (footprint and depth) were provided to NHC by Otak.

The flow control sizing approach for the alternatives discussed here was to maximize the infiltration facility at Site A, then optimize the detention vault footprint at Site R to meet the standard. Site R facilities were sized for three future conditions alternatives (No LID, Moderate LID, and Maximum LID) and an interim redevelopment condition (Phase 1). Results are summarized in Table 2, and the following sections provide additional discussion of individual alternatives.

Table 2. Flow Control Facility Sizing Summary

Facility	Alternative	Footprint (ac)	Max Depth (ft)	Max Storage (acre-feet)
Site A†	All	2.7	13.5	36.5
Site R	No LID	1.8	15	27.0
Site R	Mod LID	1.35	15	20.3
Site R	Max LID	0.65	15	9.8
Site R	Phase 1	2.7	15	40.5

†Infiltration rate of 2 iph at Site A assumed for all alternatives except Phase 1 (no Site A).

nhc

LID Scenarios

Otak developed alternatives for two levels of LID implementation in the Overlake Village area (lower basin). Both use combinations of bioretention swales and porous paver systems along future street alignments and a proposed urban trail. In previous modeling, NHC developed stage-area-volume-discharge relationships (HSPF FTABLEs) for each type of treatment based on design information provided by Otak. LID modeling assumes rainfall and evaporation on/from the surface of the LID treatment, as well as loading with runoff from adjacent areas. The designed outflow from the LID facilities is infiltration. No low flow outlets or underdrain systems were assumed, and any overflows are routed downstream through the existing drainage system. Previous modeling by NHC determined the maximum loading for each LID type (in terms of loading area per acre of LID) to avoid overflows, assuming a 0.5 inch per hour infiltration rate as directed by Otak.

Table 3 summarizes the surface area of each LID treatment for the two LID alternatives by subbasin, as well as the total off-site (i.e. beyond LID footprint) area routed to the LID facilities. Underlying soil types for the LID facilities and tributary areas were estimated by NHC from mapping provided by Otak. These are important because different runoff rates from the different soil types can produce variable results, both for runoff going to LID and for runoff bypassing LID. No sensitivity analyses were performed on alternate distributions of soil types to LID, but differences are unlikely to be significant for the range of reasonable distributions.

Table 3. Overlake Village LID Implementation by Subbasin

Alternative	Treatment	R-1a (ac)	R-1c (ac)	R-1d (ac)	R-1e (ac)
Moderate	Bioretention	0.25	0.24	0.16	0.14
	Pavers	0.33	0.41	0.19	0.31
	Total Off-Site Area	4.87	5.47	2.94	3.79
Maximum	Bioretention	0.56	0.59	0.32	0.29
	Pavers	1.26	1.22	0.76	0.62
	Total Off-Site Area	15.33	15.24	9.10	7.66
Note: Off-site loading capacity is 8.5 ac/ac for pavers and 8.25 ac/ac for bioretention.					

Phase 1 Alternative

The Phase 1 alternative represents an interim development scenario, including redevelopment of only parts of the basin occurring prior to the construction of the Site A infiltration pond. The objective for this alternative was to determine how much detention would be required at Site R to meet flow control requirements for this initial redevelopment. The areas included in the Phase 1 redevelopment were:

- The 21.2-acre Sears property adjacent to Site R,
- Area affected by the 36th Street bridge project (13.1 acres total including portions of Microsoft Augusta campus currently served by drainage vault to be removed in bridge project),
- NE 24th Street and 152nd Avenue NE future improvements (12.6 acres)
- Miscellaneous redevelopment in the lower basin (100,000 square feet)
- Additional detention volume for Microsoft West Campus redevelopment (9 acre-feet)

Phase 1 detention requirements were determined by setting target flows based only on the redevelopment area, then sizing the Site R facility to meet the flow duration standard for those targets. Phase 1 target flow quantiles are shown in Table 4, and the flow duration curve is shown in

Figure 3. Alternatively, we could look at the basin outlet compliance point with target flows consisting of forested flows for the redeveloped areas plus existing flows for unaffected areas; however, non-redeveloped areas must bypass the detention in that scenario, ultimately producing the same result. (Note that the 2005 DOE manual allows off-site (i.e. non-redeveloped area in this case) runoff to be routed through project detention only if the 100-year flow is less than 50 percent of the project 100-year flow: this is clearly not the case in this application.) Because specific redevelopment areas were not defined for Microsoft West Campus, this area was not included in the pond-sizing model; the pre-determined 9 acre-foot requirement was simply added to the results of our Phase 1 modeling.

Table 4. Redeveloped Area Forested Flow Quantiles (flows in cfs)

Location	½ of 2-year	2-year	10-year	50-year	100-year
Redeveloped area	0.42	0.83	1.36	1.81	2.00

Modeling Approach to Tracking Infiltrated Runoff

As discussed in the Pre-Development section, NHC's modeling assumed that groundwater in the basin emerges at the basin outlet. Groundwater recharge from pervious land surfaces is stored, attenuated, and released by a conceptual groundwater algorithm (linear and non-linear reservoirs) that is part of the HSPF PERLND operation, but this approach to groundwater routing cannot be directly applied to facilities where runoff has already been collected and infiltrated such as an infiltration vault (e.g. Site A) or distributed infiltration-based LID facility (e.g. bioretention). One way to represent the groundwater storage and attenuated downstream release of water collected by infiltration facilities is to create a groundwater reach (HSPF RCHRES operation), which requires sufficient knowledge of the groundwater system behavior to specify a storage-discharge relationship for the reach that reasonably mimics the aquifer's behavior. This information was not available for the Overlake watershed.

In lieu of the groundwater reach approach, NHC decided to represent the hydrograph of groundwater associated with infiltration facilities by scaling groundwater outflow hydrographs from forested PERLNDs so that the total volume of water delivered to the basin outlet is equivalent to the volume of water infiltrated at Site A and, for scenarios that included them, infiltration-based LID facilities. This approach assured similar levels of storage and attenuation for facility-infiltrated water and pervious area-infiltrated water in the basin. PERLNDs representing forest cover with the same soil type distributions as found in the tributary areas to the infiltration facilities were used to generate time series of groundwater outflow for scaling. These groundwater outflow time series were then scaled to match the infiltrated volume, and the resultant flows were combined at the basin outlet with outflow from the detention vault and groundwater from pervious areas within the basin, which is assumed to bypass detention facilities.

This approach to the routing of groundwater inflows contributed by infiltration facilities does not account for localized water table and groundwater flow variations that could occur due to concentration or mounding of groundwater at the infiltration sites, especially the Site A facility. Such analysis is beyond the scope of this work and the capabilities of HSPF.

Infiltration Rate Sensitivity

At Otak's instruction, an infiltration rate of two inches per hour was assumed for Site A per recommendations based on initial testing in the area. Because infiltration is such a significant component of flow control in the basin, NHC performed sensitivity analysis to investigate the effects on required facility sizing at Site R for lower infiltration rates. Only the No LID future development alternative was considered in this analysis. Results are shown in Table 5.

For infiltration rates down to one inch per hour (and perhaps slightly lower) at Site A, required detention can be accommodated at Site R. If reliable infiltration at Site A falls below that level, an additional detention site could be required. Because Site R is scheduled to be constructed before detailed infiltration testing can be performed at Site A, it may be advisable to consider a larger facility to allow for potentially reduced infiltration capacity at Site A. As shown in Table 2, a larger Site R vault is also required to meet Phase 1 detention requirements.

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Site A Infiltration (iph)	Site R Footprint† (ac)	Site R Max Depth (ft)	Site R Max Storage (acre-feet)
2.0	1.8	15	27.0
1.5	1.9	15	28.5
1.0	2.1	15	31.5
0.5	>2.4	15	>36
†Maximum vault size approx. 2.4 ac per Otak.			

Other Modeling Results

In addition to the primary application to detention pond sizing, the HSPF model was also used to provide design information to Otak related to water quality facility design and bypass design for City of Bellevue flows.

Water Quality Facility Design Parameters

Otak requested water quality volumes and peak inflows for the area upstream of Site A and for the NE 24th Street/152nd Avenue NE street improvements. Per the DOE manual, water quality volume can be determined from continuous modeling results as the total flow volume below the 9-percent, 24-hour exceedance flow, i.e. 91 percent of annual runoff volume. Water quality peak flow was interpreted to be the 6-month peak flow—determined from partial duration analysis—and was provided to Otak at both 24-hour and 10-minute (minimum model time step) durations. Water quality design parameters are listed in Table 6.

Table 6. Water Quality Facility Design Parameters

Facility/Project	WQ Volume (acre-feet)	24-hr WQ Peak (cfs)	10-min WQ Peak (cfs)
Site A Pre-settling	4.15	8.0	17.5
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City of Bellevue Bypass Pipeline

The Overlake drainage system currently receives inflow from approximately 142 acres within the City of Bellevue at two locations in the lower basin. Per Otak's direction, our Overlake stormwater modeling assumes that the Bellevue runoff will bypass the Redmond system in the future. Based on future development to Bellevue's zoning, future peak flows for that area are expected to be in the range of 116 cfs, 132 cfs, and 149 cfs respectively for the 25-, 50-, and 100-year peaks. These values may be somewhat conservative, as they assume minimal storage in the contributing area;

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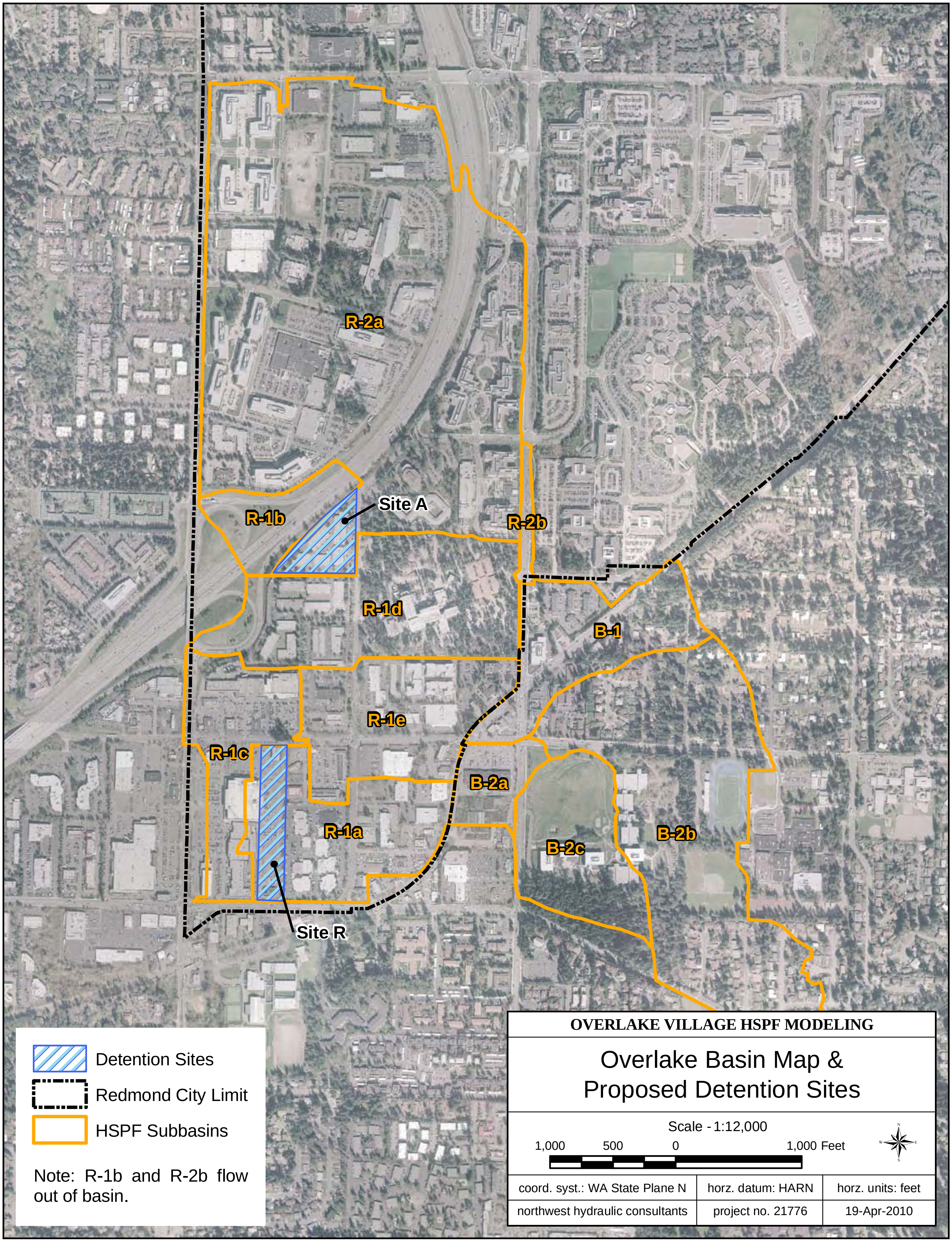

R-2a
R-1b
Site A
R-2b
R-1d
B-1
R-1e
R-1c
B-2a
R-1a
B-2b
B-2c
Site R
Detention Sites
Redmond City Limit
HSPF Subbasins
Note: R-1b and R-2b flow out of basin.
OVERLAKE VILLAGE HSPF MODELING
Overlake Basin Map &
Proposed Detention Sites
Scale - 1:12,000
1,000 500 0 1,000 Feet
coord. syst.: WA State Plane N
horz. datum: HARN
horz. units: feet
northwest hydraulic consultants
project no. 21776
19-Apr-2010

Figure 1

Figure 2. Basin Outlet Target Flow Durations

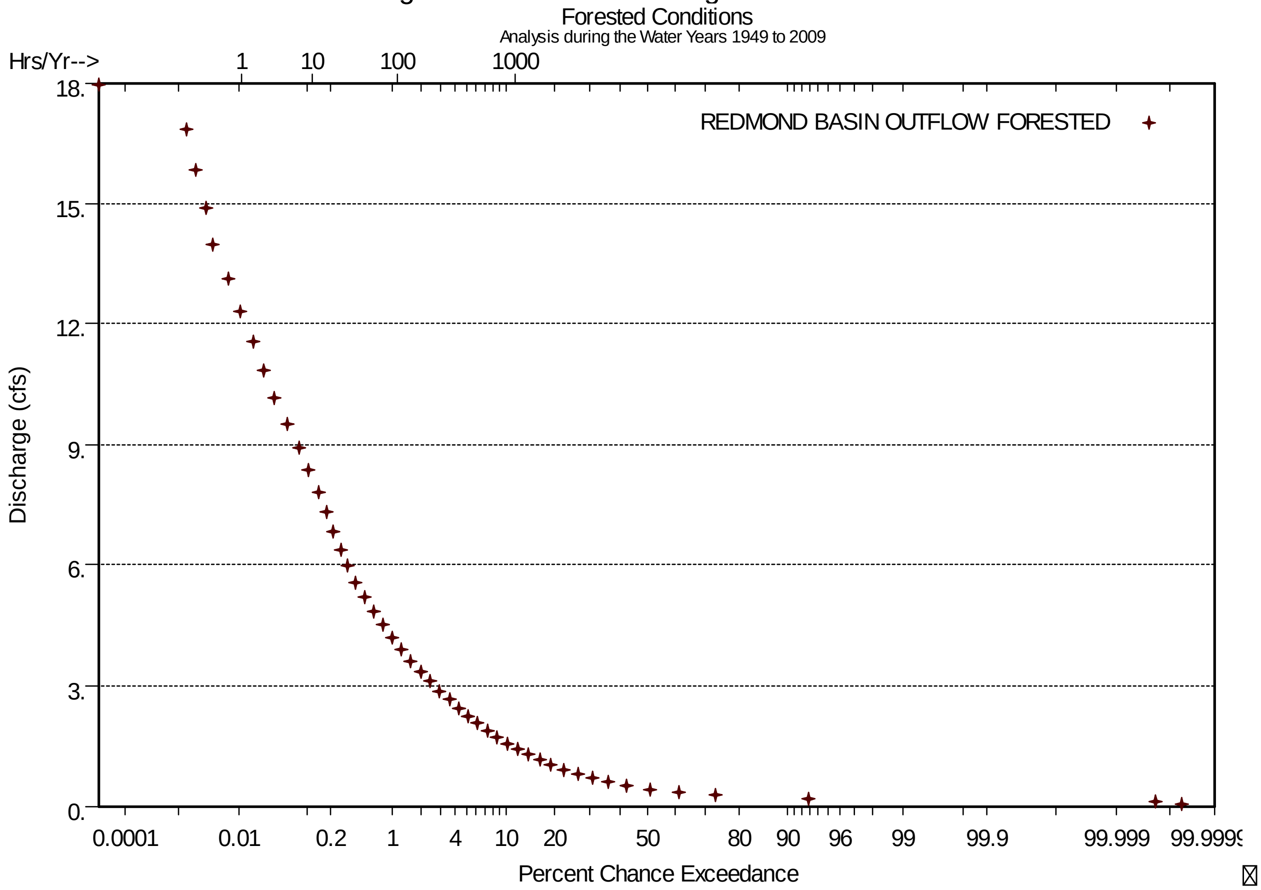
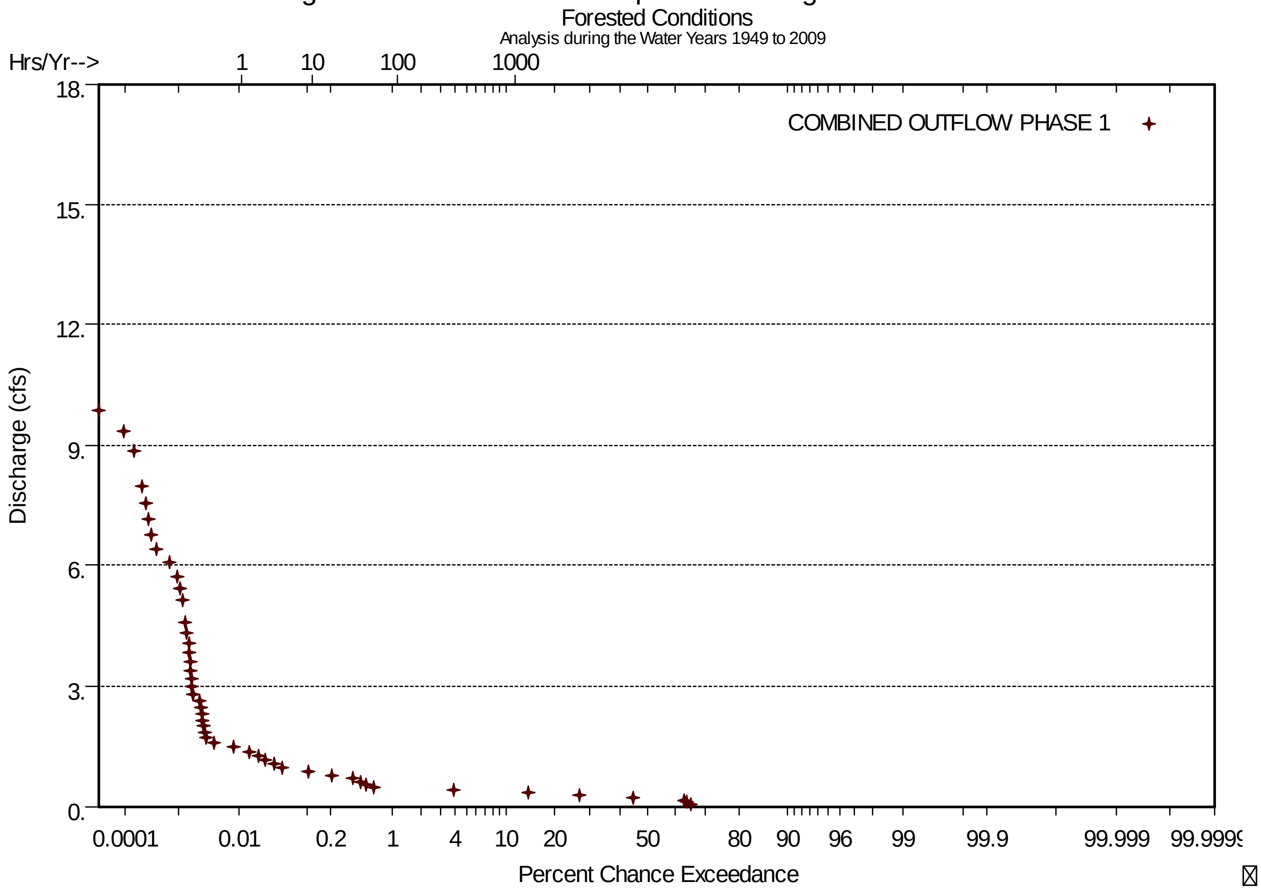


Figure 3. Phase 1 Redeveloped Area Target Flow Durations



Memorandum

northwest hydraulic consultants
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To: Larry Grimm and Michelle Claassen, Otak

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From: Patty Dillon and David Hartley

Subject: Overlake Detention Pond Sizing

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1.0	2.1	15	31.5
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The Overlake drainage system currently receives inflow from approximately 142 acres within the City of Bellevue at two locations in the lower basin. Per Otak's direction, our Overlake stormwater modeling assumes that the Bellevue runoff will bypass the Redmond system in the future. Based on future development to Bellevue's zoning, future peak flows for that area are expected to be in the range of 116 cfs, 132 cfs, and 149 cfs respectively for the 25-, 50-, and 100-year peaks. These values may be somewhat conservative, as they assume minimal storage in the contributing area;

however, they are approximate indicators of the discharge capacity required to bypass stormwater runoff from this area.

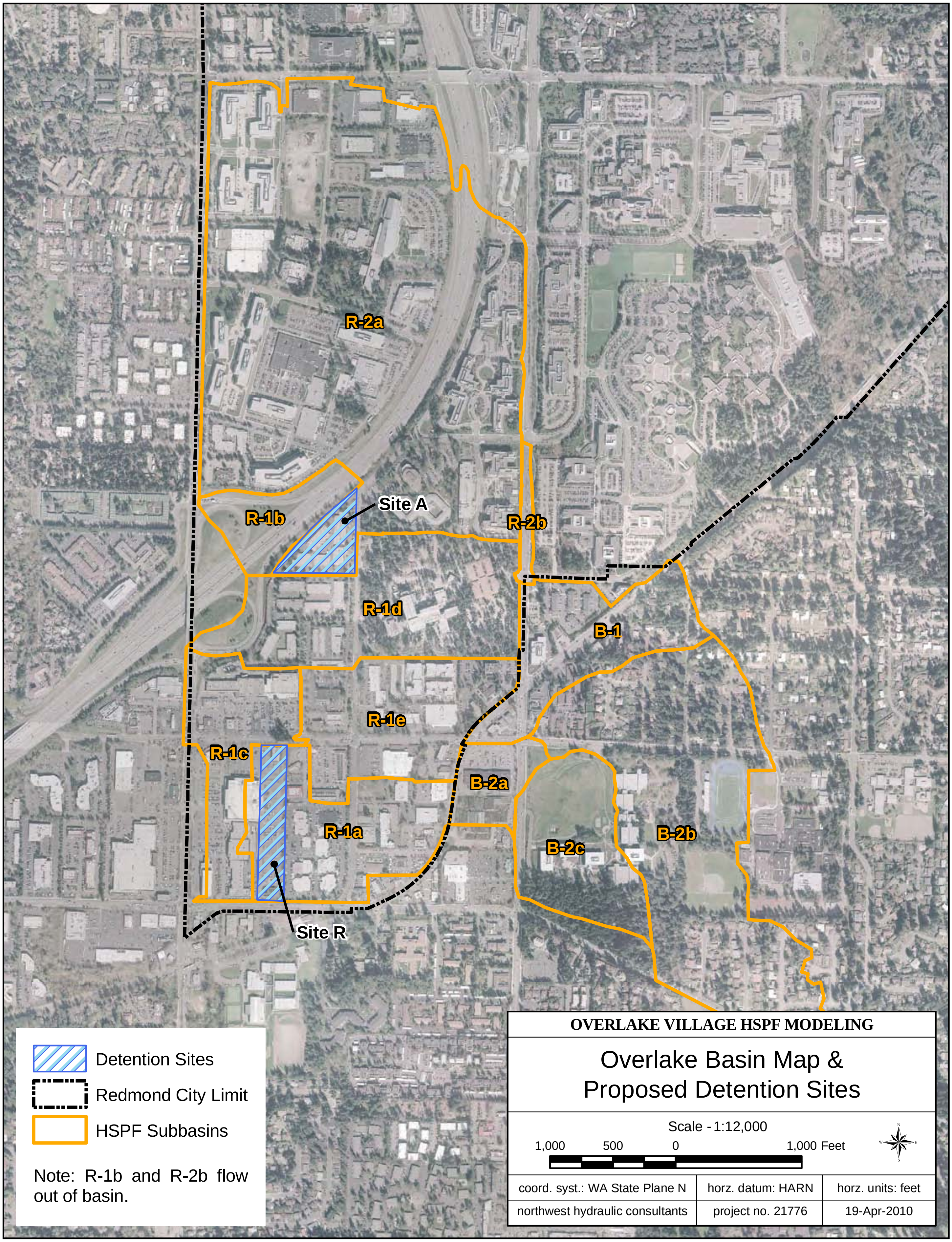

R-2a
R-1b
Site A
R-2b
R-1d
B-1
R-1e
R-1c
B-2a
R-1a
B-2b
B-2c
Site R
Detention Sites
Redmond City Limit
HSPF Subbasins
Note: R-1b and R-2b flow out of basin.
OVERLAKE VILLAGE HSPF MODELING
Overlake Basin Map &
Proposed Detention Sites
Scale - 1:12,000
1,000 500 0 1,000 Feet
coord. syst.: WA State Plane N
horz. datum: HARN
horz. units: feet
northwest hydraulic consultants
project no. 21776
19-Apr-2010

Figure 1

Figure 2. Basin Outlet Target Flow Durations

Forested Conditions

Analysis during the Water Years 1949 to 2009

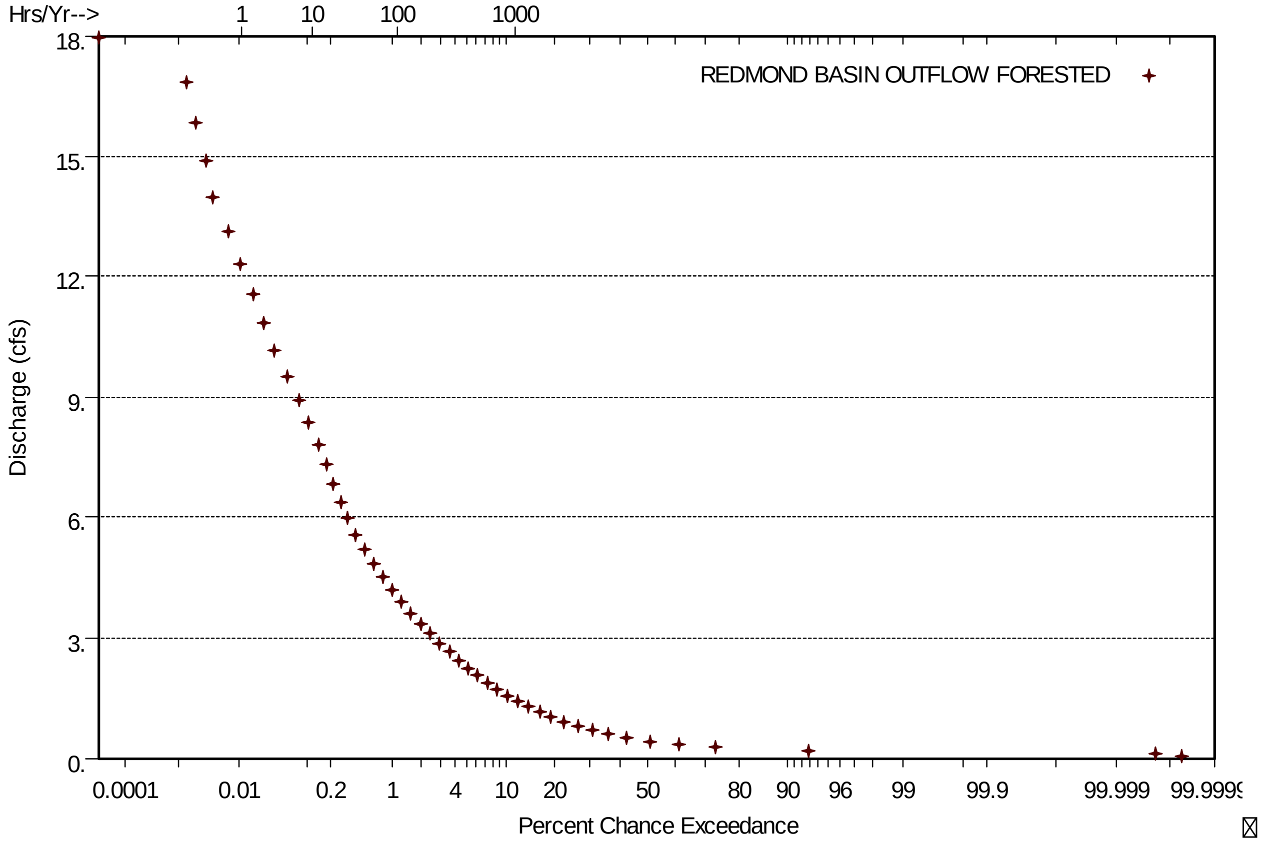
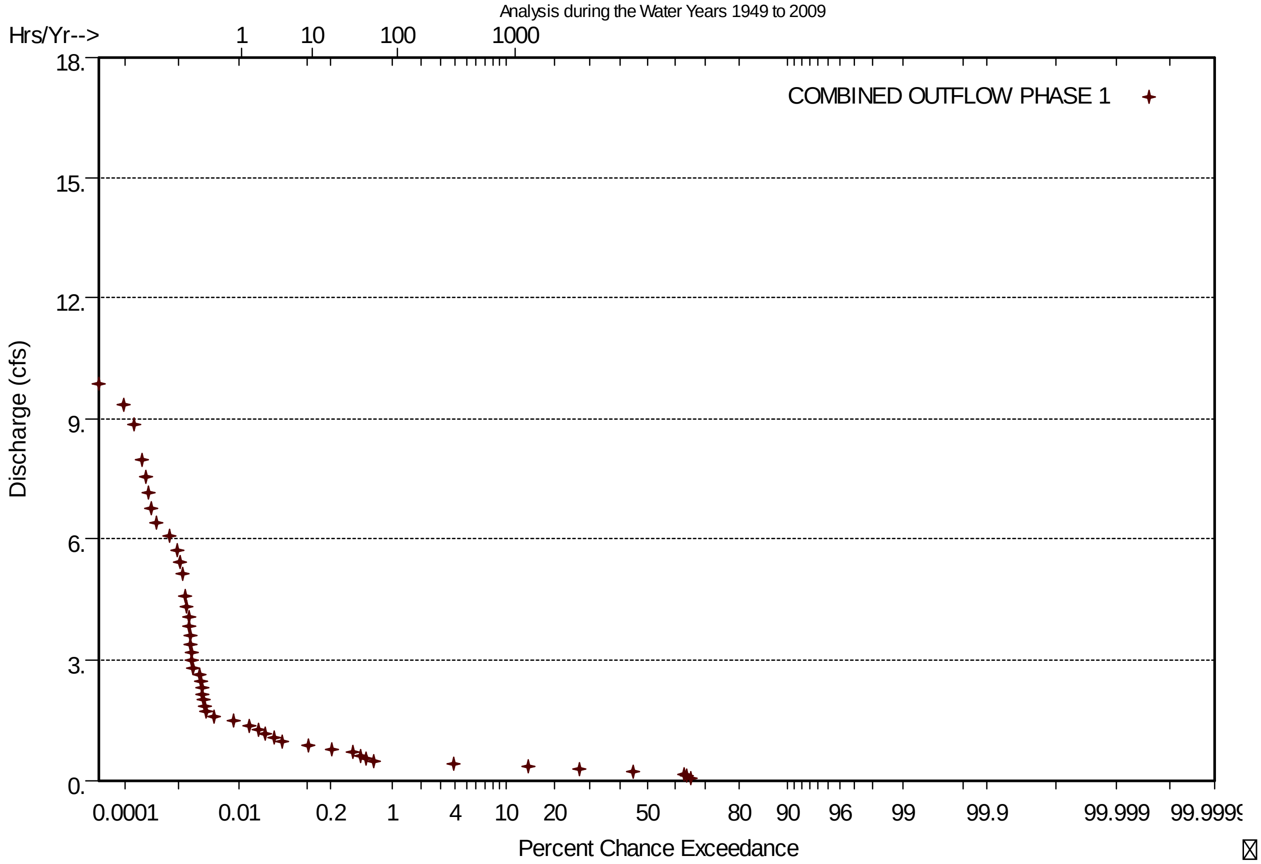


Figure 3. Phase 1 Redeveloped Area Target Flow Durations

Forested Conditions

Analysis during the Water Years 1949 to 2009



Appendix D: Project Cost Opinions

Appendix D

Appendix D provides the opinions of project costs prepared as a part of alternative analyses performed to identify preferred facility solutions; and opinions of project costs of the recommended stormwater facilities of the project. Opinions of project costs are organized in this appendix by facility location. The individual stormwater facilities, and components thereof for which cost opinions are provided, are located as shown in Figure D-1. An identification number is provided in the listing of opinions of project cost sheets that is also shown in Figure D-1 to assist in locating the cost element.

1. Lower Collocated Facility

Refer to Section 4 for the description of vault depth vs. cost comparison using these cost opinions.

Alternative Analysis Vault Depth vs. Cost		
Cost Opinion	Page No.	Figure D-1 Element No.
20ft Vault Depth, 15ft Maximum Water Depth	D-1	N/A
15ft Vault Depth, 10ft Maximum Water Depth	D-2	N/A
10ft Vault Depth, 5ft Maximum Water Depth	D-3	N/A

Refer to Sections 3 and 4 and Appendix B1 for the description of analyses and facility costs using these cost opinions.

Alternative Analysis and Facility Cost LID Implementation Level vs. Stormwater Vault Size		
Cost Opinion	Page No.	Figure D-1 Element No.
Summary - Cost Analysis of LID and Stormwater Vault Options	D-4	N/A
Bioretention including Landscaping	D-5	N/A
Infiltrators + Permeable Pavement	D-6	N/A
Regional Stormwater Vault – Lower Site	D-7	1.1
Demolition of 3.48 ac Typical Site with No Building	D-8	1.1
New Trunk Line to Lower Vault	D-9	1.2
Storm Outfall to Existing Conveyance	D-10	1.3

2. Upper Collocated Facility

Refer to Section 4 for discussion of facility costs using these cost opinions.

Cost Opinion	Page No.	Figure D-1 Element No.
Summary Upper Collocated Facility Cost Summary Sheet	D-11	N/A
Demolition of 3.48 ac Typical Site with One Story Building	D-12	2.1
Regional Stormwater Vault – Upper Site	D-13	2.1

3. NE24th/152nd NE Runoff Treatment Facility Options

Refer to Section 4 for discussion of facility costs using these cost opinions.

Cost Opinion	Page No.	Figure D-1 Element No.
Filterra Treatment System (152^{nd} NE) with Wet Vault/StormFilter System (NE 24^{th})	D-14	3.1
Wet Vault/StormFilter (152^{nd} NE and NE 24th)	D-15	3.2

4. Initial Phase Bellevue Bypass Storm Pipeline

Refer to Section 4 for discussion of facility costs using this cost opinion.

Cost Opinion	Page No.	Figure D-1 Element No.
Initial Phase Bellevue Bypass Storm Piping around Lower Facility	D-16	4.1

5. Final Phase Bellevue Bypass Trunk Line in Bel-Red Road

Refer to Section 4 for discussion of facility costs using this cost opinion.

Cost Opinion	Page No.	Figure D-1 Element No.
Bellevue Bypass – Storm Trunk Line in Bel-Red Road	D-17	5.1

6. North Tributary Areas Initial Phase Runoff Treatment System

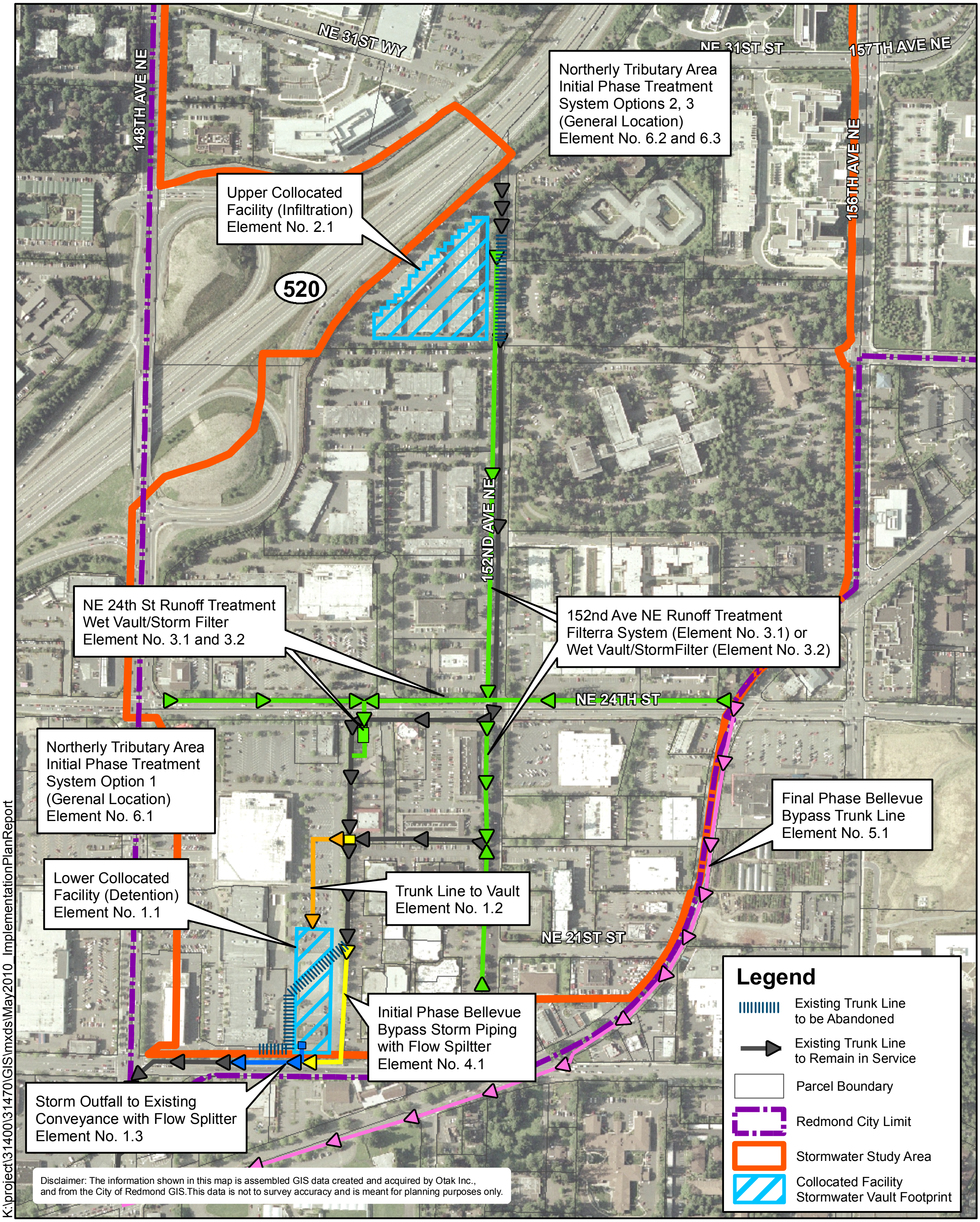
Refer to Section 4 for discussion of facility costs using these cost opinions.

Cost Opinion	Page No.	Figure D-1 Element No.
Initial Phase Runoff Treatment using Filterra Systems in Lower Watershed (Option 1)	D-18	6.1
Initial Phase Runoff Treatment using Filterra System (Option 2)	D-19	6.2
Initial Phase Runoff Treatment using Wet Vault/Media Filter System (Option 3)	D-20	6.3

7. Intersection Oil Treatment System

Refer to Section 4 for discussion of facility costs using this cost opinion.

Cost Opinion	Page No.	Figure D-1 Element No.
Intersection Oil Treatment System Using Filterra System	D-21	N/A



K:\project\31400\31470\GIS\mxds\May2010_ImplementationPlanReport

Figure D-1
Cost Opinion
Element Locations

Overlake Village Stormwater and
Park Facilites Conceptual Design

City of Redmond WASHINGTON

otak

The Berger Partnership PS Landscape Architecture

0 250 500 1,000 Feet

N

Date of Aerial Photography: 2002

PLANNING LEVEL PROJECT CONSTRUCTION COST OPINION					
PROJECT:	**Overlake Village Stormwater and Park Facilities Conceptual Design**			**PROJECT ID:**	**31470**
DESCRIPTION:	**VAULT DEPTH COMPARISON - 20ft Vault Depth, 15ft Max Water Depth**			**DATE:**	**4/20/2010**
ITEM NO.	**ITEM**	**QUANTITY**	**UNIT**	**UNIT PRICE**	**AMOUNT**
Construction Elements					
1	STRUCTURE EXCAVATION CLASS A INCL. HAUL	70,900	CY	$ 10.00	$ 709,000
2	SHORING OR EXTRA EXCAVATION CLASS A	25,000	SF	$ 80.00	$ 2,000,000
3	GRAVEL BACKFILL FOR WALL	3,500	CY	$ 24.00	$ 84,000
4	CONC. CLASS 4000	5,000	CY	$ 400.00	$ 2,000,000
5	ST. REINF. BAR	463,000	LB	$ 0.80	$ 370,400
6	PCPS SLAB - 12.5 INCH HALLOWCORE	74,200	SF	$ 8.00	$ 593,600
				Subtotal Construction Elements	**$ 5,757,000**
Required Ancillary Items					
7	DEWATERING		LS		$ 600,000
				Subtotal Ancillary	$ 600,000
				Subtotal Construction + Ancillary	**$ 6,357,000**
Contingency					
	CONTINGENCY ACCOUNTED FOR IN TOTAL FACILITY COSTS				
Tax/Permitting/Engineering/Construction Management					
	THESE PERCENTAGES ACCOUNTED FOR IN TOTAL FACILITY COSTS				
2010 Dollars				**Total Estimated Construction Cost (Rounded)**	**$ 6,360,000**
				Total Estimated Construction Cost per cf (Rounded)	**$ 5.70**

Notes:

1. The above cost opinion is in 2010 dollars and does not include future escalation, financing, or O&M costs.
2. The order-of-magnitude cost opinion has been prepared for guidance in project evaluation from the information available at the time of preparation and for the assumptions stated. The final costs of the project will depend on actual labor and material
3. Increase percentage markup if work is in or immediately adjacent to flowing or standing water, steep slope, and/or other erosion-prone conditions

PLANNING LEVEL PROJECT CONSTRUCTION COST OPINION

PROJECT: **Overlake Village Stormwater and Park Facilities Conceptual Design** **PROJECT ID: 31470**

DESCRIPTION: **VAULT DEPTH COMPARISON - 15ft Vault Depth, 10ft Max Water Depth** **DATE: 4/20/2010**

ITEM NO.	ITEM	QUANTITY	UNIT	UNIT PRICE	AMOUNT
Construction Elements					
1	STRUCTURE EXCAVATION CLASS A INCL. HAUL	81,500	CY	$ 10.00	$ 815,000
2	SHORING OR EXTRA EXCAVATION CLASS A	27,500	SF	$ 65.00	$ 1,787,500
3	GRAVEL BACKFILL FOR WALL	3,300	CY	$ 24.00	$ 79,200
4	CONC. CLASS 4000	6,350	CY	$ 400.00	$ 2,540,000
5	ST. REINF. BAR	581,000	LB	$ 0.80	$ 464,800
6	PCPS SLAB - 12.5 INCH HALLOWCORE	112,100	SF	$ 8.00	$ 896,800
				Subtotal Construction Elements	**$ 6,583,300**
Required Ancillary Items					
7	DEWATERING		LS		$ 250,000
				Subtotal Ancillary	$ 250,000
				Subtotal Construction + Ancillary	**$ 6,833,300**
Contingency					
	CONTINGENCY ACCOUNTED FOR IN TOTAL FACILITY COSTS				$ -
Tax/Permitting/Engineering/Construction Management					
	THESE PERCENTAGES ACCOUNTED FOR IN TOTAL FACILITY COSTS				
2010 Dollars				**Total Estimated Construction Cost (Rounded)**	**$ 6,840,000**
				Total Estimated Construction Cost per cf (Rounded)	**$ 6.10**

Notes:

1. The above cost opinion is in 2010 dollars and does not include future escalation, financing, or O&M costs.

2. The order-of-magnitude cost opinion has been prepared for guidance in project evaluation from the information available at the time of preparation and for the assumptions stated. The final costs of the project will depend on actual labor and material

3. Increase percentage markup if work is in or immediately adjacent to flowing or standing water, steep slope, and/or other erosion-prone conditions

PLANNING LEVEL PROJECT CONSTRUCTION COST OPINION					
PROJECT:	**Overlake Village Stormwater and Park Facilities Conceptual Design**			**PROJECT ID: 31470**	
DESCRIPTION:	**Vault Depth Comparison - 10ft Vault Depth, 5ft Max Water Depth**			**DATE: 4/20/2010**	
ITEM NO.	**ITEM**	**QUANTITY**	**UNIT**	**UNIT PRICE**	**AMOUNT**
Construction Elements					
1	STRUCTURE EXCAVATION CLASS A INCL. HAUL	112,000	CY	$ 10.00	$ 1,120,000
2	SHORING OR EXTRA EXCAVATION CLASS A	40,000	SF	$ 50.00	$ 2,000,000
3	GRAVEL BACKFILL FOR WALL	2,700	CY	$ 24.00	$ 64,800
4	CONC. CLASS 4000	9,400	CY	$ 400.00	$ 3,760,000
5	ST. REINF. BAR	946,000	LB	$ 0.80	$ 756,800
6	PCPS SLAB - 12.5 INCH HALLOWCORE	224,000	SF	$ 8.00	$ 1,792,000
				Subtotal Construction Elements	**$ 9,493,600**
Required Ancillary Items					
7	DEWATERING		LS		$ -
				Subtotal Ancillary	$ -
				Subtotal Construction + Ancillary	**$ 9,493,600**
Contingency					
	CONTINGENCY ACCOUNTED FOR IN TOTAL FACILITY COST:				$ -
Tax/Permitting/Engineering/Construction Management					
	THESE PERCENTAGES ACCOUNTED FOR IN TOTAL FACILITY COSTS				
2010 Dollars				**Total Estimated Construction Cost (Rounded)**	**$ 9,500,000**
				Total Estimated Construction Cost per cf (Rounded)	**$ 8.70**

Notes:

1. The above cost opinion is in 2010 dollars and does not include future escalation, financing, or O&M costs.
2. The order-of-magnitude cost opinion has been prepared for guidance in project evaluation from the information available at the time of preparation and for the assumptions stated. The final costs of the project will depend on actual labor and material
3. Increase percentage markup if work is in or immediately adjacent to flowing or standing water, steep slope, and/or other erosion-prone conditions

SUMMARY - COST ANALYSIS OF LID OPTIONS AND STORMWATER VAULT OPTIONS (STORMWATER COSTS ONLY)

Option 1: No LID

	Unit	Quantity	Unit Cost	Total
LID Elements				
Bioretention[1,2]	ac	0	$1,610,000	$0.00
Infiltrators/Pervious Pavement[2]	ac	0	$2,677,000	$0.00
			Subtotal	*$0.00*
Vault Elements				
Lower Site Detention Vault	cf	1,176,120	$11.50	$13,525,380.00
Lower Site Parking Lot Pavement Repair[3]	sf	78,408	$3.50	$274,428.00
Lower Site Demolition Costs	ac	1.80	$98,400.00	$177,120.00
Lower Facility Outlet Piping to Ex. Conveyance	ea	1	$240,000.00	$240,000.00
Lower Facility Inlet Piping	ea	1	$260,000.00	$260,000.00
Lower Site Land Leasing Cost	sf	78,408	$28.12	$2,204,832.96
			Subtotal	*$16,681,760.96*
			Total:	**$16,682,000**

Site Summary		
Lower Site Area	1.8	ac
Lower Site Volume	27	ac-ft

Option 2: Moderate LID

	Unit	Quantity	Unit Cost	Total
LID Elements				
Bioretention[1,2]	ac	0.78	$1,610,000	$1,255,800.00
Infiltrators/Pervious Pavement[2]	ac	1.23	$2,677,000	$3,292,710.00
			Subtotal	*$4,548,510.00*
Vault Elements				
Lower Site Detention Vault	cf	882,090	$11.50	$10,144,035.00
Lower Site Parking Lot Pavement Repair[3]	sf	58,806	$3.50	$205,821.00
Lower Site Demolition Costs	ac	1.35	$98,400.00	$132,840.00
Lower Facility Outlet Piping to Ex. Conveyance	ea	1	$240,000.00	$240,000.00
Lower Facility Inlet Piping	ea	1	$260,000.00	$260,000.00
Lower Site Land Leasing Cost	sf	58,806	$28.12	$1,653,624.72
			Subtotal	*$12,636,320.72*
			Total:	**$17,185,000**

Site Summary		
Lower Site Area	1.35	ac
Lower Site Volume	20.25	ac-ft

Option 3: Maximum LID

	Unit	Quantity	Unit Cost	Total
LID Elements				
Bioretention[1,2]	ac	1.76	$1,610,000	$2,833,600.00
Infiltrators/Pervious Pavement[2]	ac	3.86	$2,677,000	$10,333,220.00
			Subtotal	*$13,166,820.00*
Vault Elements				
Lower Site Detention Vault	cf	424,710	$11.50	$4,884,165.00
Lower Site Parking Lot Pavement Repair[3]	sf	28,314	$3.50	$99,099.00
Lower Site Demolition Costs	ac	0.65	$98,400.00	$63,960.00
Lower Facility Outlet Piping to Ex. Conveyance	ea	1	$240,000.00	$240,000.00
Lower Facility Inlet Piping	ea	1	$260,000.00	$260,000.00
Lower Site Land Leasing Cost	sf	28,314	$28.12	$796,189.68
			Subtotal	*$6,343,413.68*
			Total:	**$19,511,000**

Site Summary		
Lower Site Area	0.65	ac
Lower Site Volume	9.75	ac-ft

Footnotes:

[1]Costs do not consider possible land costs associated with ROW LID

[2]Costs do not take a credit for landscaping and sidewalk improvements that would already be done as part of the new street construction

[3]Cost per sf derived from RSMeans 32-12-16.14-0030

PLANNING LEVEL PROJECT CONSTRUCTION COST OPINION

PROJECT: Overlake Village Stormwater and Park Facilities Conceptual Design — **PROJECT ID:** 31470
DESCRIPTION: BIORETENTION INCLUDING LANDSCAPING(L:7260ft, W:6ft, D:3ft) — **DATE:** 1/27/2010

ITEM NO.	ITEM	QUANTITY	UNIT	UNIT PRICE	AMOUNT
Construction Elements					
1	EXCAVATION INCL. HAUL	6,500	CY	$ 7.00	$ 45,500
2	AMENDED SOIL	4,800	CY	$ 70.00	$ 336,000
3	2" MULCH LAYER	270	CY	$ 50.00	$ 13,500
4	LANDSCAPING	43,560	SF	$ 5.00	$ 217,800
5	IRRIGATION	43,560	SF	$ 2.00	$ 87,120
6	FILTER FABRIC	6,500	SY	$ 5.00	$ 32,500
				0 ıction Elements	**$ 732,420**
Required Ancillary Items					
7	DEWATERING		2%		$ 14,648
8	EROSION & SEDIMENTATION CONTROL		1%	(see note 3)	$ 7,324
9	MOBILIZATION		3%		$ 21,973
				Subtotal Ancillary	$ 43,945
				Subtotal Construction + Ancillary	**$ 776,365**
Contingency					
10	CONTINGENCY		30%		$ 232,910
				Subtotal Construction + Ancillary + Contingency	**$ 1,009,275**
Tax/Permitting/Engineering/Construction Management					
11	SALES TAX		9.5%		$ 95,881
12	PERMITTING		5%		$ 50,464
13	ENGINEERING		20%		$ 201,855
14	ADMINISTRATION AND LEGAL		5%		$ 50,464
15	CONSTRUCTION MANAGEMENT		20%		$ 201,855
				Subtotal Tax/Permitting/Engineering/Construction Management	$ 600,518
				Subtotal Construction + Ancillary + Contingency + Sales Tax	**$ 1,609,793**
2010 Dollars				**Total Estimated Project Construction Cost (Rounded)**	**$ 1,610,000**
				Total Estimated Construction Cost per acre (Rounded)	**$ 1,610,000**

Notes:

1. The above cost opinion is in 2010 dollars and does not include future escalation, financing, or O&M costs.
2. The order-of-magnitude cost opinion has been prepared for guidance in project evaluation from the information available at the time of preparation and for the assumptions stated. The final costs of the project will depend on actual labor and material
3. Increase percentage markup if work is in or immediately adjacent to flowing or standing water, steep slope, and/or other erosion-prone conditions.
4. Assumes no property acquisition costs.

PLANNING LEVEL PROJECT CONSTRUCTION COST OPINION

PROJECT: **Overlake Village Stormwater and Park Facilities Conceptual Design** **PROJECT ID:** **31470**

DESCRIPTION: **INFILTRATORS + PERMEABLE PAVEMENT (L:3960ft, W:11ft)** **DATE:** **1/27/2010**

ITEM NO.	ITEM	QUANTITY	UNIT	UNIT PRICE	AMOUNT
Construction Elements					
1	EXCAVATION INCL. HAUL	7,800	CY	$ 6.00	$ 46,800
2	SHOULDER BALLAST	10,000	TON	$ 35.00	$ 350,000
3	STORM TECH SC-740 CHAMBERS	1,120	EA	$ 350.00	$ 392,000
4	FILTER FABRIC	12,800	SY	$ 5.00	$ 64,000
5	POROUS PAVERS	43,560	SF	$ 6.00	$ 261,360
6	BEDDING SAND FOR PAVERS	3,700	CF	$ 28.00	$ 103,600
				0 ıction Elements	**$ 1,217,760**
Required Ancillary Items					
7	DEWATERING		2%		$ 24,355
8	EROSION & SEDIMENTATION CONTROL		1%	(see note 3)	$ 12,178
9	MOBILIZATION		3%		$ 36,533
				Subtotal Ancillary	$ 73,066
				Subtotal Construction + Ancillary	**$ 1,290,826**
Contingency					
10	CONTINGENCY		30%		$ 387,248
				Subtotal Construction + Ancillary + Contingency	**$ 1,678,073**
Tax/Permitting/Engineering/Construction Management					
11	SALES TAX		9.5%		$ 159,417
12	PERMITTING		5%		$ 83,904
13	ENGINEERING		20%		$ 335,615
14	ADMINISTRATION AND LEGAL		5%		$ 83,904
15	CONSTRUCTION MANAGEMENT		20%		$ 335,615
				Subtotal Tax/Permitting/Engineering/Construction Management	$ 998,454
				Subtotal Construction + Ancillary + Contingency + Tax/Permitting/Engineering/Construction Management	**$ 2,676,527**
2010 Dollars				**Total Estimated Project Construction Cost (Rounded)**	**$ 2,677,000**
				Total Estimated Construction Cost per acre (Rounded)	**$ 2,677,000**

Notes:

1. The above cost opinion is in 2010 dollars and does not include future escalation, financing, or O&M costs.
2. The order-of-magnitude cost opinion has been prepared for guidance in project evaluation from the information available at the time of preparation and for the assumptions stated. The final costs of the project will depend on actual labor and material
3. Increase percentage markup if work is in or immediately adjacent to flowing or standing water, steep slope, and/or other erosion-prone conditions.
4. Assumes no property acquisition costs.

PLANNING LEVEL PROJECT CONSTRUCTION COST OPINION							
PROJECT:	**Overlake Village Stormwater and Park Facilities Conceptual Design**			**PROJECT ID:**			**31470**
DESCRIPTION:	**REGIONAL STORMWATER VAULT - LOWER SITE (providing 25.5 ac-ft)**			**DATE:**			**4/20/2010**
ITEM NO.	**ITEM**	**QUANTITY**	**UNIT**	**UNIT PRICE**		**AMOUNT**	
Construction Elements							
1	STRUCTURE EXCAVATION CLASS A INCL. HAUL	70,940	CY	$	10.00	$	709,400
2	SHORING OR EXTRA EXCAVATION CLASS A	25,000	SF	$	80.00	$	2,000,000
3	GRAVEL BACKFILL FOR WALL	3,480	CY	$	24.00	$	83,520
4	CONC. CLASS 4000	4,950	CY	$	400.00	$	1,980,000
5	ST. REINF. BAR	462,670	LB	$	0.80	$	370,136
6	PCPS SLAB - 12.5 INCH HALLOWCORE	74,250	SF	$	8.00	$	594,000
					0 ıction Elements	**$**	**5,737,056**
Required Ancillary Items							
7	DEWATERING					$	600,000
8	EROSION & SEDIMENTATION CONTROL		1%	(see note 3)		$	57,371
9	MOBILIZATION		3%			$	172,112
					Subtotal Ancillary	$	829,482
					Subtotal Construction + Ancillary	**$**	**6,566,538**
Contingency							
10	CONTINGENCY		30%			$	1,969,961
					Subtotal Consturction + Ancillary + Contingency	**$**	**8,536,500**
Tax/Permitting/Engineering/Construction Management							
11	STATE SALES TAX		9.5%			$	810,968
12	PERMITTING		5%			$	426,825
13	ENGINEERING		15%			$	1,280,475
14	ADMINISTRATION AND LEGAL		5%			$	426,825
15	CONSTRUCTION MANAGEMENT		15%			$	1,280,475
					Subtotal Tax/Permitting/Engineering/Construction Management	$	4,225,568
					Subtotal Construction + Ancillary + Contingency + Tax/Permitting/Engineering/Construction Management	**$**	**12,762,068**
2010 Dollars					**Total Estimated Project Construction Cost (Rounded)**	**$**	**12,770,000**
					Total Estimated Construction Cost per cf (Rounded)	**$**	**11.50**

Notes:

1. The above cost opinion is in 2010 dollars and does not include future escalation, financing, or O&M costs.
2. The order-of-magnitude cost opinion has been prepared for guidance in project evaluation from the information available at the time of preparation and for the assumptions stated. The final costs of the project will depend on actual labor and material
3. Increase percentage markup if work is in or immediately adjacent to flowing or standing water, steep slope, and/or other erosion-prone conditions.

PLANNING LEVEL PROJECT CONSTRUCTION COST OPINION

PROJECT:	**Overlake Village Stormwater and Park Facilities Conceptual Design**			**PROJECT ID:**	**31470**
DESCRIPTION:	**DEMOLITION OF 3.48 AC TYPICAL SITE WITH NO BUILDING**			**DATE:**	**4/20/2010**

ITEM NO.	ITEM	QUANTITY	UNIT	UNIT PRICE	AMOUNT
Construction Elements					
1	DUMPING FEES	650	TON	$ 80.00	$ 52,000
2	SIDEWALK DEMOLITION	1,500	SY	$ 8.90	$ 13,350
3	PAVEMENT DEMOLITION	14,000	SY	$ 4.39	$ 61,460
4	CURB DEMOLITION	3,400	LF	$ 3.96	$ 13,464
5	SITE DEMOLITION HAUL	1,300	CY	$ 17.75	$ 23,075
6	STORMWATER PIPE REMOVAL	690	LF	$ 8.20	$ 5,658
7	SEWER PIPE REMOVAL	320	LF	$ 8.20	$ 2,624
8	WATER PIPE REMOVAL	350	0	$ 13.70	$ 4,795
9	MISCELLANEOUS ITEMS	5,000	LS	$ 1.00	$ 5,000
				Subtotal Construction Elements	**$ 181,426**
Required Ancillary Items					
10	DEWATERING		0%		$ -
11	EROSION & SEDIMENTATION CONTROL		1%	(see note 3)	$ 1,814
12	MOBILIZATION		3%		$ 5,443
				Subtotal Ancillary	$ 7,257
				Subtotal Construction + Ancillary	**$ 188,683**
Contingency					
13	CONTINGENCY		30%		$ 56,605
				Subtotal Consturction + Ancillary + Contingency	**$ 245,288**
Tax/Permitting/Engineering/Construction Management					
14	STATE SALES TAX		9.5%		$ 23,303
15	PERMITTING		5%		$ 12,265
16	ENGINEERING		10%		$ 24,529
17	ADMINISTRATION AND LEGAL		5%		$ 12,265
18	CONSTRUCTION MANAGEMENT		10%		$ 24,529
				Subtotal Tax/Permitting/Engineering/Construction Management	$ 96,891
				Subtotal Construction + Ancillary + Contingency + Tax/Permitting/Engineering/Construction Management	**$ 342,179**
2010 Dollars				**Total Estimated Project Construction Cost (Rounded)**	**$ 350,000**
				Total Estimated Construction Cost per acre (Rounded)	**$ 98,400**

Notes:

1. The above cost opinion is in 2010 dollars and does not include future escalation, financing, or O&M costs.
2. The order-of-magnitude cost opinion has been prepared for guidance in project evaluation from the information available at the time of preparation and for the assumptions stated. The final costs of the project will depend on actual labor and material
3. Increase percentage markup if work is in or immediately adjacent to flowing or standing water, steep slope, and/or other erosion-prone conditions.

PLANNING LEVEL PROJECT CONSTRUCTION COST OPINION					
PROJECT:	Overlake Village Stormwater and Park Facilities Conceptual Design			PROJECT ID:	31470
DESCRIPTION:	**NEW TRUNKLINE TO LOWER VAULT**			**DATE:**	**5/18/2010**
Item No.	**Item**	**Quantity**	**Unit**	**Unit Price**	**Amount**
Construction Elements					
1	CRUSHED SURFACING BASE COARSE	95	TON	$ 25.00	$ 2,400
2	HMA, CL 1/2-IN	80	TON	$ 80.00	$ 6,500
3	SHORING	3,636	SF	$ 1.50	$ 5,500
4	BANK RUN GRAVEL FOR TRENCH BACKFILL	681	CY	$ 20.00	$ 13,700
5	SAWCUTTING	800	LF	$ 3.00	$ 2,400
6	REMOVE PAVEMENT	422	SY	$ 3.50	$ 1,500
7	EXCAVATION INCLUDING HAUL AND DISPOSAL	1,279	CY	$ 10.00	$ 12,800
8	SCHEDULE A, 48 IN. DIAM. PIPE	400	LF	$ 150.00	$ 60,000
9	CATCH BASIN TYPE 2 - 84 IN.	2	EA	$ 5,500.00	$ 11,000
				Subtotal Construction Elements	**$ 116,000**
Required Ancillary Items					
10	DEWATERING		2%		$ 2,400
11	EROSION & SEDIMENTATION CONTROL		1%		$ 1,200
12	MOBILIZATION		3%		$ 3,500
				Subtotal Ancillary Items	$ 8,000
				Subtotal Construction + Ancillary	**$ 124,000**
Contingency					
13	CONTINGENCY		30%		$ 38,000
				Subtotal Construction + Ancillary + Contingency	**$ 162,000**
Tax/Permitting/Engineering/Construction Management					
14	SALES TAX		9.5%		$ 15,400
15	PERMITTING		5%		$ 8,100
16	ENGINEERING		20%		$ 32,400
17	ADMINISTRATION AND LEGAL		5%		$ 8,100
18	CONSTRUCTION MANAGEMENT		20%		$ 32,400
19	EASEMENTS AND PROPERTY ACQUISITION		Not Included		$ -
				Subtotal Tax/Permitting/Engineering/Construction Management	$ 97,000
				Subtotal Construction + Ancillary+ Tax/Permitting/Engineering/Construction Management	**$ 259,000**
2010 Dollars				**Total Estimated Project Cost (Rounded)**	**$ 260,000**

Notes:
1. The above cost opinion is in 2010 dollars and does not include future escalation, financing, or O&M costs.
2. The order-of-magnitude cost opinion has been prepared for guidance in project evaluation based on information available at the time of preparation and the assumptions stated.

PLANNING LEVEL PROJECT CONSTRUCTION COST OPINION

PROJECT: Overlake Village Stormwater and Park Facilities Conceptual Design — **PROJECT ID: 31470**

DESCRIPTION: STORM OUTFALL TO EXISTING COVEYANCE FOR LOWER VAULT — **DATE: 5/18/2010**

Item No.	Item	Quantity	Unit	Unit Price	Amount
Construction Elements					
1	REMOVE PAVEMENT	400	SY	$ 3.50	$ 1,400
2	EXCAVATION INCLUDING HAUL AND DISPOSAL	1,840	CY	$ 10.00	$ 18,400
3	SAWCUTTING	750	LF	$ 3.00	$ 2,300
4	FLOW CONTROL STRUCTURE 84 IN.	1	EA	$ 10,000.00	$ 10,000
5	BANK RUN GRAVEL FOR TRENCH BACKFILL	879	CY	$ 20.00	$ 17,600
6	CATCH BASIN TYPE 2 - 84 IN.	3	EA	$ 5,500.00	$ 16,500
7	SCHEDULE A, 48 IN. DIAM. PIPE	375	LF	$ 150.00	$ 56,300
8	ASPHALT TREATED BASE COURSE	130	TON	$ 80.00	$ 10,400
9	HMA, CL 1/2-IN	100	TON	$ 80.00	$ 8,000
10	SHORING	5,222	SF	$ 1.50	$ 7,900
				Subtotal Construction Elements	**$ 149,000**
Required Ancillary Items					
11	DEWATERING		2%		$ 3,000
12	EROSION & SEDIMENTATION CONTROL		1%		$ 1,500
13	MOBILIZATION		3%		$ 4,500
				Subtotal Ancillary Items	$ 9,000
				Subtotal Construction + Ancillary	**$ 158,000**
Contingency					
14	CONTINGENCY		30%		$ 48,000
				Subtotal Construction + Ancillary + Contingency	**$ 206,000**
Tax/Permitting/Engineering/Construction Management					
15	SALES TAX		9.5%		$ 4,600
16	PERMITTING		5%		$ 2,400
17	ENGINEERING		20%		$ 9,600
18	ADMINISTRATION AND LEGAL		5%		$ 2,400
19	CONSTRUCTION MANAGEMENT		20%		$ 9,600
20	EASEMENTS AND PROPERTY ACQUISITION		Not Included		$ -
				Subtotal Tax/Permitting/Engineering/Construction Management	$ 29,000
				Subtotal Construction + Ancillary+ Tax/Permitting/Engineering/Construction Management	**$ 235,000**
2010 Dollars				**Total Estimated Project Cost (Rounded)**	**$ 240,000**

Notes:
1. The above cost opinion is in 2010 dollars and does not include future escalation, financing, or O&M costs.
2. The order-of-magnitude cost opinion has been prepared for guidance in project evaluation based on information available at the time of preparation and the assumptions stated.

SUMMARY - UPPER COLLOCATED FACILITY COST SUMMARY SHEET (STORMWATER COSTS ONLY)

	Unit	Quantity	Unit Cost	Total
Vault Elements				
Upper Site Detention Vault	cf	1,589,940	$ 7.78	$12,369,733.20
Upper Site Demolition Costs	ac	2.70	$297,100.00	$802,170.00
			Subtotal	*$13,171,903.20*

Total: **$13,172,000**

Site Summary		
Upper Site Area	2.7	ac
Upper Site Volume	36.5	ac-ft

PLANNING LEVEL PROJECT CONSTRUCTION COST OPINION					
PROJECT:	**Overlake Village Stormwater and Park Facilities Conceptual Design**			**PROJECT ID:**	
DESCRIPTION:	**DEMOLITION of 3.48 ac Typical Site with One Story Building**			**DATE:**	**31470**
					4/20/2010
ITEM NO.	**ITEM**	**QUANTITY**	**UNIT**	**UNIT PRICE**	**AMOUNT**
Construction Elements					
1	BUILDING DEMOLITION	644,000	CF	$ 0.29	$ 186,760
2	DUMPING FEES	3,100	TON	$ 80.00	$ 248,000
3	SIDEWALK DEMOLITION	1,500	SY	$ 8.90	$ 13,350
4	PAVEMENT DEMOLITION	8,100	SY	$ 4.39	$ 35,559
5	CURB DEMOLITION	3,400	LF	$ 3.96	$ 13,464
6	SITE DEMOLITION HAUL	1,300	CY	$ 17.75	$ 23,075
7	STORMWATER PIPE REMOVAL	690	LF	$ 8.20	$ 5,658
8	SEWER PIPE REMOVAL	320	LF	$ 8.20	$ 2,624
9	WATER PIPE REMOVAL	350	LF	$ 13.70	$ 4,795
10	ELECTRICAL PIPE REMOVAL	300	LF	$ 15.70	$ 4,710
11	NATURAL GAS PIPE REMOVAL	300	LF	$ 16.70	$ 5,010
12	MISCELLANEOUS ITEMS	5,000	LS	$ 1.00	$ 5,000
	Subtotal Construction Elements				**$ 548,005**
Required Ancillary Items					
13	DEWATERING		0%		$ -
14	EROSION & SEDIMENTATION CONTROL		1%	(see note 3)	$ 5,480
15	MOBILIZATION		3%		$ 16,440
	Subtotal Ancillary				$ 21,920
	Subtotal Construction + Ancillary				**$ 569,925**
Contingency					
16	CONTINGENCY		30%		$ 170,978
	Subtotal Consturction + Ancillary + Contingency				**$ 740,903**
Tax/Permitting/Engineering/Construction Management					
17	STATE SALES TAX		9.5%		$ 70,386
18	PERMITTING		5%		$ 37,046
19	ENGINEERING		10%		$ 74,091
20	ADMINISTRATION AND LEGAL		5%		$ 37,046
21	CONSTRUCTION MANAGEMENT		10%		$ 74,091
	Subtotal Tax/Permitting/Engineering/Construction Management				$ 292,660
	Subtotal Construction + Ancillary + Contingency + Tax/Permitting/Engineering/Construction Management				**$ 1,033,563**
2010 Dollars	**Total Estimated Construction Cost (Rounded)**				**$ 1,040,000**
	Total Estimated Construction Cost per acre (Rounded)				**$ 297,100**
	Total Estimated Prjoect Construction Cost for 2.7 ac (Required Footprint) (Rounded)				**$ 803,000**

Notes:

1. The above cost opinion is in 2010 dollars and does not include future escalation, financing, or O&M costs.

2. The order-of-magnitude cost opinion has been prepared for guidance in project evaluation from the information available at the time of preparation and for the assumptions stated. The final costs of the project will depend on actual labor and material

3. Increase percentage markup if work is in or immediately adjacent to flowing or standing water, steep slope, and/or other erosion-prone conditions.

PLANNING LEVEL PROJECT CONSTRUCTION COST OPINION					
PROJECT:	**Overlake Village Stormwater and Park Facilities Conceptual Design**			**PROJECT ID:**	
DESCRIPTION:	**REGIONAL STORMWATER VAULT - UPPER SITE (providing 36.3 ac-ft storage)**			**DATE:**	**31470**
					4/20/2010
ITEM NO.	**ITEM**	**QUANTITY**	**UNIT**	**UNIT PRICE**	**AMOUNT**
Construction Elements					
1	STRUCTURE EXCAVATION CLASS A INCL. HAUL	98,700	CY	$ 10.00	$ 987,000
2	SHORING OR EXTRA EXCAVATION CLASS A	29,500	SF	$ 80.00	$ 2,360,000
3	GRAVEL BACKFILL FOR WALL	3,220	CY	$ 24.00	$ 77,280
4	CONC. CLASS 4000	3,518	CY	$ 400.00	$ 1,407,200
5	ST. REINF. BAR	435,800	LB	$ 0.80	$ 348,640
6	PCPS SLAB - 12.5 INCH HALLOWCORE	113,200	SF	$ 8.00	$ 905,600
				Subtotal Construction Elements	**$ 6,085,720**
Required Ancillary Items					
7	DEWATERING				$ -
8	EROSION & SEDIMENTATION CONTROL		1%	(see note 3)	$ 60,857
9	MOBILIZATION		3%		$ 182,572
				Subtotal Ancillary	$ 243,429
				Subtotal Construction + Ancillary	**$ 6,329,149**
Contingency					
10	CONTINGENCY		30%		$ 1,898,745
				Subtotal Consturction + Ancillary + Contingency	**$ 8,227,893**
Tax/Permitting/Engineering/Construction Management					
11	STATE SALES TAX		9.5%		$ 781,650
12	PERMITTING		5%		$ 411,395
13	ENGINEERING		15%		$ 1,234,185
14	ADMINISTRATION AND LEGAL		5%		$ 411,395
15	CONSTRUCTION MANAGEMENT		15%		$ 1,234,185
				Subtotal Tax/Permitting/Engineering/Construction Management	$ 4,072,810
				Subtotal Construction + Ancillary + Contingency + Tax/Permitting/Engineering/Construction Management	**$ 12,300,703**
2010 Dollars				**Total Estimated Construction Cost (Rounded)**	**$ 12,310,000**
				Total Estimated Construction Cost per cf Storage (Rounded)	**$ 7.78**
				Total Estimated Prjoect Construction Cost for 36.5 ac-feet (Required Detention Volume) (Rounded)	**$ 12,370,000**

Notes:

1. The above cost opinion is in 2010 dollars and does not include future escalation, financing, or O&M costs.
2. The order-of-magnitude cost opinion has been prepared for guidance in project evaluation from the information available at the time of preparation and for the assumptions stated. The final costs of the project will depend on actual labor and material
3. Increase percentage markup if work is in or immediately adjacent to flowing or standing water, steep slope, and/or other erosion-prone conditions.
4. Property acquisition costs not included.

PLANNING LEVEL PROJECT CONSTRUCTION COST OPINION

PROJECT: **Overlake Village Stormwater and Park Facilities Conceptual Design** **PROJECT ID:** **31470**

DESCRIPTION: **NE 24th/152nd Runoff Treatment--Filterra Treatment System (152nd Ave NE) and Wet Vault System/StormFilter System (NE 24th Street)** **DATE:** **5/18/2010**

Item No.	Item	Quantity	Unit	Unit Price	Amount
Construction Elements					
1	FLOW CONTROL STRUCTURE 48-IN	1	EA	$ 5,000.00	$ 5,000
2	FILTERRA BIORETENTION SYSTEM (6'X8') (enhanced treatment)	18	EA	$ 14,100.00	$ 253,800
3	SCHEDULE A, 12"-DIAM PIPE	2,850	LF	$ 35.00	$ 99,800
4	4" SDR-35 PVC	90	LF	$ 5.00	$ 500
5	CATCH BASIN TYPE 1	9	EA	$ 1,200.00	$ 10,800
6	CATCH BASIN TYPE 2 - 48 IN. (COMBINATION INLET)	18	EA	$ 2,500.00	$ 45,000
7	CATCH BASIN TYPE 2 - 48 IN. (STANDARD GRATE)	9	EA	$ 2,500.00	$ 22,500
8	WETVAULT (10' X 55')	55	LF	$ 900.00	$ 49,500
9	EXCAVATION INCLUDING HAUL AND DISPOSAL	3,100	CY	$ 10.00	$ 31,000
10	STORMWATER TREATMENT SYSTEM (STORMFILTER 96")	1	EA	$ 32,600.00	$ 32,600
11	SHORING	2,040	SF	$ 1.50	$ 3,100
				Subtotal Construction Elements	**$ 554,000**
Required Ancillary Items					
12	DEWATERING		2%		$ 11,100
13	EROSION & SEDIMENTATION CONTROL		1%		$ 5,600
14	MOBILIZATION		3%		$ 16,700
				Subtotal Ancillary Items	$ 34,000
				Subtotal Construction + Ancillary	**$ 588,000**
Contingency					
15	CONTINGENCY		30%		$ 177,000
				Subtotal Construction + Ancillary + Contingency	**$ 765,000**
Tax/Permitting/Engineering/Construction Management					
16	SALES TAX		9.5%		$ 72,700
17	PERMITTING		5%		$ 38,300
18	ENGINEERING		20%		$ 153,000
19	ADMINISTRATION AND LEGAL		5%		$ 38,300
20	CONSTRUCTION MANAGEMENT		20%		$ 153,000
21	EASEMENTS AND PROPERTY ACQUISITION		LS		$ 50,000
				Subtotal Tax/Permitting/Engineering/Construction Management	$ 506,000
				Subtotal Construction + Ancillary+ Tax/Permitting/Engineering/Construction Management	**$ 1,271,000**
2010 Dollars				**Total Estimated Project Cost (Rounded)**	**$ 1,280,000**

Notes:
1. The above cost opinion is in 2010 dollars and does not include future escalation, financing, or O&M costs.
2. The order-of-magnitude cost opinion has been prepared for guidance in project evaluation based on information available at the time of preparation and the assumptions stated.
3. Only water quality costs are addressed by this cost opinion

PLANNING LEVEL PROJECT CONSTRUCTION COST OPINION

PROJECT: **Overlake Village Stormwater and Park Facilities Conceptual Design** **PROJECT ID:** **31470**

DESCRIPTION: **NE 24TH/152ND RUNOFF TREATMENT -- WET VAULT/STORMFILTER (BOTH STREETS)** **DATE:** **5/18/2010**

Item No.	Item	Quantity	Unit	Unit Price	Amount
Construction Elements					
1	FLOW CONTROL STRUCTURE 48-IN	1	EA	$ 5,000.00	$ 5,000
2	SCHEDULE A, 12"-DIAM PIPE	5,810	LF	$ 35.00	$ 203,400
3	CATCH BASIN TYPE 1	18	EA	$ 1,200.00	$ 21,600
4	CATCH BASIN TYPE 2 - 48 IN. (STANDARD GRATE)	18	EA	$ 2,500.00	$ 45,000
5	WETVAULT (20' X 85')	85	LF	$ 1,300.00	$ 110,500
6	EXCAVATION INCLUDING HAUL AND DISPOSAL	9,500	CY	$ 10.00	$ 95,000
7	STORMWATER TREATMENT SYSTEM (STORMFILTER 8'X16')	1	EA	$ 63,500.00	$ 63,500
8	SHORING	3,150	SF	$ 1.50	$ 4,800
				Subtotal Construction Elements	**$ 549,000**
Required Ancillary Items					
9	DEWATERING		2%		$ 11,000
10	EROSION & SEDIMENTATION CONTROL		1%		$ 5,500
11	MOBILIZATION		3%		$ 16,500
				Subtotal Ancillary Items	$ 33,000
				Subtotal Construction + Ancillary	**$ 582,000**
Contingency					
12	CONTINGENCY		30%		$ 175,000
				Subtotal Construction + Ancillary + Contingency	**$ 757,000**
Tax/Permitting/Engineering/Construction Management					
13	SALES TAX		9.5%		$ 72,000
14	PERMITTING		5%		$ 37,900
15	ENGINEERING		20%		$ 151,400
16	ADMINISTRATION AND LEGAL		5%		$ 37,900
17	CONSTRUCTION MANAGEMENT		20%		$ 151,400
18	EASEMENTS AND PROPERTY ACQUISITION		LS		$ 50,000
				Subtotal Tax/Permitting/Engineering/Construction Management	$ 501,000
				Subtotal Construction + Ancillary+ Tax/Permitting/Engineering/Construction Management	**$ 1,258,000**
2010 Dollars				**Total Estimated Project Cost (Rounded)**	**$ 1,260,000**

Notes:
1. The above cost opinion is in 2010 dollars and does not include future escalation, financing, or O&M costs.
2. The order-of-magnitude cost opinion has been prepared for guidance in project evaluation based on information available at the time of preparation and the assumptions stated.
3. Only water quality costs are addressed by this cost opinion

PLANNING LEVEL PROJECT CONSTRUCTION COST OPINION

PROJECT: **Overlake Village Stormwater and Park Facilities Conceptual Design** **PROJECT ID:** **31470**

DESCRIPTION: **INITIAL PHASE BELLEUVE BYPASS STORM PIPING AROUND LOWER FACILITY** **DATE:** **5/18/2010**

Item No.	Item	Quantity	Unit	Unit Price	Amount
Construction Elements					
1	REMOVE PAVEMENT	580	SY	$ 3.50	$ 2,100
2	EXCAVATION INCLUDING HAUL AND DISPOSAL	2,560	CY	$ 10.00	$ 25,600
3	SAWCUTTING	1,090	LF	$ 3.00	$ 3,300
4	FLOW CONTROL STRUCTURE 84-IN	1	EA	$ 10,000.00	$ 10,000
5	BANK RUN GRAVEL FOR TRENCH BACKFILL	1,177	CY	$ 20.00	$ 23,600
6	CATCH BASIN TYPE 2 - 84 IN.	2	EA	$ 5,500.00	$ 11,000
7	SCHEDULE A, 48 IN. DIAM. PIPE	545	LF	$ 150.00	$ 81,800
8	ASPHALT TREATED BASE COURSE	190	TON	$ 80.00	$ 15,200
9	HMA, CL 1/2-IN	150	TON	$ 80.00	$ 12,000
10	SHORING	7,257	SF	$ 1.50	$ 10,900
				Subtotal Construction Elements	**$ 196,000**
Required Ancillary Items					
11	DEWATERING		2%		$ 4,000
12	EROSION & SEDIMENTATION CONTROL		1%		$ 2,000
13	MOBILIZATION		3%		$ 5,900
				Subtotal Ancillary Items	$ 12,000
				Subtotal Construction + Ancillary	**$ 208,000**
Contingency					
14	CONTINGENCY		30%		$ 63,000
				Subtotal Construction + Ancillary + Contingency	**$ 271,000**
Tax/Permitting/Engineering/Construction Management					
15	SALES TAX		9.5%		$ 6,000
16	PERMITTING		5%		$ 3,200
17	ENGINEERING		20%		$ 12,600
18	ADMINISTRATION AND LEGAL		5%		$ 3,200
19	CONSTRUCTION MANAGEMENT		20%		$ 12,600
20	EASEMENTS AND PROPERTY ACQUISITION		Not Included		$ -
				Subtotal Tax/Permitting/Engineering/Construction Management	$ 38,000
				Subtotal Construction + Ancillary+ Tax/Permitting/Engineering/Construction Management	**$ 309,000**
2010 Dollars				**Total Estimated Project Cost (Rounded)**	**$ 310,000**

Notes:
1. The above cost opinion is in 2010 dollars and does not include future escalation, financing, or O&M costs.
2. The order-of-magnitude cost opinion has been prepared for guidance in project evaluation based on information available at the time of preparation and the assumptions stated.

PLANNING LEVEL PROJECT CONSTRUCTION COST OPINION

PROJECT: **Overlake Village Stormwater and Park Facilities Conceptual Design** **PROJECT ID:** **31470**

DESCRIPTION: **FINAL PHASE BELLEVUE BYPASS - STORM TRUNK LINE IN BEL-RED ROAD** **DATE:** **5/18/2010**

Item No.	Item	Quantity	Unit	Unit Price	Amount
Construction Elements					
1	REMOVE PAVEMENT	3,230	SY	$ 3.50	$ 11,400
2	EXCAVATION INCLUDING HAUL AND DISPOSAL	8,550	CY	$ 10.00	$ 85,500
3	SAWCUTTING	6,560	LF	$ 3.00	$ 19,700
4	REMOVE PIPE	1,500	LF	$ 15.00	$ 22,500
5	CATCH BASIN TYPE 2-48 IN.	3	EA	$ 2,500.00	$ 7,500
6	CATCH BASIN TYPE II - 84-IN	13	EA	$ 5,500.00	$ 71,500
7	SCHEDULE A, 24 IN. DIAM. PIPE	700	LF	$ 50.00	$ 35,000
8	SCHEDULE A, 48 IN. DIAM. PIPE	2,580	LF	$ 150.00	$ 387,000
9	GRAVEL BACKFILL	3,540	TON	$ 20.00	$ 70,800
10	ASPHALT TREATED BASE COURSE	1,020	TON	$ 80.00	$ 81,600
11	HMA, CL 1/2-IN	810	TON	$ 80.00	$ 64,800
12	UTILITY RELOCATIONS	1	LS	$ 50,000.00	$ 50,000
13	SHORING	25,540	SF	$ 1.50	$ 38,400
				Subtotal Construction Elements	**$ 946,000**
Required Ancillary Items					
14	DEWATERING		2%		$ 19,000
15	EROSION & SEDIMENTATION CONTROL		1%		$ 9,500
16	TRAFFIC CONTROL	1	ls	$90,000.00	$ 90,000
17	MOBILIZATION		3%		$ 28,400
				Subtotal Ancillary Items	$ 147,000
				Subtotal Construction + Ancillary	**$ 1,093,000**
Contingency					
18	CONTINGENCY		30%		$ 328,000
				Subtotal Construction + Ancillary + Contingency	**$ 1,421,000**
Tax/Permitting/Engineering/Construction Management					
19	SALES TAX		9.5%		$ 31,200
20	PERMITTING		5%		$ 16,400
21	ENGINEERING		20%		$ 65,600
22	ADMINISTRATION AND LEGAL		5%		$ 16,400
23	CONSTRUCTION MANAGEMENT		20%		$ 65,600
24	EASEMENTS AND PROPERTY ACQUISITION		Not Included		$ -
				Subtotal Tax/Permitting/Engineering/Construction Management	$ 196,000
				Subtotal Construction + Ancillary+ Tax/Permitting/Engineering/Construction Management	**$ 1,617,000**
2010 Dollars				**Total Estimated Project Cost (Rounded)**	**$ 1,620,000**

Notes:
1. The above cost opinion is in 2010 dollars and does not include future escalation, financing, or O&M costs.
2. The order-of-magnitude cost opinion has been prepared for guidance in project evaluation based on information available at the time of preparation and the assumptions stated.

PLANNING LEVEL PROJECT CONSTRUCTION COST OPINION

PROJECT: **Overlake Village Stormwater and Park Facilities Conceptual Design** — **PROJECT ID:** **31470**

DESCRIPTION: **Northerly Tributary Areas Initial Phase Runoff Treatment System using Filterra Systems in Lower Watershed (Option 1)** — **DATE:** **5/18/2010**

Item No.	Item	Quantity	Unit	Unit Price	Amount
Construction Elements					
1	CATCH BASIN TYPE 1 (STANDARD GRATE)	16	EA	$ 1,100.00	$ 17,600
2	CEMENT CONCRETE CURB AND GUTTER (18")	1,200	LF	$ 18.00	$ 21,600
3	FILTERRA BIORETENTION SYSTEM (4'X4')	1	EA	$ 8,400.00	$ 8,400
4	FILTERRA BIORETENTION SYSTEM (4'X6')	3	EA	$ 9,500.00	$ 28,500
5	FILTERRA BIORETENTION SYSTEM (4'X8')	1	EA	$ 10,200.00	$ 10,200
6	FILTERRA BIORETENTION SYSTEM (6'X6')	3	EA	$ 10,500.00	$ 31,500
7	FILTERRA BIORETENTION SYSTEM (6'X8')	4	EA	$ 14,100.00	$ 56,400
8	FILTERRA BIORETENTION SYSTEM (6'X10')	3	EA	$ 18,000.00	$ 54,000
9	FILTERRA BIORETENTION SYSTEM (6'X12')	2	EA	$ 21,000.00	$ 42,000
10	LANDSCAPING	4,000	SF	$ 10.00	$ 40,000
11	CATCH BASIN TYPE 2 - 48 IN. (STANDARD GRATE)	16	CY	$ 2,500.00	$ 40,000
12	4" SDR-35 PVC	160	LF	$ 5.00	$ 800
13	SCHEDULE A, 12 IN. DIAM. PIPE	240	LF	$ 35.00	$ 8,400
				Subtotal Construction Elements	**$ 360,000**
Required Ancillary Items					
3	DEWATERING		2%		$ 7,200
4	EROSION & SEDIMENTATION CONTROL		1%		$ 3,600
5	MOBILIZATION		3%		$ 10,800
				Subtotal Ancillary Items	$ 22,000
				Subtotal Construction + Ancillary	**$ 382,000**
Contingency					
6	CONTINGENCY		30%		$ 115,000
				Subtotal Construction + Ancillary + Contingency	**$ 497,000**
Tax/Permitting/Engineering/Construction Management					
7	SALES TAX		9.5%		$ 47,300
8	PERMITTING		5%		$ 24,900
9	ENGINEERING		20%		$ 99,400
10	ADMINISTRATION AND LEGAL		5%		$ 24,900
11	CONSTRUCTION MANAGEMENT		20%		$ 99,400
12	EASEMENTS AND PROPERTY ACQUISITION		Not Included		$ -
				Subtotal Tax/Permitting/Engineering/Construction Management	$ 296,000
				Subtotal Construction + Ancillary+ Tax/Permitting/Engineering/Construction Management	**$ 793,000**
2010 Dollars				**Total Estimated Project Cost (Rounded)**	**$ 800,000**

Notes:
1. The above cost opinion is in 2010 dollars and does not include future escalation, financing, or O&M costs.
2. The order-of-magnitude cost opinion has been prepared for guidance in project evaluation based on information available at the time of preparation and the assumptions stated.

PLANNING LEVEL PROJECT CONSTRUCTION COST OPINION						
PROJECT:	**Overlake Village Stormwater and Park Facilities Conceptual Design**			**PROJECT ID:**		**31470**
DESCRIPTION:	**Northerly Tributary Areas Initial Phase Runoff Treatment System using Filterra Bioretention Systems (Option 2)**			**DATE:**		**5/18/2010**
Item No.	**Item**	**Quantity**	**Unit**	**Unit Price**		**Amount**
Construction Elements						
1	FLOW CONTROL STRUCTURE 48-IN	1	EA	$ 5,000.00	$	5,000
2	FILTERRA BIORETENTION SYSTEM (6'X8') (enhanced treatment)	25	EA	$ 14,100.00	$	352,500
3	4" SDR-35 PVC	125	LF	$ 5.00	$	700
4	CATCH BASIN TYPE 2 - 48 IN. (COMBINATION INLET)	25	EA	$ 2,500.00	$	62,500
5	CONVEYANCE CONNECTION ALLOWANCE	1	LS	$ 50,000.00	$	50,000
6	UTILITY CONFLICT ALLOWANCE	1	LS	$ 20,000.00	$	20,000
				Subtotal Construction Elements	**$**	**491,000**
Required Ancillary Items						
7	DEWATERING		2%		$	9,900
8	EROSION & SEDIMENTATION CONTROL		1%		$	5,000
9	MOBILIZATION		3%		$	14,800
				Subtotal Ancillary Items	$	30,000
				Subtotal Construction + Ancillary	**$**	**521,000**
Contingency						
10	CONTINGENCY		30%		$	157,000
				Subtotal Construction + Ancillary + Contingency	**$**	**678,000**
Tax/Permitting/Engineering/Construction Management						
11	SALES TAX		9.5%		$	15,000
12	PERMITTING		5%		$	7,900
13	ENGINEERING		20%		$	31,400
14	ADMINISTRATION AND LEGAL		5%		$	7,900
15	CONSTRUCTION MANAGEMENT		20%		$	31,400
16	EASEMENTS AND PROPERTY ACQUISITION		Not Included		$	-
				Subtotal Tax/Permitting/Engineering/Construction Management	$	94,000
				Subtotal Construction + Ancillary+ Tax/Permitting/Engineering/Construction Management	**$**	**772,000**
2010 Dollars				**Total Estimated Project Cost (Rounded)**	**$**	**780,000**

Notes:
1. The above cost opinion is in 2010 dollars and does not include future escalation, financing, or O&M costs.
2. The order-of-magnitude cost opinion has been prepared for guidance in project evaluation based on information available at the time of preparation and the assumptions stated.

PLANNING LEVEL PROJECT CONSTRUCTION COST OPINION					
PROJECT:	**Overlake Village Stormwater and Park Facilities Conceptual Design**			**PROJECT ID:**	**31470**
DESCRIPTION:	**Northerly Tributary Areas Initial Phase Runoff Treatment System using Wet Vault/Media Filter System (Option 3)**			**DATE:**	**5/18/2010**
Item No.	**Item**	**Quantity**	**Unit**	**Unit Price**	**Amount**
Construction Elements					
1	FLOW CONTROL STRUCTURE 48-IN	1	EA	$ 5,000.00	$ 5,000
2	WETVAULT (20' X 40')	40	LF	$ 1,300.00	$ 52,000
3	STORMFILTER MANHOLE 96" (14 CARTIDGES)	1	EA	$ 45,500.00	$ 45,500
4	EXCAVATION INCLUDING HAUL AND DISPOSAL	600	CY	$ 10.00	$ 6,000
5	SHORING	100	SF	$ 1.50	$ 200
6	CONVEYANCE CONNECTION ALLOWANCE	1	LS	$ 50,000.00	$ 50,000
7	UTILITY CONFLICT ALLOWANCE	1	LS	$ 20,000.00	$ 20,000
				Subtotal Construction Elements	**$ 179,000**
Required Ancillary Items					
8	DEWATERING		2%		$ 3,600
9	EROSION & SEDIMENTATION CONTROL		1%		$ 1,800
10	MOBILIZATION		3%		$ 5,400
				Subtotal Ancillary Items	$ 11,000
				Subtotal Construction + Ancillary	**$ 190,000**
Contingency					
11	CONTINGENCY		30%		$ 57,000
				Subtotal Construction + Ancillary + Contingency	**$ 247,000**
Tax/Permitting/Engineering/Construction Management					
12	SALES TAX		9.5%		$ 23,500
13	PERMITTING		5%		$ 12,400
14	ENGINEERING		20%		$ 49,400
15	ADMINISTRATION AND LEGAL		5%		$ 12,400
16	CONSTRUCTION MANAGEMENT		20%		$ 49,400
17	EASEMENTS AND PROPERTY ACQUISITION		Not Included		$ -
				Subtotal Tax/Permitting/Engineering/Construction Management	$ 148,000
				Subtotal Construction + Ancillary+ Tax/Permitting/Engineering/Construction Management	**$ 395,000**
2010 Dollars				**Total Estimated Project Cost (Rounded)**	**$ 400,000**

Notes:
1. The above cost opinion is in 2010 dollars and does not include future escalation, financing, or O&M costs.
2. The order-of-magnitude cost opinion has been prepared for guidance in project evaluation based on information available at the time of preparation and the assumptions stated.

PLANNING LEVEL PROJECT CONSTRUCTION COST OPINION

PROJECT: **Overlake Village Stormwater and Park Facilities Conceptual Design** — **PROJECT ID:** **31470**

DESCRIPTION: **INTERSECTION OIL TREATMENT USING FILTERRA SYSTEM** — **DATE:** **5/18/2010**

Item No.	Item	Quantity	Unit	Unit Price	Amount
Construction Elements					
1	FILTERRA BIORETENTION SYSTEM (INTERNAL BYPASS)	4	EA	$ 10,500.00	$ 42,000
2	CURB AND SIDEWALK REMOVAL	8	SY	$ 20.00	$ 200
3	CONVEYANCE CONNECTION ALLOWANCE	1	LS	$ 10,000.00	$ 10,000
				Subtotal Construction Elements	**$ 53,000**
Required Ancillary Items					
4	DEWATERING		5%		$ 2,700
5	EROSION & SEDIMENTATION CONTROL		3%		$ 1,600
6	TRAFFIC CONTROL	1	LS		$ 30,000
7	MOBILIZATION		5%		$ 2,700
				Subtotal Ancillary Items	$ 37,000
				Subtotal Construction + Ancillary	**$ 90,000**
Contingency					
8	CONTINGENCY		30%		$ 27,000
				Subtotal Construction + Ancillary + Contingency	**$ 117,000**
Tax/Permitting/Engineering/Construction Management					
9	SALES TAX		9.5%		$ 2,600
10	PERMITTING		5%		$ 1,400
11	ENGINEERING		20%		$ 5,400
12	ADMINISTRATION AND LEGAL		5%		$ 1,400
13	CONSTRUCTION MANAGEMENT		20%		$ 5,400
14	EASEMENTS AND PROPERTY ACQUISITION		Not Included		$ -
				Subtotal Tax/Permitting/Engineering/Construction Management	$ 17,000
				Subtotal Construction + Ancillary+ Tax/Permitting/Engineering/Construction Management	**$ 134,000**
2010 Dollars				**Total Estimated Project Cost (Rounded)**	**$ 140,000**

Notes:
1. The above cost opinion is in 2010 dollars and does not include future escalation, financing, or O&M costs.
2. The order-of-magnitude cost opinion has been prepared for guidance in project evaluation based on information available at the time of preparation and the assumptions stated.

Appendix E: Stormwater Conveyance Concepts

Stormwater Conveyance Concepts

The overall concept for the conveyance is to use the existing stormwater trunk line system to the maximum extent possible and to add local collector storm drains as necessary to convey street and private development areas to the trunk line.

Trunk Line System

The proposed stormwater trunk line system is shown in Figure E-1. The proposed system uses the existing trunk line system in 152nd Avenue NE south of NE 31st Street to NE 24th Street, then the NE 24th Street trunk line from 152nd Avenue NE to west of 151st Avenue NE, then the north-south trunk line south of NE 24th Street where it is joined by the east-west trunk line north of NE 21st Street from 152nd Avenue NE to the east. New trunk line piping is needed in areas where the existing trunk line needs to be relocated or the pipe invert needs to be lowered.

Arterial System

The arterial collection system addresses future reconstruction of NE 24th Street and 152nd Avenue NE. The proposed arterial collection system is shown in Figure E-2. Runoff from the arterial streets would be collected by dedicated catch basin and storm drain lines to a treatment unit in order to keep the water still needing runoff treatment separate from the trunk line water which would have already received runoff treatment.

Clean Water Local Collection System

Local collection systems are proposed to convey runoff treated flow from local streets and private development areas to the stormwater trunk line. The general layout and features of the proposed local clean water collection system are shown in Figure E-3.

Overall Conveyance

The overall conveyance system showing the trunk line, arterial, and clean water local collection systems is shown in Figure E-4.

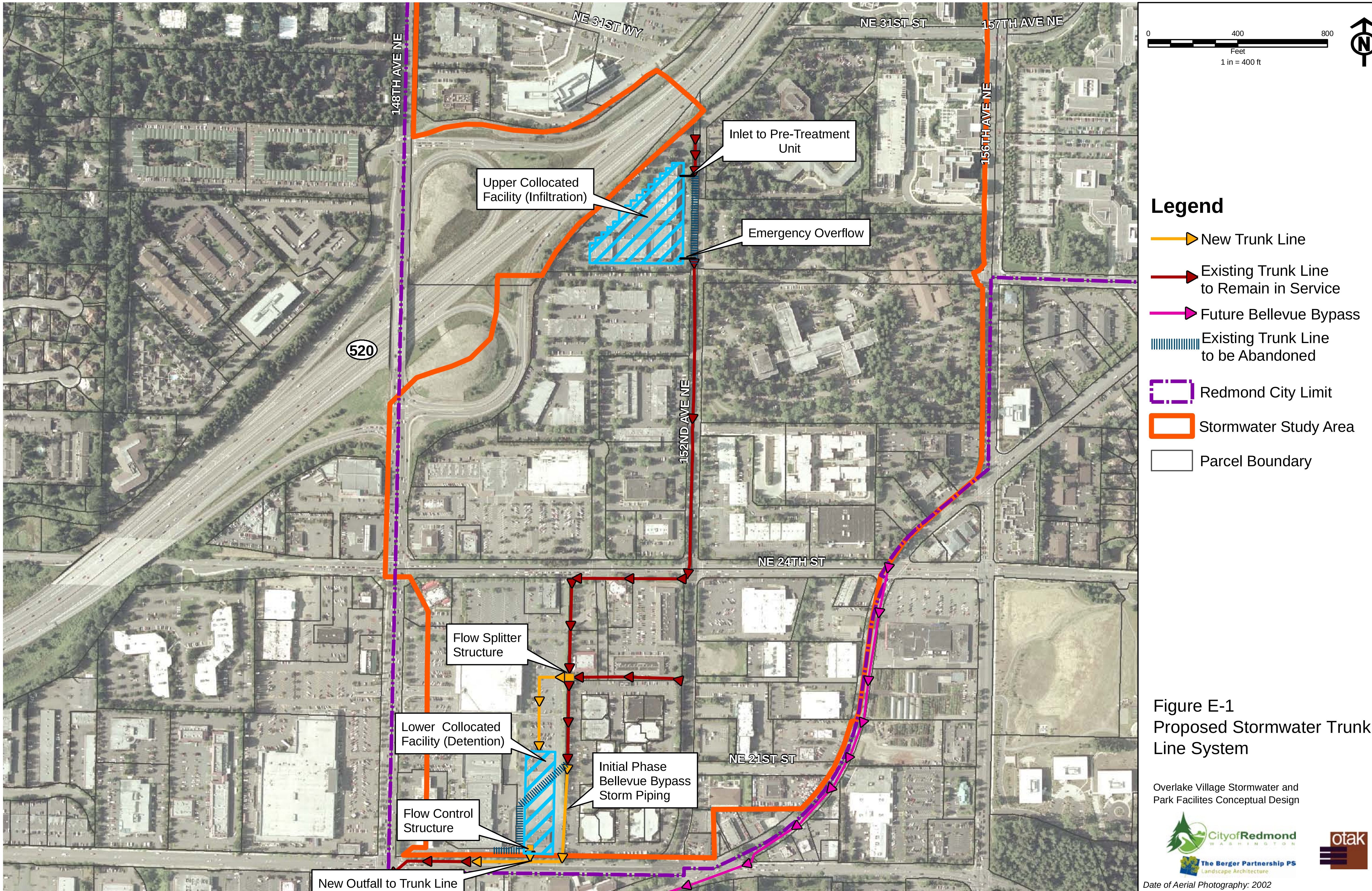


Figure E-1
Proposed Stormwater Trunk Line System

Overlake Village Stormwater and Park Facilites Conceptual Design

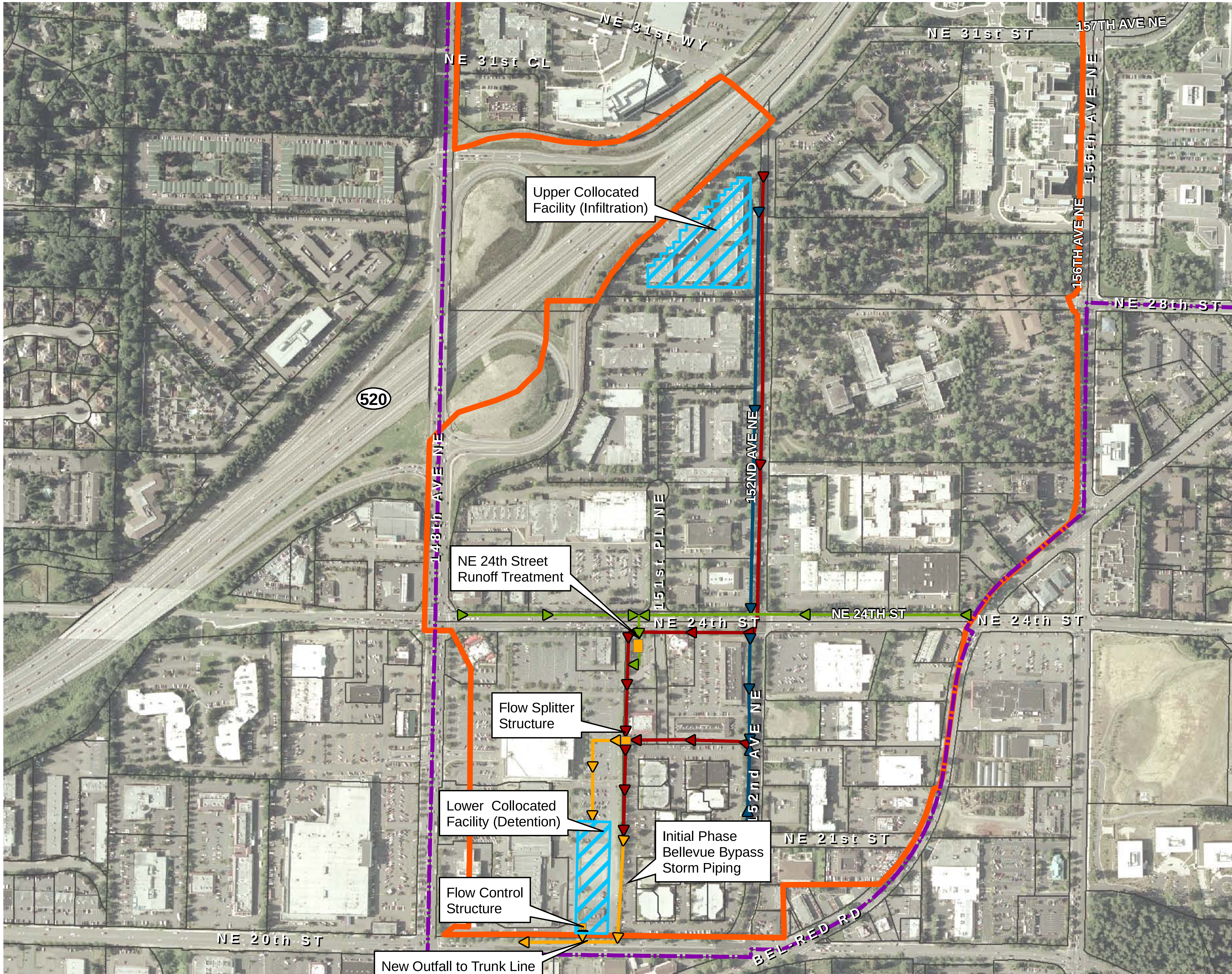
City of Redmond WASHINGTON

The Berger Partnership PS Landscape Architecture

otak

Date of Aerial Photography: 2002

K:\project\31400\31470\GIS\mxds\April2010_ImplementationPlanReport



0 400 800
Feet
1 in = 404 ft

N

Legend

- New Trunk Line
- Existing Trunk Line to Remain
- NE 24th Street Runoff Collection System to Treatment Vault
- 152nd Avenue NE Street Runoff Treatment by Filterra Systems, Discharge to Existing Trunk Lines (See Text for Alternative to Filterra)
- Redmond City Limit
- Stormwater Study Area
- Parcel Boundary

Figure E-2
Artertial Stormwater Collection and Treatment System Concept

Overlake Village Stormwater and Park Facilites Conceptual Design

CityofRedmond WASHINGTON

The Berger Partnership PS Landscape Architecture

otak

Date of Aerial Photography: 2002

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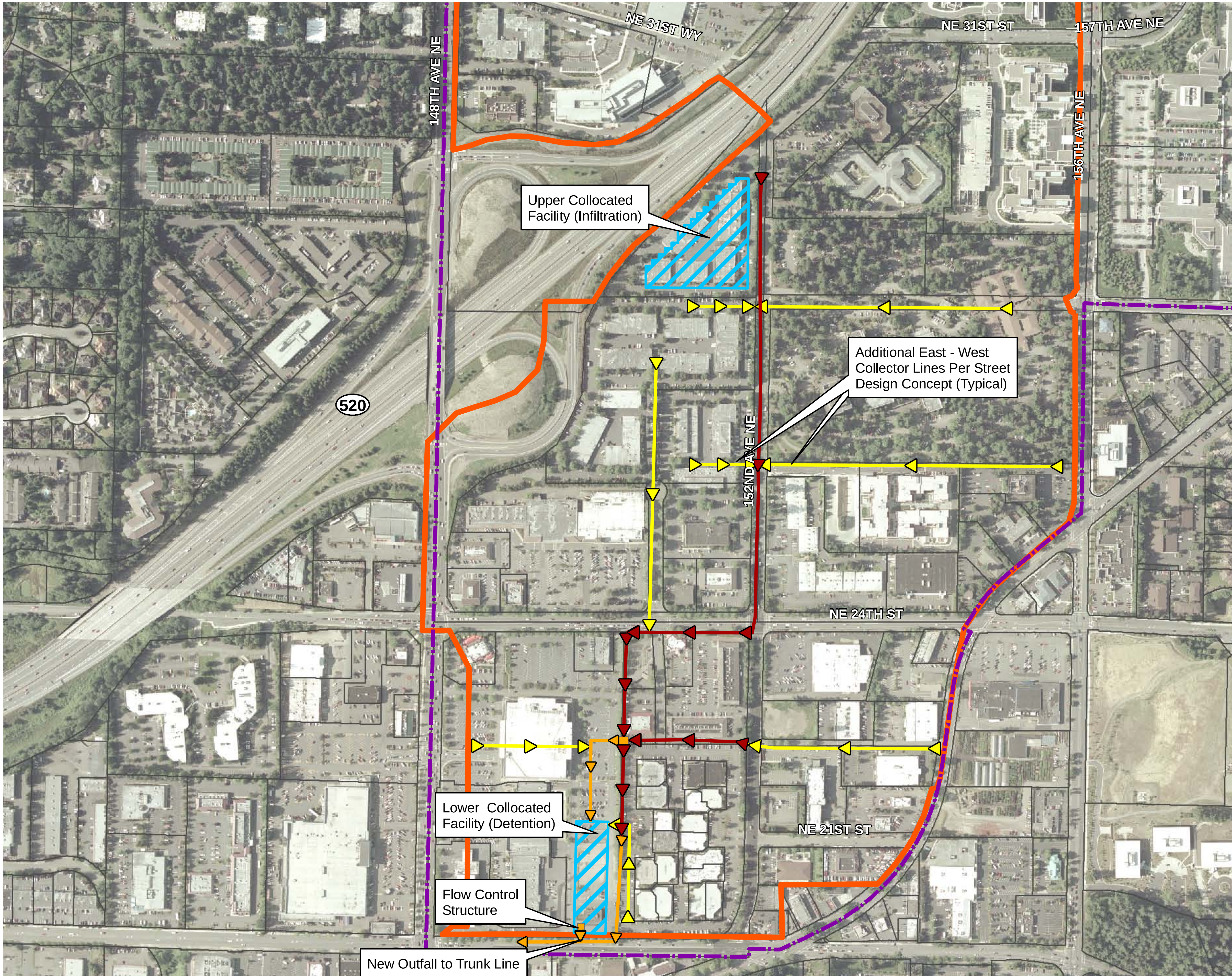

Figure E-3
Clean Water Redevelopment Collection and Treatment System Concept

Overlake Village Stormwater and Park Facilites Conceptual Design

City of Redmond WASHINGTON

The Berger Partnership PS Landscape Architecture

otak

Date of Aerial Photography: 2002

K:\project\31400\31470\GIS\mxds\May2010_ImplementationPlanReport

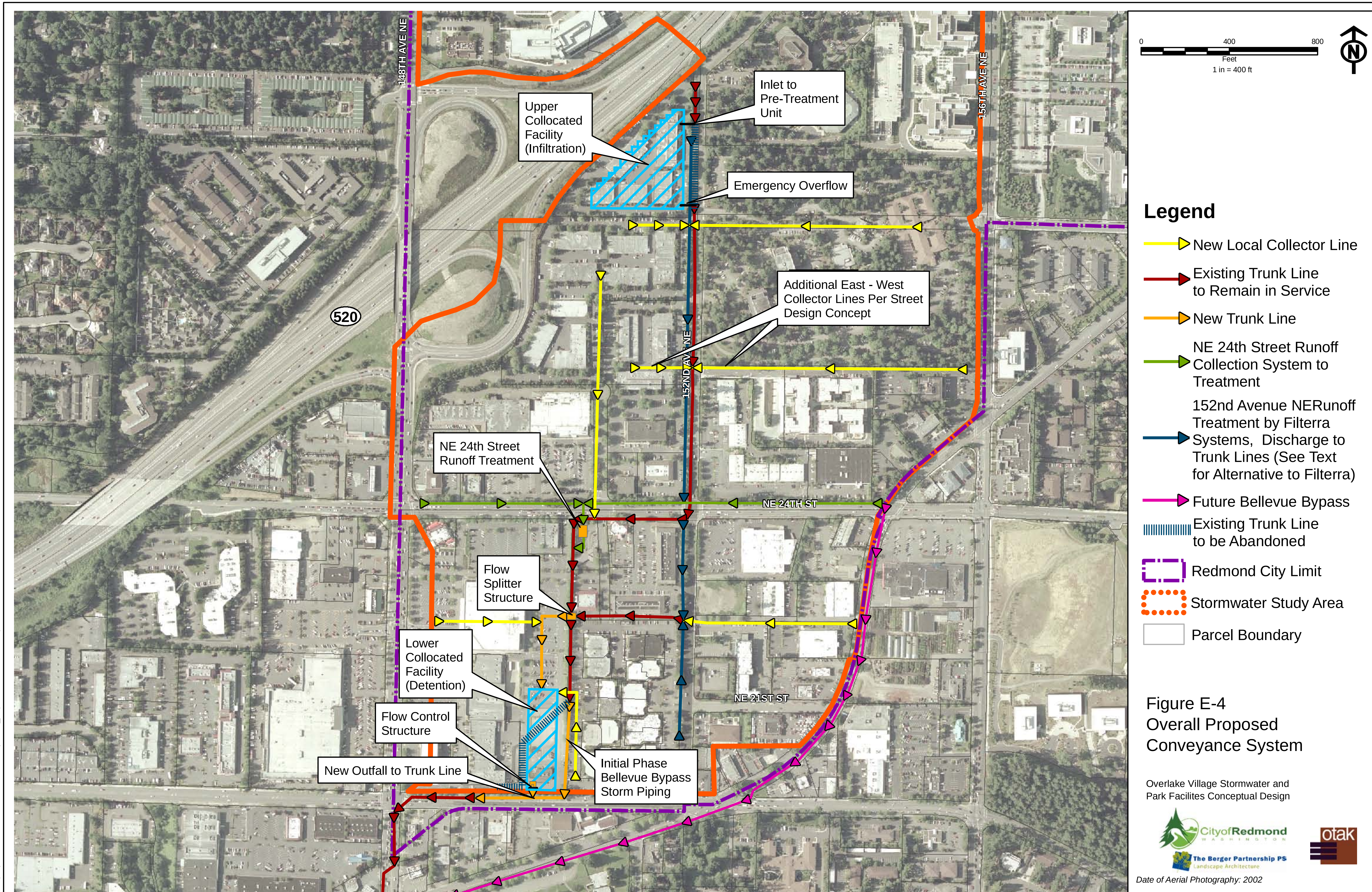

Figure E-4
Overall Proposed Conveyance System

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Appendix F: Bellevue Bypass

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Resolved
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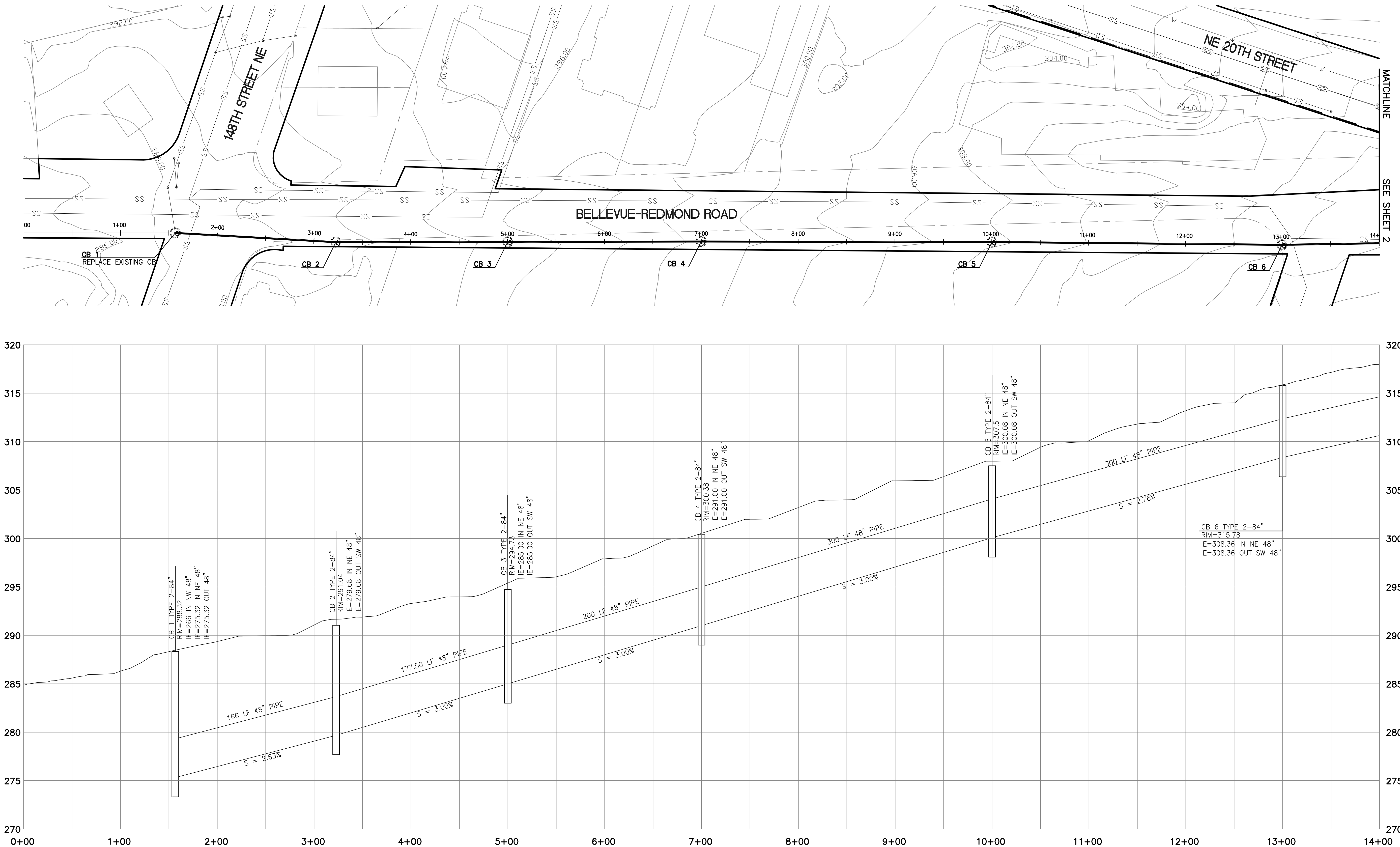
C470B270
C470U930



PRELIMINARY — NOT FOR CONSTRUCTION

Figure F-1
Final Phase Bellevue Bypass Trunk Line in Bel-Red Road

Overlake Village Stormwater and Park Facilities Conceptual Design

City of Redmond WASHINGTON

otak

The Berger Partnership PS
Landscape Architecture

HORZ. SCALE 50' 0' 50' 100' IN FEET

VERT. SCALE 5' 0' 5' 10' IN FEET

SHEET

Plotted: May 27, 2010 – 10:34pm kevino K:\project\31400\31470\Dwg\BellevueBypass.dwg Layout Name: Layout1

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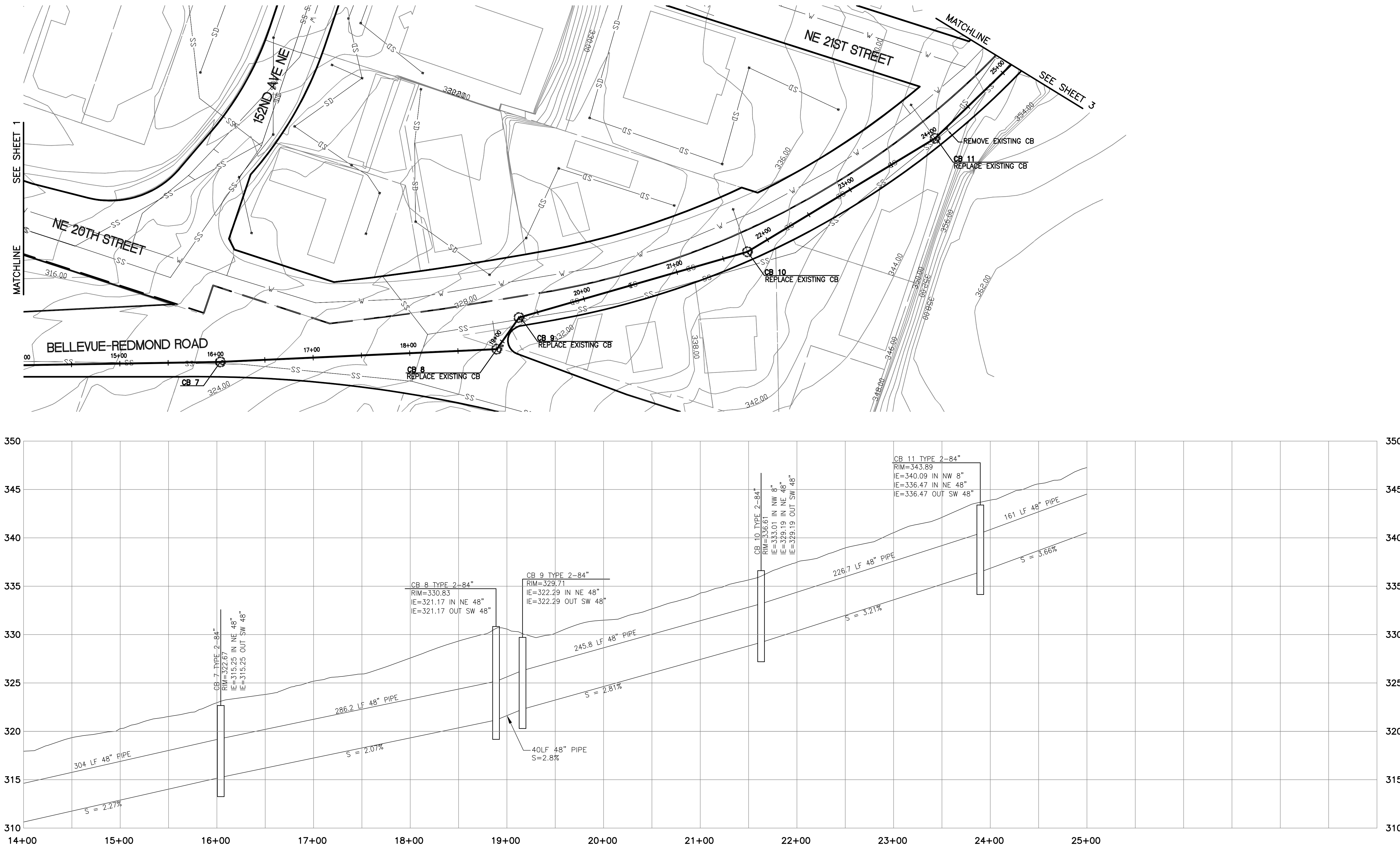
Resolved
TTLBLK
C470B170
C470B270
C470U930



PRELIMINARY — NOT FOR CONSTRUCTION

Figure F–2
Final Phase Bellevue Bypass Trunk Line in Bel–Red Road

Overlake Village Stormwater and Park Facilities Conceptual Design

City of Redmond WASHINGTON

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Landscape Architecture

HORZ. 50' 0' 50' 100' SCALE IN FEET

VERT. 5' 0' 5' 10' SCALE IN FEET

SHEET

2 of 3

Plotted: May 27, 2010 – 10:33am kevino K:\project\31400\31470\Dwg\BellevueBypass.dwg Layout Name: Layout2

XREF LIST
Ltscale: 1
Resolved
TTLBLK
C470B170
C470B270
C470U930

PRELIMINARY — NOT FOR CONSTRUCTION

Figure F–3
Final Phase Bellevue Bypass Trunk Line in Bel–Red Road

Overlake Village Stormwater and Park Facilities Conceptual Design

City of Redmond WASHINGTON

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Landscape Architecture

HORZ. 50' 0' 50' 100' SCALE IN FEET

VERT. 5' 0' 5' 10' SCALE IN FEET

SHEET
3 of 3

Plotted: May 27, 2010 – 10:29am kevino K:\project\31400\31470\Dwg\BellevueBypass.dwg Layout Name: Layout3