APPENDIX I: ECOSYSTEMS DISCIPLINE REPORT

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I-405, Bellevue to Lynnwood Improvement Project

INTERSTATE 405 Corridor Program

Congestion Relief & Bus Rapid Transit Projects

ECOSYSTEMS DISCIPLINE REPORT

April 2011

Washington State Department of Transportation

U.S. Department of Transportation
Federal Highway Administration

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SUMMARY

Study Approach

For the I-405, Bellevue to Lynnwood Improvement Project (Bellevue to Lynnwood Improvement Project), the I-405 Team gathered existing information on wetlands, aquatic resources, wildlife, and vegetation for the study area through literature and Internet research. Additional information on these resources was gathered by conducting wetland delineations, stream habitat surveys, and field studies verifying wildlife presence and wildlife habitat.

The information collected was then compared to the project footprint to assess potential temporary and permanent effects.

Existing Conditions

The existing conditions of wetlands, aquatic resources (i.e., streams, rivers, and lakes), and wildlife habitat in the study area are generally degraded. There are 21 wetlands in the study area. All 21 wetlands have been affected by development to some extent.

Twelve aquatic resources are present in the study area and vary from small spring-fed stream channels to a large river. Aquatic resources in the study area are highly urbanized and their functions have been compromised; however, many fish species use the aquatic resources, including both resident and anadromous fish. The most common resident fish in the streams are likely cutthroat trout, sculpin, three-spine stickleback, and longnose dace. Coho salmon, an anadromous fish, may use the streams as well. The Sammamish River resident fish are similar to stream resident fish but the river hosts a greater variety of anadromous fish including steelhead, sockeye, coho, and Chinook salmon.

Aquatic resource and wetland buffers are typical of built environments and generally consist of immature trees, shrubs, or grasses intermixed with non-native, invasive plant species.

Land cover in the study area includes forests, shrubs and grasses, and maintained vegetation. These land cover types may be important to wildlife for feeding, migrating, resting, and breeding. Wildlife habitats are fragmented throughout the study area, and much of the existing wildlife habitat is

located along the roadside in areas where vegetation is regularly mowed or maintained.

Project Effects

The project will result in temporary and permanent effects to wetlands, aquatic resources, and wildlife habitat. Permanent effects will occur to eight wetlands in the study area: four forested wetlands, one emergent wetland, and three wetlands with both forested and emergent vegetation communities. Additionally, two wetlands will incur temporary effects from project construction: one forested wetland and one with both forested and emergent vegetation communities. A total of approximately 0.38 acres of permanent and 0.03 acres of temporary wetland effects will occur as a result of the project.

The project will also permanently and temporarily affect wetland buffers. Nine wetlands will incur permanent buffer effects, totaling 2.03 acres. Three wetlands will incur temporary buffer effects totaling 0.47 acres. If a wetland is wholly filled by the project, it is not considered to have buffer effects.

The project will also affect aquatic resources in the study area. Four of the twelve aquatic resources in the study area, totaling 1,447 square feet, will be permanently affected by the project. An additional 400 square feet of the Sammamish River will be temporarily affected by the project. Permanent and temporary effects to aquatic resources result from any construction activity that will occur below the ordinary high water mark (OHWM). Construction activities, such as the addition of impervious surface, placement of new structures, and extension of culverts, may result in permanent effects to aquatic resources.

The project will both permanently and temporarily affect aquatic resource buffers. Eight of the twelve aquatic resources in the study area will incur permanent effects to their buffers, totaling 37,834 square feet. Four aquatic resources will incur temporary effects to their buffers, totaling 7,830 square feet. Permanent effects to aquatic resource buffers result from the removal of vegetation and conversion of buffer habitat to new impervious surface. Temporary effects to aquatic resource buffers stem from vegetation clearing and soil disturbing activities that occur within the aquatic resource buffer during project construction.

The project will add impervious surface to the study area, which will result in the permanent loss of 17 acres of upland vegetation, including 6.0 acres of forested land and 11 acres of maintained vegetation. The loss of 17 acres of vegetation equals less than 1 percent of the total land cover in the study area. Approximately 55 acres of vegetation will be temporarily affected during construction. Permanent and temporary effects to vegetation will result in a reduction of habitat available to wildlife present in the study area.

Measures to Avoid or Minimize Effects

The Bellevue to Lynnwood Improvement Project will be designed to avoid effects to wetlands, aquatic resources, and wildlife habitat to the extent practicable. Project elements, such as locating project features away from sensitive areas, will be incorporated throughout the design of the project to avoid or minimize effects to resources. If effects cannot be avoided, effects will be minimized to the extent possible. During construction, the Washington State Department of Transportation (WSDOT) will require that appropriate best management practices (BMPs) and conservation measures be implemented to reduce potential effects to natural resources from construction. Mitigation activities to offset project effects will be performed in accordance with applicable local, state, and federal regulations that govern wetlands, aquatic resources, and wildlife habitat.

Unavoidable Adverse Effects

The project will result in effects to wetlands, streams and rivers, and upland vegetation that cannot be avoided due to the project design.

Permanent impacts to approximately 0.42 acres of aquatic resources, wetlands, and associated buffers cannot be avoided due to the current roadway design. Wetlands and their buffers will incur effects that will compromise their ability to provide water quality, hydrologic, and habitat functions as detailed in Section 5. Four of the eleven streams and the one river in the study area, totaling 1,447 square feet of stream channel, will be permanently affected by roadway widening or culvert extensions. Three of these resources are non-fish bearing streams. Eight stream buffers will be permanently affected by the project.

The project will result in the permanent loss of 17 acres of upland vegetation (6.0 acres of forested habitat and 11 acres of maintained vegetation). The reduction in size of these upland habitats in the study area will affect wildlife species that rest, feed, and breed in these habitats.

ACRONYMS AND ABBREVIATIONS

Term	Meaning
BA	Biological Assessment
BMP	best management practice
CAD	computer-aided design
cfs	cubic feet per second
Corps	U.S. Army Corps of Engineers
CWA	Clean Water Act
dBA	A-weighted decibel
DPS	Distinct Population Segment
Ecology	Washington State Department of Ecology
EIS	Environmental Impact Statement
ESA	Endangered Species Act
ESU	evolutionarily significant unit
FHWA	Federal Highway Administration
GIS	geographic information system
HOV	high-occupancy vehicle
LWD	large woody debris
MP	milepost
NB	northbound
NMFS	National Marine Fisheries Service
NRCS	Natural Resources Conservation Service
OHWM	ordinary high water mark
PEM	palustrine emergent
PFO	palustrine forested
PSS	palustrine scrub/shrub
RCW	Revised Code of Washington
ROD	Record of Decision
SB	southbound
SMA	Washington State Shoreline Management Act

Term	Meaning
SPCC	Spill Prevention Control and Countermeasures
SR	state route
TESC	temporary erosion and sediment control
USFWS	U.S. Fish and Wildlife Service
WAC	Washington Administrative Code
WDFW	Washington State Department of Fish and Wildlife
WDNR	Washington State Department of Natural Resources
WRIA	water resource inventory area
WSDOT	Washington State Department of Transportation

GLOSSARY

Term	Meaning
ambient noise	The totality of noise associated with a given environment encompassing sounds from many sources near and far.
anadromous fish	A fish species that spends a part of its life cycle in the sea and returns to freshwater streams to reproduce (for example, salmon, steelhead, and trout).
aquifer	A geological stratum of saturated materials with the capability to yield useable quantities of groundwater on a long-term, sustainable basis.
bank	The slope of land adjoining a body of water, such as a river, lake, wetland or drainage channel. With respect to flowing waters, banks are either right or left as viewed facing in the direction of the flow.
basin	An area of land that drains to a specific waterbody.
best management practice (BMP)	Innovative and improved environmental protection tools, practices, and methods that have been determined to be the most effective, practical means of avoiding or reducing environmental impacts.
buffer	A designated area along and adjacent to a stream or wetland that may be regulated to control the negative effects of adjacent development on the aquatic resource.
cobble	Rock fragment smaller than boulder and larger than gravel; arbitrarily 1 to 50 pounds or 2 to 8 inches in diameter.
conservation	As defined by the Endangered Species Act (ESA), the use of all methods and procedures that are necessary to bring any endangered or threatened species to the point at which the measures provided pursuant to the ESA are no longer necessary.
corridor	Within the context of a visual analysis, the road or highway and the adjacent area that is visible from and extending along the highway. The distance the corridor extends out from the highway may vary depending on different factors, such as land use and topography, or the corridor may be defined as a set width, such as one-quarter or one-half mile.

Term	Meaning
critical areas	These include aquifer recharge areas, fish and wildlife habitat conservation areas, flood hazard areas, geologic hazard areas, and wetlands. Critical area functions and values are protected by ordinances that require development to avoid or compensate for adverse effects on critical areas.
critical habitat	Under the Endangered Species Act, (1) the specific areas within the geographic area occupied by a federally-listed species on which are found physical or biological features essential to conserving the species, and that may require special protection or management considerations; and (2) specific areas outside the geographic area occupied by a federally-listed species when it is determined that such areas are essential for the conservation of the species.
culvert	A pipe or box structure that drains open channels, swales, or ditches under a roadway or embankment.
cumulative effect	The effect on the environment that results from the incremental effect of an action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such actions. Cumulative effects can result from individually minor but collectively noticeable actions taking place over a period of time.
decibel (dB)	A logarithmic based unit of measure of sound pressure.
deciduous	Trees that shed their leaves annually.
delineation	Establishing the boundaries of a wetland by applying adopted jurisdictional methods.
detention	The temporary storage of stormwater runoff in a stormwater facility to control the discharge rates.
detention pond	A surface catchment designed to reduce effects on stormwater runoff quality and/or quantity impacts by storing the increased runoff volume that results from development, then slowly releasing it at controlled runoff rates. Detention tanks and vaults are underground structures used to reduce peak stormwater flows.
direct effect	An effect caused by an action or alternative and occurring at the same time and location. Effects may be ecological, aesthetic, historic, cultural, economic, social, or health-related.

Term	Meaning
discharge	Runoff leaving an area via overland flow, built conveyance systems, or infiltration facilities; a rate of fluid flow; or a volume of fluid passing a point per unit of time.
dominant species	A plant species that exerts a controlling influence on or defines the character of a vegetative community.
dominate	To comprise more than 50 percent of a population.
downstream	Referring to the direction of the flow of a stream or river.
drainage ditch	An open channel designed and constructed to convey water. This may include modifications of natural drainages or manmade historic channels incorporated in a system design.
duration	The length of time of an event.
ecosystem	A community of organisms interacting with each other, and the environment in which they live.
effect	Something brought about by a cause or agent; a result. This may include ecological, aesthetic, historic, cultural, economic, social, health, or other effects, whether direct, indirect, or cumulative. Effects may include those resulting from actions that may have both beneficial and detrimental effects.
emergent	A plant that grows rooted in shallow water or saturated soil, where most of the plant emerges from the water or above the ground surface and stands vertically.
emergent wetlands	Wetlands comprised of plants that are rooted in shallow water or saturated soil but have foliage that extends out of the water or above the ground surface.
endangered species	Any species that is in danger of extinction throughout all or a substantial portion of its range.
Endangered Species Act (ESA)	Federal legislation adopted to prevent the extinction of plants and animals.
erosion	The wearing away of soil or rock by the action of running water, wind, ice, or geologic agents. For this analysis, erosion relates primarily to stormwater runoff.
Evolutionarily Significant Unit (ESU)	The term used by the National Marine Fisheries Service for a fish species population protected by a listing under the Endangered Species Act.

Term	Meaning
express toll lane	A limited-access freeway lane that is actively managed through a variable toll system to regulate its use and thereby maintain express travel speeds and reliability. Toll prices rise or fall in real time as the lane approaches capacity or becomes less used. This ensures that traffic in the express toll lane remains flowing at express travel speeds of 45 to 60 miles per hour. Toll prices may differ for carpools, transit, motorcycles, and single-occupant vehicles. Tolls for are collected electronically using overhead scanners that read a transponder inside the vehicle and automatically debit the operator's account. See also: "managed lane."
Federal Highway Administration (FHWA)	One of several agencies in the U.S. Department of Transportation, the FHWA provides federal financial assistance to the states through the Federal Aid Highway Program, the purpose of which is to construct and improve the National Highway System, urban and rural roads, and bridges.
federally-listed species	Any species of fish, wildlife, or plant that has been determined by the U.S. Fish and Wildlife Service or National Marine Fisheries Service to be endangered or threatened under Section 4 of the Endangered Species Act.
fill	Any material placed in an area to increase surface elevation.
flood	An overflow or inundation that comes from a river, stream, tide, wave action, storm drain, or excess rainfall; any relatively high streamflow overtopping the natural or artificial banks in any reach of a stream.
floodplain	The total area subject to inundation by a flood, including the flood fringe and floodway.
forested land cover	Vegetated areas where trees with an average height greater than 20 feet are the predominant vegetation. See also: "shrubs/grasses land cover" and "maintained vegetation land cover."
forested wetland	A wetland characterized by woody vegetation that is 20 feet tall or taller.
general-purpose lane	A freeway or arterial lane available for use by all traffic.
geographic information system (GIS)	A digital computer mapping system that can overlay a wide variety of data such as land use, utilities, and vegetative cover, and provide a spatial analysis.

Term	Meaning
gradient	A measure of how steep a slope is. A slope with a gradient of ten percent rises (or declines) one foot for every ten feet of horizontal length.
groundwater	That portion of the water below the ground surface that is free flowing within the soil particles. Groundwater typically moves slowly, generally at a downward angle because of gravity, and eventually enters into streams, lakes, and oceans.
groundwater recharge	The process where natural sources (infiltrating rain, snowmelt or surface water) or pumped water enters and replenishes the groundwater supply.
habitat	The environment or specific surroundings where a plant or animal grows or lives.
habitat fragmentation	The separation of a habitat into pieces that are no longer physically connected to each other as a result of human development.
herbaceous	A plant with no persistent woody stem above the ground.
high-occupancy vehicle (HOV)	High-occupancy vehicle is a special designation for a bus, carpool, or vanpool provided as an encouragement to increase ride-sharing. Specially designated HOV lanes and parking are among the incentives for persons to pool trips, use fewer vehicles, and make the transportation system more efficient. HOV lanes are generally inside (left-side) lanes, and are identified by signs and a diamond on the pavement. Currently, two or more (2+) occupants are required to use the I-405 HOV lanes. Motorcycles are allowed to use freeway HOV lanes as well.
hydric soil	Soils formed under conditions of saturation, flooding, or ponding long enough to develop anaerobic conditions (absence of oxygen) in the upper part.
hydrologically connected	Linked to or associated with the water source of another system either through surface water, a stream, groundwater etc.
hydrology	Within the context of a wetland, permanent or periodic inundation or prolonged soil saturation sufficient to create anaerobic conditions in the soil.
impervious surface	Pavement, roofs, and other compacted or hardened areas that do not allow the passage of rainfall or runoff into the ground.
incised	A term used to describe down-cutting (downward erosion) by a stream. Incision deepens and often steepens the stream channel.

Term	Meaning
indirect effect	An effect that occurs later in time or is removed in distance from the proposed action, but is still reasonably foreseeable. Indirect effects may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems.
invasive species	Non-native species that disrupt and displace native species.
jurisdiction	A municipal government agency, such as a city or county, and as appropriate, federal and state agencies and federally recognized tribes. The term also can mean "to have authority over."
large woody debris	Logs, limbs, or root wads that are waterward of the ordinary high water line. To qualify as large woody debris, it must be of sufficient size to be resistant to erosion, provide bank stability, or help maintain or create habitat features important to fish life.
listed species	Any species of fish, wildlife, or plant that has been determined to be endangered or threatened. See also: "federally-listed species" and "State-listed species."
macroinvertebrate	Small animals that are visible with the naked eye, yet which have no backbone (insects, worms, larvae, etc.).
maintained vegetation land cover	Areas of roadside vegetation, including roadway medians and shoulders that are regularly maintained, and landscaped areas consisting primarily of plants grown for ornamental value for residential, commercial, and industrial developments. Maintained vegetation typically provides little to no value as wildlife habitat. See also: "forested land cover" and "shrubs/grasses land cover."
meandering	Following a winding and turning course.
minimization	Taking measures to reduce potential effects to the smallest practical amount, extent, size, or degree. Minimization could include alignment shifts, a commitment to seasonal construction windows, replacement of land or facilities, restoration or landscaping, or payment of fair market value for affected lands.

Term	Meaning
mitigation	An effort to: (1) avoid the impact altogether by not taking a certain action or parts of an action; (2) minimize the impact by limiting the magnitude of the action and its implementation, by using technology or by taking affirmative steps; (3) rectify the impact by repairing, rehabilitating, or restoring the affected environment; (4) reduce or eliminate the impact over time by preservation and maintenance operations; (5) compensate for the impact by replacing, enhancing or providing substitute resources or environments; and/or (6) monitor the impact and taking appropriate corrective measures.
mitigation bank	A mitigation project constructed in advance of planned development to mitigate for unavoidable effects on wetlands and their associated habitat. Banks are generally sized to provide sufficient mitigation for several development projects in one location. As a result, the bank typically provides higher functioning wetlands and more useable habitat than may be possible on an individual project scale.
National Environmental Policy Act (NEPA)	Federal legislation adopted in 1969 that established a national environmental policy intentionally focused on federal activities and the desire for a sustainable environment balanced with other essential needs of present and future generations. NEPA also established federal agency responsibility and created the basic framework for integrating environmental considerations into federal decision-making. The fundamentals of the NEPA decision-making process include: an interdisciplinary approach in planning and decision-making for actions that affect the human environment, interagency coordination, consideration of alternatives, examination of potential environmental consequences and mitigation, documentation of the analysis, and making the information available to the public for comment prior to implementation.
noise level	The sound pressure level, measured using a meter with an "A" frequency weighting and reported as dBA.
nutrients	Essential chemicals needed by plants or animals for growth, such as phosphorus.

Term	Meaning
ordinary high water mark (OHWM)	The elevation marking the highest water level which is so common and maintained for a sufficient time in all ordinary years that it leaves evidence upon the landscape, such as a clear and natural line impressed on the bank, changes in soil character, destruction of or change in vegetation, or the presence of litter and debris. Generally, it is the point where the natural vegetation changes from predominately aquatic to upland species. Where the ordinary high water mark cannot be found, it is the line of mean annual flood - the highest the water gets in an average year, but not the highest it gets during extreme flooding.
outfall	The point of discharge for stormwater runoff; also the outlet or mouth of a drain pipe or culvert that discharges stormwater runoff.
outlet	The point of water disposal from a stream, river, lake, tidewater, or artificial drain.
palustrine	Tidal or non-tidal freshwater areas dominated by trees, shrubs, persistent emergents, mosses, or lichens. Palustrine also includes wetlands lacking this vegetation but having the following characteristics: area less than 20 acres; no active wave-formed or bedrock shoreline; and water depth in the deepest part is less than 6.6 feet at low water.
palustrine emergent (PEM)	A wetland characterized by erect, rooted, non-woody plants such as cattails, rushes, and sedges.
palustrine forested (PFO)	A wetland characterized by woody vegetation that is 20 feet tall or taller.
palustrine scrub-shrub (PSS)	A wetland characterized by areas dominated by woody vegetation less than 20 feet tall, such as trees, shrubs, or young trees that are stunted due to environmental conditions.
peak period	The period of the day during which the maximum amount of travel occurs. It may be specified as the morning (AM) or afternoon or evening (PM) peak.
priority habitats	Habitat types with unique or significant value to a diverse group of species.
recharge	Water, whether precipitation, surface water, or groundwater, that enters and adds to an aquifer.
recharge area	Land area important for retaining precipitation as part of the groundwater hydrology of the region.

Term	Meaning
reconnaissance-level field survey	A qualitative investigation, where the biologist walks the site, photographs key areas, and makes observations of plants and wildlife, to assess overall site conditions.
refugia habitat	An area of a stream that provides shelter or safety for aquatic species.
resident fish	Fish that do not migrate out to the ocean, but remain in fresh water.
restoration	To improve a disturbed or altered wetland by returning wetland parameters that may be missing.
retaining wall	A structure used to hold earth in place where the natural grade cannot be maintained.
retention/detention pond	A drainage facility designed to reduce stormwater runoff quantity and quality effects either by holding the increased runoff volume that results from development for a considerable amount of time, allowing the suspended particles to settle out, and then slowly releasing it through natural means on site; or by holding the runoff for a short period of time and then releasing it to the stormwater management system for treatment and discharge.
riffle	A shallow area of a stream or river in which water flows rapidly over a rocky or gravelly stream bed.
right-of-way	Land purchased prior to the construction of transportation improvements along with land for sound walls, retaining walls, stormwater facilities, and other project features. This also includes permanent or temporary easements for construction and maintenance. Vacant land may also be set aside for future highway expansion under certain circumstances.
riparian	Pertaining to anything connected with or immediately adjacent to the banks of a stream, river, or other waterbody.
riparian area	The land and habitat adjacent to streams, lakes, estuaries, or other waterways, comprising the transition area between the aquatic ecosystem and the nearby upland terrestrial ecosystem. Riparian corridors, or zones, identified by soil characteristics or plant communities, include the wet areas in and near streams, ponds, lakes, springs, and other surface waters.
runoff	Rainwater or snowmelt that leaves an area as a surface drainage.
salmonid	Any member of the family *Salmonidae*, which includes all species of salmon, trout, and char (including bull trout).

Term	Meaning
scrub/shrub wetland	Wetland dominated by woody vegetation less than 20 feet tall. The vegetation may include shrubs, young trees, and trees or shrubs that may be stunted because of environmental conditions. Scrub-shrub wetlands are flooded for extended periods during the growing season.
sediment	Material that originates from weathering and erosion of rocks, dirt, or unconsolidated deposits and organic material. Sediment is carried and deposited by wind, ice or water. It is often transported by stormwater runoff and may be suspended within the water.
seep	A spot where water trickles out of the ground to form a pool or wet area.
sensitive species	Any native wildlife species that is vulnerable or declining and is likely to become endangered or threatened throughout a significant portion of its range without cooperative management or removal of threats.
Shoreline Management Act (SMA)	Washington State legislation adopted in 1971 that requires local jurisdictions to create and implement a Shoreline Master Program. The purpose of the Shoreline Master Program is to regulate land use and new development within sensitive shoreline areas. Shorelines, according to the SMA, include all areas typically within 200 feet inland from principal bodies of water (rivers and streams with flows of at least 20 cubic feet per second, lakes over 20 acres, and tidal areas) and associated wetlands. The local Shoreline Master Program identifies standards of protection for shoreline areas, and typically contains shoreline policies, shoreline use environments or zones, and specific shoreline regulations. The final Shoreline Master Program is subject to approval by the State Department of Ecology.
shrubs/grasses land cover	Vegetated areas where woody plants (distinguished from a tree by their multiple stems and lower height) less than 20 feet tall, grasses and grass-like plants, or a combination of these are the predominant vegetation. See also: "forested land cover" and "maintained vegetation land cover."
single-occupant vehicle (SOV)	A vehicle having one occupant (i.e., the driver).
slope	The change in elevation over a distance, or an inclined land form.

Term	Meaning
species of concern	Species whose conservation standing is of concern to the U.S. Fish and Wildlife Service, but for which status information is still needed for consideration to list the species under the Endangered Species Act.
Spill Prevention Control and Countermeasures (SPCC) Plan	A plan for minimizing effects to soil, surface water, and groundwater in the event of a spill of contaminated soil, petroleum products, contaminated water, or other hazardous substances. The SPCC plan addresses construction procedures, equipment, and materials.
staging area	Locations used during construction to provide room for employee parking, large equipment storage, and material stockpiles.
State Environmental Policy Act (SEPA)	Washington State legislation adopted in 1974, that establishes an environmental review process for all development proposals and major planning studies prior to taking any action. SEPA includes early coordination to identify and mitigate any substantial issues or significant effects that may result from a project or study.
State-listed species	Species of wildlife that are considered to be at-risk and are protected by Washington State laws.
State monitor species	Wildlife species that are monitored by the Washington State Department of Fish and Wildlife for status and distribution to avoid their becoming threatened or endangered.
stormwater	The portion of precipitation that does not naturally percolate into the ground or evaporate, but flows overland, in channels, or in pipes into a defined surface water channel or a constructed stormwater facility.
stormwater detention	The process of storing stormwater in manmade facilities such as ponds or vaults and releasing the stormwater at a controlled rate. This helps control the volume and rate at which stormwater enters streams and rivers. Controlling the flow of stormwater helps maintain or improve conditions in the streams and minimizes erosion of stream banks.
study area	The area specifically evaluated for environmental effects.
substrate	Organic and mineral materials that form the bed of a body of water.
threatened species	Any species that is likely to become endangered within the foreseeable future throughout all or a substantial portion of its range.

Term	Meaning
topography	The physical features of a geographic area taken collectively; especially, the variations in elevation of the earth's surface.
tributary	A stream or other body of water that contributes its water to another stream or body of water.
understory	The vegetation of a forest that grows in the shade of the canopy (branches and foliage of mature trees meeting overhead). The understory usually consists of smaller herbaceous and shrub species such as ferns, various berries, and ivies.
upland (UPL)	Vegetative species that almost always occur in non- wetlands under normal conditions (estimated probability >99 percent).
uplands	An area that is not sufficiently wet to exhibit the vegetation, soils, and/or hydrologic characteristics associated with wetlands.
vegetative community	A unique and defined area of vegetation within an ecosystem that is composed of specific species of plants.
Water Resource Inventory Area (WRIA)	An administrative and planning area designated by the Washington State Department of Ecology for addressing water and aquatic resource management issues. Sixty-two WRIAs have been designated, corresponding to the state's major watershed basins. The terms WRIA and watershed are frequently used interchangeably, although a WRIA may include more than one watershed.
watershed	The region of land that drains into a specific body of water, such as a river, lake, sea, or ocean. Rain that falls anywhere within a given body of water's watershed will eventually drain into that body of water.
wetland	Areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.
wetland boundary	The point on the ground at which a shift from wetlands to non-wetlands or aquatic habitat occurs. These boundaries often follow topographic contours.

Term	Meaning
wetland hydrology	The inflow and outflow of water through a wetland and its interaction with other site factors. The 1987 Corps of Engineers Wetlands Delineation Manual indicates that an area meets the criterion if the area is inundated or saturated to the surface for at least 5 percent of the growing season in most years.

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SECTION 1 INTRODUCTION

What are the primary features of the I-405, Bellevue to Lynnwood Improvement Project?

The I-405, Bellevue to Lynnwood Improvement Project (Bellevue to Lynnwood Improvement Project) will add capacity, restripe existing pavement, and add transit shoulders. Although two build alternatives are being proposed, the additional pavement (footprints) for Build Alternatives 1 and 2 are the same. The difference between the two build alternatives is operational. These operational differences are implemented through different lane striping, and, in the case of Build Alternative 1, adding electronic equipment and signage to provide for tolling of the express toll lanes. Under both build alternatives, lanes that are not managed as express toll lanes or High-occupancy Vehicle (HOV) lanes will operate as general-purpose lanes.

Both Build Alternatives include the following improvement:

- Northbound (NB) lane between NE 124th Street and State Route (SR) 522
- Braided ramps between the I-405 NB on-ramp from NE 160th and the NB I-405 off-ramp to SR 522
- Southbound (SB) transit shoulders between SR 522 and NE 160th Street and between SR 527 and NE 195th Street
- New NB and SB structures over NE 132nd Street and a new NB structure over the railroad for the I-405 NB off-ramp to NE 124th Street

Build Alternative 1

Build Alternative 1 will result in a two-lane express toll lane system in both directions between NE 6th Street and SR 522, transitioning to a one-lane express toll lane system in both directions between SR 522 and I-5. Under this alternative, the proposed express toll lanes will replace the existing HOV lane and the general-purpose lane south of SR 522 that will be built as part of the Kirkland Nickel Project.

Build Alternative 2

Build Alternative 2 will retain the current one-lane HOV system in both directions throughout the project length from

SR 520 to I-5. This alternative would make minor improvements to the existing HOV system; however, it is assumed that the HOV lane occupancy requirement will change from 2+ to 3+ in response to current Washington State Department of Transportation (WSDOT) and Federal Highway Administration (FHWA) policy.

What is the purpose of this report?

The purpose of the Bellevue to Lynnwood Improvement Project Ecosystems Discipline Report is to define and describe ecosystems in the study area. An ecosystem is a system formed by the interaction of organisms within their physical environment. This report identifies the environments, or habitats, that are part of the ecosystem in the study area, as well as the plants and animals living in these environments. This discipline report also identifies the effects that constructing or not constructing the project will have on ecosystems.

What topics are included in the Ecosystems Discipline Report?

There are many environments, or habitats, and organisms within an ecosystem. This discipline report, however, focuses on three elements of an ecosystem: wetlands, aquatic resources, and wildlife habitat. This report concentrates on these three elements because they are the most likely to be affected by the project.

Wetlands

Wetlands are areas that are inundated or saturated by surface water or groundwater frequently enough, and for long enough periods of time, to support vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas. Twenty-one wetlands have been identified in the study area.

Aquatic Resources

Aquatic resources are defined as aquatic environments, such as streams, rivers, and lakes, and the organisms that inhabit these environments. This report primarily focuses on fish species that inhabit the waterbodies in the study area.

There are twelve aquatic resources that cross I-405 in the study area: Yarrow Creek, C5, Juanita Creek at NE 124th Street, Juanita Creek at NE 132nd Street, Juanita Creek at NE 145th Street, C28, C29, KL14, Stream 42, Sammamish River, Stream 64, and Stream 66. Many fish species use the streams and river, including both resident and anadromous fish. The primary resident fish species are cutthroat trout (*Oncorhynchus clarki*), sculpin (*Cottus* species), three-spine stickleback (*Gasterosteus aculeatus*), and longnose dace (*Rhinichthys cataractae*). Coho salmon (*Oncorhynchus kisutch*) is the principal anadromous fish using the streams; the Sammamish River is used by steelhead (*O. mykiss*), sockeye (*O. nerka*), coho, and Chinook salmon (*O. tshawytscha*).

Wildlife Habitat

Habitat is defined as areas that may be important to wildlife for feeding, migrating, resting, and breeding. Wildlife habitat in the study area consists of forests, shrubs, and grasses, or maintained vegetation, such as landscaping or roadside vegetation that is maintained for safety purposes.

Why are ecosystems important to consider?

Ecosystems are important to consider for many reasons. Wetlands, aquatic resources, and wildlife habitats are integral to the long-term viability and sustainability of the area's ecosystems. These resources provide plants or animals with areas to live, grow, and reproduce. These habitats provide the plants and animals in the study area with adequate food, water, shelter, and living space.

Various local, state, and federal agencies exist to ensure the protection of wetlands, aquatic resources, and wildlife habitats, and their regulations are in place to guide resource-friendly development. Identifying wetlands, aquatic resources, and wildlife habitats that exist in the study area and understanding their functions is critical to protecting these resources.

What studies were completed?

The I-405 Team gathered existing information on wetlands, aquatic resources, uplands, and wildlife for the study area through literature and Internet research, and by conducting interviews with various federal, state, county, and local

agencies, and tribal representatives. The team also reviewed information collected on these resources from the I-405, SR 520 to SR 522 Kirkland Nickel Improvement Project (Kirkland Nickel Project); the I-405/NE 195th Street to SR 527 – Northbound Auxiliary Lane Project; and the I-405, NE 8th Street to SR 520 Improvement Project (NE 8th to SR 520). This report relies, in part, on information collected for these three projects.

Additional information to determine the quantity and quality of existing ecosystem resources was gathered by conducting delineations on the wetlands, conducting surveys on the streams and rivers, and identifying vegetation types and wildlife habitat in the study area.

Additional general information was collected during a series of interdisciplinary team site visits where experts in the fields of fisheries, wetlands, wildlife, road design, drainage design, and permitting reviewed the natural and manmade features located in the study area.

The information collected was then compared to the project footprint to assess potential temporary and permanent effects.

What are the key messages from this report?

The Bellevue to Lynnwood Improvement Project study area contains important wetlands, aquatic resources, and wildlife habitats that are integral to the long-term viability and sustainability of the area's ecosystems. Construction of the Bellevue to Lynnwood Improvement Project will have temporary and permanent effects on these resources.

Effects to wetlands include the permanent partial or whole filling of wetlands or wetland buffers in the study area. Filling or modification of wetlands and wetland buffers could affect the water quality, hydrologic, and habitat functions of the wetlands.

Streams in the study area will be both permanently and temporarily affected by the project. Effects to wetlands and streams are primarily associated with construction-related activities including removing wetland and riparian vegetation, stream diversions and in-water work, extending culverts, temporary filling of wetlands and streams, and sedimentation.

Upland vegetation in the study area will be affected by the addition of impervious surface in the study area, the

conversion of existing vegetation communities to a different type of habitat, and the reduction of upland habitats available in the study area.

Some of project effects will be beneficial. The project will provide treatment for stormwater runoff, which will improve the quality of water entering streams in the study area. The project will also provide mitigation for streams and wetlands affected by the project. Proposed mitigation will result in improved habitat conditions of streams and wetlands in the project area.

What measures are proposed to avoid or reduce effects?

Build Alternative 1

The Bellevue to Lynnwood Improvement Project will be designed to avoid adverse effects to ecosystems to the extent practicable. During construction, WSDOT will require that appropriate best management practices (BMPs) and conservation measures be implemented to reduce potential construction effects to natural resources. Mitigation measures to offset project effects will be performed in accordance with applicable local, state, and federal regulations that govern ecosystems discussed in this discipline report.

Measures to minimize effects from construction include: adding retaining walls to reduce the area of fill in wetlands and streams; limiting in-stream work to times of the year when fish are not likely to be present; limiting the duration of in-stream work to minimize effects to streams and fish; limiting construction activities to the smallest area and shortest duration practicable; and revegetating disturbed areas to reduce effects to wildlife habitat and terrestrial species.

Where effects to wetlands, aquatic resources, and wildlife habitat are unavoidable, mitigation activities will be implemented to offset the effects to these resources. WSDOT will mitigate for permanent effects to wetlands at the Kelsey Creek wetland mitigation site. Mitigation will include wetland creation, wetland enhancement, and wetland buffer enhancement. The enhancements include excavation of fill materials, planting of wetland vegetation, and planting of native upland vegetation to increase and enhance wetland buffers. Similarly, unavoidable effects to streams will be offset

at two on-site, in-kind mitigation sites (Sammamish River and C28) to compensate for the stream functions and values affected by the project.

Build Alternative 2

Since Build Alternative 1 and Build Alternative 2 share the same footprint, effects to ecosystems are the same for both alternatives. Thus, measures to avoid or reduce effects to wetlands, aquatic resource, and wildlife habitat for Build Alternative 2 are the same as for Build Alternative 1.

No Build Alternative

We anticipate no effects to wetlands, aquatic resources, or wildlife habitat from the No Build Alternative. Thus, measures to avoid or reduce effects to these three elements are not necessary.

SECTION 2 PROJECT DESCRIPTION

What is the intent of the Bellevue to Lynnwood project and what are the improvements?

The Bellevue to Lynnwood Improvement Project is intended to improve safety and reduce congestion along I-405 between NE 6th Street in Bellevue and I-5 in Lynnwood. To accomplish this, WSDOT proposes the following improvements:

- Northbound lane from NE 124th Street to SR 522;
- Braided ramps between the I-405 northbound on-ramp from NE 160th Street and the northbound I-405 off-ramp to SR 522;
- Southbound transit shoulders between SR 522 and NE 160th Street and between SR 527 and NE 195th Street;
- New northbound and southbound structures over NE 132nd Street and a new northbound structure over the railroad for the I-405 northbound off-ramp to NE 124th Street; and
- Small amounts of additional widening, between four and eight feet, at several locations for buffers, wider shoulders, tolling equipment, enforcement areas and maintenance pull-outs.
- Minor upgrades to pedestrian facilities in some interchange areas.

Exhibit 2-1 shows the Bellevue to Lynnwood project vicinity. Exhibit 2-2, sheets 1 through 17, shows more detail of the project improvements in the 17-mile long corridor.

What are braided ramps?

Braided ramps vertically separate movements with bridge structures to eliminate traffic conflicts between closely-spaced on-ramps and off-ramps.

What is a transit shoulder?

A transit shoulder is a freeway shoulder that is designated for use by buses during specific hours to avoid congestion in the general purpose lanes. Transit shoulders improve the appeal of transit by helping to maintain travel time and trip reliability. They also have a positive effect on the general purpose lanes, because buses cannot accelerate as quickly as vehicles and tend to slow traffic. Speeds for buses using the transit shoulder are usually restricted to ensure safety. Transit shoulders are always available as a refuge for disabled vehicles or incidents, which would close the transit shoulder to bus travel.

Are there related projects?

The Bellevue to Lynnwood Improvement Project is designed to compliment other projects along I-405 including:

- Kirkland Nickel Stage 1 Project, which added one lane in each direction between NE 85th Street and NE 124th Street and opened to traffic in November 2007;

- NE 195th to SR 527 Auxiliary Lane Project, which added one northbound lane between NE 195th Street and SR 527 and opened to traffic in June 2010; and
- NE 8th Street to SR 520 Braided Ramps Project, which creates new multi-level "braided" ramps to separate vehicles entering and exiting northbound I-405 between NE 8th Street and SR 520 and is anticipated to be open to traffic during the summer of 2012.

What are baseline conditions?
Baseline conditions for the Bellevue to Lynnwood Improvement Project represent what will exist in the future after the Kirkland Nickel Project and the NE 8th Street to SR 520 Braided Ramps Project are complete. Baseline conditions provide an important point of comparison for understanding the effects of the proposed build alternatives.

Kirkland Nickel Project Stage 2 improvements are a baseline condition for natural environmental analyses such as ecosystems, water resources, and soils and geology, but not for traffic and transportation analysis.

The Kirkland Nickel Stage 2 Project will reconfigure the NE 116th Street interchange, build northbound and southbound lanes between NE 70th Street and NE 85th Street, and a southbound lane between SR 522 and NE 124th Street, and between NE 70th Street and SR 520. The Kirkland Nickel Stage 2 project has been environmentally cleared and permitted, and, along with the other projects mentioned in this section, is considered part of the baseline conditions for this analysis (see "*What are baseline conditions?*" sidebar). The Bellevue to Lynnwood Improvement Project will be constructed at the same time.

What will the completed project provide?

The Bellevue to Lynnwood Improvement Project fills in the remaining gaps and allows WSDOT to provide an improved system on I-405 between NE 6th Street and I-5. WSDOT has designed this project to maximize the use of existing pavement and minimize the need for new pavement. In some areas, small amounts of widening of less than a lane width, together with narrower shoulders and lanes, will allow an additional lane. In other areas, narrowing the shoulders and lanes will allow an additional lane without any pavement widening.

Exhibit 2-3 shows the configuration in each of the project segments when this project and the related projects described above are complete.

How will this portion of I-405 be operated after the project is completed?

In this environmental document, WSDOT and FHWA are considering two operational alternatives: 1) Express Toll and General Purpose Lanes (ETL); and 2) High Occupancy Vehicle and General Purpose Lanes (HOV). Under both scenarios, the project footprint is the same. The occupancy requirement for

HOVs in this portion of the I-405 corridor is the same. It is assumed the occupancy requirement, to maintain HOV performance standards under WSDOT's HOV policy, will be three or more people (HOV 3+). The difference is in how the roadway lanes would be managed.

What is WSDOT's HOV Policy?

WSDOT has established performance standards to ensure that the state's freeway HOV system provides reliable travel time and dependability for transit users and carpoolers. Speeds and reliability of the HOV system are monitored year-round.

It is WSDOT's current policy that vehicles in an HOV lane should be able to maintain an average speed of 45 mph or greater at least 90% of the time during the morning and afternoon rush hour.

Alternative 1: Express Toll and General Purpose Lanes (ETL)

This operational alternative will provide two express toll lanes in each direction between NE 6th Street in Bellevue and SR 522 in Bothell, and one express toll lane in each direction between SR 522 and I-5 in Lynnwood. The express toll lane system will be open toll free to all HOV traffic with three or more occupants and all transit vehicles. The express toll lane system will also be open to single occupant vehicles (SOVs) and HOVs with two occupants through tolling.

The southern end of the express toll lane system will be at the existing direct access ramps at NE 6th Street in Bellevue where one of the two northbound express toll lanes will begin and one of the two southbound express toll lanes will end. South of the NE 6th Street, the other express toll lanes will connect with the existing single northbound and southbound HOV lanes. The northern end of the system would be much like it is today with I-405 becoming SR 525. Access points will be at various locations along the mainline as shown in Exhibit 2-4. The express toll lanes will be separated from the general purpose (GP) lanes by a two- to four-foot wide buffer. At an access point, the buffer will open and a section of transition lane may be provided between the express toll and general purpose lanes to ease ingress and egress to the system.

What are express toll lanes?

Express toll lanes preserve trip reliability for transit and HOV users, while providing a new option to other motorists who choose to pay a toll when lane capacity is available. Express toll lanes on I-405 would be similar to the express toll lanes on SR 167.

Express toll lanes have been successfully implemented in several locations around the U.S: State Route 91 in Orange County; I-15 in San Diego; I-25 in Denver; and I-394 in Minneapolis to name a few. WSDOT is working with engineers from these existing facilities to capture lessons learned.

Alternative 2: High Occupancy Vehicle and General Purpose Lanes (HOV)

This operational alternative will allow HOV users with three or more occupants and transit vehicles to use the single HOV lane, similar to today's operation. Access between the HOV lane and GP lanes will be allowed throughout the project, except northbound between NE 6th Street and SR 520 where access is not allowed under today's operation. The new northbound lane between NE 124th Street and SR 522 will be operated as a GP lane.

What will conditions be like if the project is not built?

No Build Alternative

A No Build Alternative has been evaluated as the basis for comparing effects associated with the Build Alternatives. No new improvements would be made beyond those constructed as a part of the Kirkland Nickel Project Stage 2, the NE 8th Street to SR 520 Braided Ramps Project, and the NE 195th Street to SR 527 Auxiliary Lane Project.

The No Build Alternative does not include additional stormwater treatment or any roadway improvements that would increase roadway capacity, reduce congestion, or improve safety on I-405. Only routine activities such as road maintenance, repair, and minor safety improvements would occur. As with the two build alternatives, we assume that the occupancy requirement for HOVs in this portion of the I-405 corridor will be three or more people (HOV 3+).

Exhibit 2-1: Project Vicinity

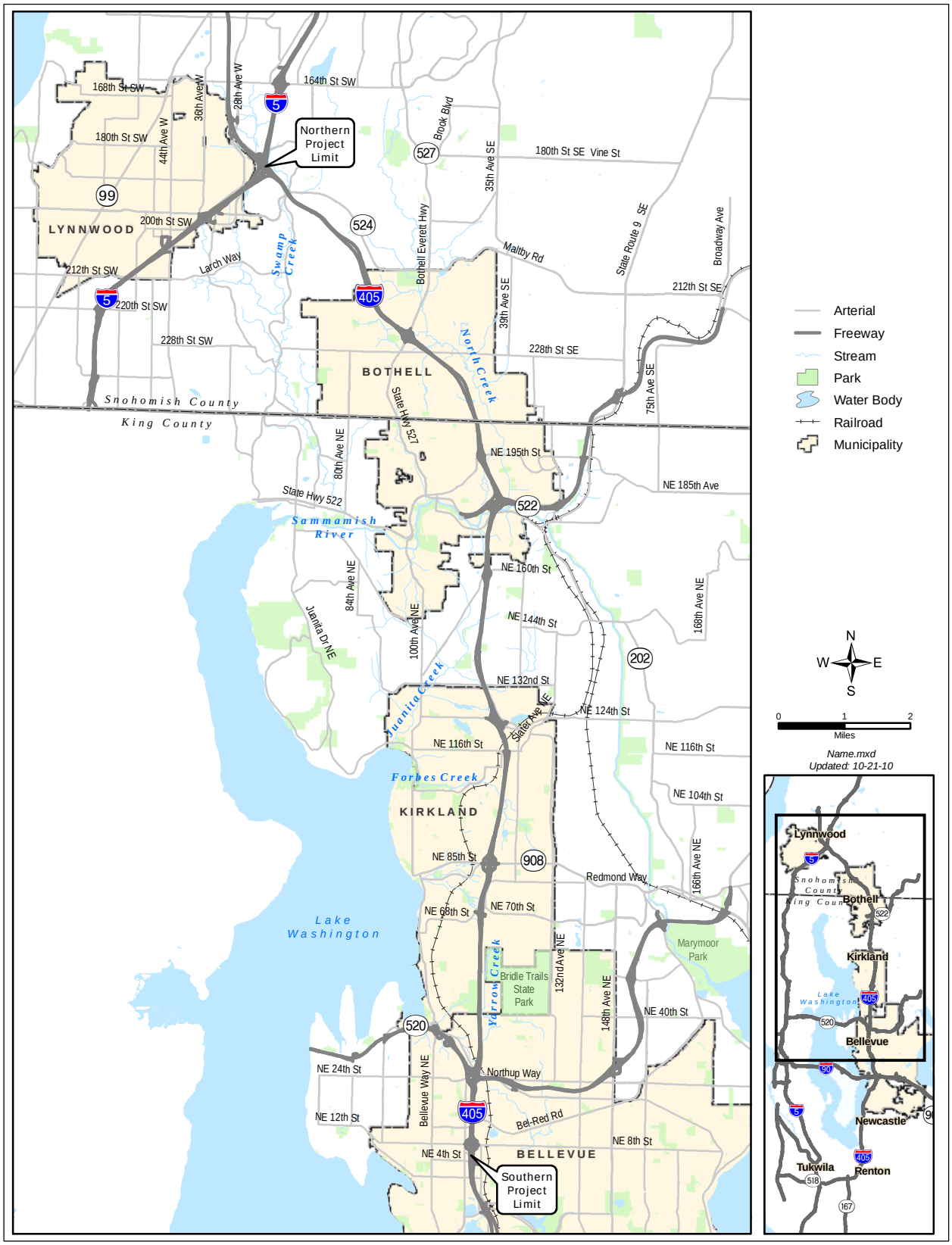


Exhibit 2-2: Project Improvements – Sheet 1 of 17

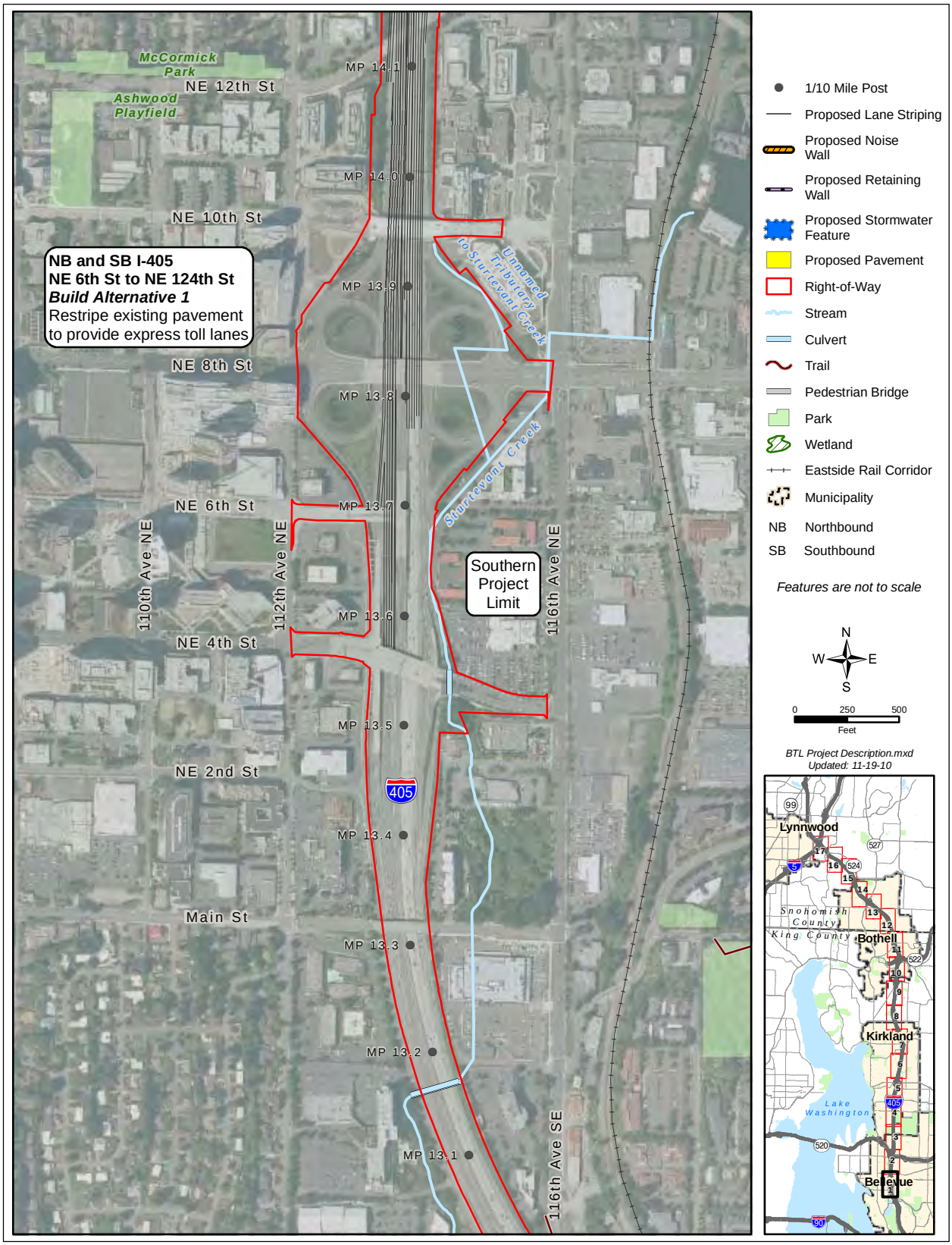
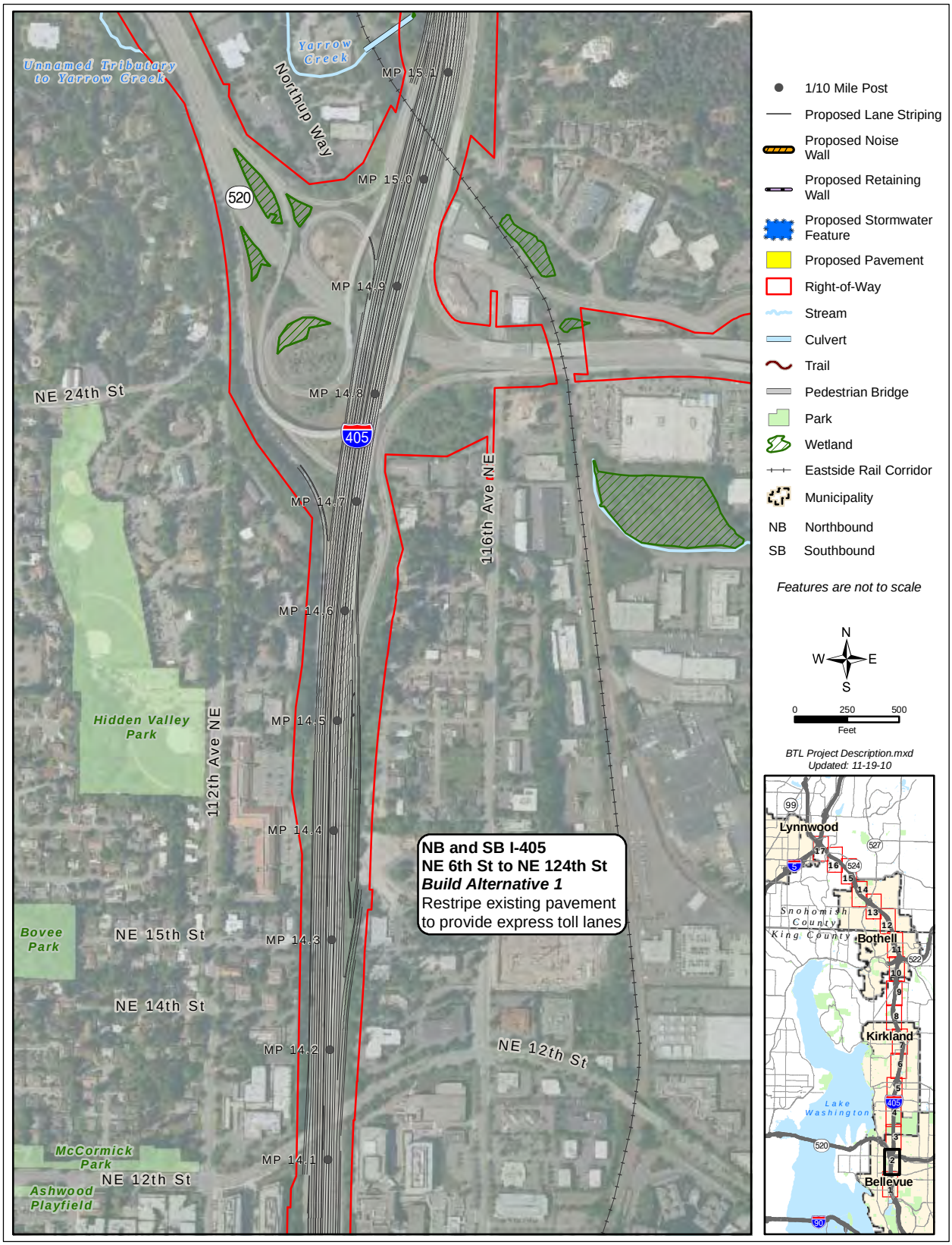


Exhibit 2-1: Project Improvements – Sheet 2 of 17



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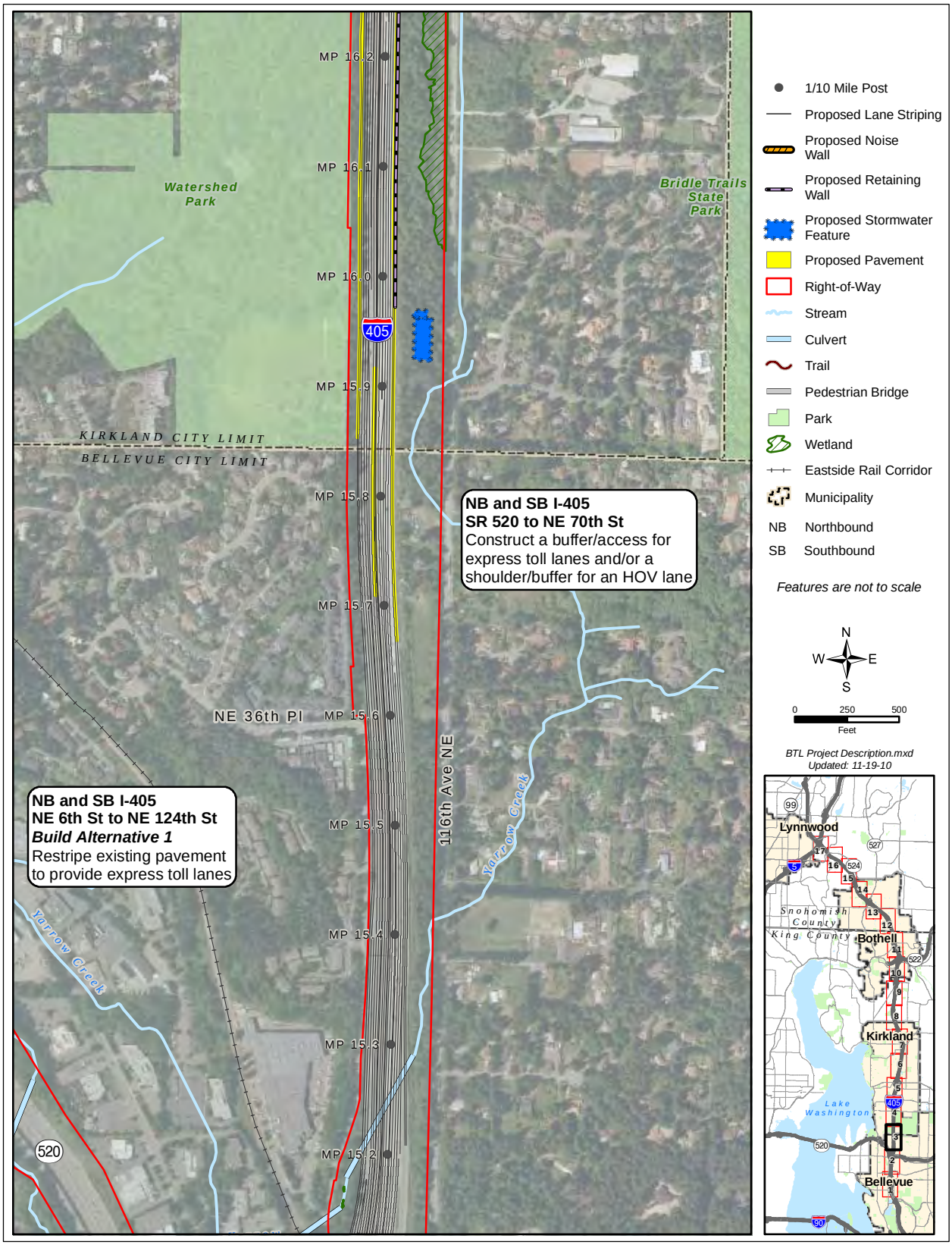

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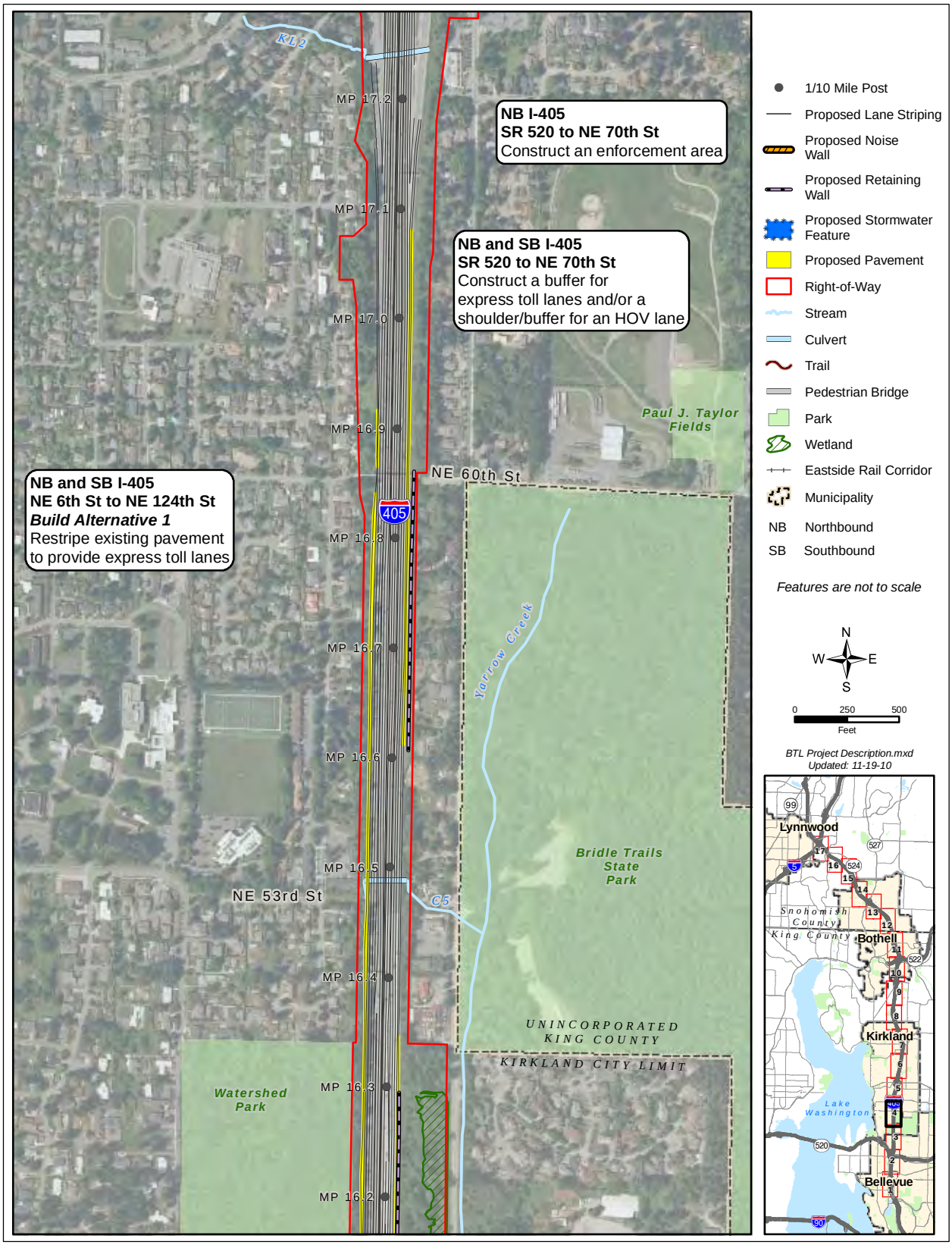

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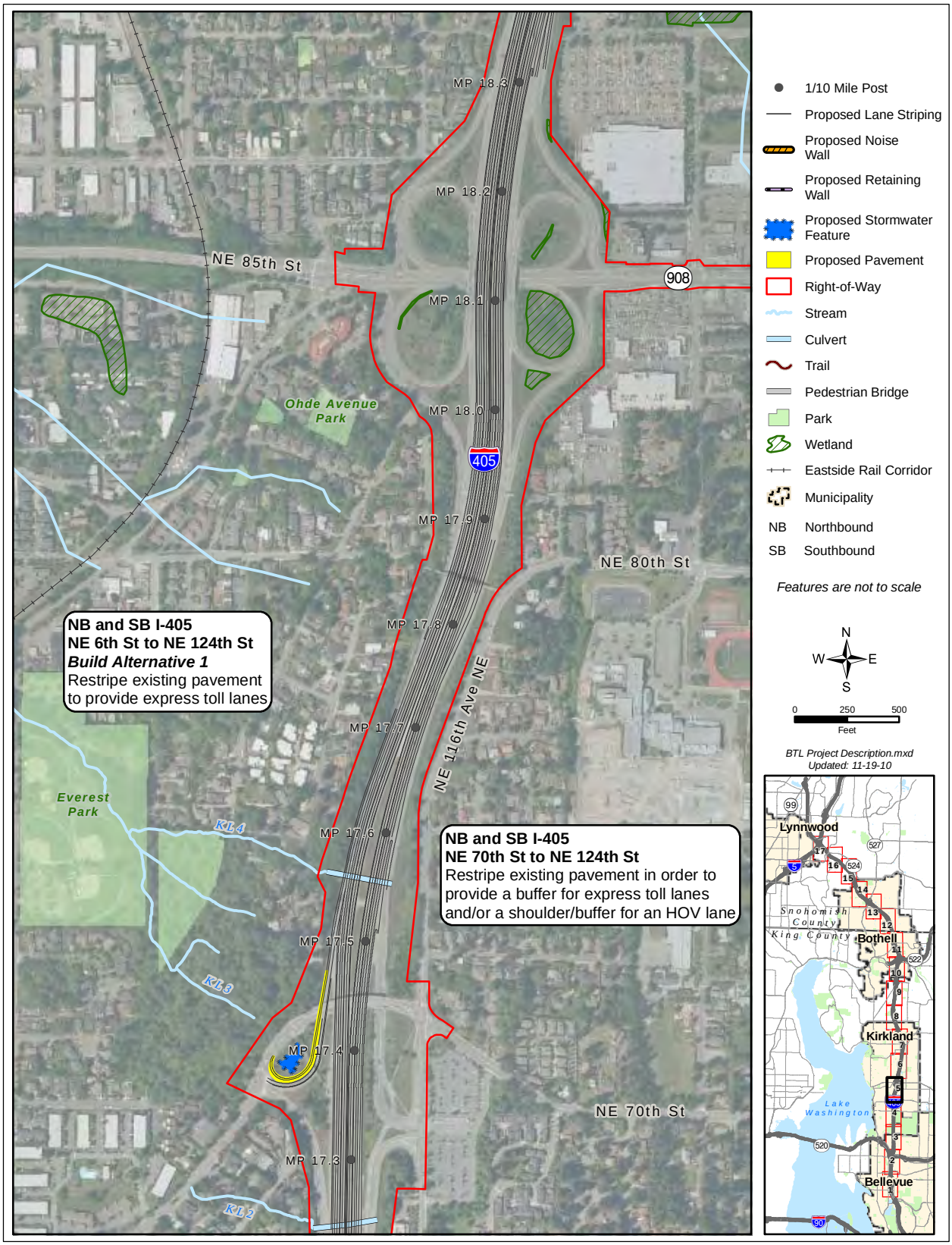

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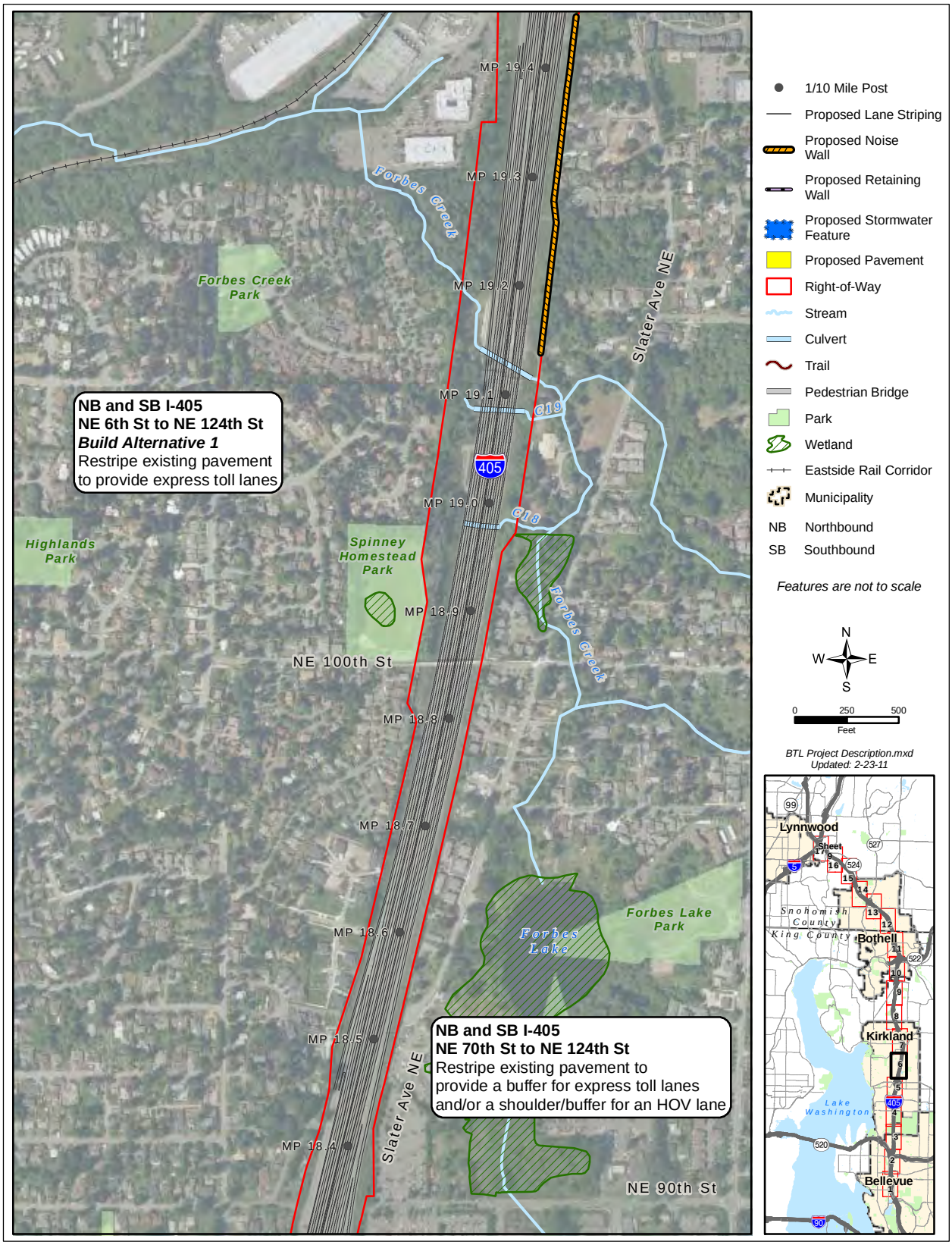

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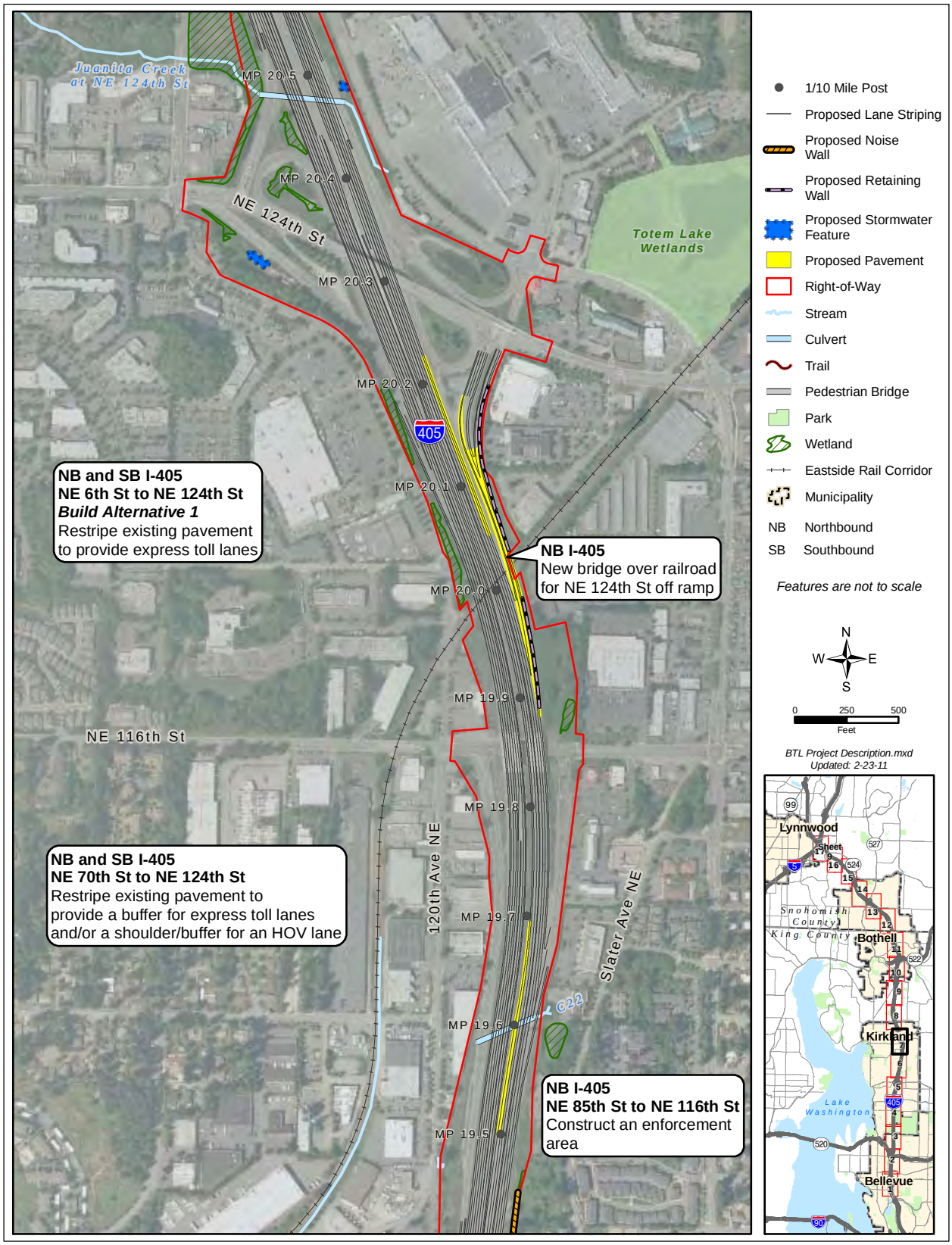

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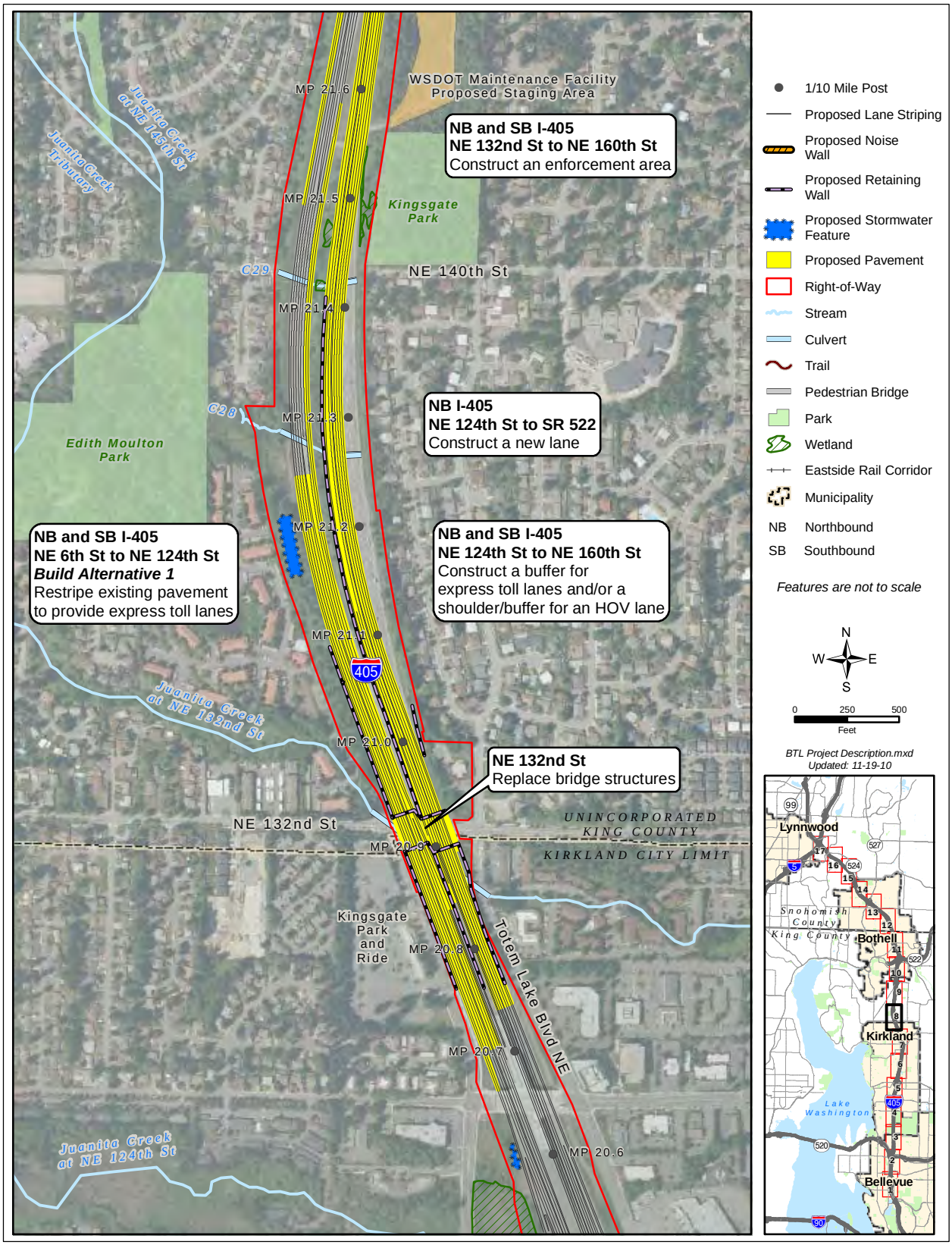

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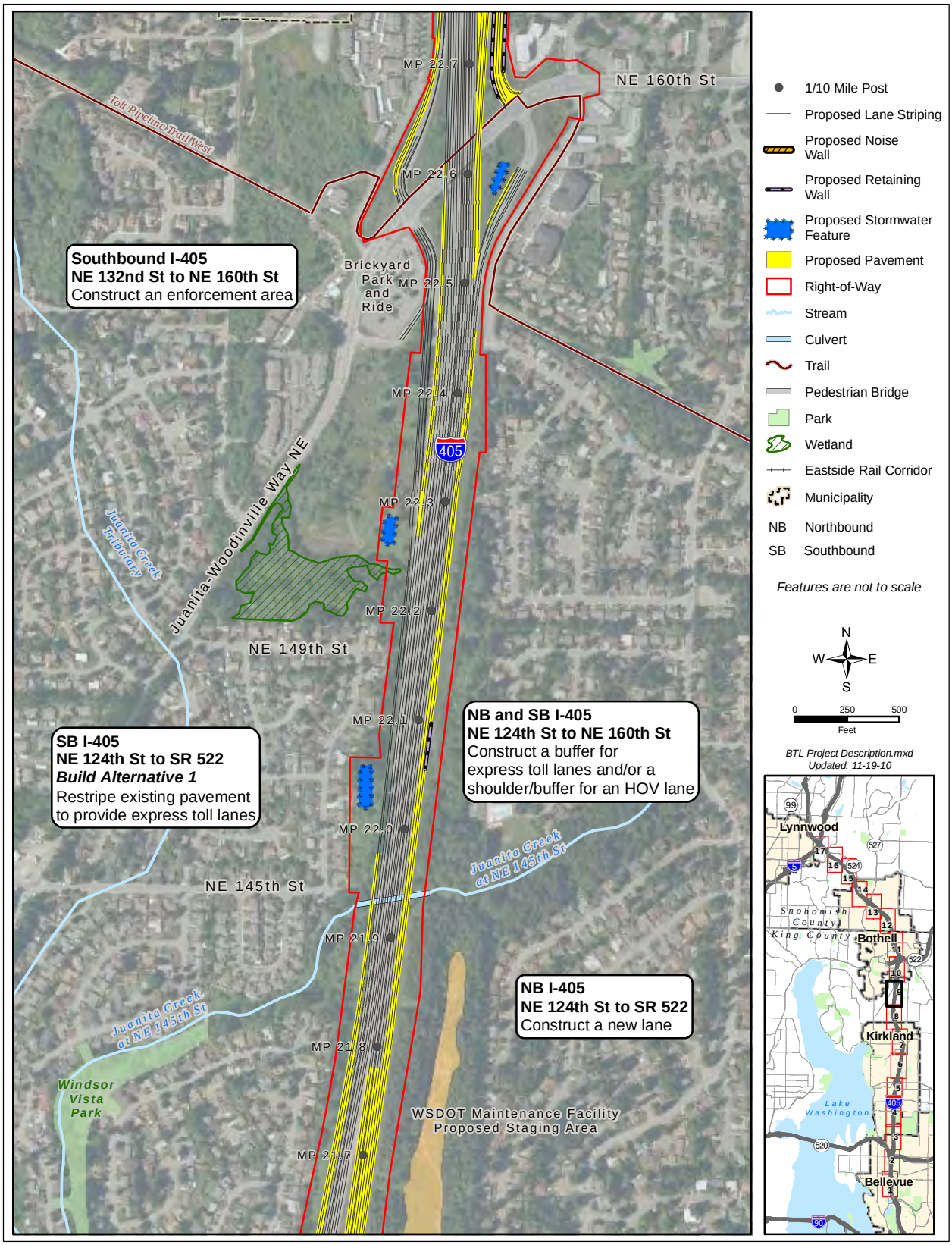

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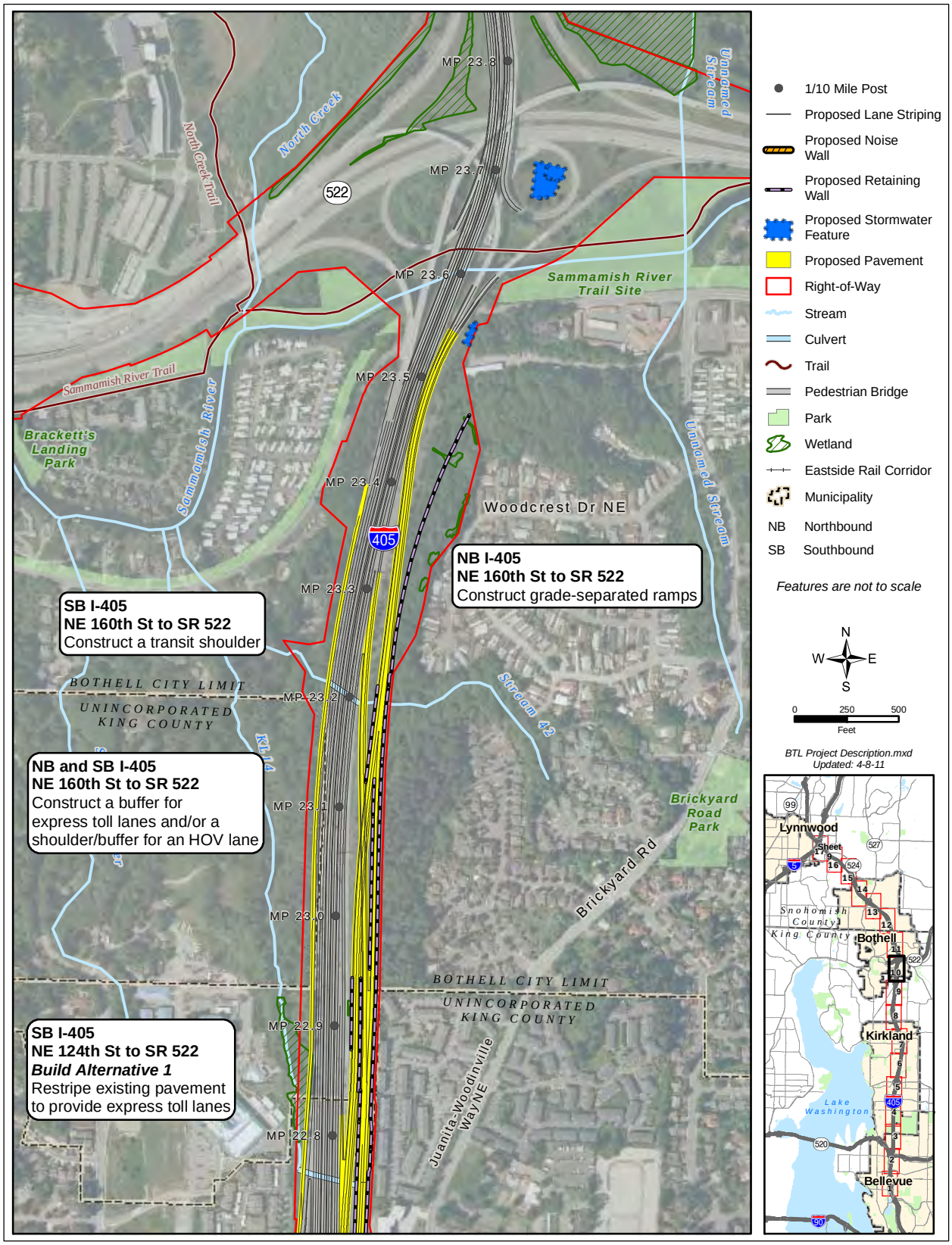

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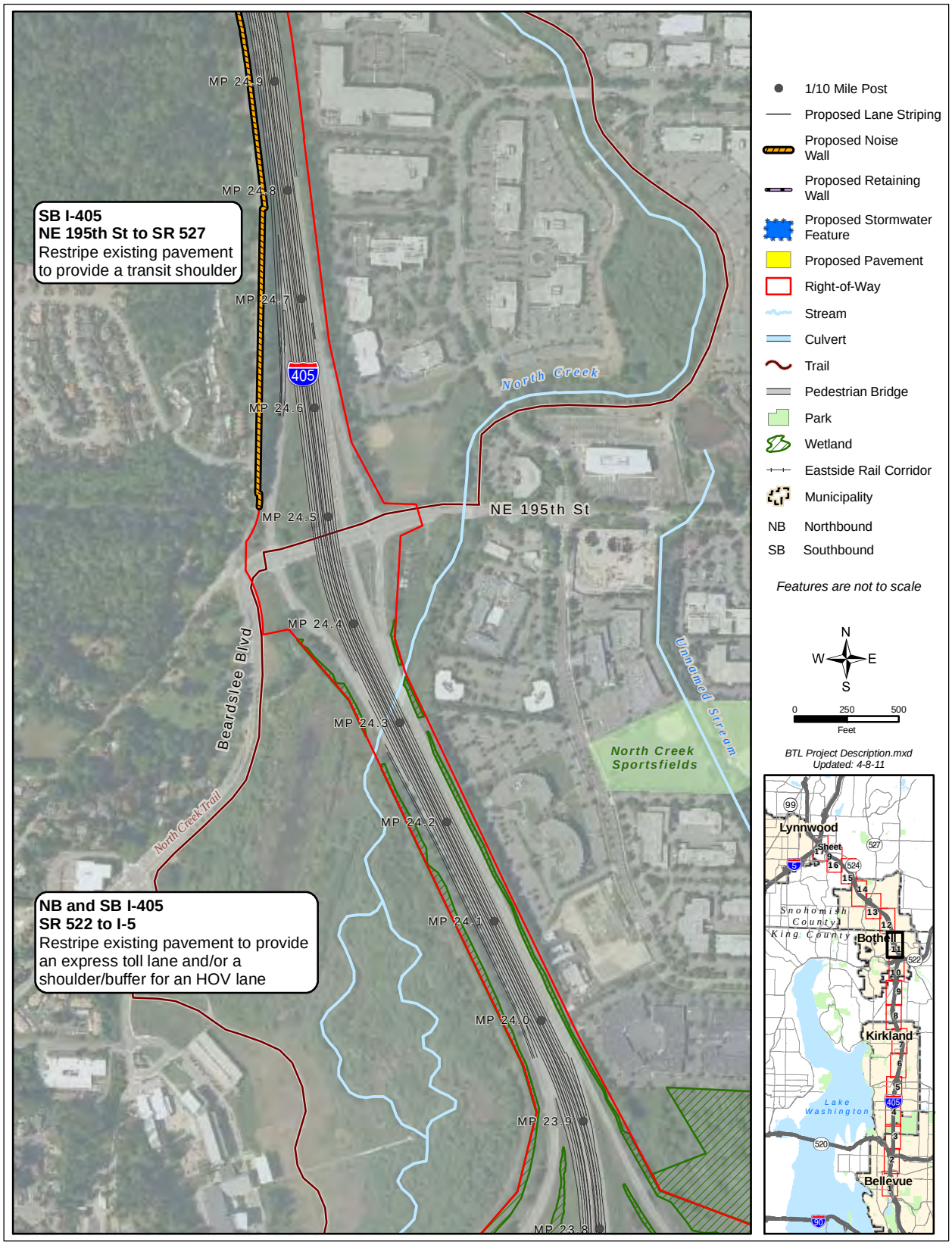

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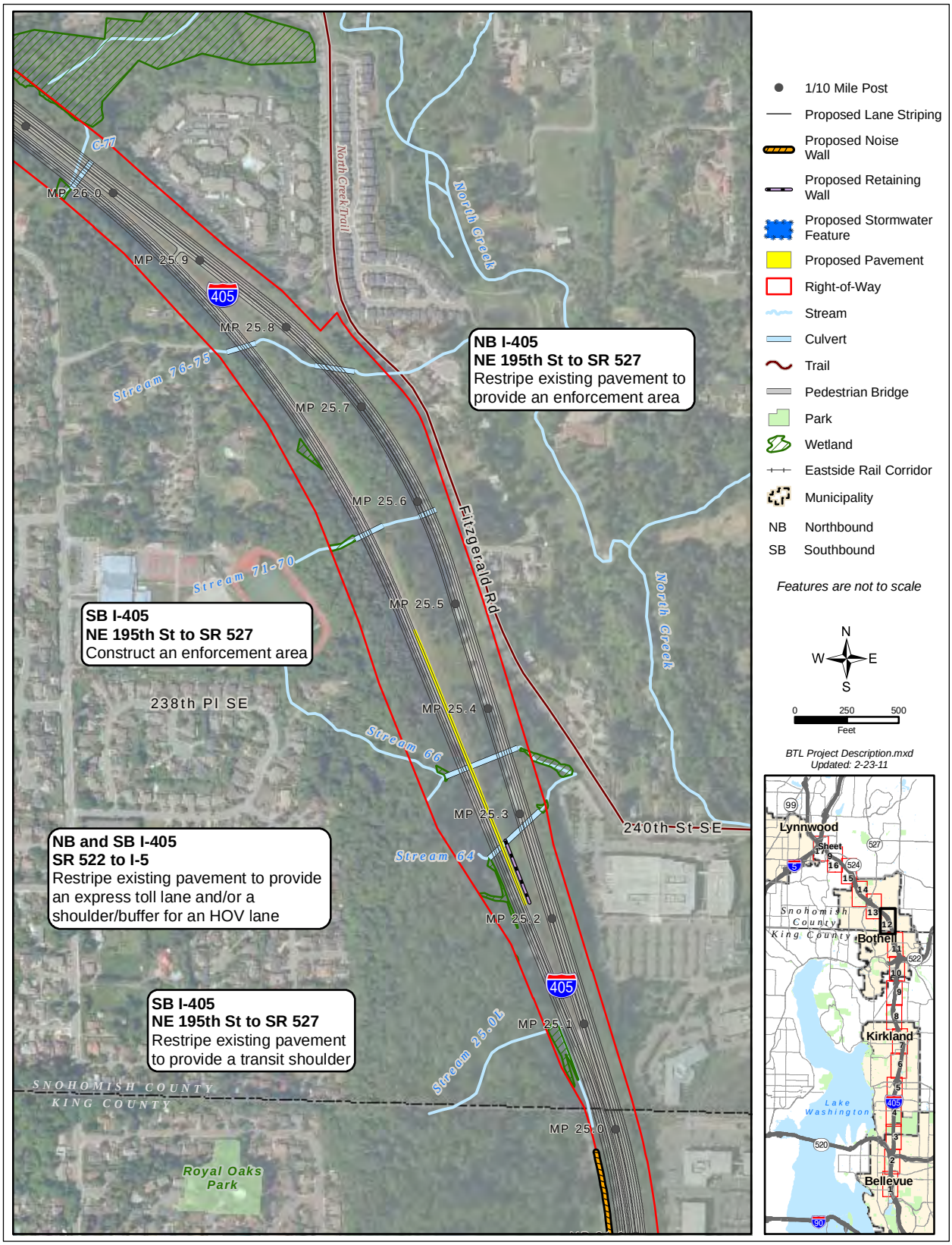

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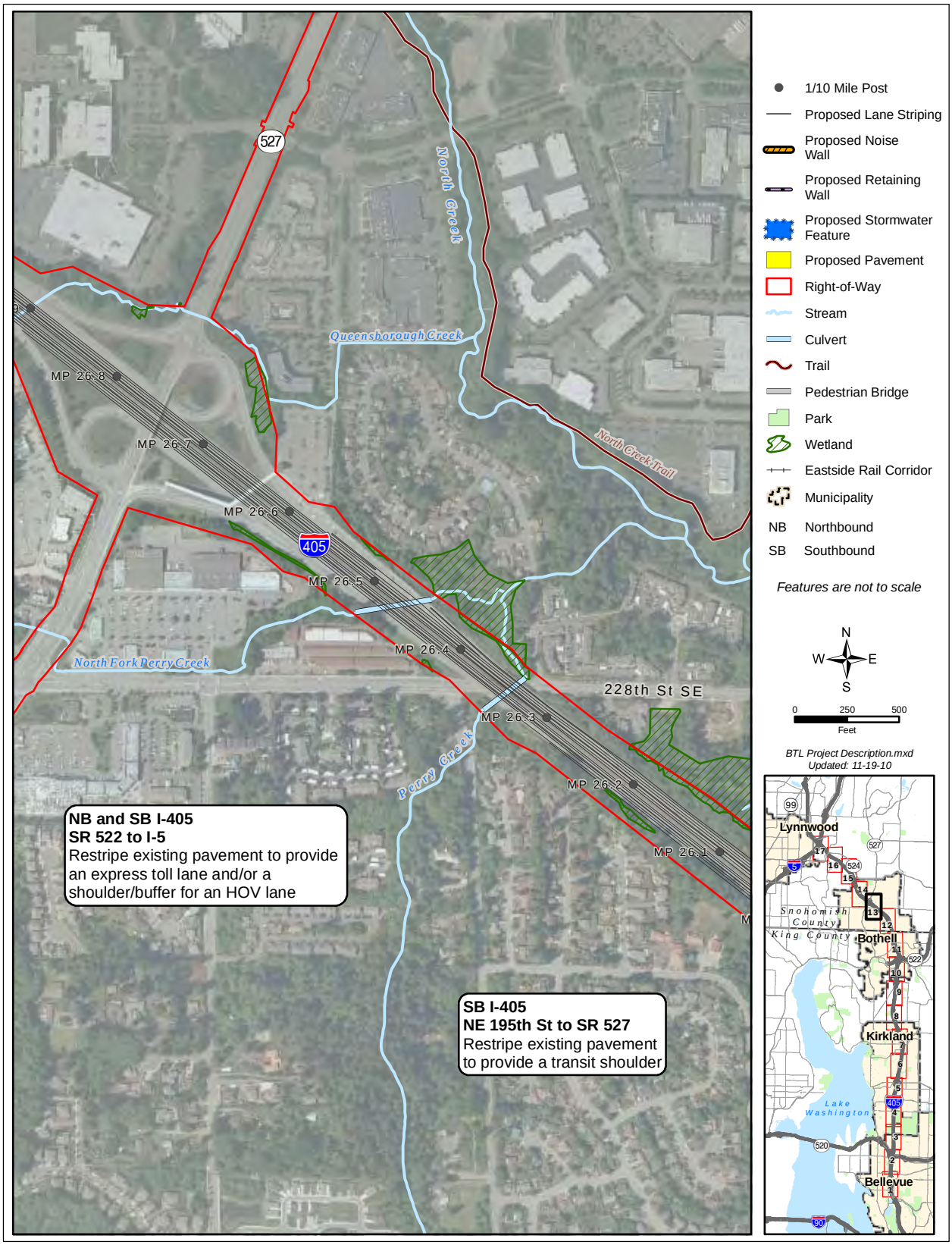

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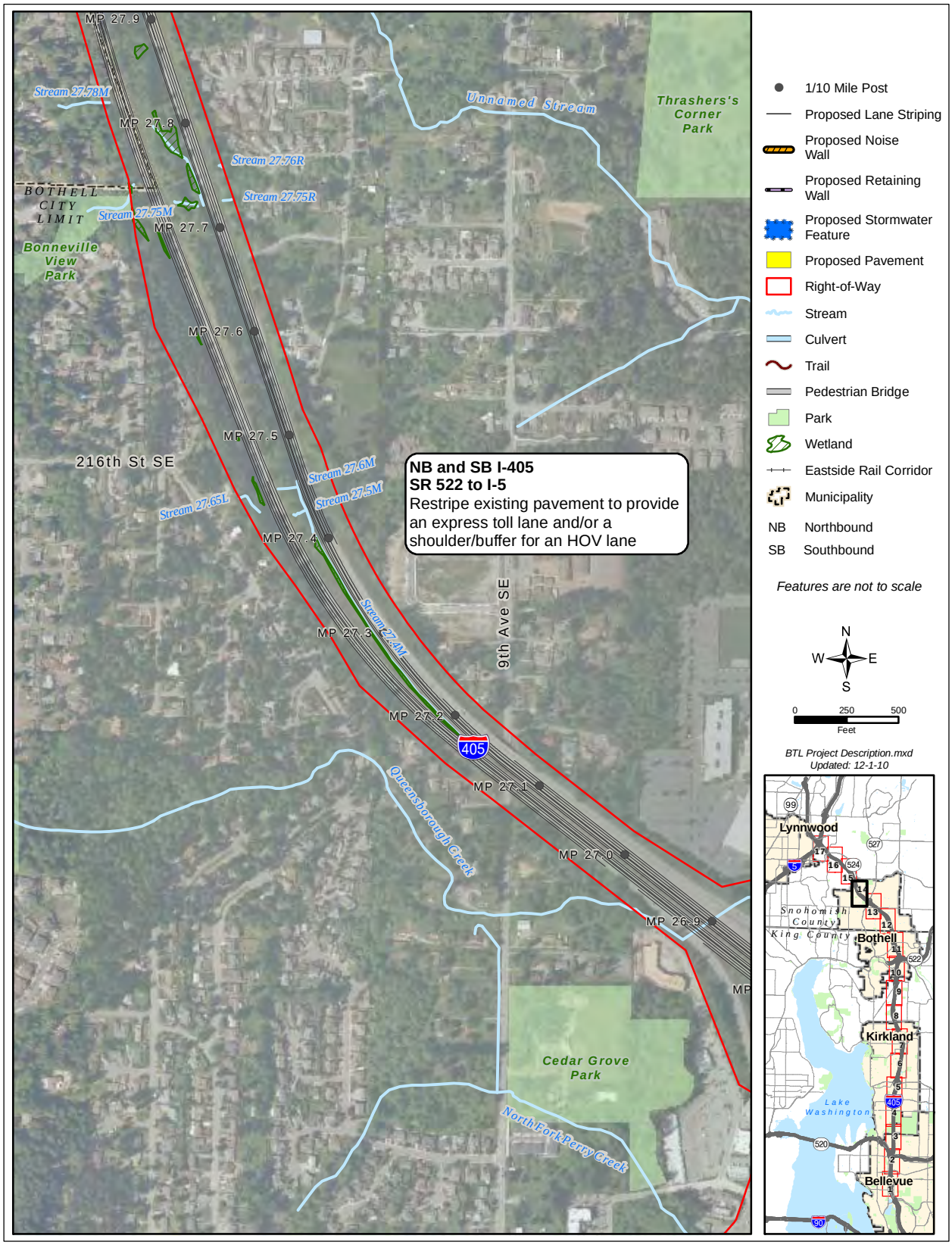

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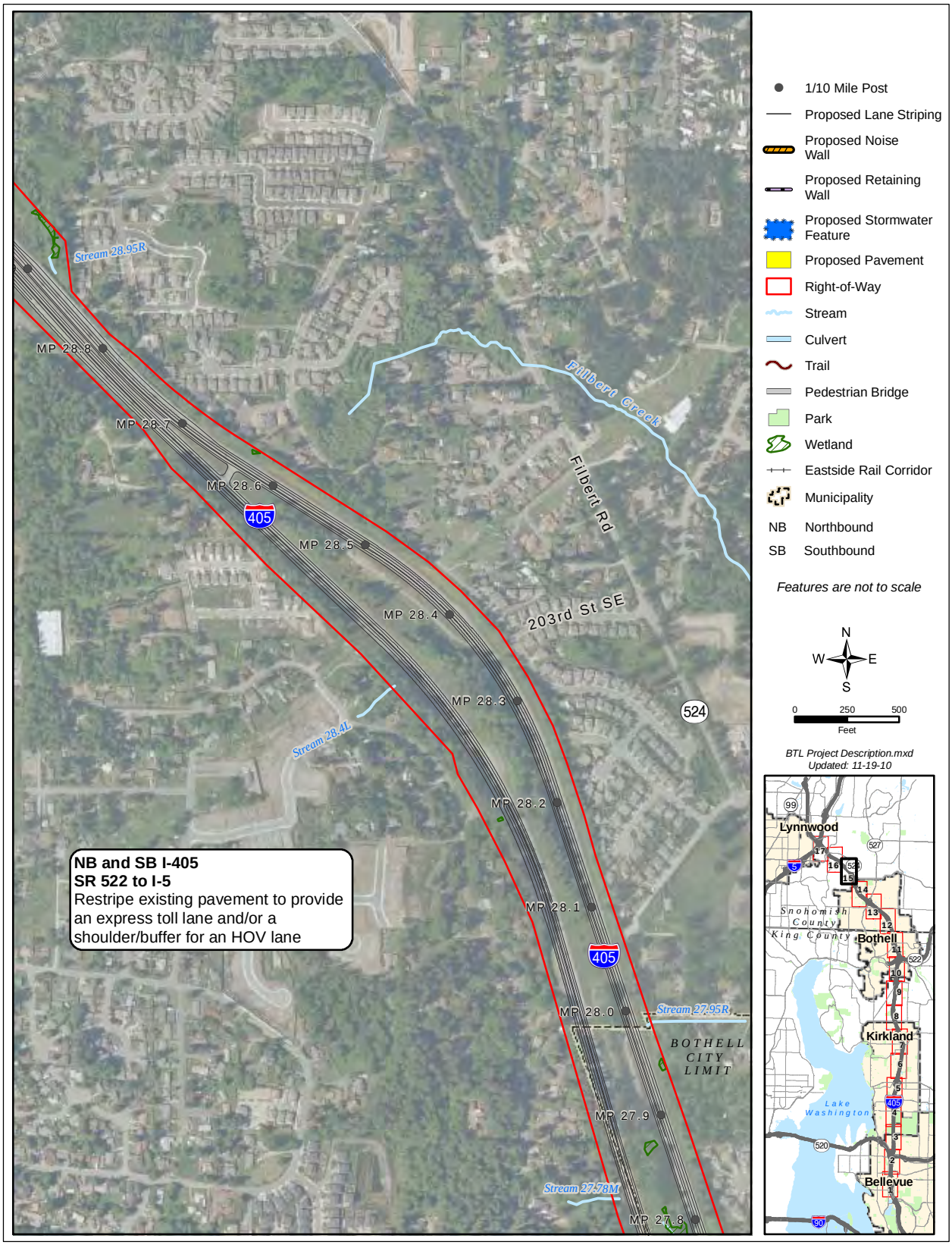

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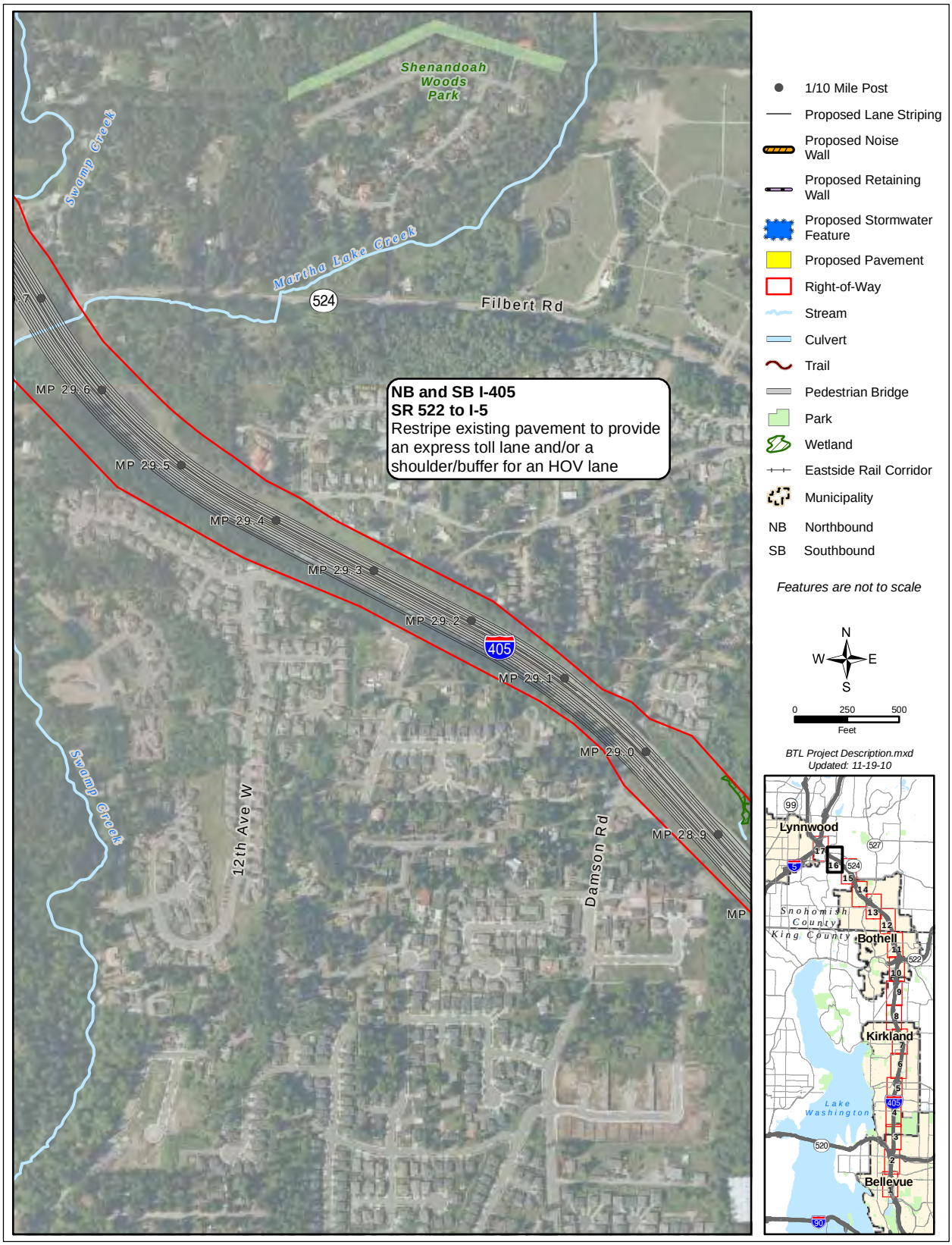


Exhibit 2-2: Project Improvements – Sheet 17 of 17

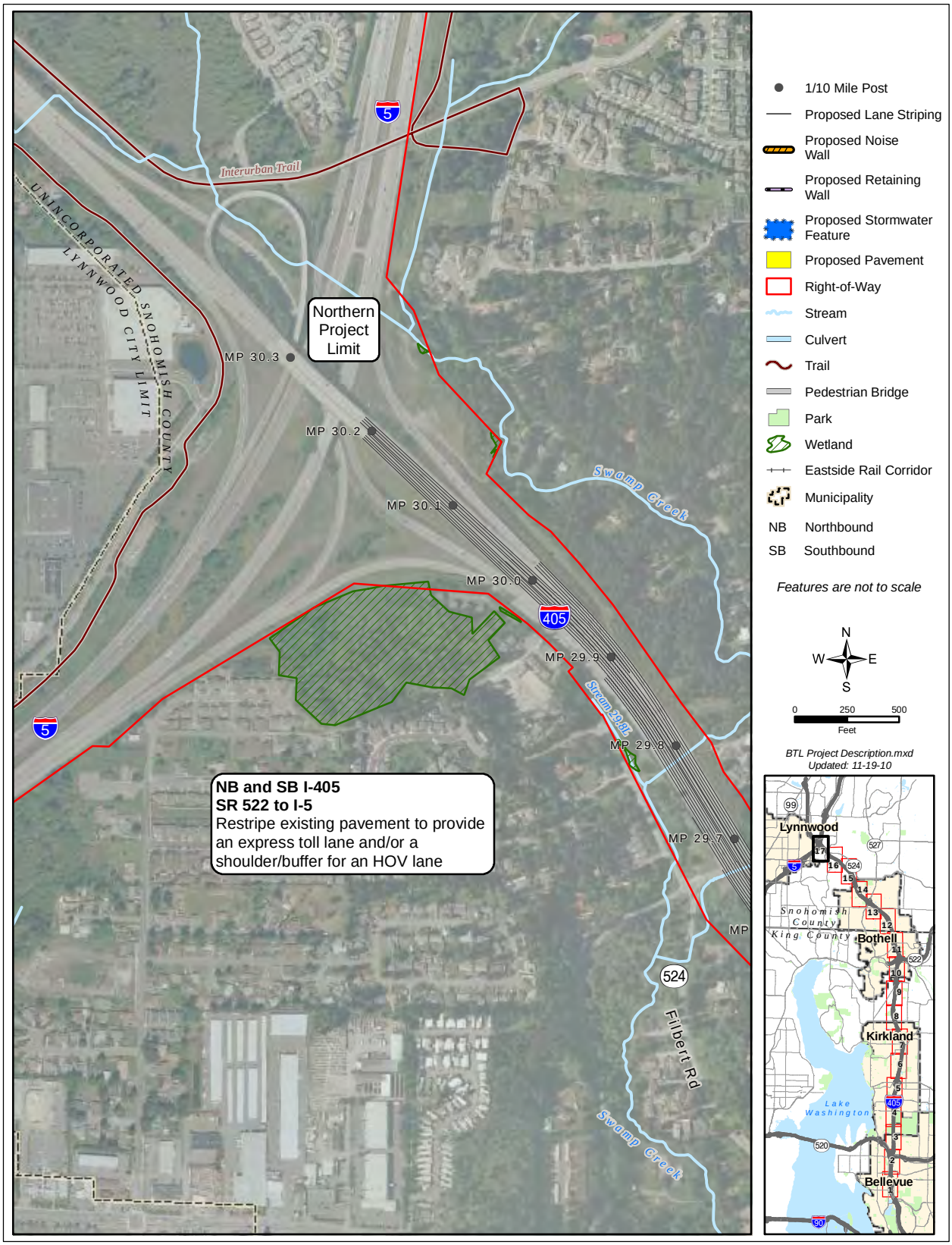


Exhibit 2-3: Project Alternatives – Sheet 1 of 2

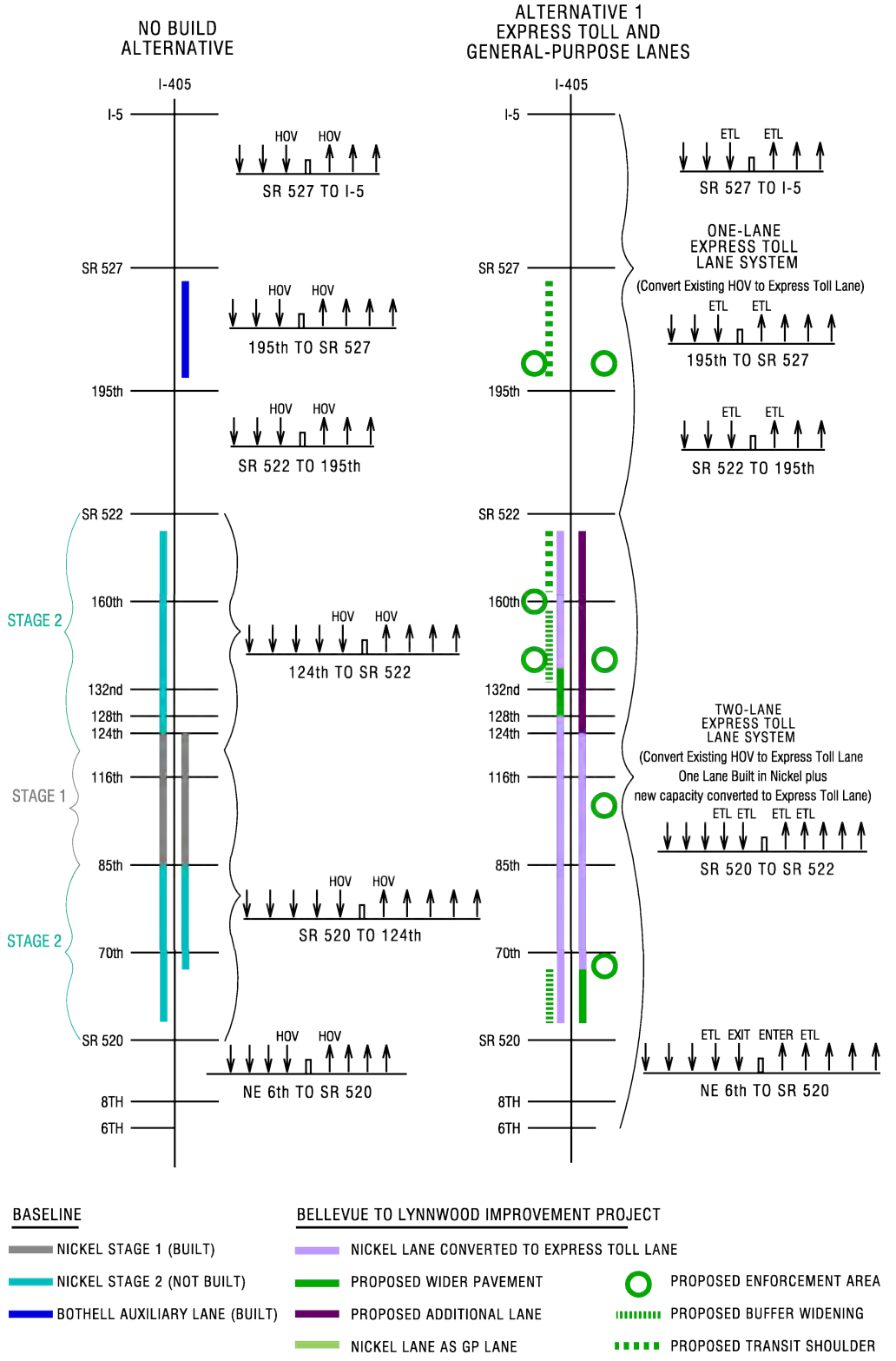


Exhibit 2-3: Project Alternatives – Sheet 2 of 2

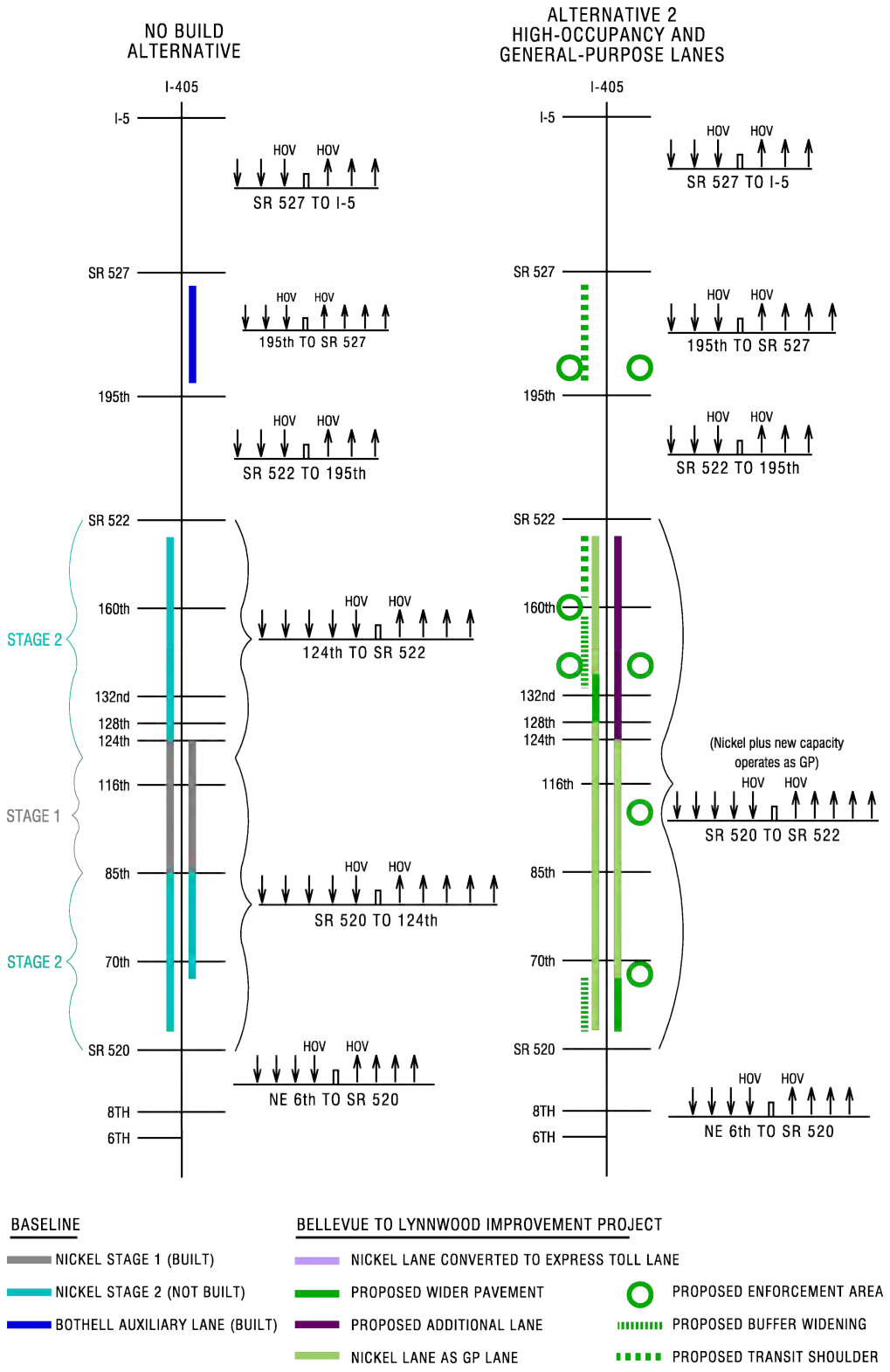
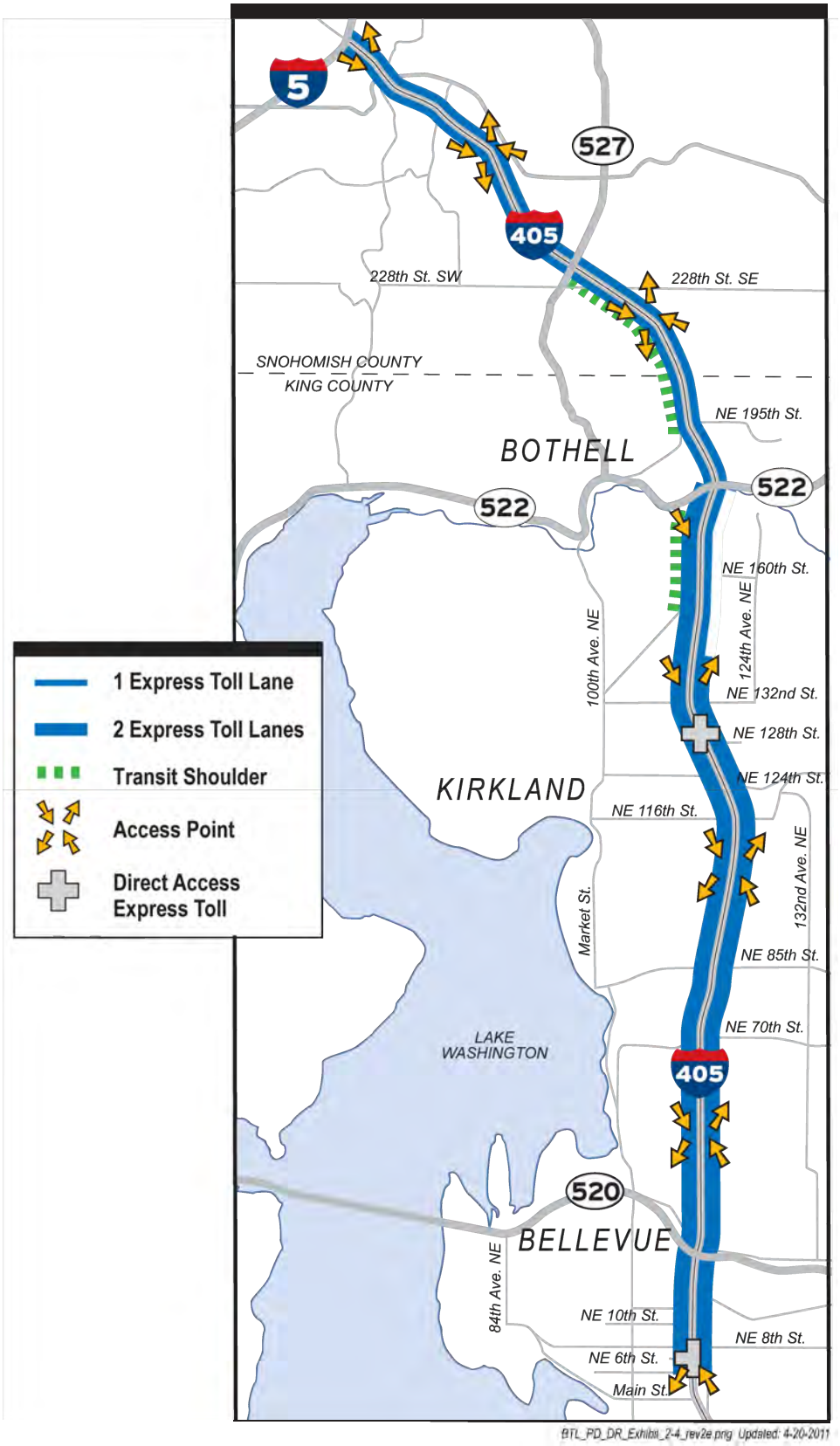


Exhibit 2-4: Express Toll Lanes Access Locations



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