



CITY OF KIRKLAND
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MEMORANDUM

To: Kurt Triplett, City Manager

From: James Lopez, Assistant City Manager
Kathy Brown, Public Works Director
John Starbard, Deputy Public Works Director
Kari Page, Safer Routes to School Coordinator
David Wolbrecht, Neighborhood Services Outreach Coordinator

Date: November 8, 2019

Subject: Citywide Transportation Connections Map

RECOMMENDATION:

City Council receive an update on the final staff recommendations to the Citywide Transportation Connections Map and provide direction for finalizing the map for inclusion in the 2019 *Comprehensive Plan* update, which is slated for action on December 10, 2019.

BACKGROUND:

Background about the Citywide Transportation Connections Map project as presented to Council on October 15 is provided in Appendix A.

The most current draft map containing the staff recommendations can be found at <http://kirklandwa.gov/citywideconnections>. A compilation of public comment can be viewed on the righthand sidebar of that webpage. Additionally, a large-sized print-out of the connections map will be available in the Council study, and smaller compilations of neighborhood maps will be placed in each Councilmember's box in the Council study.

CITY COUNCIL STUDY SESSION: OCTOBER 15, 2019

The City Council held a study session on October 15, 2019, at which staff provided an overview of the connections map project, displayed the draft connections map on screen, illustrated specific connections using Google Maps, summarized outreach efforts to date, and provided the Council with details and analyses of the approximately dozen of connections that had generated the greatest amount of comment up to that point.

Though some of the connections that were discussed did not receive much comment from the Council, others did. Council feedback was that the "Conceptual" category should be eliminated. Conceptual connections should either be included in the CIP as funded or unfunded, or if they were not feasible, the connections should be removed from the map at this time. This Council direction has altered several of the fire response time related connections in Goat Hill, as described later in this memo. For those additional connections that Council provided comment on, staff has provided additional analysis, which is detailed below. Additionally, staff has included additional analysis of those connections that have generated a significant response from the community since the October 15 Study Session.

PLANNING COMMISSION MEETING: OCTOBER 24, 2019

The Planning Commission held a public hearing about the proposed Citywide Transportation Connections Map on October 24, 2019. Prior to the hearing, the Commission heard a brief presentation from staff. Twenty-three community members provided comment on the connections map. Following the close of the hearing, the Commission deliberated then was unanimous in advancing a three-part recommendation to Council:

1. The Commission endorsed the concept of establishing a single map that showed all currently-proposed transportation connections in the City.
2. The Commission was not comfortable at that time in making a recommendation about the map that has been discussed with the public and was presented to the Commission on October 24.
3. If the Council chooses to adopt a citywide connections map, then the Commission recommends that the final connections map classify each connection into one of these four categories:
 - a. **Planned Connections.** There are connections that would be public projects, identified and funded in the CIP, and deemed feasible.
 - b. **Proposed Connections.** There are connections that likely would be public projects, deemed feasible, but in the 20-year CIP as unfunded projects.
 - c. **Potential Connections.** These are connections that would be built in conjunction with private development and are deemed feasible; they would not appear in the CIP.
 - d. **Explored/Conceptual.** These are connections that could be memorialized and studied in the future, but at this time are deemed infeasible.

For the purposes of this report, and because the Council has not yet deliberated on the Commission's recommendation, staff has not used the Planning Commission's recommended terminology but has used terminology developed over the course of the project:

Potential Public Projects - Streets

Generally, these potential street connections would be initiated by the City. Each would only happen if they were chosen by the City Council to be prioritized as part of the City's Capital Improvement Program (CIP). Although identified and initiated by the City, funding for these streets may come from a variety of sources.

Potential Private Project - Streets

Generally, these potential street connections would be initiated by development of the adjacent property(ies).

Potential Public Project - Pedestrian

Generally, these potential pedestrian connections are located on City- or publicly-owned property and would be initiated by the City. Funding for these connections may come from a variety of sources, including the Neighborhood Safety Program.

Potential Private Project - Pedestrian

Generally, these potential pedestrian connections would be initiated by development of the adjacent property(ies). In locations with high public benefit, the City may initiate a connection independent of development.

Staff recommends that the Council keep the current terminology at this time rather than change to the Planning Commission proposed terminology. While there is merit to the Planning Commission categories, the extensive public outreach conducted all year has used the current terminology. A change this late in the process may create considerable confusion about the map. The Connections Map will be able to be updated as often as the Council chooses to do so, so in the next update this change in terminology could be considered.

OVERVIEW OF RECOMMENDATIONS FOR PROMINENT CONNECTIONS

As directed by Council on October 15, staff is returning with further analysis of connections that relate to a "Conceptual" category for potential public projects, with recommendations for placing them in the CIP or removing the connection entirely. Additionally, staff has continued to receive public comment since October 15, including the Public Hearing on October 24, and has continued to review the comments and connections against relevant City policies. For the purposes of this report and discussion, staff grouped the connections into the following categories:

- *Connections with additional analysis based on Council direction to revise "Conceptual" category*
 - Initial engineering assessment and updated staff recommendations are detailed after Table 1. Recommendations are made for deletion or inclusion in the CIP.
- *Connections from prior adopted Plans that received prominent community comment since the October 15 Study Session*
 - Feedback, analysis, and recommendations can be found in Appendix B.
 - Staff recommend that any connection in an existing neighborhood plan remain on the connections map at this time as the intention of the connections map was to consolidate the applicable neighborhood plans and identify potential new transportation connections. Removing a connection from this connections map does not remove previously-adopted connections from their respective neighborhood plans. Review of the previously-adopted connections can be conducted during the neighborhood planning process and/or as part of subsequent *Comprehensive Plan* updates.
- *Connections with revisions based on further staff analysis*
 - Feedback, analysis, and recommendations can be found in Appendix C.
 - Both of these revisions bring the connections into alignment with the City's interest for the connections.
- *Other connections that received prominent community comment since the October 15 Study Session*

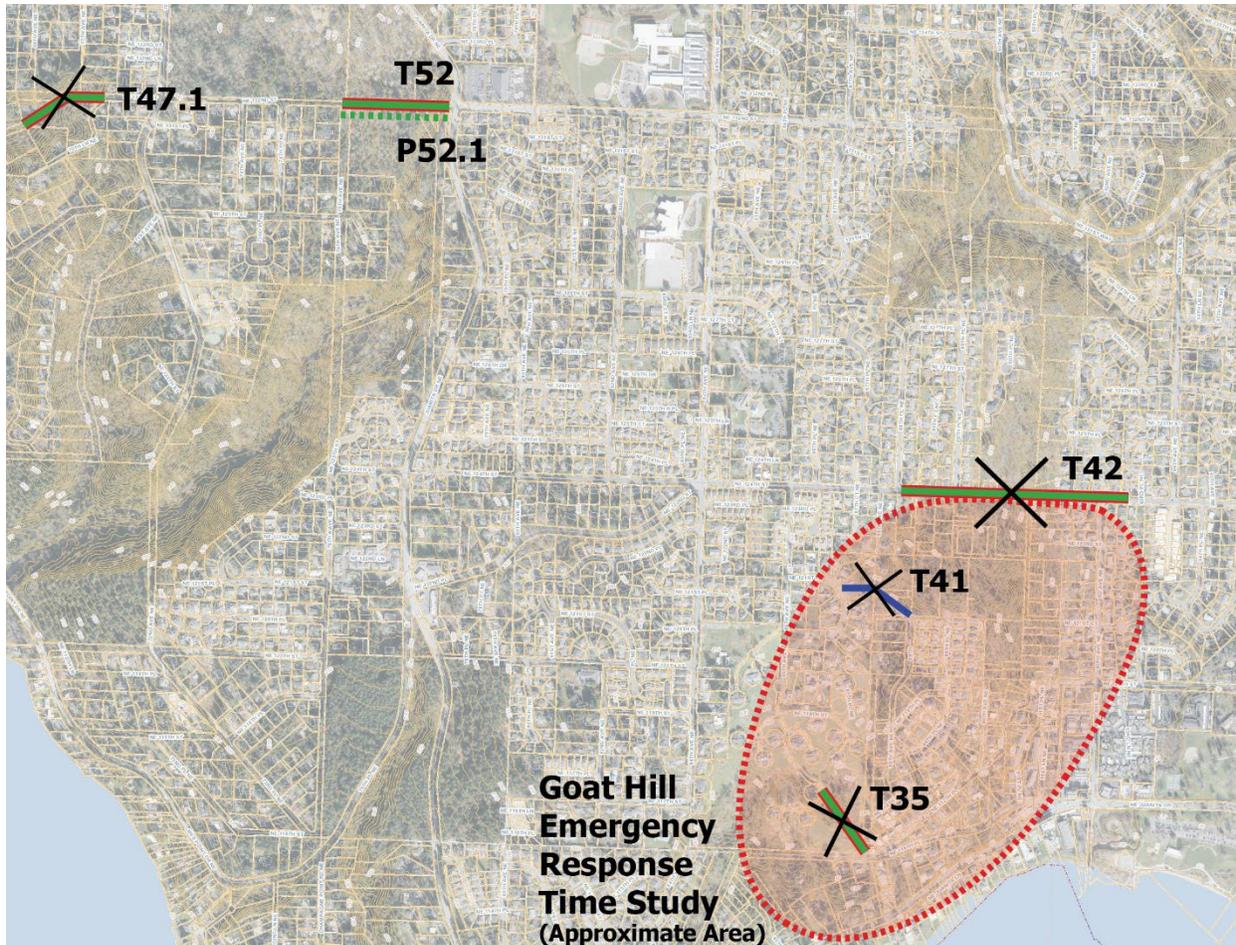
Feedback, analysis, and staff recommendations are detailed after Table 1.

Table 1: **Overview of Staff Recommendations and Relationship to Neighborhood Concerns**

ID	Staff Recommendation	Does staff recommendation mitigate stated neighborhood concerns?
<i>Connections with additional analysis based on Council direction to revise "Conceptual" category</i>		
T52	Emergency-access connection in 20-year CFP and pedestrian/bicycle connection in 6-year CIP (P52.1)	Somewhat mitigates neighborhood concerns of neighborhood character
T47.1	Remove connection from map as infeasible	Mitigates neighborhood concerns of environmental and neighborhood character impacts
T42	Remove connection from map as impractical	Mitigates neighborhood concerns of environmental, neighborhood character, and personal property impacts
T35	Remove from map and group with T41 and other associated potential connections for further study	Somewhat mitigates neighborhood concerns of feasibility and efficacy
<i>Connections from prior Neighborhood Plans that received prominent community comment since the October 15 Study Session</i>		
T07 T08 T10	Maintain connections as previously adopted in Rose Hill Neighborhood Plan	Does not mitigate neighborhood concerns of impacts to neighborhood character and traffic.
P10	Maintain connection as previously adopted in Rose Hill Neighborhood Plan	Does not mitigate property owner concerns of impact to business operations, safety, and security.
<i>Connections with revisions based on further staff analysis</i>		
P56	Revise northern terminus to align with P56.3 at NE 145 th St	Mitigates neighborhood concerns of impacts to private property
T21	Revise southern terminus to align with NE 112 th St	Somewhat mitigates property owner concerns
<i>Other connections that received prominent community comment since the October 15 Study Session</i>		
T57	Maintain connection as potential private project – street, with traffic mitigation	Somewhat mitigates neighborhood concerns of neighborhood character and cut-through traffic.
P37	Change designation from potential public to potential private project	Somewhat mitigates neighborhood concerns of personal property impacts

RECOMMENDATIONS

CONNECTIONS WITH ADDITIONAL ANALYSIS BASED ON COUNCIL DIRECTION TO REVISE "CONCEPTUAL" CATEGORY



Map Figure 1: **Overview of Connections Related to previous "Conceptual" Category**

T52 – Completion of NE 132nd Street between Juanita Drive NE and 76th Ave NE

Connection Background: This connection was identified as part of the Fire Department's Standards of Coverage and Deployment Plan. Additionally, this connection has been identified as part of an unfunded project in the 2019-2024 CIP (NMC 09011). That project consists of several pedestrian/bicycle improvements that originated in the Juanita Drive Corridor Study, including NM5 from Project Group 5 – "Construct pedestrian/bicycle pathway along existing easement. Build a nonmotorized bridge across Denny Creek."

Updated Recommendation: Based on the highly preliminary, in-house engineering assessment, staff recommends retaining T52 as an emergency access only connection for fire/EMS vehicles (which also could be used for pedestrian circulation) and add it as an unfunded project in the 20 CFP. Additionally, as directed by Council, staff is adding P52.1 to the connections map, which would appear on the map parallel to T52, a non-motorized only connection and retained as an unfunded project in the 6 Year CIP (NMC 09011).

Feedback and Analysis: Comments provided during this and the prior Finn Hill Neighborhood Planning process indicate an overall neighborhood sentiment of strong opposition to this potential connection

being a vehicular connection open to general use, with impacts to neighborhood character, environmental concerns, and cost-benefit being some of the main themes of concern. There was some support for this as a bicycle/pedestrian only connection, and less support for this as an emergency access only connection.

City Council Discussion: The Council discussed several topics related to the proposed T52 connection, including:

- A desire for additional data regarding impact of this as an emergency connection on emergency response time;
- An approximate cost of such a connection;
- The total homes served by the proposed connection;
- A concern about engineering feasibility;
- Whether this connection should remain as an emergency connection, and, if so, whether it should be in place of or in addition to a bicycle/pedestrian connection;
- General direction that this connection’s implementation as a bicycle/pedestrian as articulated in the current CIP (as an Unfunded 6-Year Project) should not be delayed or impacted by a potential emergency connection in the future; and
- If this emergency connection were not to be made, should additional building requirements be explored for new construction in this area, such as requiring sprinklers in lieu of this emergency connection.

Additional Staff Analysis: GIS staff completed a study of the travel times for fire/EMS vehicles in the neighborhood to the west of proposed T52 connection (Appendix D).

Figure “Travel Time Analysis - Finn Hill Study Area, 2014 through 2018” in Appendix D lists all 69 fire/EMS calls by year from January 1, 2014 through December 31, 2018, in the neighborhood to the west of proposed T52 connection and includes travel times for the first-in responding unit, the average for all units on a call, and averages for both categories. Staff have summarized some of that data here for convenience:

Table 4: Summary of Travel Time Analysis

Year	Total Number of Calls	Number of Calls with Less than 4 Minute Travel Time	Average First-In Travel Time (min” sec’)
2014	6	0	6’ 33”
2015	15	1	5’ 17”
2016	23	3	5’ 23”
2017	10	2	5’ 39”
2018	15	3	5’ 31”
TOTAL	69	9	--

Using standard guidelines for fire station coverage, map figure “Finn Hill Access Road Analysis Four-minute Travel Time Scenarios” in Appendix D illustrates staff analysis of three scenarios:

1. Using the existing street network (T52 and T47.1 not open)
2. T52 is open (but not T47.1)
3. Both T52 and T47.1 are open [as noted later in this report, an initial engineering assessment has determined that T47.1 is impracticable to construct]

Additionally, as requested by the City Council at its October 15 Study Session, Public Works staff in the Capital Improvement Program conducted an initial engineering assessment of proposed connection T52 (Appendix E). That assessment looked at three bridge scenarios, with associated cost estimates for each scenario:

1. Smallest for Ladder Trucks: \$20.4M
2. Smallest for Ambulance/First Responders: \$18.9M
3. Pedestrians and Bikes only (no motor vehicles, emergency or otherwise): \$12.8M

All three options were deemed feasible for construction. It is worth stating that this analysis was conducted without field evaluations and used standardized tables for estimates as opposed to specific project details. Based upon the Council's discussion and preferences, the Council could consider funding a more rigorous engineering assessment and cost estimate for its preferred option(s).

T47.1 – Extend NE 130th Place between 70th Ln NE and 66 PI NE

Connection Background: This connection was identified as part of the Fire Department's Standards of Coverage and Deployment Plan. Although not explicitly stated in that Plan, this connection would be most effective in relationship to T52.

Updated Recommendation: Based on the initial engineering assessment, staff recommend that connection T47.1 be categorized as infeasible and that it be removed from the connections map.

Feedback and Analysis: Comments provided indicate concerns for the physical feasibility and possible safety impact of this connection. One comment suggested this connection be created as a pedestrian pathway.

City Council Discussion: Some on the Council expressed concern about the engineering feasibility of this connection, and this connection was part of a larger Council discussion regarding the usefulness of showing potentially infeasible connections on this map.

Additionally, the Council inquired as to the dependency of this connection on the T52 connection (detailed above). Although not explicitly stated in the Fire Department's Standards of Coverage and Deployment Plan, staff's assessment was that for T47.1 to be most effective, it would be dependent on the existence of T52¹.

Additional Staff Analysis: As requested by the City Council at its October 15 Study Session, Public Works staff in the Capital Improvement Program conducted an initial engineering assessment of proposed connection T47.1 (Appendix F). The engineering assessment generally indicated that this connection would be infeasible based on various factors including topography, potential environmental impact, and geohazard considerations. Further, staff identified this as the single most infeasible connection of any proposed in the City.

T42 – Extend NE 124th Street between 88th Place NE and 93rd Place NE

Connection Background: This connection was identified as part of the Fire Department's Standards of Coverage and Deployment Plan.

Updated Recommendation: Based on the initial engineering assessment, staff recommend that connection T42 be categorized as impracticable and that it be removed from the connections map.

¹ During the Council's regular business meeting, public comment was offered that the T47.1 area is a landslide hazard area.

Feedback and Analysis: Comments provided indicate concerns for the physical feasibility and impact of this connection, although one comment supported this link between Juanita and Finn Hill.

City Council Discussion: Some on the Council expressed concern about the engineering feasibility of this connection, and this connection was part of a larger Council discussion regarding the usefulness of showing potentially infeasible connections on this map.

Additional Staff Analysis: As requested by the City Council at its October 15 Study Session, Public Works staff in the Capital Improvement Program conducted an initial engineering assessment of proposed connection T42 (Appendix G). The engineering assessment generally demonstrated that this connection, as represented on the draft connections map, would be impracticable due to topography, environmental factors, and geohazard considerations. While a connection along this alignment may be possible were the project to be extended further to the east toward 100th Avenue NE, the cost and neighborhood character impacts would be profound.

New Recommendation: Goat Hill Emergency Response Time Study

Based on Council comments at the October 15 Study Session regarding proposed connections T35 (identified on the Fire Department's Standards of Coverage and Deployment Plan) and T41 (potential private project), and also informed by written comments from the community and public testimony at the October 24 Public Hearing, staff conducted an initial engineering assessment of four connections on the southeast slope of Goat Hill that each potentially could improve fire/EMS response time in that area (Appendix G). Each of the four scenarios are feasible from an engineering perspective, but there is a wide range of estimated costs based upon the preliminary analyses:

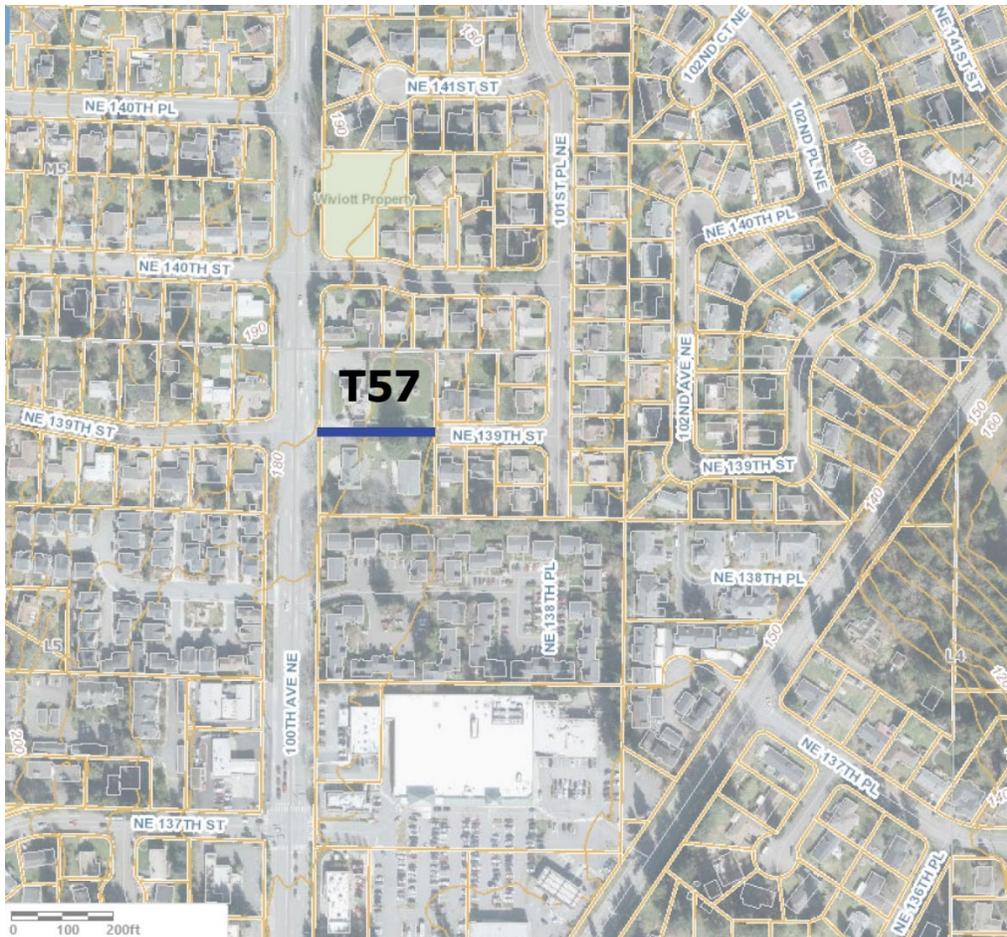
1. T35 as mapped: \$11.4M
2. T41 as an alternative to T35: \$20.1M
3. Staff-proposed alternative to T41: \$8.5M
4. Community member alternative to T41: \$31M

It is worth stating that these analyses were conducted without field evaluations and used standardized tables for estimates as opposed to specific project details. Additionally, staff did not conduct any public outreach regarding the staff-created alternative to T41, since that concept became a part of the engineering assessment for Goat Hill emergency access at a very late point in the process.

Updated Recommendation: Given the complexity for emergency access to the Goat Hill area because of environmental, topographical, and other factors, and considering the forthcoming opening of Fire Station 24, staff recommends funding a Goat Hill Emergency Response Time Study and removal from the map of T35 and T41. Such a study would involve the Goat Hill and adjacent neighborhoods in exploring emergency access connection options and would include a more detailed engineering assessment. That study would be completed by 2022 in order to inform the 2023-24 biennial budget and CIP process. To express this in the map, staff recommend removing both T35 and T41 connections from the connections map and replacing them with a dotted red area and including a description of the Goat Hill Emergency Response Time Study.

OTHER CONNECTIONS THAT RECEIVED PROMINENT COMMUNITY COMMENT SINCE THE OCTOBER 15 STUDY SESSION

T57 – Connect NE 139th Street from 101st Place NE to 100th Avenue NE; Would require obtaining a new right-of-way.



Map Figure 2: **T57 – Connect NE 139th Street from 101st Place NE to 100th Avenue NE**

Updated Recommendation: Staff recommends T57 be maintained as a potential private project – street, as indicated on the map. Additionally, staff recommends adding the following to the “Process” section: “Prior to any action, the City would seek to maintain the current street width of NE 139th Street, would explore traffic calming techniques, and would involve the local neighbors in the design of the street.”

Feedback and Analysis: This proposed connection, which is a potential private project – street classification on the map, received significant public comment in the form of written correspondence, Public Hearing comment, and a site visit with neighbors in the local vicinity of the connection. The general sentiment included concerns of potential cut-through traffic and associated safety issues, street width along NE 139th Street, impact to neighborhood character, and the potential burden of a prior King County Hearing Examiner judgement in 2000 related to a commercial day care operated at an adjacent property to the proposed connection.

Staff’s assessment of the concerns raised by the neighbors includes referencing Policy T-5.6 “*Create a system of streets and trails that form an interconnected network,*” and the associated policy guidance that “...the fact that new connections may increase traffic volume on some existing streets is not a sufficient reason for rejecting such new connections.” Initial assessment of the street width along NE 139th Street indicates that the current street width would be sufficient for proposed connection T57.

As part of this analysis, staff looked at a November 8, 2000, King County Hearing Examiner’s decision, “Report and Decision on Administrative Conditional Use Permit Appeal involving Alina Christ as Applicant

and Sherry Shams, et al, as Appellants,” which was issued for one of the adjacent properties of T57. Staff concluded that this decision would not legally prevent the T57 connection in the future. In addition to retaining its power of eminent domain, it is noteworthy that the City was not a party to that 2000 decision and the decision itself did not result in any encumbrance, recorded or otherwise, that could be construed as “running with the land.”

P37 – Pedestrian access connection at NE 117th Street between 80th Avenue NE and 82nd Avenue NE



Map Figure 3: **P37 – Pedestrian access connection at NE 117th Street between 80th Avenue NE and 82nd Avenue NE**

Connection Background: This connection was identified in Draft Finn Hill Street Connection Map, 9/2017 and adopted in the Finn Hill Neighborhood Plan as a desired bike route and greenway. The connection is also shown in the Kirkland Neighborhood Greenways Guide to Implementation.

Updated Recommendation: Given its presence in the neighborhood and greenways plans and the City’s initiative for safer routes to school, staff recommend proposed connection P37 remain on the map. Staff further recommend changing proposed connection P37’s designation from a potential public project to a potential private project. Prioritizing redevelopment of the adjacent property(ies) to initiate the creation of this pedestrian connection would generally mitigate immediate neighbor concerns for this proposed connection. However, the City would also continue to seek a voluntary purchase of the land necessary to make the connection from current or future property owners.

Feedback and Analysis: Public sentiment related to this pedestrian/bicycle connection has strong feelings on both sides. Neighbors adjacent to the connection indicated concerns about garbage, dog harassment, drugs, partying, and property values. The surrounding neighbors indicated support for the connection,

with the main reason being that it would enable children to walk to the Finn Hill schools on 84th Avenue NE without having to use Juanita Drive. The City has been receiving public input on this connection since the Juanita Drive Corridor Study in 2013/2014, during the June 15 Community Meeting, and through online comments during this Citywide Connections process.

Additional Feedback and Analysis: Additional public comment was received regarding this connection since the October 15 Study Session, and staff have been in dialogue with property owners potentially affected by this connection.

NEXT STEPS:

Staff exercised best efforts to transparently highlight the projects with prominent community concern and comment. However, staff acknowledges that members of the public, Planning Commission, or the Council may have concerns about some of the 173 connections identified on the map that were not highlighted in the above memo.

In summary, staff have outlined the various recommendations on proposed connections detailed in this staff report:

1. Connections with additional analysis based on Council direction to eliminate "Conceptual" category
 - a. T52 - Emergency-access in 20-year CFP and pedestrian/bicycle in 6-year CIP (P52.1)
 - b. T47.1 - Remove connection from map as infeasible
 - c. T42 – Remove connection from map as impractical
 - d. T35 and T41 – Remove from map and implement Goat Hill Response Time Study
2. Connections from prior Neighborhood Plans that received prominent community comment since the October 15 Study Session
 - a. T07, T08, T10 - Maintain connections as previously adopted in Rose Hill Neighborhood Plan
 - b. P10 - Maintain connection as previously adopted in Rose Hill Neighborhood Plan
3. Connections with revisions based on further staff analysis
 - a. P56 - Revise northern terminus to align with P56.3 at NE 145th St
 - b. T21 - Revise southern terminus to align with NE 112th St
 - c. P37 - Change designation from potential public to potential private project - pedestrian
4. New connection that received prominent community comment since the October 15 Study Session
 - a. T57 - Maintain connection as potential private project – street, with traffic mitigation

Staff seeks direction from the Council regarding the above recommendations or other changes to the map. Additionally, staff seek direction from the Council regarding the Planning Commission's recommendations on connection terminology. All such changes will be brought forward for Council action in December as part of the 2019 *Comprehensive Plan* update.

Appendix A: Background Discussion, Outreach Methodology, and Recommendation Process

Appendix B: Connections from Prior Plans that Received Prominent Community Comment since the October 15 Study Session

Appendix C: Connections with Revisions Based on Further Staff Analysis

Appendix D: Finn Hill Response Time Analysis

Appendix E: Proposed Connection T52 Study

Appendix F: Proposed Connection T47.1 Study

Appendix G: Proposed Connection T42 Study and Goat Hill Area Proposed Connections Study

Appendix A: Background Discussion, Outreach Methodology, and Recommendation Process

BACKGROUND DISCUSSION:

The City has a program to review and update its fourteen neighborhood plans that are part of the *Comprehensive Plan*. One of the more recent neighborhood plans acted on by the City Council was the Finn Hill Neighborhood Plan, which was adopted by the Council on January 16, 2018, by Ordinance O-4636. This was the first City-developed neighborhood plan for Finn Hill since the area's annexation in 2011. Staff and the community worked together over a two-year period to develop a recommended plan that addresses vision and values, the natural environment, land use, transportation and mobility, and other community planning topics. During the planning process, discussions were held about the fact that in some areas of Finn Hill the transportation system is underdeveloped. There are several dead-ends that preclude neighborhood connections, public street segments that lack sidewalks or even sufficient pavement, and areas that are inconsistent with the street standards found elsewhere in the City.

As was done when the Rose Hill and the Highlands neighborhood plans were updated and when the Totem Lake Business District Plan was created, potential motorized and nonmotorized connections were studied in the Finn Hill area. The issue was discussed with the community, and the point was made that likely most of these potential transportation connections would be made in conjunction with infill development. A map of potential transportation connections was drafted, an open house was conducted about many planning topics including connectivity, and staff provided the Finn Hill community and all interested parties with explanations about the draft transportation connections map and the reasons for creating it.

Because of community concerns raised about some of the connections, at the time of final review and unanimous adoption of the Finn Hill Neighborhood Plan, staff proposed postponing the inclusion of a transportation connections map. A connections map was postponed until a public outreach process could be conducted in Finn Hill about connectivity issues, including developing priorities and objective criteria regarding transportation connections for vehicles and/or pedestrians and/or bicycles, evaluating emergency response times, and how best to address bollards and barriers in the area.

Staff returned to the Council on July 3, 2018 to continue the discussion of mapping transportation connections and outreach about that topic in Finn Hill. Staff also was seeking affirmation that it should continue applying the current City connections policies the City and recommended that connections maps should be discussed and included in future neighborhood plan updates throughout the City.

During that July 3 discussion, the Council expressed several views related to transportation connections:

- There was support for the City's policies on connectivity, though there was interest in having the City be more intentional about why certain connections are sought;
- That the Kirkland Municipal Code should be amended so to that all land use appeals, including those projects that recommend connections, be directed to the Hearing Examiner; and
- There was discussion about having connections identified on one citywide map rather than on a neighborhood-by-neighborhood basis.

Advantages noted by the Council to having a citywide transportation connections map were that the final map could be finished sooner, and that there would be a single source for seeing all proposed connections. The map could be finished sooner because the current practice of discussing connections at the neighborhood level means the mapping would be complete only after the multiyear neighborhood plan update cycle was complete, which takes about eight years. Also, the City's transportation network is an integrated system that provides service to the entire City and the region; evaluating connections on a neighborhood-by-neighborhood basis diminishes that perspective.

One advantage of the neighborhood-focused connections map process is that proposed connections benefit from the local knowledge of the people who live or who have businesses closest to the connections. The Council wanted to preserve this local input in the city-wide process and, ultimately the

Appendix A: Background Discussion, Outreach Methodology, and Recommendation Process

City crafted a public-involvement process (see "Outreach Methodology," below) that enabled residents to engage on specific connections based upon their local knowledge.

Staff discussed the idea of a citywide transportation connections map with the Public Safety Committee on October 18 (all committee members were present) and with the Public Works, Parks, and Human Services Committee on October 19 (all committee members were present). Both committees showed interest in a citywide transportation connections map. Committee members also discussed the following:

- That both the type of connection (e.g., foot path, street connection) and the rationale (e.g., pedestrian connection, emergency response time) should be identified;
- That transportation connections still could be discussed as part of neighborhood plan update processes, though any suggested amendments to the citywide map would be bundled and acted upon every few years; and
- That action on a proposed ordinance to amend the Hearing Examiner process should be postponed until the public process for the citywide transportation connections map is complete.

Based on Council direction, staff returned to the City Council on January 2, 2019, at which time Council adopted Resolution R-5350, which:

- Affirmed the Council's policy support for increasing transportation connections within the City;
- Directed staff to initiate a public engagement process for discussing and evaluating proposed transportation connections throughout the City;
- Directed staff to create a citywide transportation connections map to help fulfill the City's policies for improving safety, connectivity and multimodal mobility; and
- Determined that the final draft citywide transportation connections map shall be included in the 2019 annual update to the *Comprehensive Plan*.

POLICY BASIS FOR TRANSPORTATION CONNECTIONS

Kirkland has a strong history of supporting transportation connections and increasing nonmotorized transportation options. The *Comprehensive Plan* speaks to connectivity in several policies and statements, including the following:

Land Use Element

- Policy LU-3.9: "Encourage vehicular and non-motorized connectivity."
- Improved connectivity encourages walking and biking and reduces travel distance for all transportation modes.
- Vehicle connections between adjacent properties reduces congestion on streets, number of turning movements, and gasoline consumption.
- As a part of land development, new connections to the existing street system are often required.

Transportation Element/Transportation Master Plan

- Policy T-5.2: "Design streets in a manner that supports the land use plan and that supports the other goals and policies of the transportation element."
- Policy T-5.3: "Create a transportation network that supports economic development goals."
- Policy T-5.6: "Create a system of streets and trails that form an interconnected network."
- Action T-5.6.1: "Develop a plan for connections between street ends and complete those connections."

Additionally, the Zoning Code and the Public Works Pre-approved Plans and Policies provide guidance and regulations concerning street connections and non-motorized improvements:

Appendix A: Background Discussion, Outreach Methodology, and Recommendation Process

- Chapter 105: Parking Areas, Vehicle and Pedestrian Access, and Related Improvements
- Chapter 110: Required Public Improvements
- Chapter 180: Plates 34 A-P

Not only has staff worked to implement these policies and apply these regulations, staff also has made productive use of the three connections maps that have been adopted as well as the plates in the Zoning Code. The existing transportation connection maps, even though they show precise locations, are used in a more generalized way. As private and public development is proposed, staff refers to the connections maps to see if the proposed development could facilitate a connection, even if not exactly in the location shown on a map. As funding opportunities arise, these maps also are used in conjunction with public investments and development. Examples include:

- Of the 17 potential street connections originally mapped in the North Rose Hill Neighborhood Plan, six have been completed;
- In South Rose Hill, "The Preserve" subdivision completed a through-street connection and sidewalks on 128th Avenue N.E. between N.E. 70th Street and N.E. 80th Street, as originally mapped in Figure SRH-5 in the South Rose Hill Neighborhood Plan; and
- Both Plate 34C in Chapter 180 of the Zoning Code and Figure TL-6 in the Totem Lake Business District Plan propose a connection of 118th Avenue N.E. between N.E. 116th Street and 118th Street, which is being constructed now in association with the "Lifebridge" multifamily project.

OUTREACH METHODOLOGY

STRATEGIC APPROACH TO CIVIC ENGAGEMENT

The City Council was briefed by the Assistant City Manager at the February 23, 2018, Council Policy Retreat on a new strategic approach to civic engagement initiated to further the 2017-2018 City Work Program item: "Enhance resident and business engagement in Kirkland through community-based initiatives that foster a safe, inclusive and welcoming City and a love of Kirkland." The City Council received an update by the Assistant City Manager at the May 31, 2019, Council Financial Retreat, which described in more detail staff's system of civic engagement, referred to by staff as Themed Resident Engagement for Kirkland (TREK). Staff's TREK system relies heavily upon the methodology of the International Association of Public Participation (IAP2), a robust framework used internationally for civic engagement in support of sustainable decisions, as well as other sources. Staff refer to feedback-collecting TREKs such as this citywide transportation connections map effort as "civic conversations".

TECHNIQUES USED TO COLLECT FEEDBACK ABOUT CITYWIDE CONNECTIONS

At the direction of the Assistant City Manager, staff utilized the TREK framework to craft the strategy and techniques to collect public feedback on the draft citywide transportation connections map and oversaw the implementation of the engagement plan in coordination with various staff in the Public Works Department and the Communications Manager.

Staff collected feedback through submitted online comments, emails, mailed or hand-delivered letters, and notes from in-person meetings. Staff utilized four methods of in-person outreach and six methods of digital outreach. The specific methods and their reach include:

Appendix A: Background Discussion, Outreach Methodology, and Recommendation Process

Table 1: **In-Person Techniques**

Event Type	Quantity	Attendance*
Neighborhood Association Meetings <i>Norkirk, Juanita, Moss Bay, S. Rose Hill / Bridle Trails, Finn Hill (x2), Highlands, Market, N. Rose Hill, Central Houghton, Everest, Evergreen Hill</i>	12	288
Kirkland Alliance of Neighborhoods Briefings <i>April 3, May 8, June 12, October 9</i>	4	52
Interest Group Meetings <i>Site visits (x8), Goat Hill focus group, S. Rose Hill / Bridle Trails NA</i>	10	68
Community Meeting <i>June 15 at City Hall</i>	1	75
SUBTOTAL	27	483

*Total number of people that were present at a meeting.

Table 2: **Digital Outreach Techniques*****

Digital Outreach Type	Quantity	Views****
Facebook Posts & Events	3	3,265
Nextdoor Post	1	1,694
Twitter Tweet	1	1,186
City Newsletter Articles	4	5,171
Video posted on YouTube and Facebook	1	107
Landing Webpage (www.kirklandwa.gov/citywideconnections)	1	1,909
SUBTOTAL	11	13,332

*** Metrics current as of November 10, 2019.

**** "Views" defined as: Facebook Reach, Twitter Impressions, Email Unique Opens, Webpage Unique Visits, YouTube Views, and Facebook 1m Video Views. All values collected as of November 10, 2019.

Postcard Mailing

In addition to the above outreach techniques, staff also mailed a postcard to all parcels within 300 feet of a proposed connection. Approximately 3,950 postcards were sent with delivery on or around October 10, 2019. Staff estimate the postcard resulted in approximately 260 of the 1,909 webpage views listed above.

RECOMMENDATION PROCESS

Over the course of this civic conversation, the Public Works Director and Assistant City Manager convened a staff working group to: identify potential connections, apply criteria to each connection, and review public comments. Although additional staff were involved at various points of the process, including staff in the Parks & Community Services and Planning Departments, the core working group membership included:

Appendix A: Background Discussion, Outreach Methodology, and Recommendation Process

- Director, Public Works
- Deputy Director, Public Works
- Transportation Manager, Public Works
- Development Engineering Manager, Public Works
- Deputy Fire Chief, Fire
- Assistant City Manager, City Manager's Office
- Safer Routes to School Coordinator, City Manager's Office
- Neighborhood Services Coordinator, City Manager's Office

The connections working group met numerous times throughout the course of this civic conversation, both with members of the public at community meetings and site visits, as well as internally to evaluate public comment against the criteria of each connection. This iterative process culminated in the working group presenting their findings to the City Manager and drafting staff recommendations that were presented to Council at its October 15 Study Session.

Appendix B: Connections from Prior Plans that Received Prominent Community Comment since the October 15 Study Session

T07 – Connect 130th Ave NE from NE 87th St to NE 94th St (three segments).

T08 – Connect NE 90th St from 132nd Ave NE to 128th Ave NE (two segments).

T09 – Connect 131st Ave NE between NE 90th and NE 91st St. Would require obtaining a new Right-of-Way.

T10 – Connect NE 91st St between 130th and 132nd Ave NE. Would require obtaining a new Right-of-Way.

(Due to their proximity, staff have grouped the above four connections into one category for discussion.)

Connections Background: All four connections were adopted as part of the Rose Hill Neighborhood Plan. All four are potential private projects – streets, meaning that they would be initiated by development activity of the adjacent properties, most notably the large site currently owned by Churchome.

Feedback and Analysis: These four connections together received significant public comment, both through the online comment form, the October 24 Public Hearing, and other written correspondence. Community concerns generally relate to impacts to local traffic, safety concerns from vehicles, and changes to community character. As of the writing of this report, staff are coordinating with potentially affected neighbors to schedule a site visit for these connections.

Recommendation: Based on their presence in the adopted Rose Hill Neighborhood Plan, staff recommend maintaining all four connections as potential private projects – streets, as depicted on the map. These connections can be revisited in future updates to the map and/or the neighborhood plan.

P10 – Powerline connection through NRH from NE 92nd Street to NE 80th Street

Connection Background: This connection was identified in the Rose Hill Neighborhood Plan, as well as the Parks, Recreation and Open Spaces (PROS) Plan.

Feedback and Analysis: As described in the Rose Hill Neighborhood Plan, proposed pedestrian connection P10 lies within the Seattle Public Utilities transmission line utility easement. That 150-foot wide easement runs approximately north-south along the property lines of two Honda of Kirkland owned parcels on NE 85th St. The car dealership submitted comments describing their ownership of the two parcels on either side of proposed connection P10, in addition to other nearby parcels. Honda of Kirkland expressed several concerns with this proposed connection, including safety concerns for pedestrians, as the proposed path would be located in the middle of parking lot drive access for their daily operations. The dealership also noted night time security concerns for their inventory, potential environmental impacts, and potential impacts on the business' flexibility to expand or reconfigure their operations.

Staff confirmed with Seattle Public Utilities (SPU) that SPU is open to non-motorized uses on its easements via a "Consent Agreement."

Recommendation: Given its presence on the Rose Hill Neighborhood Plan and the PROS Plan and the existence of the SPU utility easement, staff recommend proposed pedestrian pathway P10 be maintained on the map as a potential public project - pedestrian, with the following added to the "Process" section: "Prior to any action, the City would explore ways to integrate this pathway with the business operations of adjacent businesses such that potential safety, security, and business impacts are minimized."

Appendix C: Connections with Revisions Based on Further Staff Analysis

P56 – Connect Kingsgate Park to 116th Place NE

Feedback and Analysis: Based on public comment provided during the October 24 Public Hearing, staff reviewed this proposed connection. During that review process, staff identified that the connection as depicted in prior versions of the map did not accurately reflect the intentions of the Parks and Community Services Department.

Recommendation: Staff recommend revising the northern terminus of P56 to align with proposed connection P56.3 at NE 145th St. This revision would satisfy the intention of the Parks and Community Services Department and would address the stated neighborhood concerns regarding public access to a privately-owned park at NE 148th Ct.

T21 - Connect 118th Ave NE between the 11000 block (T19) and NE 116th St. Would require obtaining a new Right-of-Way.

Connection Background: This connection was identified in the Totem Lake Business District Plan.

Feedback and Analysis: Discussion with a property owner potentially affected by this connection prompted staff to review the Totem Lake Business District Plan, last amended in 2018. During that review process, staff determined that an error in the Code Publishing web service that hosts the City's Comprehensive Plan mistakenly displayed the 2015 Street Connections Figure for the Totem Lake Business District Plan in addition to the 2018 Street Connections Figure. This resulted in staff accidentally using the 2015 version in lieu of the updated 2018 version. Staff have since worked with Code Publishing to correct the error.

Recommendation: Staff recommend revising the southern terminus of proposed T21 connection such that it ends at NE 112th St. This revision would align the proposed connection with the most recently adopted Totem Lake Business District Plan.

Appendix D: Finn Hill Response Time Analysis

Travel Time Analysis - Finn Hill Study Area, 2014 through 2018

	Date	Incident Number	Incident Type	Problem	First-in Unit	Other Units	Travel Time	
							[First-in]	[Average]
2014	1/1/2014	KIFD00030214	Other	Service Call - Fire	E25	0	9' 33"	9' 33"
	2/12/2014	KIFD00123014	Medic	Aid - Emergency	A25	0	4' 12"	4' 12"
	7/1/2014	KIFD00558714	Medic	Medic	A25	1	4' 32"	6' 44"
	7/31/2014	KIFD00671314	Medic	Aid - Emergency	A25	0	4' 10"	4' 10"
	12/1/2014	KIFD01147214	Fire	Transformer - Fire	E51	0	10' 42"	10' 42"
	12/20/2014	KIFD01181314	Medic	Aid - Emergency	A25	0	6' 6"	6' 6"
	Average for year							6' 33"

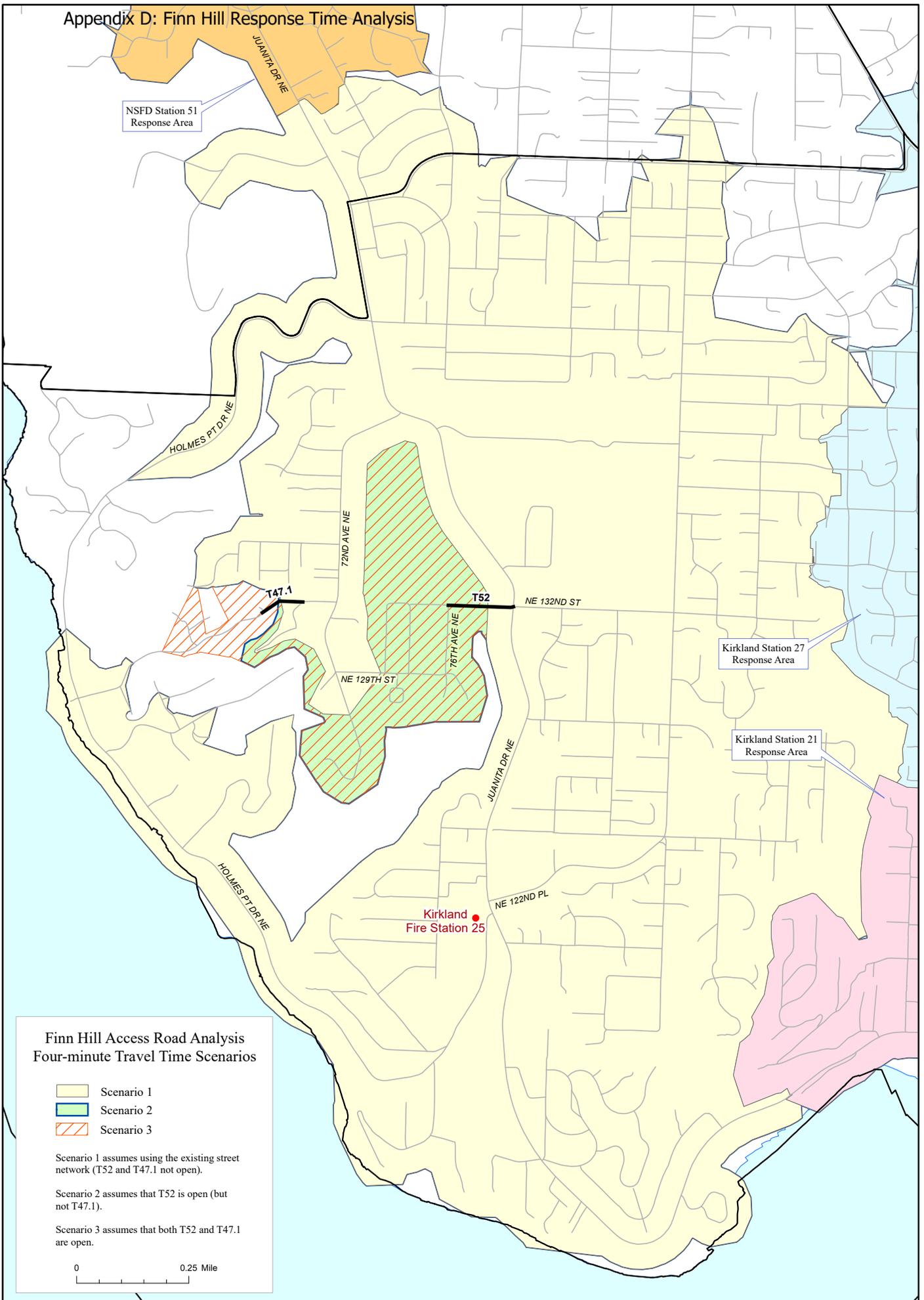
	Date	Incident Number	Incident Type	Problem	First-in Unit	Other Units	Travel Time	
							[First-in]	[Average]
2015	1/17/2015	KIFD00052015	Medic	Aid - Emergency	A25	0	4' 13"	4' 13"
	1/23/2015	KIFD00073015	Medic	Aid - Emergency	A25	0	4' 39"	4' 39"
	3/21/2015	KIFD00247015	Medic	Medic	A25	1	6' 33"	7' 1"
	4/26/2015	KIFD00353615	Medic	Aid - Emergency	A25	0	8' 14"	8' 14"
	5/24/2015	KIFD00458815	Medic	Aid - Emergency	A25	0	4' 32"	4' 32"
	5/24/2015	KIFD00459915	Medic	Aid - Emergency - DOA	A25	0	5' 10"	5' 10"
	7/20/2015	KIFD00669415	Medic	Aid - Emergency	A25	0	6' 50"	6' 50"
	8/2/2015	KIFD00716715	Fire	Wires Ground - Fire/Arc/Spark	E51	0	6' 9"	6' 9"
	8/27/2015	KIFD00804515	Medic	Aid - Emergency	A25	0	4' 33"	4' 33"
	8/28/2015	KIFD00811415	Medic	Aid - Emergency	A26	0	4' 19"	4' 19"
	8/29/2015	KIFD00815615	Other	Service Call - Fire	E25	0	6' 40"	6' 40"
	9/2/2015	KIFD00837515	Other	Flooding - Minor	E25	0	6' 17"	6' 17"
	11/15/2015	KIFD01085515	Other	Information Documentation	E26	0	7' 23"	7' 23"
	11/18/2015	KIFD01107415	Other	AFA - Multi-Family	E25	0	4' 36"	4' 36"
12/20/2015	KIFD01221415	Medic	Aid - Emergency	A25	0	3' 25"	3' 25"	
Average for year							5' 17"	5' 36"

	Date	Incident Number	Incident Type	Problem	First-in Unit	Other Units	Travel Time	
							[First-in]	[Average]
2016	1/6/2016	KIFD00016316	Medic	Medic	A25	0	5' 36"	5' 36"
	1/10/2016	KIFD00025816	Medic	Aid - Emergency	A25	0	6' 5"	6' 5"
	3/15/2016	KIFD00242216	Medic	Aid - Emergency	A25	0	4' 55"	4' 55"
	3/18/2016	KIFD00251016	Other	AFA - Residential	E25	0	4' 36"	4' 36"
	4/19/2016	KIFD00358816	Medic	Aid - Emergency	A25	0	4' 58"	4' 58"
	5/10/2016	KIFD00425016	Medic	Medic	MSO7	1	3' 16"	4' 18"
	6/27/2016	KIFD00587216	Medic	Aid - Emergency	A25	0	4' 20"	4' 20"
	7/9/2016	KIFD00627816	Medic	Patient Assist - Non-Injury	A25	0	5' 18"	5' 18"
	7/12/2016	KIFD00638716	Medic	Aid - Emergency	A25	0	5' 32"	5' 32"
	7/15/2016	KIFD00648816	Other	Aid - Non-Emergency	A25	0	6' 52"	6' 52"
	7/15/2016	KIFD00648916	Medic	Aid - Emergency	A25	0	3' 38"	3' 38"
	7/15/2016	KIFD00649016	Other	Aid - Non-Emergency	A25	0	6' 30"	6' 30"
	7/15/2016	KIFD00652416	Medic	Aid - Emergency	A25	0	4' 40"	4' 40"
	7/17/2016	KIFD00656816	Medic	Aid - Emergency	A25	0	11' 17"	11' 17"
	8/4/2016	KIFD00714816	Other	AFA - Residential	E25	0	3' 46"	3' 46"
	8/16/2016	KIFD00759016	Medic	Aid - Emergency	A25	0	4' 9"	4' 9"
	8/30/2016	KIFD00804316	Medic	Aid - Emergency	E25A	1	5' 12"	6' 53"
	9/4/2016	KIFD00817516	Medic	Medic	A25	1	4' 31"	6' 45"
	9/7/2016	KIFD00823816	Medic	Medic	A25	1	5' 34"	8' 1"
	10/6/2016	KIFD00914716	Medic	Aid - Emergency	A25	0	4' 36"	4' 36"
10/23/2016	KIFD00970216	Medic	Aid - Emergency	A25	0	7' 3"	7' 3"	
11/3/2016	KIFD01004916	Other	Aid - Non-Emergency	A25	0	5' 10"	5' 10"	
12/8/2016	KIFD01122216	Medic	Aid - Emergency	A25	0	6' 9"	6' 9"	
Average for year							5' 23"	5' 42"

	Date	Incident Number	Incident Type	Problem	First-in Unit	Other Units	Travel Time	
							[First-in]	[Average]
2017	1/5/2017	KIFD00014317	Fire	Wires Ground - Fire/Arc/Spark	E25	0	4' 59"	4' 59"
	3/11/2017	KIFD00220717	Medic	Aid - Emergency	A25	0	7' 13"	7' 13"
	5/29/2017	KIFD00463217	Medic	Aid - Emergency	A25	0	5' 53"	5' 53"
	6/23/2017	KIFD00544717	Other	Smoke - Smell	E25	0	5' 14"	5' 14"
	8/11/2017	KIFD00720017	Medic	Medic	E25A	1	7' 33"	9' 14"
	9/19/2017	KIFD00846517	Medic	Aid - Emergency	A25	0	4' 38"	4' 38"
	10/23/2017	KIFD00951917	Medic	Aid - Emergency	A25	0	3' 42"	3' 42"
	11/7/2017	KIFD00996817	Medic	Aid - Emergency	A25	0	8' 38"	8' 38"
	11/7/2017	KIFD00997317	Medic	Aid - Emergency	A25	0	3' 21"	3' 21"
	11/28/2017	KIFD01067217	Medic	Aid - Emergency	E25A	0	5' 21"	5' 21"
	Average for year							5' 39"

	Date	Incident Number	Incident Type	Problem	First-in Unit	Other Units	Travel Time	
							[First-in]	[Average]
2018	1/2/2018	KIFD00004018	Medic	Aid - Emergency	A25	0	4' 2"	4' 2"
	2/26/2018	KIFD00176218	Medic	Medic	A25	1	7' 42"	7' 48"
	3/8/2018	KIFD00205118	Medic	Aid - Emergency	A25	0	4' 22"	4' 22"
	3/17/2018	KIFD00239018	Medic	Medic	M65	1	12' 58"	14' 22"
	4/6/2018	KIFD00299018	Medic	Aid - Emergency	A25	0	4' 36"	4' 36"
	4/14/2018	KIFD00325618	Medic	Aid - Emergency Weapons	A25	0	3' 50"	3' 50"
	8/12/2018	KIFD00733218	Other	Service Call - Fire	E25	0	5' 14"	5' 14"
	8/27/2018	KIFD00787118	Medic	Aid - Emergency	A25	0	4' 6"	4' 6"
	9/8/2018	KIFD00824218	Medic	Aid - Emergency	A25	0	7' 45"	7' 45"
	9/10/2018	KIFD00831218	Medic	Aid - Emergency	A25	0	4' 28"	4' 28"
	9/14/2018	KIFD00843618	Medic	Aid - Emergency	A25	0	5' 43"	5' 43"
	10/11/2018	KIFD00939318	Medic	Aid - Emergency	A25	0	3' 52"	3' 52"
	11/2/2018	KIFD01013118	Fire	Wires Air - Flames Seen	E25	0	5' 45"	5' 45"
11/20/2018	KIFD01079018	Medic	Aid - Emergency	A25	0	3' 35"	3' 35"	
12/19/2018	KIFD01187018	Medic	Aid - Emergency	A25	0	4' 54"	4' 54"	
Average for year							5' 31"	5' 37"

Appendix D: Finn Hill Response Time Analysis



Finn Hill Access Road Analysis Four-minute Travel Time Scenarios

- Scenario 1
- Scenario 2
- Scenario 3

Scenario 1 assumes using the existing street network (T52 and T47.1 not open).

Scenario 2 assumes that T52 is open (but not T47.1).

Scenario 3 assumes that both T52 and T47.1 are open.



Transportation Connection Concept – Environmental Regulatory Snapshot

Connection: NE 132nd Street Extension to 76th Avenue NE (City T52 Connection)

Brief Location Description (Plate 1)

Generally W-E trace through existing, undeveloped ROW of NE 132nd St to connect. Extends from intersection of NE 132nd St with Juanita Drive NE west to connect with gravel surface at intersection between NE 132nd St and 74th Place NE. Project adjacent to forested area of Big Finn Hill park (to the north)

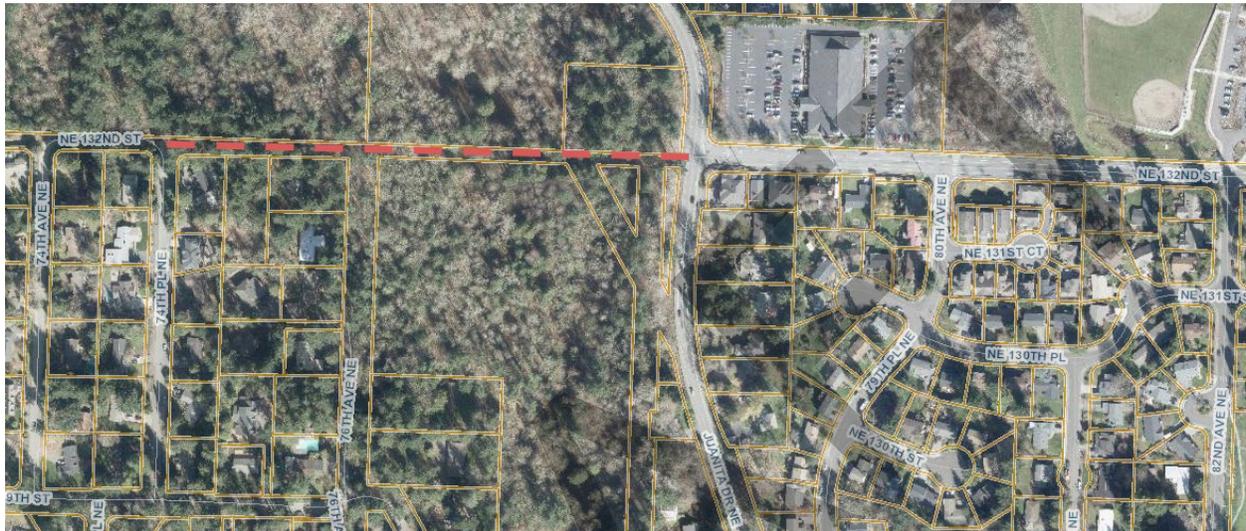


Plate 1: Proposed bypass route

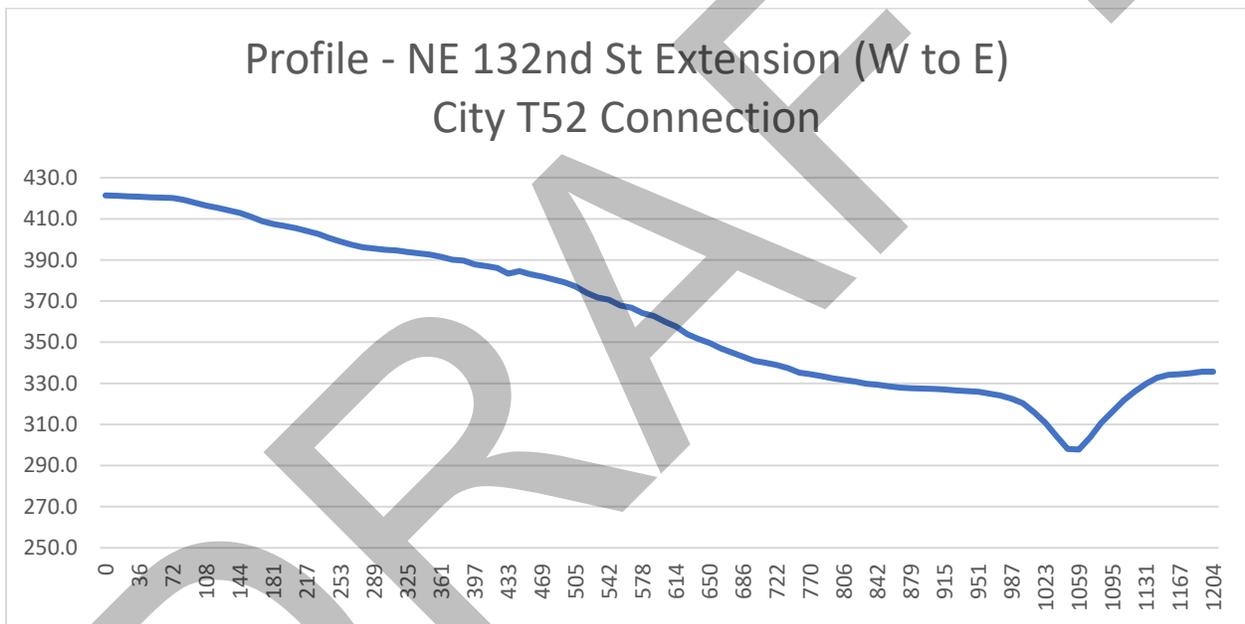
Brief Connection Design Description

- 20-foot wide section
- 1-way emergency vehicle passage as needed
 - Breakaway bollard or automatic gate to restrict other vehicle access
- 2-way pedestrian and bicycle accessible normally
- Bridge spans crossing ravine; at-grade roadway otherwise
 - Ravine bridge span (including 20-foot abutments):
 - Level bridge: approximately 425 feet
 - Bridge with -2% declination: approximately 340 feet
- No additional resurfacing of existing 76th Ave NE gravel surface (designated City T51 Connection) or existing NE 132nd St gravel surface west of intersection with 76th Ave NE (designated City T50 Connection)

Topographical Evaluation



Plate 2: Proposed bypass route with topography



Topography includes a ravine with stream at the bottom:

- Approximately 70 feet west of, and parallel to, Juanita Drive NE
- Moderate to steep hill climb west of the ravine
- Ravine depth, measured from crest grade break east of ravine to trough: approximately 37 feet deep
- Ravine widths:
 - Level measured at elevation 334: 385 feet
 - -2% declination of bridge from elevation 334 (east end): 300 feet

Overall inclination of route west of ravine: 10%

- 40-foot section of grade inclination 25%-30%

Surface Water Considerations

- Length of new impervious: 1,210 feet
- New impervious surface area proposed: 24,200 square feet
- Topography/landslide hazards near ravine and probable surface soil type(s) in general area of route may limit or exclude infiltration and/or outfall options.

General Environmental & Permitting Considerations

- Core documentation needed for multiple reviews: Why can't we avoid/minimize? Will need to demonstrate project significant enough public benefit to justify ecological damage
 - Build around SEPA review
 - Connection concept does not appear to require either ROW acquisition and/or permanent easements.
 - Need to relocate overhead utility lines and/or significant trees outside of ROW with intruding canopy may change this
 - ROW currently used by overhead utility lines, may complicate layout geometry
 - Relocation of overhead utility lines may add potential ecological impact not currently predicted – tree removals outside of ROW most likely of the issues
 - Number of significant trees in the proposed corridor may be lower than typical for undeveloped forested land
- As ravine will require a bridge, local Building permits applicable will be triggered
 - A particular concern for this type of corridor will be safety systems to clear pedestrians/bicyclists from the bridges when in use by emergency vehicles (no "bail off points" midspan, without significant additional design/construction work beyond the current concept).
 - How will emergency vehicle drivers know the bridges are clear?
- As adjacent Big Finn Hill Park is a King County park, rather than a City of Kirkland one, permits will need to be obtained from King County for any temporary and/or permanent impacts to park area
 - This may be a particular concern if relocating overhead utilities requires tree removals and/or trimming within Big Finn Hill Park property

Geohazard Considerations

- Mapped landslide hazards associated with ravine slopes are a geohazard (KZC 85) to be analyzed, in addition to the engineering challenges bridging the ravine.
 - Emergency services corridor = increased seismic slope risk scrutiny

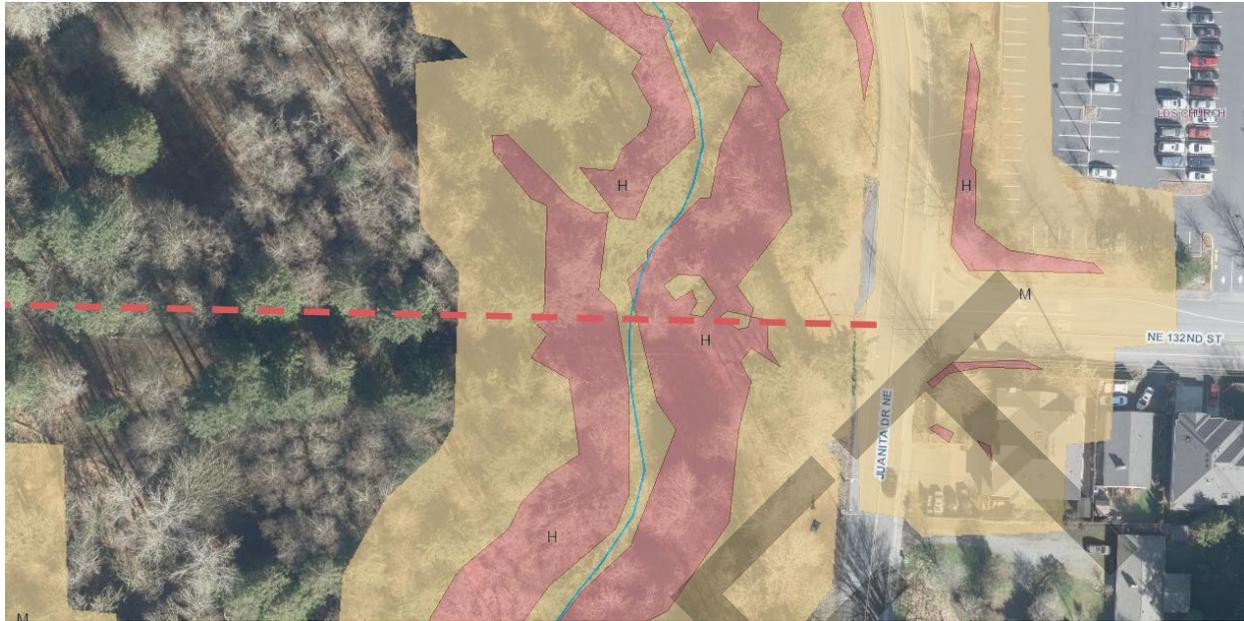


Plate 3: Proposed bypass route with City-mapped landslide/steep slope potential hazards and mapped stream

- Soils at bottom of ravine mapped as high liquefaction (likely alluvial deposits)
- East half of project alignment is generally mapped as a moderate liquefaction area, so glacial till may not be found at or very close to ground surface – important for bridge foundations/abutments

Water Resources Regulatory Considerations

- Ravine conveys a mapped water resource (a stream) with nearby wetlands (not within route area) so:
 - Local Planning review of project critical areas report, including up-to-date stream characterization
 - Stream buffer impacts to mitigate for (extent 100 feet on either side of stream banks)
 - USACE permit required; if cannot find justification for a Nationwide Permit, this might prove to need an individual permit
 - Extended review time-frame if individual permit (minimum 18 months once submitted to USACE)
 - WDFW HPA permit required
 - Bridge abutments likely outside stream ordinary high water, but State Hydraulic Code still gives WDFW applicable jurisdiction over areas adjacent to stream banks where conditions will have a significant effect on stream
 - Slope erosion and loss of tree cover shading for stream will be key WDFW concerns
 - Fish window construction timing
 - Construction schedule to replant during winter months, particularly February/March to gain back full growing season for steep slope areas.
- Disturbance proposed less than 1 acre

Tree Retention Regulatory Considerations

- Tree retention/removal to meet KZC 95 will also require significant effort.
 - Number of significant trees in proposed corridor have not been inventoried, but may already be reduced by presence of power lines.
 - Relocation of power lines to accommodate roadway may exacerbate tree removal needs, due to canopy interference
 - Much of the corridor is right-of-way.
 - Need to consider trees in close proximity to actual project corridor, all on private and/or King County property
 - Root impacts
 - Canopy impacts to allow ladder truck passage
 - Tree removals in steep slope/landslide areas are tricky, because it's difficult to replicate the tree's protection of the slope to mitigate for removal.

DRAFT

Appendix E: Proposed Connection T52 Study

Concept Cost Estimate (Iteration 1)

NE 132nd St Extension (T52)

Criterion: Smallest for Ladder Trucks

	Length	Width	Quantity	Unit Cost	Subtotals	Sig. Totals	Notes
Bridge	340	18		\$ 335.00	\$ 2,050,200.00		Steel Girder Bridge per WSDOT M23-50 Chapter 12
Bridge Support-Foundations Pile Cap Sets	60		16	\$ 1,400.00	\$ 1,344,000.00		4-6" dia piles to 15' depth per cap, 2 caps/50 ft - WSDOT M23-50 Chapter 12
Difficult Drilling Access (Add 25% of Bridge Foundation)					\$ 336,000.00		
Ped/Bike/Emerg Roadway	870	18		\$ 154.00	\$ 2,411,640.00		Assume 10 percent higher due to moderate grade (\$140 base unit price per sq. ft.)
Vegetation Removal/Restoration/Mitigation	1210	18		\$ 30.00	\$ 653,400.00		
Stormwater Facilities (25% of Roadway & Bridge Area @ Roadway Unit Price)					\$ 838,530.00		Assumes we have the available space to address stormwater management
Illumination	1210			\$ 900.00	\$ 1,089,000.00		Per lineal foot
Total Construction Significant "Fixed" Items						\$ 8,722,770.00	
Mobilization/Contract Fulfillment (15%)					\$ 1,308,415.50		
Earthwork Stabilization (15%)					\$ 1,308,415.50		
Construction Subtotal						\$ 11,339,601.00	
Construction Contingency (30%)					\$ 3,401,880.30		
Final Construction Total						\$ 14,741,481.30	
Consultants (design, inspection, etc.) (40%)					\$ 4,535,840.40		Percent of pre-contingency construction subtotal
City Services (Staff, Permit fees, etc.) (10%)					\$ 1,133,960.10		Percent of pre-contingency construction subtotal
Project Total (w/out ROW)						\$ 20,411,281.80	

Notes for Reduction (Iteration 1)

- Dirt/gravel surface road, instead of asphalt
- No emergency/earthquake resistance
- Steel girder instead of steel truss (lower than 400' limit)
- Reduce bridge deck from 20 feet to 18 (Reduce drive lane from 16 feet to 12 feet)
- Use 2% declination bridge scenario, instead of level - reduced length from 425 to 340
- Reduce illumination to non-critical route levels

Concept Cost Estimate (Iteration 2)

NE 132nd St Extension (T52)

Criterion: Smallest for Ambulance/First Responders

	Length	Width	Quantity	Unit Cost	Subtotals	Sig. Totals	Notes
Bridge	340	16		\$ 335.00	\$ 1,822,400.00		Steel Girder Bridge per WSDOT M23-50 Chapter 12
Bridge Support-Foundations Pile Cap Sets	60		16	\$ 1,400.00	\$ 1,344,000.00		4-6" dia piles to 15' depth per cap, 2 caps/50 ft - WSDOT M23-50 Chapter 12
Difficult Drilling Access (Add 25% of Bridge Foundation)					\$ 336,000.00		
Ped/Bike/Emerg Roadway	870	16		\$ 154.00	\$ 2,143,680.00		Assume 10 percent higher due to moderate grade (\$140 base unit price per sq. ft.)
Vegetation Removal/Restoration/Mitigation	1210	16		\$ 30.00	\$ 580,800.00		
Stormwater Facilities (25% of Roadway & Bridge Area @ Roadway Unit Price)					\$ 745,360.00		Assumes we have the available space to address stormwater management
Illumination	1210			\$ 900.00	\$ 1,089,000.00		Per lineal foot
Total Construction Significant "Fixed" Items						\$ 8,061,240.00	
Mobilization/Contract Fulfillment (15%)					\$ 1,209,186.00		
Earthwork Stabilization (15%)					\$ 1,209,186.00		
Construction Subtotal						\$ 10,479,612.00	
Construction Contingency (30%)					\$ 3,143,883.60		
Final Construction Total						\$ 13,623,495.60	

Appendix E: Proposed Connection T52 Study

Consultants (design, inspection, etc.) (40%)	\$	4,191,844.80	Percent of pre-contingency construction subtotal
City Services (Staff, Permit fees, etc.) (10%)	\$	1,047,961.20	Percent of pre-contingency construction subtotal
Project Total (w/out ROW)	\$	18,863,301.60	

Notes for Reduction (Iteration 2)

Not safe/suitable for ladder trucks

Dirt/gravel surface road, instead of asphalt

No emergency/earthquake resistance

Steel girder instead of steel truss (lower than 400' limit)

Reduce bridge deck from 20 feet to 16 (Reduce drive lane from 16 feet to 10 feet)

Use 2% declination bridge scenario, instead of level - reduced length from 425 to 340

Reduce illumination to non-critical route levels

Concept Cost Estimate (Iteration 3)

Criterion: Pedestrians and Bikes only (no motor vehicles, emergency or otherwise)

NE 132nd St Extension (T52)

	Length	Width	Quantity	Unit Cost	Subtotals	Sig. Totals	Notes
Bridge	340		14	\$ 275.00	\$ 1,309,000.00		Steel Girder Bridge per WSDOT M23-50 Chapter 12
Bridge Support-Foundations Pile Cap Sets	60		16	\$ 1,400.00	\$ 1,344,000.00		4-6" dia piles to 15' depth per cap, 2 caps/50 ft - WSDOT M23-50 Chapter 12
Difficult Drilling Access (Add 25% of Bridge Foundation)					\$ 336,000.00		
Ped/Bike Roadway	870	12		\$ 110.00	\$ 1,148,400.00		Assume 10 percent higher due to moderate grade (\$100 base unit price per sq. ft.)
Vegetation Removal/Restoration/Mitigation	1210	14		\$ 30.00	\$ 508,200.00		
Stormwater Facilities (15% of Roadway & Bridge Area @ Roadway Unit Price)					\$ 250,800.00		Assumes we have the available space to address stormwater management
Illumination	1210			\$ 650.00	\$ 786,500.00		Per lineal foot
Total Construction Significant "Fixed" Items						\$ 5,682,900.00	
Mobilization/Contract Fulfillment (15%)					\$ 852,435.00		
Earthwork Stabilization (10%)					\$ 568,290.00		
Construction Subtotal						\$ 7,103,625.00	
Construction Contingency (30%)					\$ 2,131,087.50		
Final Construction Total						\$ 9,234,712.50	
Consultants (design, inspection, etc.) (40%)				\$	2,841,450.00		Percent of pre-contingency construction subtotal
City Services (Staff, Permit fees, etc.) (10%)				\$	710,362.50		Percent of pre-contingency construction subtotal
Project Total (w/out ROW)						\$ 12,786,525.00	

Notes for Reduction (Iteration 3)

Not safe/suitable for any motor vehicles

Dirt/gravel surface road, instead of asphalt

No emergency/earthquake resistance

Steel girder instead of steel truss (lower than 400' limit)

Reduce bridge deck from 20 feet to 14 (Reduce ped/bike shared-use down to two 5 foot wide "lanes", one each direction)

Use 2% declination bridge scenario, instead of level - reduced length from 425 to 340

Lowered roadway unit prices to ped/bike loading only (no vehicles)

Stormwater changed to non-pollution generating levels and assuming infiltration-in-place associated with gravel surfacing

Reduce illumination to just pedestrian levels

Reduced earthwork-stabilization due to much lighter traffic loading

Transportation Connection Concept – Environmental Regulatory Snapshot

Connection: NE 130th Place Extension Linking 70th Lane NE to 66th Place NE (City T47.1 Connection)

Brief Location Description (Plate 1)

Generally NE-SW trace generally following the right-of-way of NE 130th Place from the point where that street meets 70th Lane NE (east end) to the intersection of that street with 66th Place NE. This extension involves two parts shown Plate 1 below: a presently undeveloped 520-foot long portion within the existing right-of-way (red dashed line) and a portion presently developed as a shared driveway meandering between right-of-way and adjacent undeveloped parcels (orange dashed line).

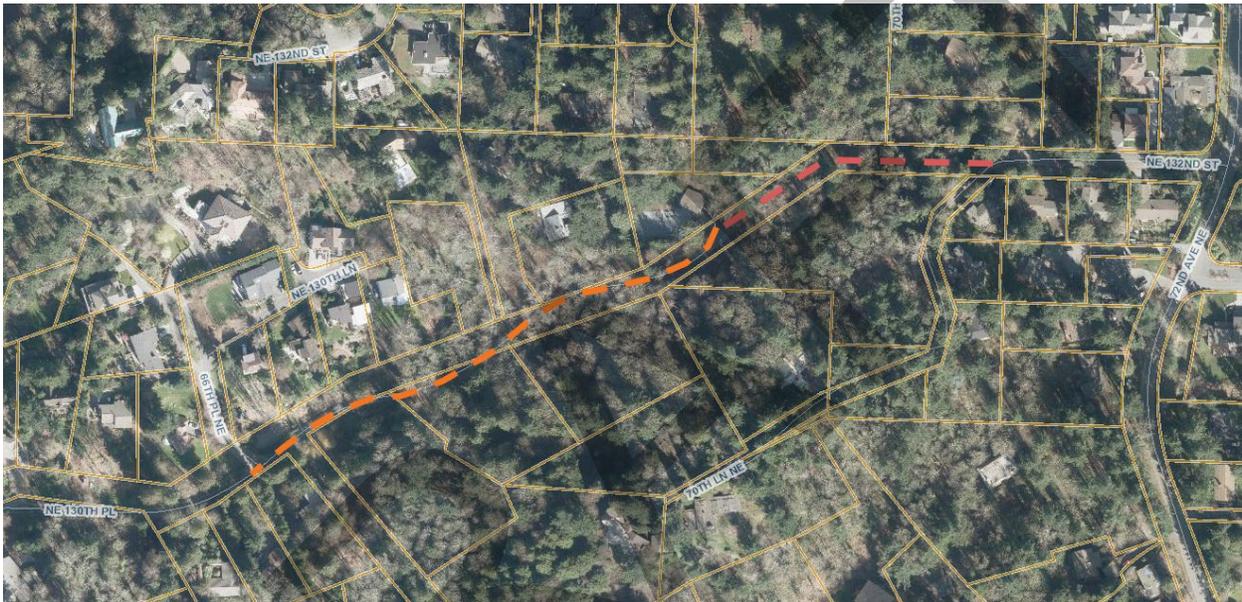


Plate 1: Proposed new emergency connection route. This combines an undeveloped portion (red dashed line) with a portion presently developed as a shared residential driveway that is not entirely confined to the right-of-way (orange dashed line)

This evaluation assumed that the developed portion of this proposed route (orange dashed line) is already acceptable without additional improvement. This evaluation focuses exclusively on the undeveloped portion of this proposed route, as shown in Plate 1a below.



Plate 1a: Proposed new emergency connection route (presently undeveloped portion).

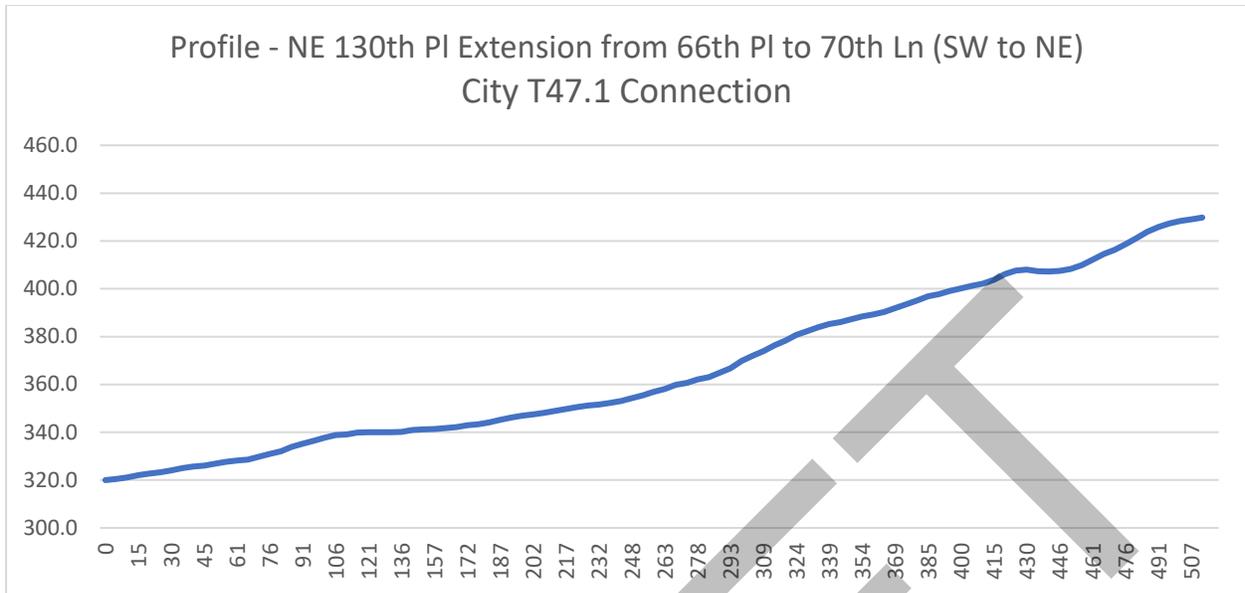
Brief Connection Design Description

- 20-foot wide section for roadway, plus an additional 5 feet to accommodate retaining walls on both north and south sides, where route cuts into existing topography
- 1-way emergency vehicle passage as needed
 - Breakaway bollard or automatic gate to restrict other vehicle access
- 2-way pedestrian and bicycle accessible normally
- The proposed route in the Citywide Plan has several challenges, including topography and the combination of vertical curves with a mid-route horizontal curve.

Topographical Evaluation



Plate 2: Proposed new emergency connection route (red dashed line) with topography



Overall inclination of Citywide Plan-proposed route, from southwest to northeast: 22%

- This is a topographically complex route, particularly if confined to the available right-of-way width.
- Two sections of route, approximately 40 feet long each, have grades 40% or greater, with smaller sections up to 60%
- Due to high difficulties in stabilizing downslope sides of route, assumed that this roadway route will be 100 percent cut into the existing slopes. The topography is complex, and incisions into slopes both north and south of roadway surface are expected.
- Retaining walls up to 15 to 20 feet in height are anticipated along the cut-slope portions of this slope.
 - Due to the presence of landslide debris fields (described below), it is very unlikely these retaining walls can be constructed with just cantilever soldier piles and no tie-backs.
 - Tiebacks require significant permanent easements either north or south of roadway, as retaining walls will vary from one side of the roadway to the other along this length
 - Even if found to be possible (or possible for some, if not all, of the wall lengths), cantilever soldier piles will be very expensive and may have long-term maintenance issues
 - Cantilever retaining walls, even less than 20 feet in vertical height, are typically not able to resist a destabilized soil backslope
 - 60 to 80+ foot piles, depending on wall heights and thicknesses of landslide debris fields
 - Thickness, relative stability, degree of groundwater seepage, and other landslide characteristics cannot be determined without substantial initial investigation and probable stability monitoring (up to a year or more)
 - Exposed portion of piles likely to differentially deflect over time

- Retaining walls of any type and, possibly, backslope areas behind retaining walls, will need to integrate robust groundwater seepage and dewatering measures in order to reduce hydrogeological risks for existing slope stability.
 - Expensive to implement with permanent maintenance and monitoring requirements.
- The combination of limited sight distances for multiple, very steep vertical curves; plus the 35-degree horizontal curve halfway along route; will make this route unsafe for pedestrians/cyclists, as emergency vehicles may not have sufficient sight distance and there isn't a safe "bail out" area (without significant additional construction work beyond the current concept)

Surface Water Design Considerations

For Citywide Plan-proposed route:

- Length of new impervious: 520 feet
- New impervious surface area proposed: 14,000 square feet
 - Includes additional areas indicated above to accommodate retaining walls
 - Please note that this represents a minimum value. It may be necessary to meander the actual roadway alignment in order to accommodate the existing topography.
- Topography/landslide hazards and probable surface soil type(s) will exclude (or, at best, severely curtail) infiltration and/or outfall options.
- Proposed alignment crosses two existing storm pipes (likely only shallow depths, considering site grades) and one existing surface drainage channel or swale. These features provide stormwater conveyance from residential properties located northeast of the proposed roadway. These features are indicated on Plate 4, below.
- This pipes discharge into the wetland and mapped stream adjacent to the proposed roadway route discussed below and shown on Plate 4.

General Environmental & Permitting Considerations

- Core documentation needed for multiple reviews: Why can't we avoid/minimize? Will need to demonstrate project significant enough public benefit to justify ecological damage
 - Build around SEPA review
- Citywide Plan connection concept is assumed to not require either ROW acquisition and/or permanent easements for the straight surface roadway route.
 - However, meanders in the roadway alignment due to topography may require either ROW acquisition and/or permanent easements.
 - Permanent tie-backs associated with the needed retaining walls will require either ROW acquisition and/or permanent easements.

Geohazard Considerations

- The proposed route will require significant geotechnical investigation and analysis to address multiple mapped geohazards (per KZC 85).
 - The proposed alignment passes through two mapped areas of past landslide debris, and passes in very close proximity to two additional mapped areas of past landslide debris.
 - The proposed alignment is located entirely within high or moderate mapped landslide hazard areas, in addition to the landslide debris fields

- It will be very difficult and may prove impossible to stabilize on-site soils, particularly within mapped landslide debris areas, to allow for roadway grades greater than 20 to 30 percent. As proposed route involves grades in excess of 40 percent, this route may not be achievable.
- Retaining walls will, typically, be required to retain landslide debris fields up-gradient of proposed routes.
 - Substantial additional loading placed upon these walls, due to lack of soil stability.
- Substantial initial geological investigation will be required to determine if this route is even developable. This investigation will likely include a combination of surface mapping (soil and vegetation condition), subsurface investigations to unknown (at this time) depths, and a period of slope movement/inclinometer installation and monitoring (at least a year). Access for investigation equipment (mainly drill rigs) will require initial ground disturbance work and have to reach multiple difficult-to-access areas of existing slopes.
- As this is intended to be an emergency services corridor = increased seismic slope risk scrutiny

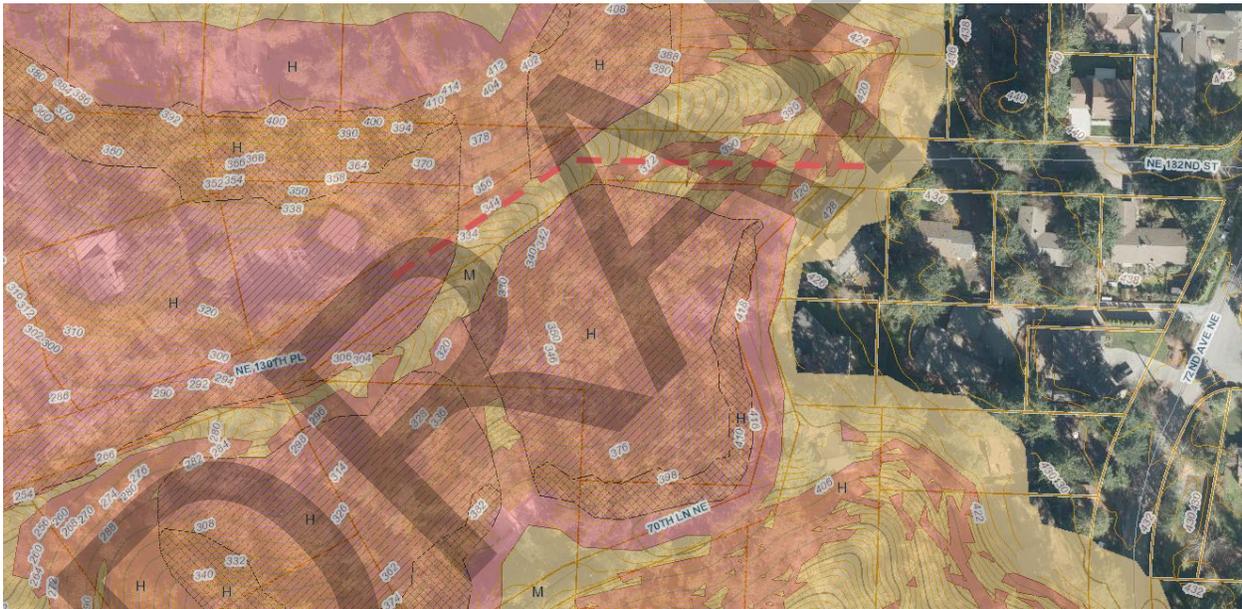


Plate 3: Proposed new emergency connection route (red dashed line) with City-mapped landslide/steep slope potential hazards

Water Resources Regulatory Considerations

- The proposed alignment does not directly impact mapped natural water resources (e.g. streams, wetlands, etc.). The existing drainage channel crossed by the proposed alignment is not mapped as a natural stream.
 - No State permits involved at this time
 - No federal permitting/approval required at this time
 - No fish window construction timing, but avoiding winter weather construction will be important
 - Construction schedule to replant during winter months, particularly February/March to gain back full growing season for steep slope areas.

- The proposed alignment does pass very close (within 30-35 feet) of the mapped wetland and stream indicated on Plate 4, below. This will impact wetland and stream buffers, requiring mitigation and KZC 90 land use review and approval by the Planning Department.
- Construction disturbance proposed less than 1 acre at this time.

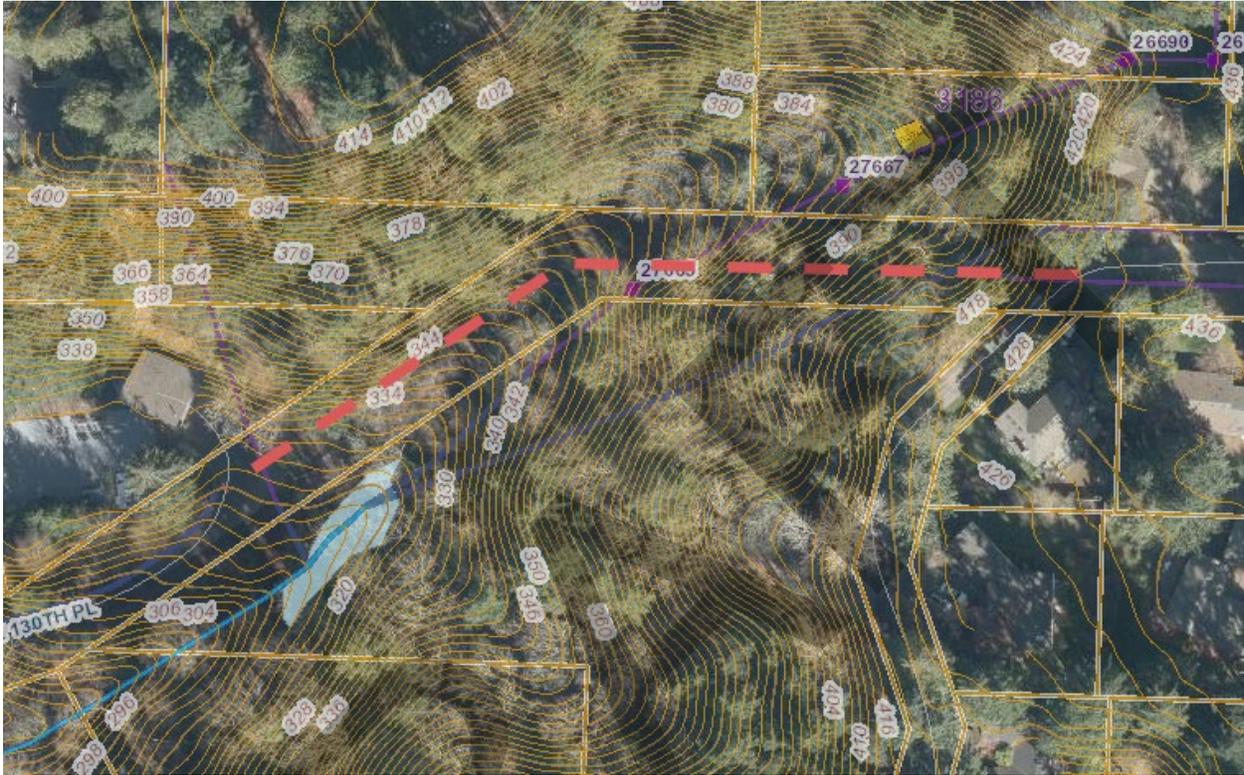


Plate 4: Proposed new emergency connection route (red dashed line) with City-mapped wetland, natural stream, and stormwater utility features

Tree Retention Regulatory Considerations

- Tree retention/removal to meet KZC 95 will also require significant effort.
 - Number of significant trees in proposed corridor have not been inventoried, but expected to be dense.
 - Much or all of proposed route is located within right-of-way, but slope stability hazards will substantially reduce usability of right-of-way tree removal policies.
 - Need to consider trees in close proximity to actual project corridor
 - Root impacts
 - Canopy impacts to allow ladder truck passage
 - Tree removals in steep slope/landslide areas are very tricky, because it's difficult to replicate the tree's protection of the slope to mitigate for removal.
 - In areas of mapped landslide debris, this difficulty is substantially increased, as trees growing after the landslide are often key to the current stability conditions.

Transportation Connection Concept – Environmental Regulatory Snapshot

Connection: NE 124th St Extension (City T42 Connection)

Brief Location Description (Plate 1)

Generally E-W trace through combination of existing, undeveloped ROW and both developed and undeveloped parcels to connect. Extends from NE-124th St/89th Ave NE cul-de-sac east to connect with intersection of NE 124th Street and 93rd Avenue NE.



Plate 1: Proposed new emergency connection route (red dashed line)

Brief Connection Design Description

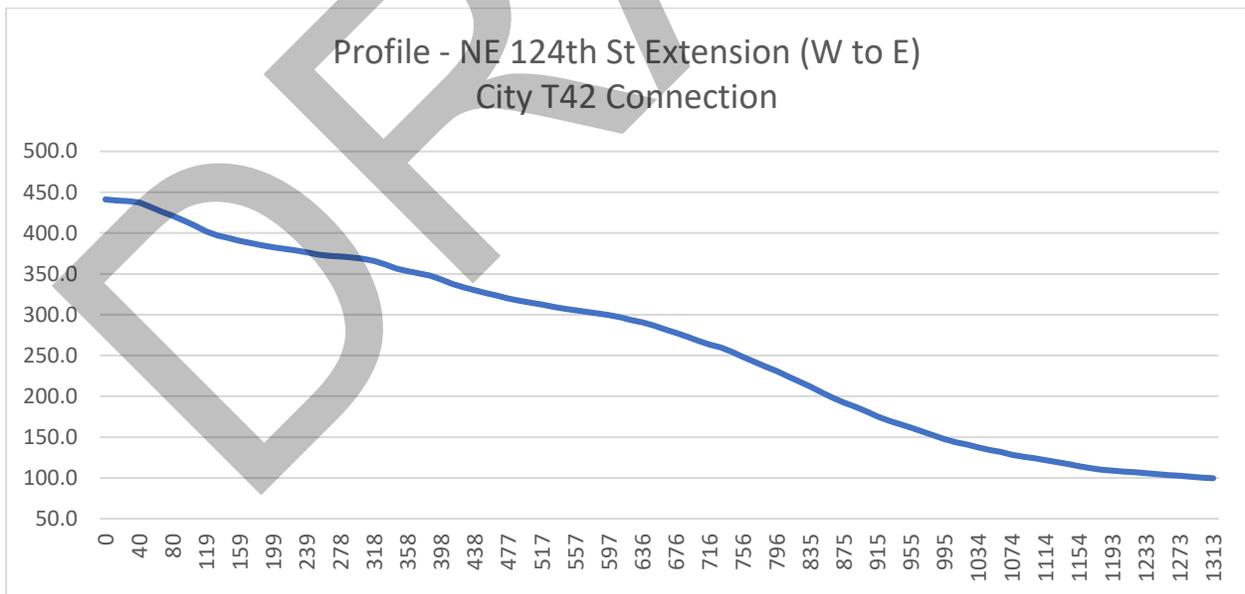
- 20-foot wide section
- 1-way emergency vehicle passage as needed
 - Breakaway bollard or automatic gate to restrict other vehicle access
- 2-way pedestrian and bicycle accessible normally
- Concept in the draft Citywide Transportation Connections Map shows alignment as depicted, as a straight line connecting NE 124th Street.
 - This alignment crosses 4 parcels presently developed as single-family residences (2 at the west end, 2 at the east end).
 - Parcels would need to be acquired and the residence building removed to make proposed alignment work

- An alternative street routing at the west end to avoid the 2 impacted parcels involves increasing the route from NE 124th Street north on 88th Place NE to NE 127th Place, east on NE 127th Place to 89th Place NE, and finally south on 89th Place NE to return to the alignment with NE 124th Street
 - This alternative route would add a total of 2,300 feet of travel distance over the proposed concept.
- No alternative routes to bypass the 2 parcels at the east end available.

Topographical Evaluation



Plate 2: Proposed new emergency connection route (red dashed line) with topography and stream



Overall declination of route, from west to east: -30%

- Sloping sections of roadway up to 225 feet in length have slopes between 40 to 50%
- Fairly abrupt crest vertical curve transition at the west end may require grading to adjust (which will add to need to remove existing residential buildings).

- Vertical curve at east end probably achievable without addition of either grading or a causeway structure.

Surface Water Design Considerations

- Length of new impervious: 1330 feet
- New impervious surface area proposed: 24,600 square feet
- Replaced impervious surface area proposed: 2,000 square feet
- Topography/landslide hazards will exclude (or, at best, severely curtail) infiltration and/or outfall options for much of corridor.
 - Purchased residential parcels at east end might be used for detention, once existing buildings demolished.
 - Infiltration may be possible at east end, depending on soil types present and groundwater elevation

General Environmental & Permitting Considerations

- Core documentation needed for multiple reviews: Why can't we avoid/minimize? Will need to demonstrate project significant enough public benefit to justify ecological damage
 - Build around SEPA review
- Connection concept will require City acquisition of four developed residential properties and likely removal of the existing buildings and developments
 - Parcels are not large enough to easily accommodate route and, in a couple cases, buildings are in the way; permanent easements will not likely suffice
 - Demolition of parcels will require City permits

Geohazard Considerations

- Mapped landslide hazards, as well as proximity to mapped historical landslides, collectively indicate a significant geohazard (KZC 85) scenario requiring significant geotechnical investigation and analysis
 - Stream noted close to alignment (see Plate 2) may be spring-fed, increasing potential landslide risk
 - Emergency services corridor = increased seismic slope risk scrutiny

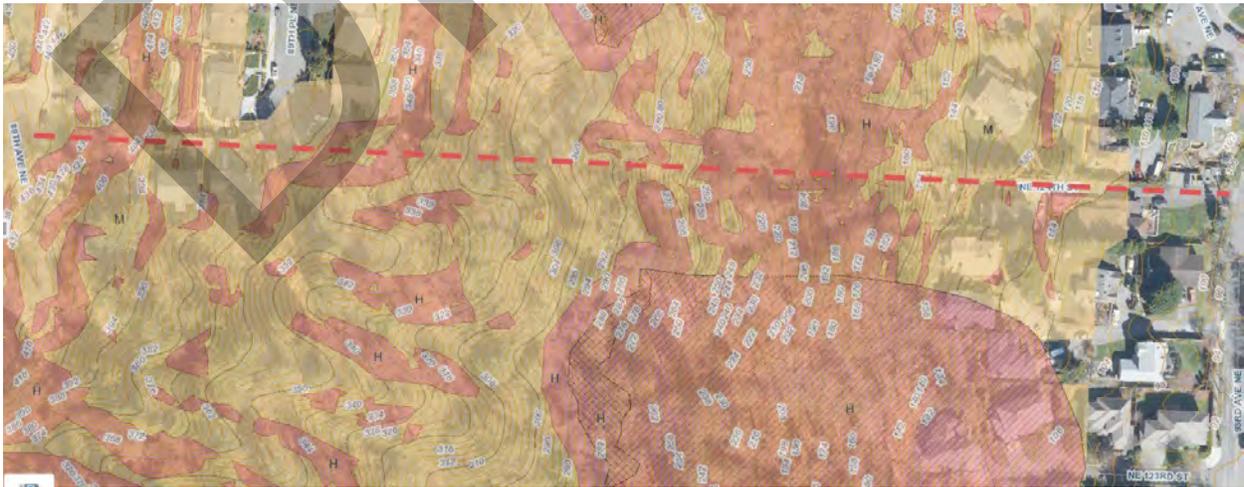


Plate 3: Proposed new emergency connection route (red dashed line) with City-mapped landslide/steep slope potential hazards

Water Resources Regulatory Considerations

- Proposed alignment very close to head of an existing mapped stream (See Plate 2)
 - Local Planning review of project critical areas report, including updated stream characterization
 - Spring fed, or unmapped surface flow?
 - May be additional stream length south of proposed connection not yet characterized/mapped
 - Within likely stream buffers
 - Will need to demonstrate that moving the proposed route further south, away from the stream, is not feasible.
 - No State permits involved at this time
 - If stream actually crosses proposed connection route, this will trigger WDFW requiring an HPA
 - No federal permitting/approval required at this time
 - If stream actually crosses proposed connection route, this will trigger requirement for USACE approval. If an applicable Nationwide Permit cannot be identified, this may need to be an Individual Permit (very long time frame)
 - No fish window construction timing (unless stream found to cross proposed connection route), but avoiding winter weather construction will be important
 - Construction schedule to replant during winter months, particularly February/March to gain back full growing season for steep slope areas.
- Construction disturbance proposed less than 1 acre

Tree Retention Regulatory Considerations

- Tree retention/removal to meet KZC 95 will also require significant effort.
 - Number of significant trees in proposed corridor have not been inventoried, but expected to be dense outside of the developed residential parcels.
 - Some forested portions of the corridor are located on real property, not right-of-way.
 - Need to consider trees in close proximity to actual project corridor
 - Root impacts
 - Canopy impacts to allow ladder truck passage
 - Tree removals in steep slope/landslide areas are tricky, because it's difficult to replicate the tree's protection of the slope to mitigate for removal.

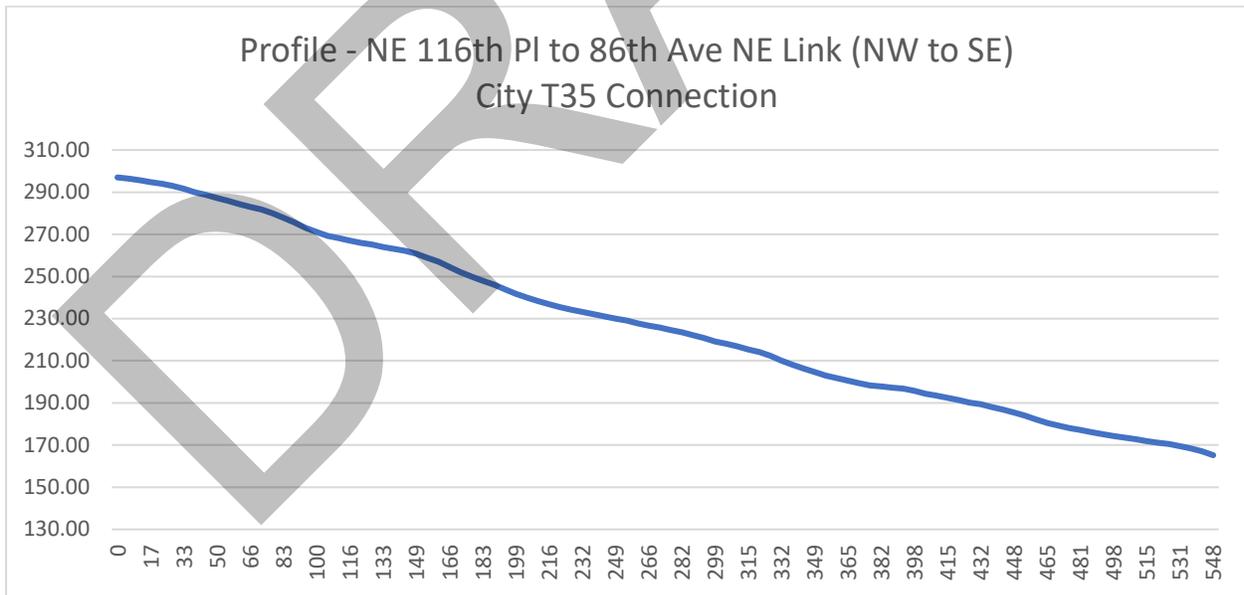
Concept Cost Estimate							
NE 124th St Extension (T42)							
	Length	Width	Quantity	Unit Cost	Subtotals	Sig. Totals	Notes
Ped/Bike/Emerg Roadway	1330	20		\$ 271.25	\$ 7,215,250.00		Assume 55 percent higher due to mainslope grade (\$175 base unit price per sq. ft.)
Demolition					\$ 400,000.00		
Vegetation Removal/Restoration/Mitigation	1330	20		\$ 30.00	\$ 798,000.00		
Stormwater Facilities (25% of Roadway)					\$ 1,803,812.50		Assumes we have the available space to address stormwater management
Illumination	1330			\$ 1,200.00	\$ 1,596,000.00		Per lineal foot
Total Construction Significant "Fixed" Items						\$ 11,813,062.50	
Mobilization/Contract Fulfillment (15%)					\$ 1,771,959.38		
Earthwork Stabilization (25%)					\$ 2,953,265.63		
Construction Subtotal						\$ 16,538,287.50	
Construction Contingency (30%)					\$ 4,961,486.25		
Final Construction Total						\$ 21,499,773.75	
Consultants (design, inspection, etc.) (40%)					\$ 6,615,315.00		Percent of pre-contingency construction subtotal
City Services (Staff, Permit fees, etc.) (10%)					\$ 1,653,828.75		Percent of pre-contingency construction subtotal
Project Total (w/out ROW)						\$ 29,768,917.50	

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Topographical Evaluation



Plate 2: Proposed new emergency connection route (red dashed line) with topography



Overall declination of route, from north to south: -24%

- Sloping sections of roadway up to 55 feet in length have slopes between 40 to 50%
- Relatively gentle vertical curves at either end of the connection (not abrupt vertical transitions at connection points)

Surface Water Design Considerations

- Estimated length of new impervious surface: 555 feet
- Estimated new impervious surface area proposed: 11,100 square feet
- Topography/landslide hazards and probable surface soil type(s) will exclude (or, at best, severely curtail) infiltration and/or outfall options.

General Environmental & Permitting Considerations

- Core documentation needed for multiple reviews: Why can't we avoid/minimize? Will need to demonstrate project significant enough public benefit to justify ecological damage
 - Build around SEPA review
- Connection concept will require either ROW acquisition and/or permanent easement through undeveloped private property

Geohazard Considerations

- Mapped landslide hazard areas and, in particular, mapped historical slide debris will involve significant geotechnical investigation and analysis for KZC 85 compliance
 - Emergency services corridor = increased seismic slope risk scrutiny



Plate 3: Proposed new emergency connection route (red dashed line) with City-mapped landslide/steep slope potential hazards and streams

Water Resources Regulatory Considerations

- Proposed alignment very close to existing mapped water resources, including a stream (approximately 30 feet at closest) and wetlands associated with stream (approximately 14 feet at closest)
 - Local Planning review of project critical areas report, including updated stream characterization and wetland classification/delineation
 - Well within likely stream and wetland buffers
 - Will need to demonstrate that moving the proposed route further west, away from the stream and wetlands, is not feasible.
 - For instance, moving alignment further west moves alignment further into mapped steep slope and landslide debris area.
 - No State permits involved at this time
 - No federal permitting/approval required at this time
 - No fish window construction timing, but avoiding winter weather construction will be important
 - Construction schedule to replant during winter months, particularly February/March to gain back full growing season for steep slope areas.
- Construction disturbance proposed less than 1 acre



Plate 4: Proposed bypass route (red dashed line) with City-mapped stream and wetland areas

Tree Retention Regulatory Considerations

- Tree retention/removal to meet KZC 95 will also require significant effort.

- Number of significant trees in proposed corridor have not been inventoried, but expected to be dense in the north half of the proposed alignment.
- The entire corridor is on real property, not right-of-way.
- Need to consider trees in close proximity to actual project corridor
 - Root impacts
 - Canopy impacts to allow ladder truck passage
- Tree removals in steep slope/landslide areas are tricky, because it's difficult to replicate the tree's protection of the slope to mitigate for removal.

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Concept Cost Estimate							
NE 116th Pl-86th Ave NE Link (T35)							
	Length	Width	Quantity	Unit Cost	Subtotals	Sig. Totals	Notes
Ped/Bike/Emerg Roadway	555	20		\$ 280.00	\$ 3,108,000.00		Assume 60 percent higher due to mainslope grade and landslide stabilization (\$175 base unit price per sq. ft.)
Vegetation Removal/Restoration/Mitigation	555	20		\$ 30.00	\$ 333,000.00		
Stormwater Facilities (25% of Roadway)					\$ 777,000.00		Assumes we have the available space to address stormwater management
Illumination	555			\$ 1,200.00	\$ 666,000.00		Per lineal foot
Total Construction Significant "Fixed" Items						\$ 4,884,000.00	
Mobilization/Contract Fulfillment (15%)					\$ 732,600.00		
Earthwork Stabilization (15%)					\$ 732,600.00		
Construction Subtotal						\$ 6,349,200.00	
Construction Contingency (30%)					\$ 1,904,760.00		
Final Construction Total						\$ 8,253,960.00	
Consultants (design, inspection, etc.) (40%)					\$ 2,539,680.00		Percent of pre-contingency construction subtotal
City Services (Staff, Permit fees, etc.) (10%)					\$ 634,920.00		Percent of pre-contingency construction subtotal
Project Total (w/out ROW)						\$ 11,428,560.00	

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Transportation Connection Concept – Environmental Regulatory Snapshot

Connection: 87th Avenue NE to 89th Avenue NE Link (City T41 Connection)

Brief Location Description (Plate 1)

Generally NW-SE trace through existing, developed and undeveloped parcels, to connect. Small portion of connection crosses undeveloped ROW. Extends from 87th Ave NE to connect with gravel 89th Ave NE (in-line with the 121st Ave transect; no actual street)

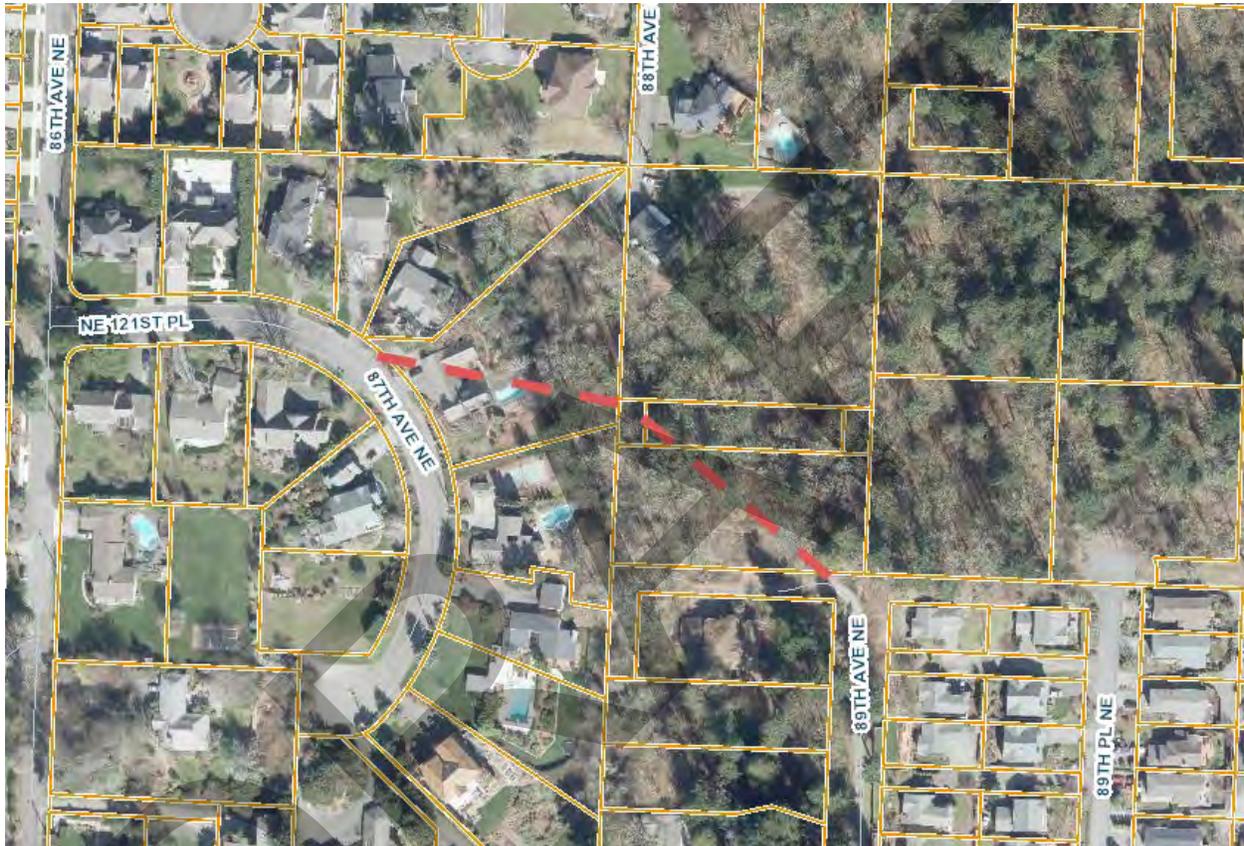


Plate 1: Proposed new emergency connection route (red dashed line)

Brief Connection Design Description

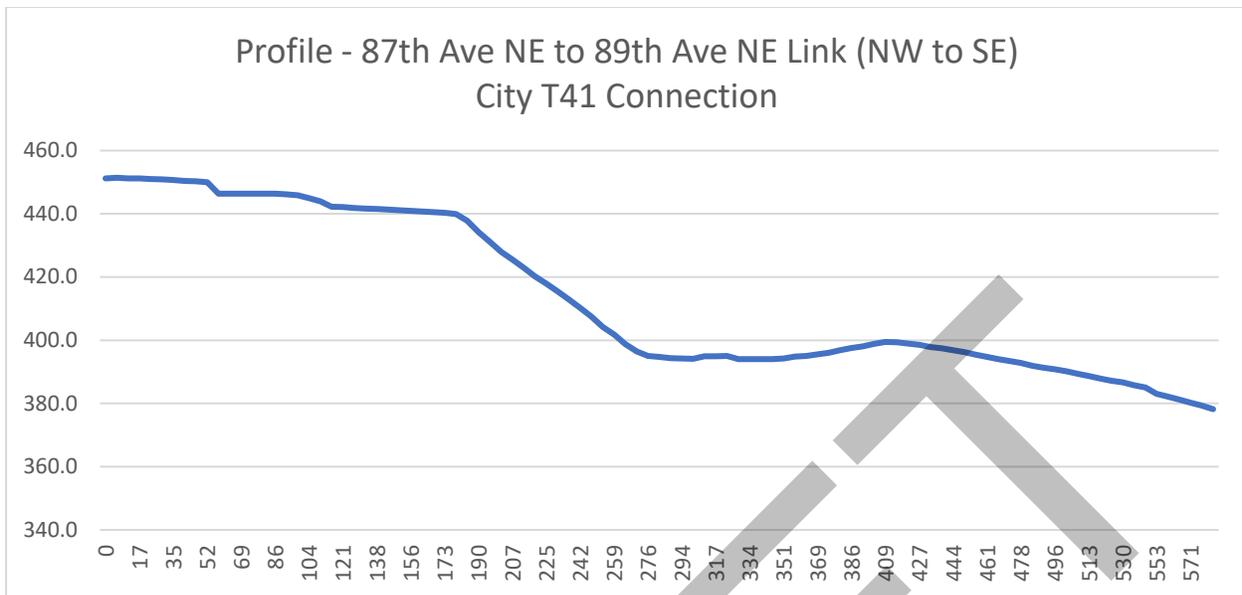
- 20-foot wide section for roadway, plus an additional 5 feet to accommodate retaining wall on south side and safety guardrail on north side
- 1-way emergency vehicle passage as needed
 - Breakaway bollard or automatic gate to restrict other vehicle access
- 2-way pedestrian and bicycle accessible normally
- No additional resurfacing of existing 89th Ave NE gravel surface from southeast end of connection
- Concept in the draft Citywide Transportation Connections Map shows alignment as depicted.
 - This alignment crosses 1 parcel presently developed as a single-family residence.
 - Parcels would need to be acquired and the residence building removed to make proposed alignment work

- No alternative route option from 87th Ave NE avoids need to acquire at least one residential parcel and remove the residence and other developments of that parcel.
- The proposed route in the Citywide Plan has several challenges, including topography and the combination of the vertical curve at the base of a steep slop with a horizontal curve.
 - A suggested alternate route that is more achievable (blue dashed line in Plate 2) is also considered in this Snapshot document.
 - This may be similar to the idea John Starbard indicated Councilmember Asher had in mind.

Topographical Evaluation

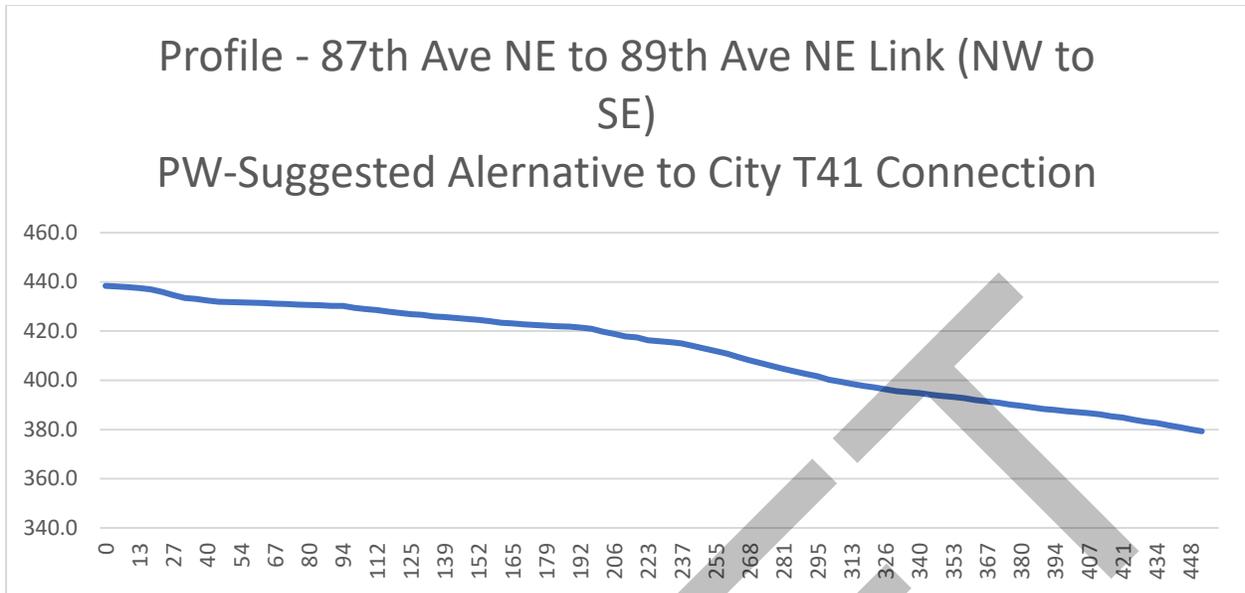


Plate 2: Proposed new emergency connection route (red dashed line) with topography and suggested alternative for a similar connection route (blue dashed line)



Overall declination of Citywide Plan-proposed route (red dashed line on Plate 2), from northwest to southeast: -13%

- However, an approximate length of 90 feet will be 45% or greater, descending into ravine
- Due to high difficulty stabilizing downslope side of route, assumed that this roadway route will be 100 percent cut into the existing slope upslope of roadway surface
- Retaining walls up to 30 feet are anticipated along the ravine wall portion of this slope, to support the upslope side.
 - Due to the height and backslope, tie-backs should be considered
 - Will require significant permanent easements south of roadway in both developed and undeveloped private property
 - It may be possible to do this with cantilever soldier piles, but will be very expensive and may have long-term maintenance issues
 - 100+ foot piles
 - Thick structural steel
 - Exposed portion of piles likely to differentially deflect over time
- The combination of limited sight distances for vertical curves, plus the 30-degree horizontal curve halfway along route will make this route unsafe for pedestrians/cyclists, as emergency vehicles may not have sufficient sight distance and there isn't a safe "bail out" area (without significant additional construction work beyond the current concept)



Overall declination of alternative to Citywide Plan-proposed route (blue dashed line on Plate 2), from northwest to southeast: -13%

- Similar elevation change over similar travel distance
- However:
 - Only approximately 40 feet of length exceeds a 25% grade
 - None exceeds a 30% grade
 - Route generally in-line with slope, so minimal retaining walls and little additional width required.
 - Gentler vertical curves and horizontal curve reduced to 26 degrees

Surface Water Design Considerations

For Citywide Plan-proposed route (red dashed line on Plate 2):

- Length of new impervious: 590 feet
- New impervious surface area proposed: 14,800 square feet
 - Includes additional area indicated above to accommodate safety rail and retaining wall
- Topography/landslide hazards and probable surface soil type(s) will exclude (or, at best, severely curtail) infiltration and/or outfall options.

For a more southerly alternative to the Citywide Plan-proposed route (blue dashed line on Plate 2):

- Length of new impervious: 455 feet
- New impervious surface area proposed: 9,100 square feet
- Topography/landslide hazards and probable surface soil type(s) will still exclude (or, at best, severely curtail) infiltration and/or outfall options.

General Environmental & Permitting Considerations

- Core documentation needed for multiple reviews: Why can't we avoid/minimize? Will need to demonstrate project significant enough public benefit to justify ecological damage

- Build around SEPA review
- Both Citywide Plan connection concept (red dashed line in Plate 2) and the alternative (blue dashed line in Plate 2) will require either ROW acquisition and/or permanent easements through undeveloped private property
- Both Citywide Plan connection concept (red dashed line in Plate 2) and the alternative (blue dashed line in Plate 2) will require City acquisition of one developed residential property and removal of the existing building and developments
 - Parcel too developed to accommodate route, with building in the way
 - Demolition of parcel developments will require City permits

Geohazard Considerations

- Mapped landslide hazards associated with ravine slope and more general steep slope of the area are collectively a significant geohazard (KZC 85) problem for the Citywide Plan connection concept (red dashed line in Plate 2) requiring significant geotechnical investigation and analysis
 - Need to look at general, east-west stability (due to the downslope mapped landslides) as well as pre- and post-construction ravine wall stability both upslope and downslope of roadway route
 - Emergency services corridor = increased seismic slope risk scrutiny
- Location of the alternative route (blue dashed line in Plate 2) outside of the mapped high landslide hazard area associated with the ravine will significantly reduce (though not remove) the need for geotechnical investigation and slope stability analysis.



Plate 3: Proposed new emergency connection route (red dashed line) with City-mapped landslide/steep slope potential hazards and suggested alternative for a similar connection route (blue dashed line)

Water Resources Regulatory Considerations

- There are no mapped water resources (e.g. streams, wetlands, etc.), including within the existing ravine, for either connection alternative discussed in this document, so:
 - No KZC 90 considerations
 - No State permits involved at this time
 - No federal permitting/approval required at this time
 - No fish window construction timing, but avoiding winter weather construction will be important
 - Construction schedule to replant during winter months, particularly February/March to gain back full growing season for steep slope areas.
- Construction disturbance proposed less than 1 acre

Tree Retention Regulatory Considerations

- Tree retention/removal to meet KZC 95 will also require significant effort.
 - Number of significant trees in proposed corridor have not been inventoried, but expected to be dense outside of the developed residential parcel.
 - Much of both routes are on real property, not right-of-way.
 - Need to consider trees in close proximity to actual project corridor
 - Root impacts
 - Canopy impacts to allow ladder truck passage
 - Tree removals in steep slope/landslide areas are tricky, because it's difficult to replicate the tree's protection of the slope to mitigate for removal.

Concept Cost Estimate							
87th Ave NE-89th Ave NE Link (T41)							
	Length	Width	Quantity	Unit Cost	Subtotals	Sig. Totals	Notes
Ped/Bike/Emerg Roadway	590	25		\$ 271.25	\$ 4,000,937.50		Assume 60 percent higher due to mainslope grade and landslide stabilization (\$175 base unit price per sq. ft.)
Demolition					\$ 250,000.00		
Vegetation Removal/Restoration/Mitigation	590	25		\$ 30.00	\$ 442,500.00		
Soldier Pile Retaining Wall	175	30		\$ 200.00	\$ 1,050,000.00		Height, not Width
Difficult Drilling Access (Add 50% of Retaining Wall)					\$ 262,500.00		
Stormwater Facilities (25% of Roadway)					\$ 1,000,234.38		Assumes we have the available space to address stormwater management
Illumination	590			\$ 1,200.00	\$ 708,000.00		Per lineal foot
Total Construction Significant "Fixed" Items						\$ 7,714,171.88	
Mobilization/Contract Fulfillment (15%)					\$ 1,157,125.78		
Earthwork Stabilization (30%)					\$ 2,314,251.56		
Construction Subtotal						\$ 11,185,549.22	
Construction Contingency (30%)					\$ 3,355,664.77		
Final Construction Total						\$ 14,541,213.98	
Consultants (design, inspection, etc.) (40%)					\$ 4,474,219.69		Percent of pre-contingency construction subtotal
City Services (Staff, Permit fees, etc.) (10%)					\$ 1,118,554.92		Percent of pre-contingency construction subtotal
Project Total (w/out ROW)						\$ 20,133,988.59	

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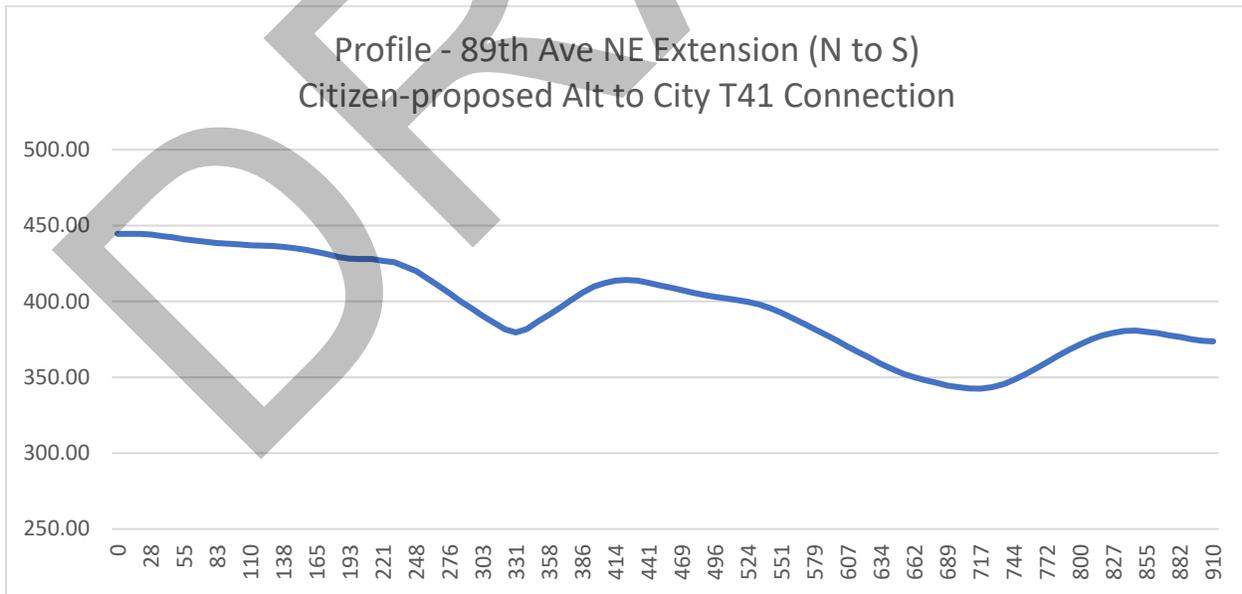
Concept Cost Estimate									
87th Ave NE-89th Ave NE Link (PW Suggested Alternative to T41)									
	Length	Width	Quantity	Unit Cost	Subtotals	Sig. Totals	Notes		
Ped/Bike/Emerg Roadway	455	20		\$ 227.50	\$ 2,070,250.00		Assume 30 percent higher due to moderate slope (\$175 base unit price per sq. ft.)		
Demolition					\$ 250,000.00				
Vegetation Removal/Restoration/Mitigation	455	20		\$ 30.00	\$ 273,000.00		Assumes we have the available space to address stormwater management		
Stormwater Facilities (25% of Roadway)					\$ 517,562.50		Per lineal foot		
Illumination	455			\$ 1,200.00	\$ 546,000.00				
						\$ 3,656,812.50			
Total Construction Significant "Fixed" Items									
Mobilization/Contract Fulfillment (15%)					\$ 548,521.88				
Earthwork Stabilization (15%)					\$ 548,521.88				
						\$ 4,753,856.25			
Construction Subtotal									
Construction Contingency (30%)					\$ 1,426,156.88	\$ 6,180,013.13			
Final Construction Total									
							Percent of pre-contingency construction subtotal		
Consultants (design, inspection, etc.) (40%)					\$ 1,901,542.50		Percent of pre-contingency construction subtotal		
City Services (Staff, Permit fees, etc.) (10%)					\$ 475,385.63	\$ 8,556,941.25			
Project Total (w/out ROW)									

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Topographical Evaluation



Plate 2: Proposed new emergency connection route (red dashed line) with topography



Topography includes two ravines, with depths measured from crest grade break to trough:

- North ravine approximately 44 feet deep
- South ravine approximately 56 feet deep

Overall declination of route, from north to south (assuming ravine bridges): -8%
Ravine widths/Bridge lengths (measured from one crest grade break to the next, in order to minimize vertical curves at bridge ends):

- North ravine: approximately 195 feet
- South ravine: approximately 415 feet
- Ravine geometry doesn't offer feasible alternatives for a longer roadway as an at-grade alternative to bridges

Surface Water Design Considerations

- Length of new impervious: 920 feet
- New impervious surface area proposed: 18,400 square feet
- Topography/landslide hazards and probable surface soil type(s) will exclude (or, at best, severely curtail) infiltration and/or outfall options.

General Environmental & Permitting Considerations

- Core documentation needed for multiple reviews: Why can't we avoid/minimize? Will need to demonstrate project significant enough public benefit to justify ecological damage
 - Build around SEPA review
- Connection concept will require either ROW acquisition and/or permanent easements through undeveloped private property
- As the two ravines will require bridges, local Building permits applicable will be triggered.
 - A particular concern for this type of corridor will be safety systems to clear pedestrians/bicyclists from the bridges when in use by emergency vehicles (no "bail off points" midspan on either bridge, without significant additional design/construction work beyond the current concept).
 - How will emergency vehicle drivers know the bridges are clear?
 - As there is only limited space available between the ravines, it may be necessary to configure the safety system for both spans together, rather than each individually.

Geohazard Considerations

- Mapped landslide hazards associated with ravine slopes and more general steep slope of the area are collectively a significant geohazard (KZC 85) problem requiring significant geotechnical investigation and analysis
 - This will be above and beyond the norm for the engineering challenges bridging the two ravines.
 - Need to look at general, east-west stability (due to the downslope mapped landslides) as well as four ravine wall stability analyses
 - Emergency services corridor = increased seismic slope risk scrutiny



Plate 3: Proposed new emergency connection route (red dashed line) with City-mapped landslide/steep slope potential hazards

Water Resources Regulatory Considerations

- Ravines are not mapped water resources (e.g. streams), so:
 - No KZC 90 considerations
 - No State permits involved at this time
 - No federal permitting/approval required at this time
 - No fish window construction timing, but avoiding winter weather construction will be important
 - Construction schedule to replant during winter months, particularly February/March to gain back full growing season for steep slope areas.
- Construction disturbance proposed less than 1 acre

Tree Retention Regulatory Considerations

- Tree retention/removal to meet KZC 95 will also require significant effort.
 - Number of significant trees in proposed corridor have not been inventoried, but expected to be dense.
 - Much of the corridor is on real property, not right-of-way.
 - Need to consider trees in close proximity to actual project corridor
 - Root impacts
 - Canopy impacts to allow ladder truck passage
 - Tree removals in steep slope/landslide areas are tricky, because it's difficult to replicate the tree's protection of the slope to mitigate for removal.

Concept Cost Estimate									
89th Ave NE Extension (Citizen Suggested Alternative to T41)									
	Length	Width	Quantity	Unit Cost	Subtotals	Sig. Totals	Notes		
North Bridge	235	20		\$ 350.00	\$ 1,645,000.00		Steel Truss Bridge per WSDOT M23-50 Chapter 12		
South Bridge	435	20		\$ 450.00	\$ 3,915,000.00		Steel Truss Bridge per WSDOT M23-50 Chapter 12		
Bridge Foundations Pile Cap Sets	60		32	\$ 1,400.00	\$ 2,688,000.00		4-6" dia piles to 15' depth per cap, 2 caps/50 ft - WSDOT M23-50 Chapter 12		
Difficult Drilling Access (Add 25% of Bridge Foundation)					\$ 672,000.00				
Ped/Bike/Emerg Roadway	250	20		\$ 227.50	\$ 1,137,500.00		Assume 30 percent higher due to sideslope grade (\$175 base unit price per sq. ft.)		
Vegetation Removal/Restoration/Mitigation	920	20		\$ 30.00	\$ 552,000.00				
Stormwater Facilities (25% of Roadway & Bridge Area @ Roadway Unit Price)					\$ 1,046,500.00		Assumes we have the available space to address stormwater management		
Illumination	920			\$ 1,200.00	\$ 1,104,000.00		Per lineal foot		
Total Construction Significant "Fixed" Items						\$ 12,760,000.00			
Mobilization/Contract Fulfillment (15%)					\$ 1,914,000.00				
Earthwork Stabilization (20%)					\$ 2,552,000.00				
Construction Subtotal						\$ 17,226,000.00			
Construction Contingency (30%)					\$ 5,167,800.00				
Final Construction Total						\$ 22,393,800.00			
Consultants (design, inspection, etc.) (40%)					\$ 6,890,400.00		Percent of pre-contingency construction subtotal		
City Services (Staff, Permit fees, etc.) (10%)					\$ 1,722,600.00		Percent of pre-contingency construction subtotal		
Project Total (w/out ROW)						\$ 31,006,800.00			

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Appendix G: Proposed Connection T42 Study and Goat Hill Area Proposed Connections Study

Route	Citywide Transportation Connections Designation	Average Route Slope	Slopes > 40%	ROW Acquisition?	ROW Acquisition Needed (sq ft)		New Impervious Area (Est. sf)	Usability				Significant Tree Removals?	Relative Cost (1 Lowest to 5 Highest)	Permitting Difficulty (1 Low to 3 High)			Notes
					Undeveloped	Developed		Emergency Vehicles	Motor Vehicles (see note 4)	Pedestrians	Cyclists			Water Resources	Geohazards	Tree Removal	
NE 116th Pl-86th Ave NE Link	T35	24%	Y	Y	11,100	0	11,100	Y	L	D	D	Y	2	2 to 3	3	3	
87th Ave NE-89th Ave NE Link	T41	13%	Y	Y	6,400	45,400	14,800	Y	D	L	L	Y	3	1	3	3	
87th Ave NE-89th Ave NE Link	PW Alt to T41	13%	N	Y	4,800	25,200	9,100	Y	L	Y	Y	Y	1	1	1	3	
89th Ave NE Extension	Citizen Alt to T41	8%	N	Y	15,800	0	18,400	Y	D	L	L	Y	5	1	2	3	Assumes 2 ravine bridges
NE 124th St Extension	T42	30%	Y	Y	10,100	34,100	26,600	L	N	N	N	Y	4	1 (3)	3	3	
	Yes = Y																
	No = N																
	Limited (Safety) = L																
	Difficult = D																
	<u>Table Notes:</u>																
		1 Route assumes 1-way 20-foot wide roadway/bridge with no "switchbacking" or other grade-reduction routing															
		2 Planned used by emergency vehicles in emergencies, only pedestrians/cyclists otherwise (no public motor vehicle traffic)															
		3 Relative Cost rating does not include ROW acquisition and/or permanent easements															
		4 Motor Vehicle usability assumes route designed for full roadway section, rather than one-way ped/bike pathway															
		5 For T41 and PW Alt to T41 routes, high ROW acquisition due to need to acquire 1 full residential parcel, rather than just ROW corridor															
		6 For T41 route, ROW acquisition totals do not include permanent easements for tie-backs for retaining wall(s)															
		7 For T42 route, high ROW acquisition due to need to acquire 4 full residential parcels, rather than just ROW corridor															