

◀CROSSKIRKLAND▶ CORRIDOR

TRANSIT & UTILITY STUDY - **DRAFT**
15 January 2014



 **berger**
PARTNERSHIP

CROSS KIRKLAND CORRIDOR TRANSIT & UTILITY STUDY

Introduction

One of the primary goals of the CKC Master Plan (*Activate Kirkland and Evolve with Time*) is empowering the corridor to adapt and evolve over time to meet the needs of a growing city. A key tenet of the plan is a corridor that may one day include high capacity transit and how the near-term improvements we design today can be implemented in a way that will welcome transit service tomorrow. The corridor master plan has been developed with an understanding of existing utilities on the corridor, the possibility of future utilities, and how all elements - utilities, transit, transportation and recreation - can seamlessly coexist together today and in the future.

With the many variables shaping transit and utility planning, it is impossible to predict exactly what will be engineered into the corridor. Our approach to this transit and utility study is to provide guidance, show that transit and utilities can fit into the corridor in the future, and shape a reality for that to happen.

Key considerations in our study, particularly how we are identifying locations for a future transit envelope, are as follows:

Include Additional Infrastructure

The corridor is already home to infrastructure, including power, water, communications and sewer. Transit integration considerations are mindful of these existing utilities and other utilities that might be integrated into the corridor in the future.

Minimize Fragmentation

There is room through the majority of the corridor for an exceptional trail with infrastructure; however, these elements must be thoughtfully integrated into a fully functioning whole to avoid overly constricting the corridor, which could negatively impact the recreational experience. A key principle of transit integration is avoiding over-fragmentation of the corridor into smaller, disconnected pieces. The transit envelope identified in this study does so by shifting its footprint to one side of the corridor (typically to the east), allowing the remainder of the corridor to be free for trails and other infrastructure.

Transit Way Barriers As Buffers And Amenities, Not Dividers

With parallel trails and trackway, a separation is required that will likely include some structural element; the visual perception of the element should be minimized and integrated into a landscape buffer, or celebrated and become a functional amenity. Both strategies can create the perception of an integrated (not fragmented) corridor experience.

Calculated Crossings

As trackway and trail become buffered and the corridor divided, inevitable desire lines across the corridor will remain or grow. In addition to discouraging unintended crossing points, special care must be taken to plan, demarcate and intuitively lead trail users to safe crossings across the trackway.

Maintain Corridor Continuity

The fundamental tenet of rails to trails projects is to ensure the corridor remains for future rail capacity. Within maintaining that corridor, however, there is flexibility to manipulate the corridor including manipulating the existing trackway and structures along the route, including bridges, abutments and street crossings.

Design To Protect Investments

The master plan seeks to locate and place improvements to allow future evolution of the corridor to occur while minimizing impacts on existing corridor elements. In addition to avoiding spatial conflicts, the implementation of master plan elements should be designed to evolve, including use of materials that lend themselves to salvage, relocation and reuse or easy recycling.



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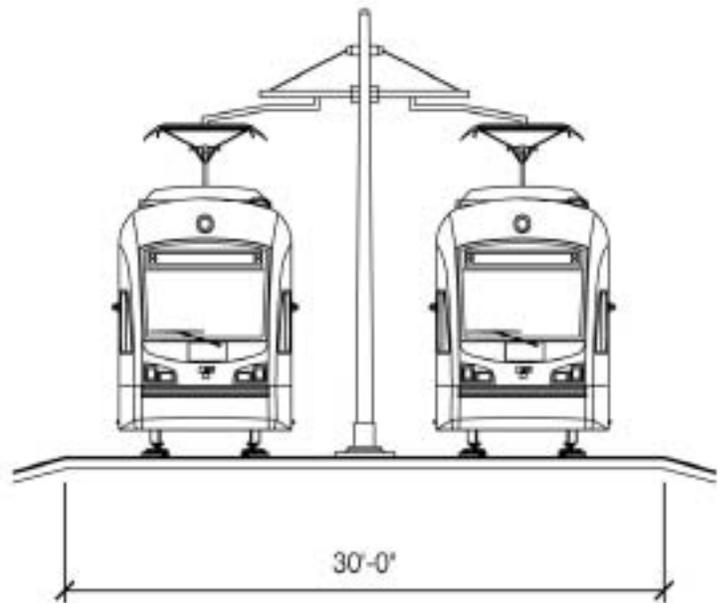
Future Transit Strategies

Given the lengthy time frame of corridor development, the master plan maintains high flexibility on the systems it accommodates. A prime example of this approach is the treatment of future transit strategies.

The initial and primary transit modes of the corridor will be walking/jogging and bicycling, but as development progresses additional modes of transit may be considered. These additional modes may include bus rapid transit, trams, modern streetcar, or light rail. Within each of these modes lies a multitude of further choices—electric powered, natural gas powered, human operator, driverless technology, just to name a few. This master plan does not attempt to guess which transit solutions might evolve on the corridor, but rather conservatively assumes what the maximum transit footprint might be.

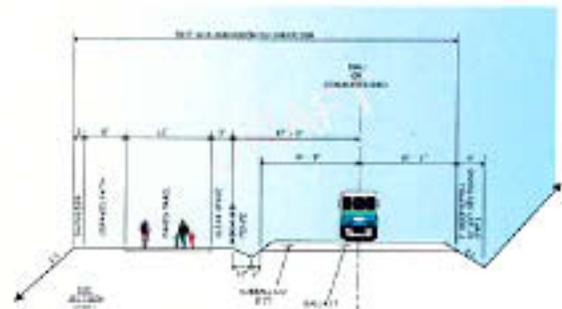
A key to any transit on the corridor will be determining an operator of transit elements because the City of Kirkland, an owner of the corridor, is not a transit agency. In light of this operator and transit mode uncertainty, this master plan assumes the major regional transit agency, Sound Transit (ST), would be the operator, as they are the state mandated agency for regional transportation, have an easement on the corridor for future transit use, and are in the early stages of studying future transit expansion opportunities. Sound Transit is in the midst of numerous corridor studies, including the Cross Kirkland Corridor, that will likely result in defining ST3, a future transit expansion package. If a transit proposal emerged for the CKC, the timeline for improvements would likely be 2031 or later (assuming a vote in 2016 and a 15-year implementation schedule). The design and use of the corridor in the near term in a way that welcomes evolving to allow transition in the future is consistent with other stretches of the Eastside Rail Corridor, notably improvements completed and underway on the Redmond Spur.

Building on the assumption of ST as operator, the master plan assumes as a base condition ST's most intensive mode of transit (both in corridor footprint and passenger capacity) Link light rail, with a 30-foot-wide transit corridor and additional 5-foot buffers on either side. This combined 40-foot envelope for transit and site amenities accommodates the assumed ST transit envelopes in the current corridor study. Should other, lower capacity transit alternatives be considered, they would likely have a reduced footprint on the corridor, making the above assumptions a conservative approach to transit planning.

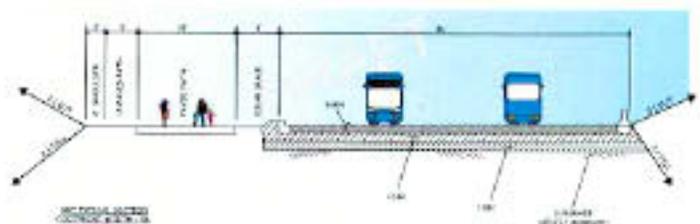


Typical Sound Transit Trackway Width

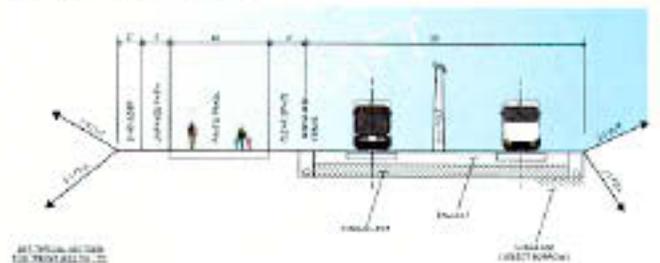
Sounder Commuter Rail Sample Cross Section



Bus Rapid Transit Sample Cross Section



Light Rail Transit Sample Cross Section





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Transit Stations

Future station locations will also impact the allocation of space within the corridor. While the City of Kirkland has identified five general areas where current or future population centers may justify stations, it is not currently feasible to accurately locate transit stops. However, some discussion may be given to the types of probable stations and their implications on corridor design. There are two main types of stations currently used by Sound Transit: Centered Station and Side Station.

The Centered Station

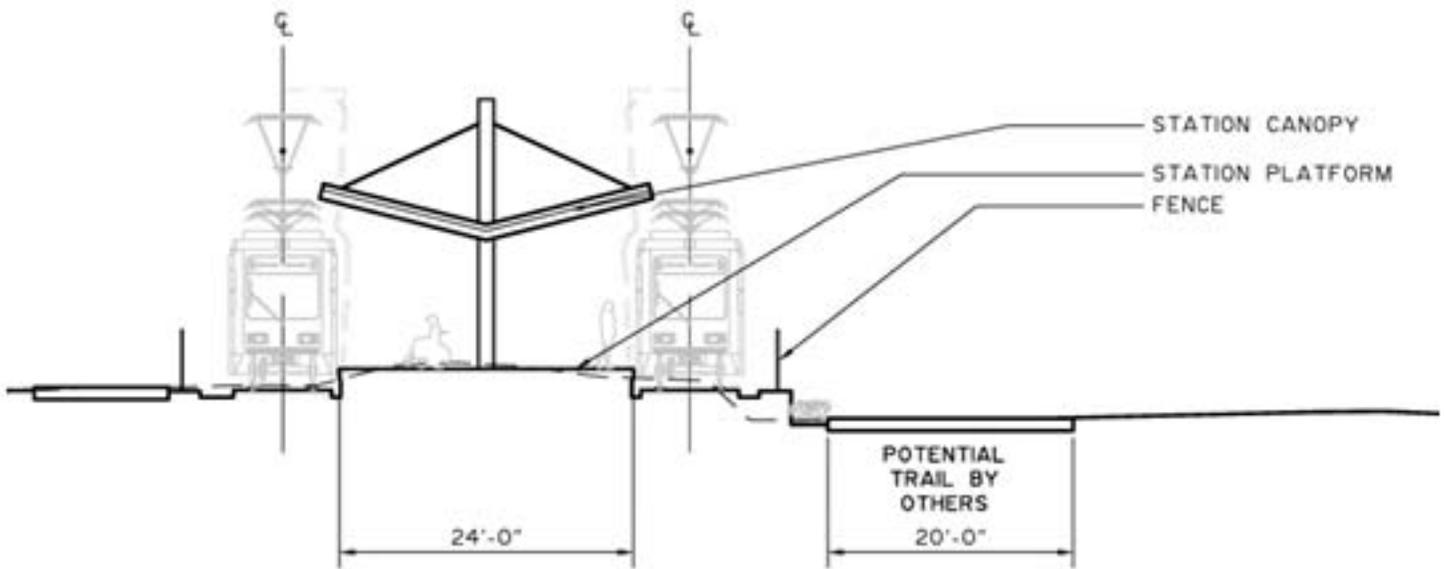
Serves both directions of transit travel from a central position between the tracks. This approach has a high degree of efficiency from an infrastructure and operations perspective by eliminating rider confusion associated with dual platforms and reducing dangerous track crossing by riders. However, it does require crossing the transit tracks to reach the central platform. While the combined width of the platform and trackway may be the same or narrower than a side station, the overall footprint of a centered station is much greater since the trackway flares for several hundred feet approaching the station area in order to create space for the centered platform.

The Side Station

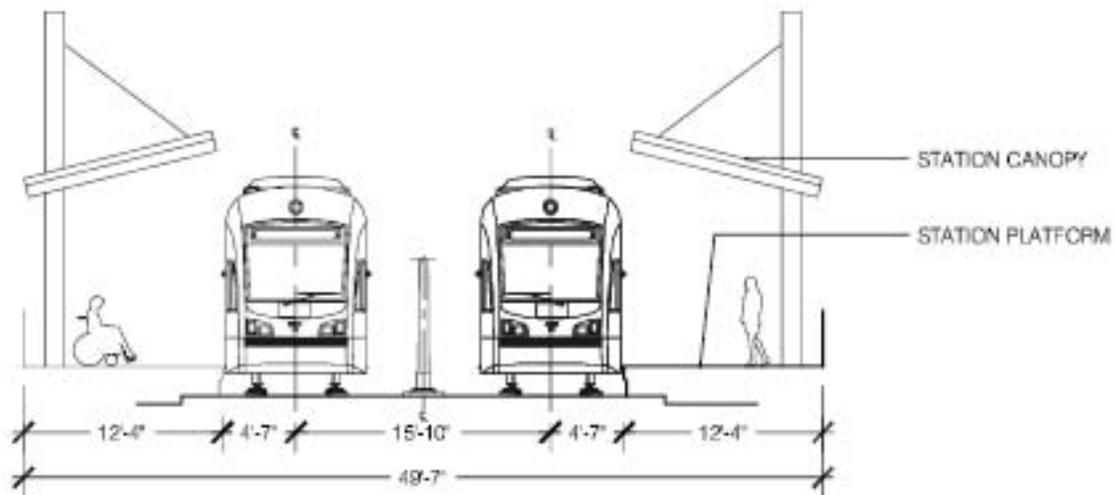
Employs separated platforms and structures and only one direction of transit travel can be accessed from the platform. This approach has inefficiencies, as many operational elements must be duplicated (such as ticket machines, canopies, etc.). It can also create rider confusion with selecting the appropriate platform. The side station can have a greatly reduced overall footprint, as compared to centered, since the trackway remains unchanged in width as it approaches and exits the station.

Additional Light Rail Infrastructure

In addition to the stations, there are other significant required elements to operate a light rail line, including transformers, crossing tracks, siding tracks, and more. However, these elements are limited in their location, increasing the light rail footprint in very limited areas. This master plan makes no attempt to quantify and locate these elements in this study. Additional transit support facilities, such as park and rides and transit transfer stations, would likely be integrated at key transportation nodes, but again are not quantified or located in this master plan study.



Centered Station Graphic



Side Station Graphic

CROSS KIRKLAND CORRIDOR TRANSIT & UTILITY STUDY

Transit and Utility Study - Assumptions

Metro Sewer Line: Assumed Dimension and Clearances

The Metro sewer line (84" dia.) is shown with a 10-foot easement on either side of the centerline of the pipe for a total sewer envelope of 20 feet. In developing transit location scenarios, it is assumed the 10 foot clearance from the centerline of the pipe is adequate for trackway and associated infrastructure. Future transit development would confirm if clearances are adequate or if additional engineering is required to protect the sewer line from impacts as well as to protect maintenance access to the sewer line.

PSE Electrical Transmission Lines

A new transmission line is in the planning stages for a portion of the corridor, and future transmission lines could expand to other areas of the corridor. Transmission lines have required clearances from corridor limits and adjacent structures. Future transmission lines must be located to avoid conflicts with other existing utilities and avoid precluding future utilities. Special consideration should be given to the view impacts of the transmission lines for corridor users, suggesting throughout much of the corridor, with its westward views, an eastern alignment may be preferred as a baseline assumption.

Reclaimed Water (Purple Pipe)

With the eastside rail corridor's proximity to the Brightwater Treatment Plant, the corridor is a likely route for future reclaimed water lines. Future water lines should be located to avoid conflicts with other existing utilities and avoid precluding future utilities.

Stormwater

While stormwater lines running longitudinally down the corridor are not currently anticipated, there are numerous green stormwater infrastructure (GSI) opportunities that could be integrated into the corridor and could necessitate additional piping and drainage structures to convey water to and from the corridor.

Communications

There is an existing fiber optic line running the length of the corridor, and future communication lines are planned (fiber optic).

Trails: Assumed Dimensions and Clearances

The primary trail is assumed to have a minimum width of 12 feet with 2 foot vertical clearance on both sides for a total of 16 feet of width. The secondary trail is assumed to have a minimum width of 8 feet with 1 foot vertical clearance on both sides for a combined dimension of 10 feet. Trail alignment shown in the transit integration study is prototypical trail assumptions. Actual trail location and placement is further detailed in the full master plan.

Property Pinch Points

The corridor has many apparent pinch points that could impact future transit alignment. This study shows instances where, with impact to other elements in the corridor, pinch points may be avoided. However, typically on infrastructure projects of a large scale such as transit corridors, acquisition of property pinch points is typical to avoid excessive shifting in transit alignments.

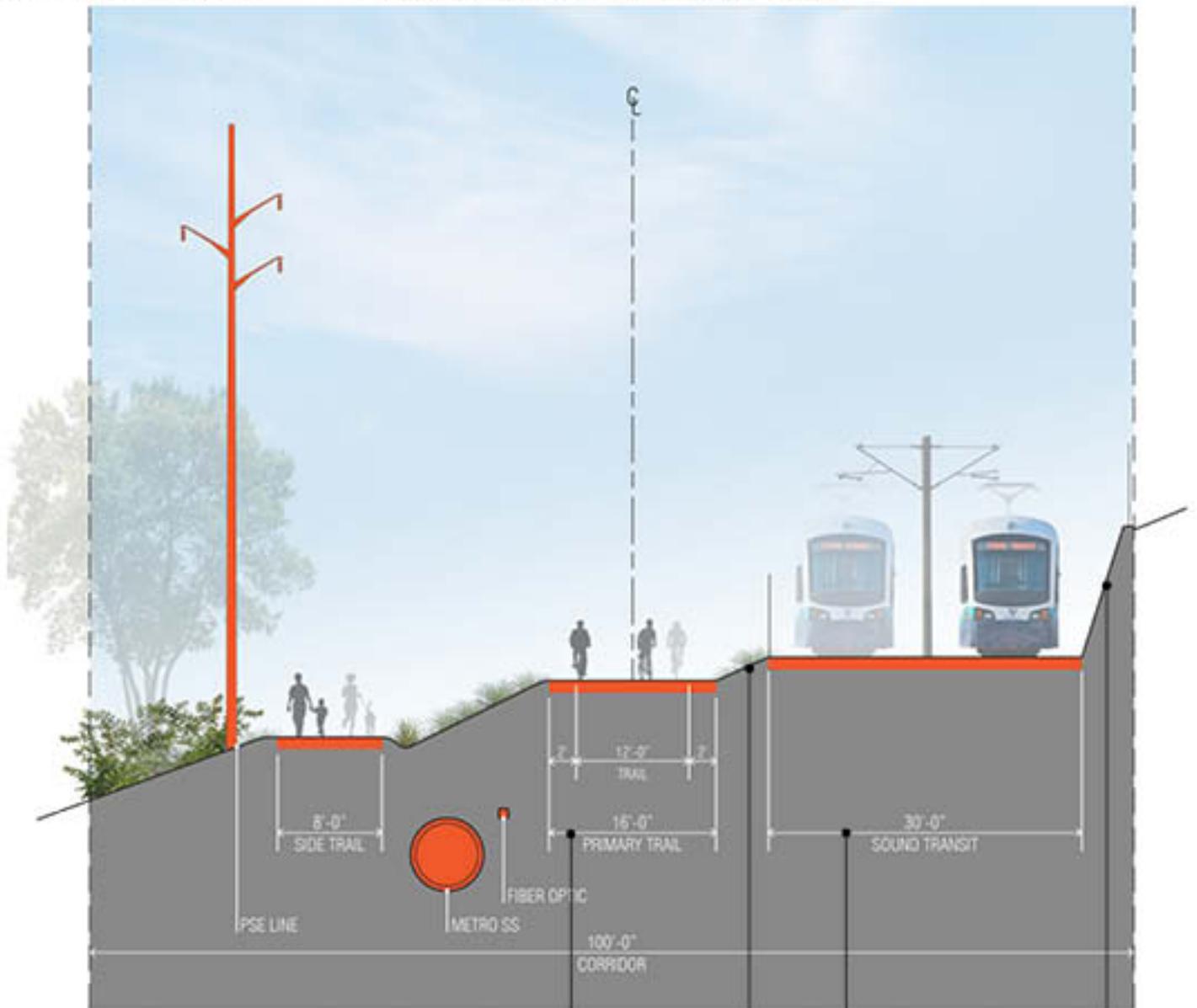
Commuter Rail

While the transit alignment study assumes Link light rail as a conservative footprint for future transit, if commuter rail were to emerge as the preferred method of the transit corridor, it could be located on the existing trackway alignment (the proposed location of the primary trail). However, the design and construction of a commuter rail line to contemporary conditions would likely require new alignment due to issues with train operations, geotechnical and environmental considerations.

Future Utility and Transit Construction

Future infrastructure construction on the corridor could have impacts on trail facilities and amenities built in the near term. The goal of this masterplan is to identify future envelopes for transit and other potential utilities so that future construction can avoid unnecessary impacts to earlier investments on the corridor. However, the construction impacts of much infrastructure (particularly light rail) will have a footprint much greater than the ultimate facility footprint. Construction of those facilities will likely have impacts to improvements, despite the masterplan's attempt to avoid them. The construction of large scale infrastructure projects is distant in time and readily justifies the near term investment of corridor recreation facilities as an appropriate civic investment that will serve the community for years.

Prototypical Corridor Alignment: with assumed utilities and future transit envelope



The primary trail is assumed to be centered on the historic trackway, typically located in the center of the corridor.

Commuter rail alternate: if commuter rail were constructed on the existing trackway alignment, the primary trail would be shifted (typically westward) off the trackway centerline and likely eliminate the parallel secondary trail.

A 5-foot minimum landscape buffer is assumed between the trackway and primary trail. This buffer is not a requirement and could be replaced by more robust barriers to mitigate reduced clearances. Such barriers should have a high level of design to enhance the corridor experience as well as enhance corridor safety (real and perceived).

A 30-foot trackway envelope is located to favor one side of the corridor to avoid over fragmentation. This envelope is typically assumed to favor the eastern side of the corridor to allow trail users to occupy the more desirable western side.

A 5-foot grade transition zone is assumed between the trackway and corridor to allow for grade transition, particular cut/fill retaining structures.

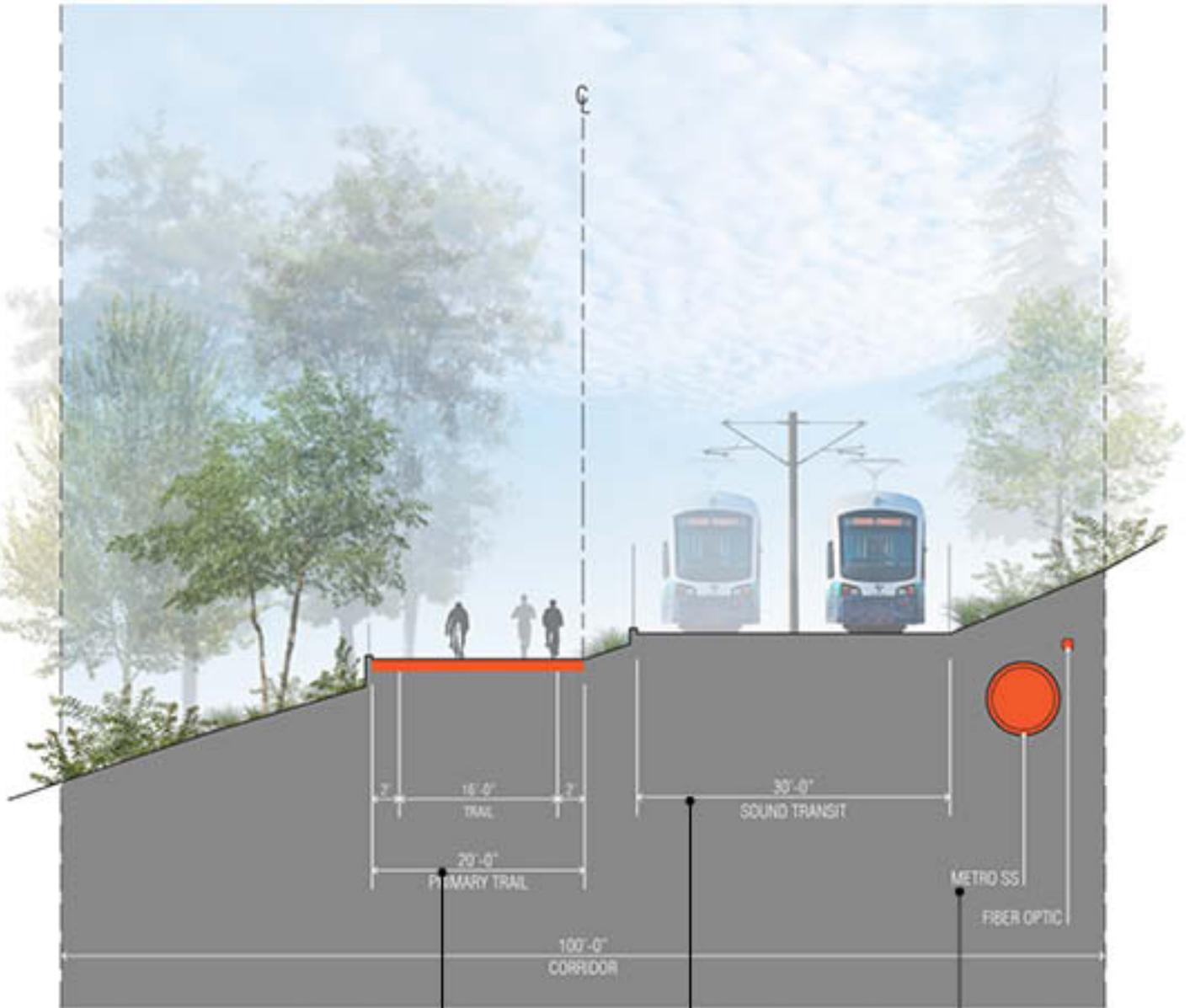
CROSS KIRKLAND CORRIDOR TRANSIT & UTILITY STUDY

Transit and Utility Study - Assumptions

Exceptions to the Prototypical Alignment

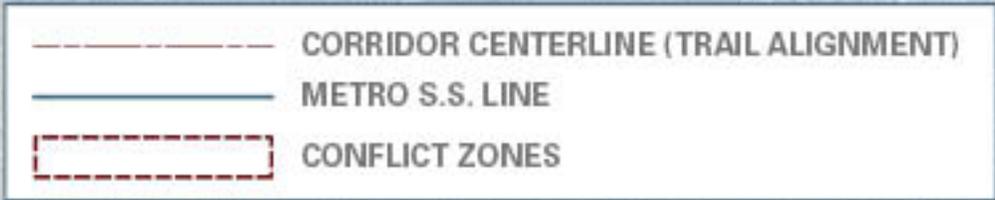
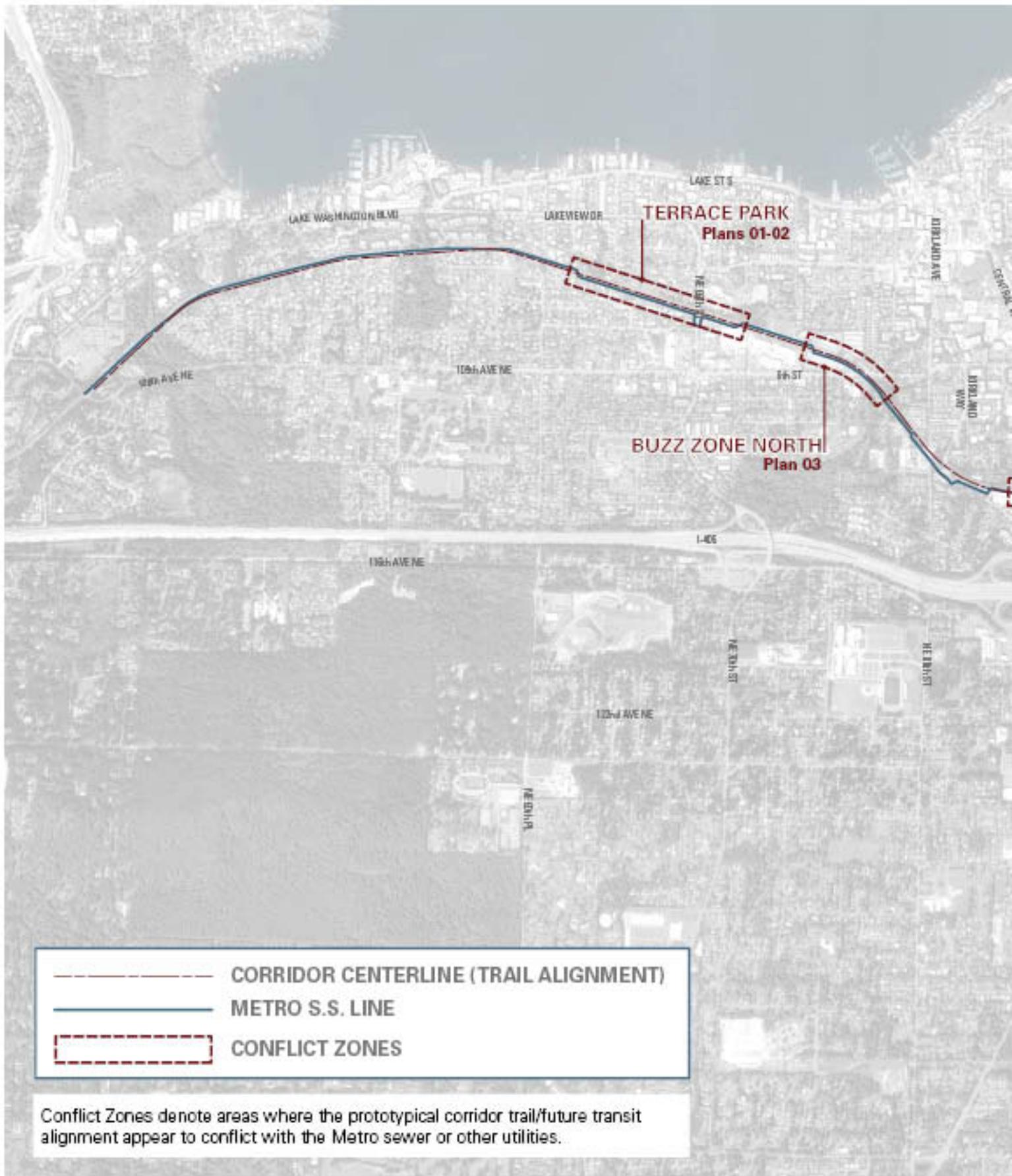
The prototypical alignment is suitable for the majority of the corridor. However, there are zones of conflict where the standard alignment (pg. 8) should be modified. Reasons for the conflict include changes in the corridor ROW, shifting of the metro sewer line to the east of the corridor, as well as structures (i.e. overpass piers) that occur within the transit alignment. These conflicts are outlined in the following plans - a key plan of conflict zones can be found on pgs. 11-12. Zone specific modifications are discussed in more detail with diagrams in the following pages.

Alternate Corridor Alignment: due to clearance conflicts with the prototypical alignment



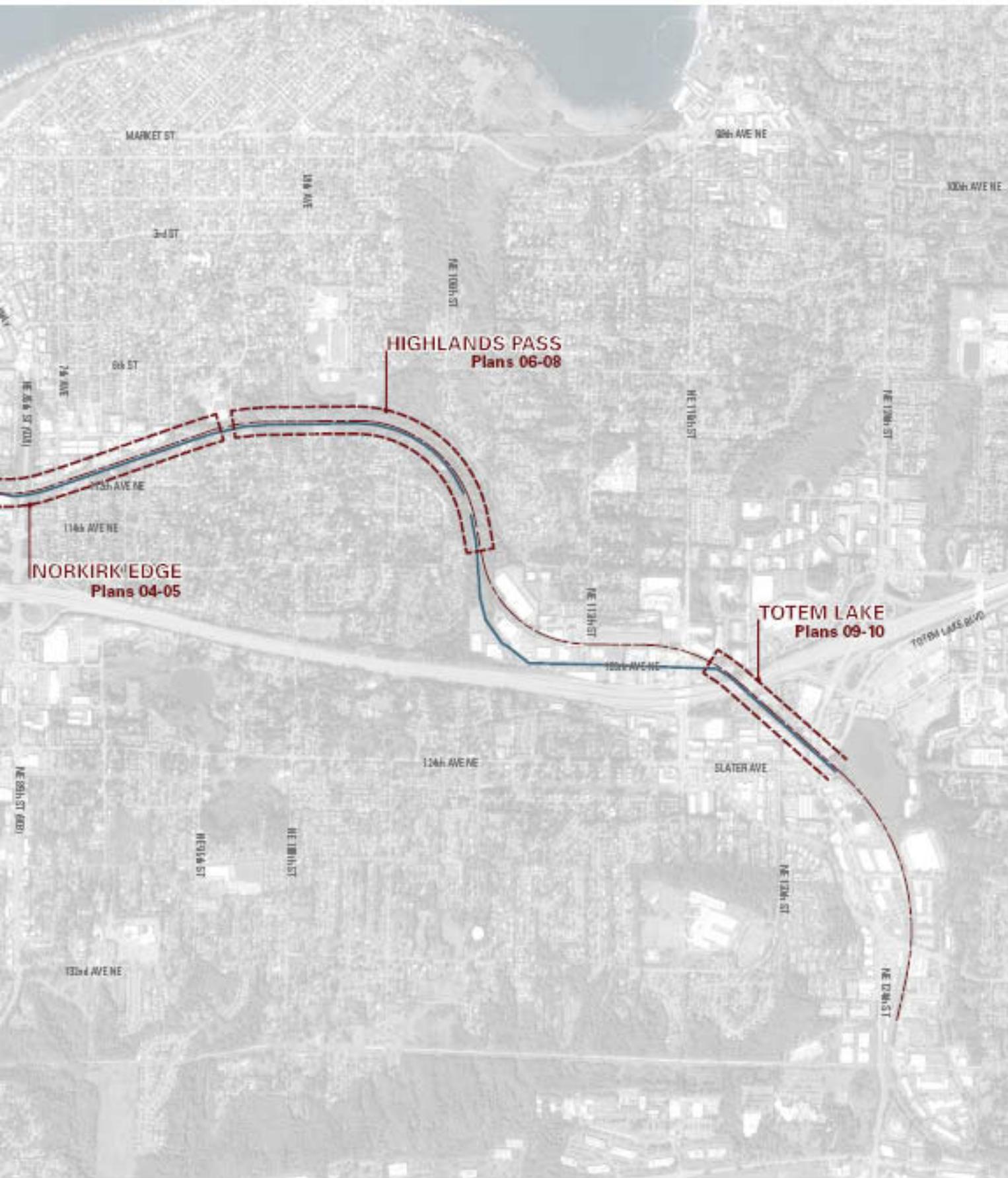
The shifting of the trail from trackway centerline westward is assumed to be completed in conjunction with the development of the transit corridor

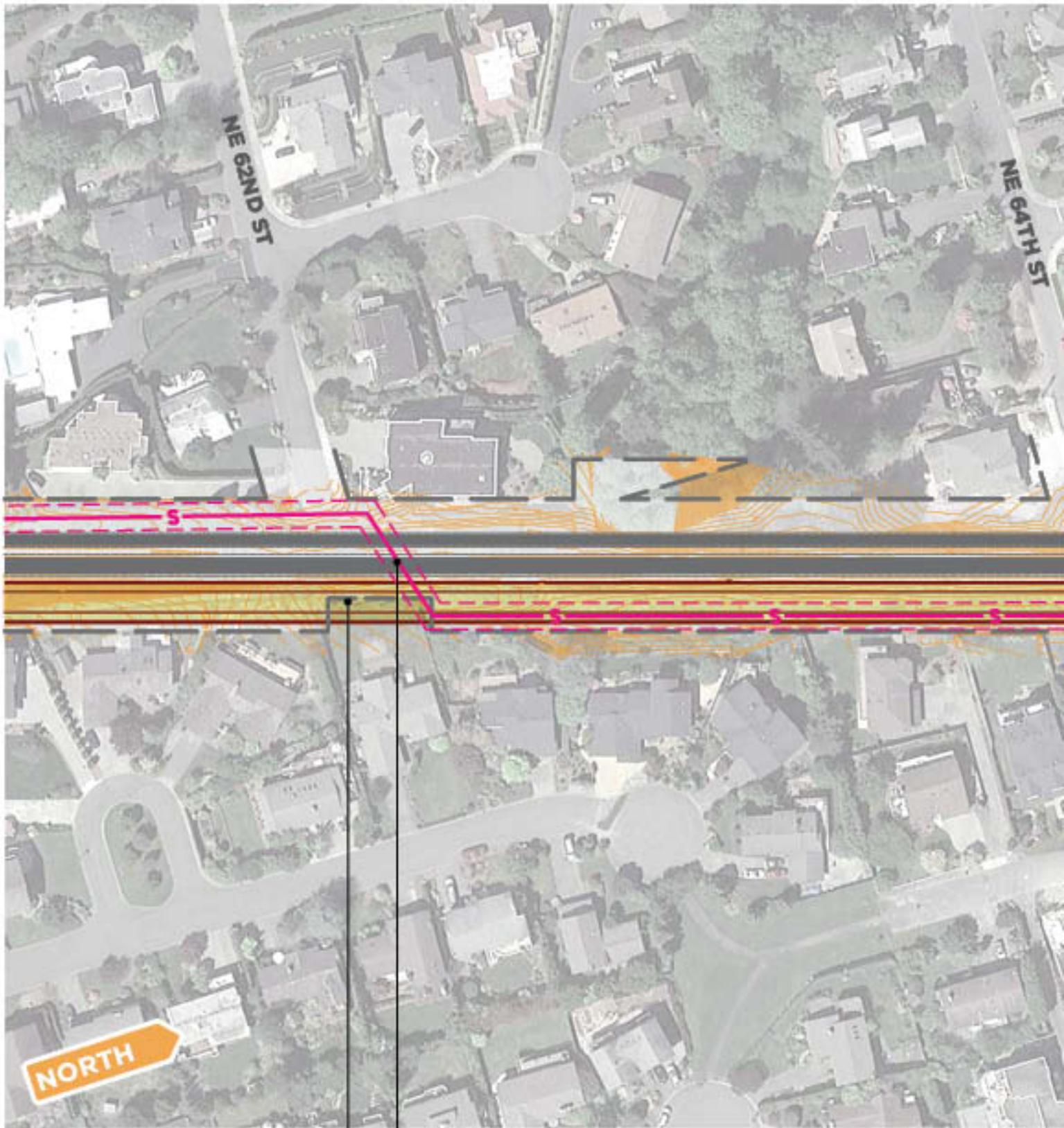
At various locations along the corridor, the Metro line shifts to the east



Conflict Zones denote areas where the prototypical corridor trail/future transit alignment appear to conflict with the Metro sewer or other utilities.

Transit & Utility Conflict Zone Diagram



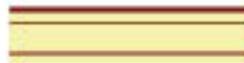


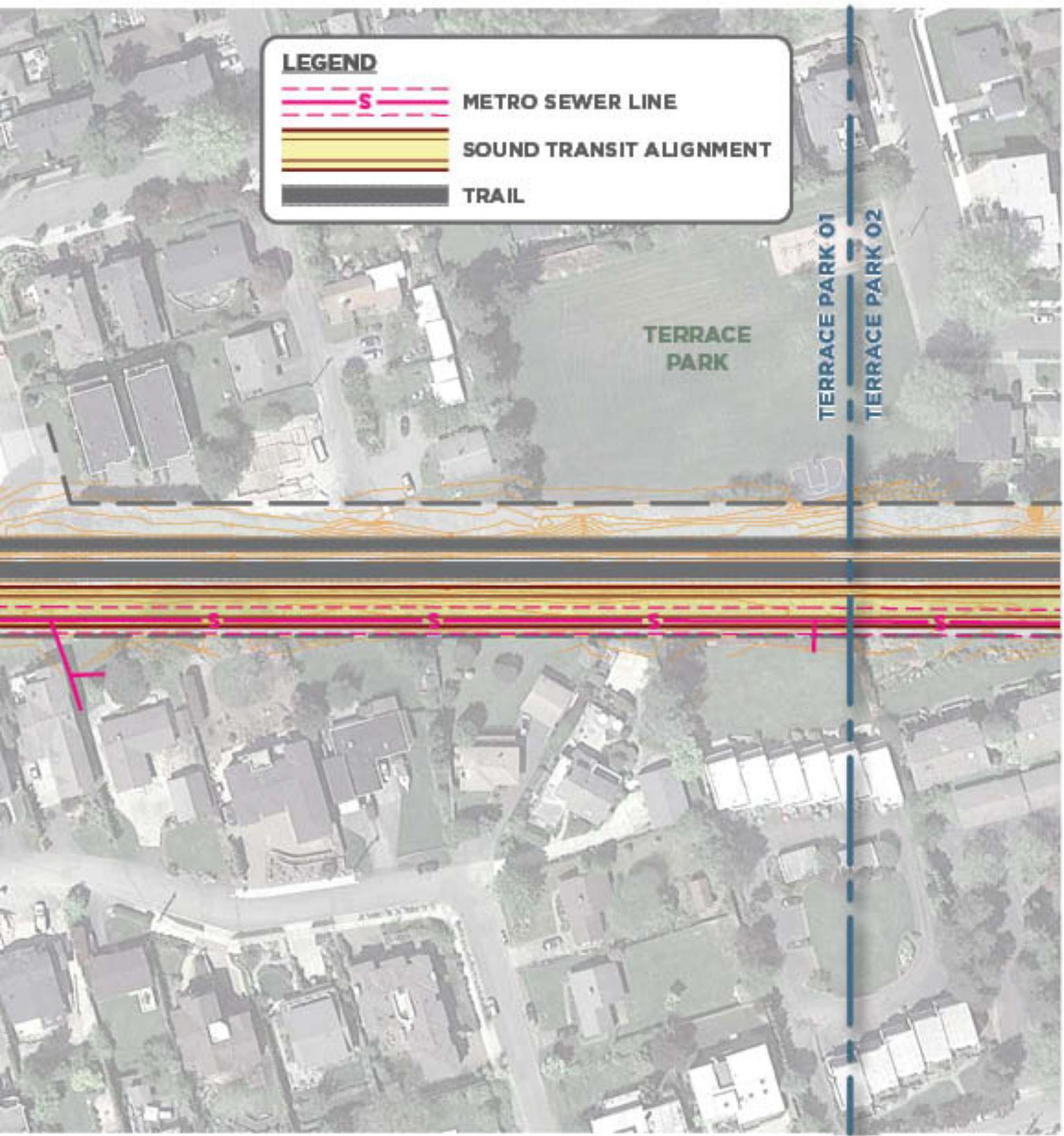
Adjacent property pinch point

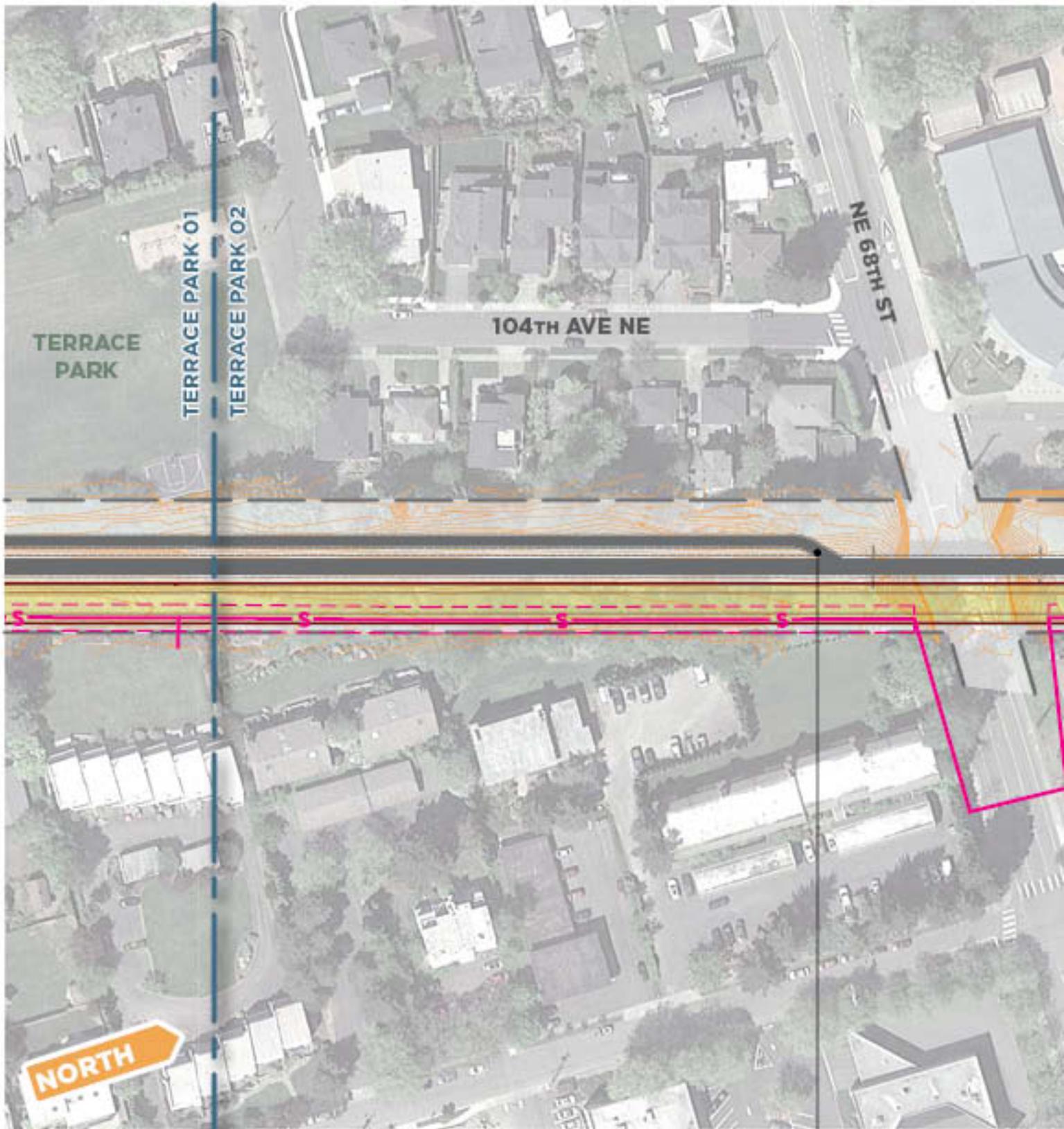
Metro Sewer line shifts from west to east

01_Transit & Utility Conflict Zone Plan - TERRACE PARK 01

LEGEND

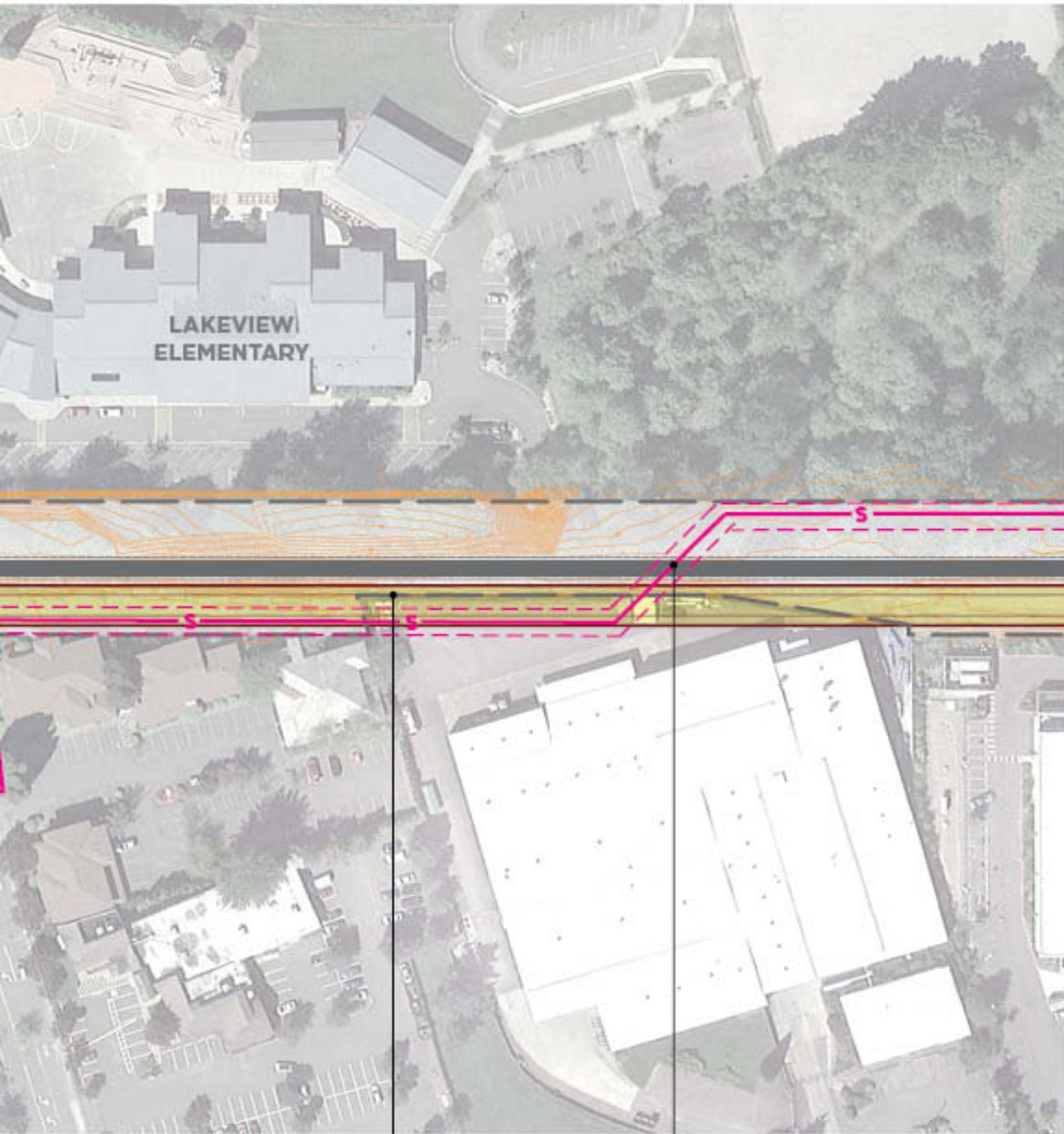
-  METRO SEWER LINE
-  SOUND TRANSIT ALIGNMENT
-  TRAIL





Approximate limit of separated primary/secondary trails,
transition to shared trail - width of shared trail subject to increase

02_Transit & Utility Conflict Zone Plan - TERRACE PARK 02



LAKEVIEW
ELEMENTARY

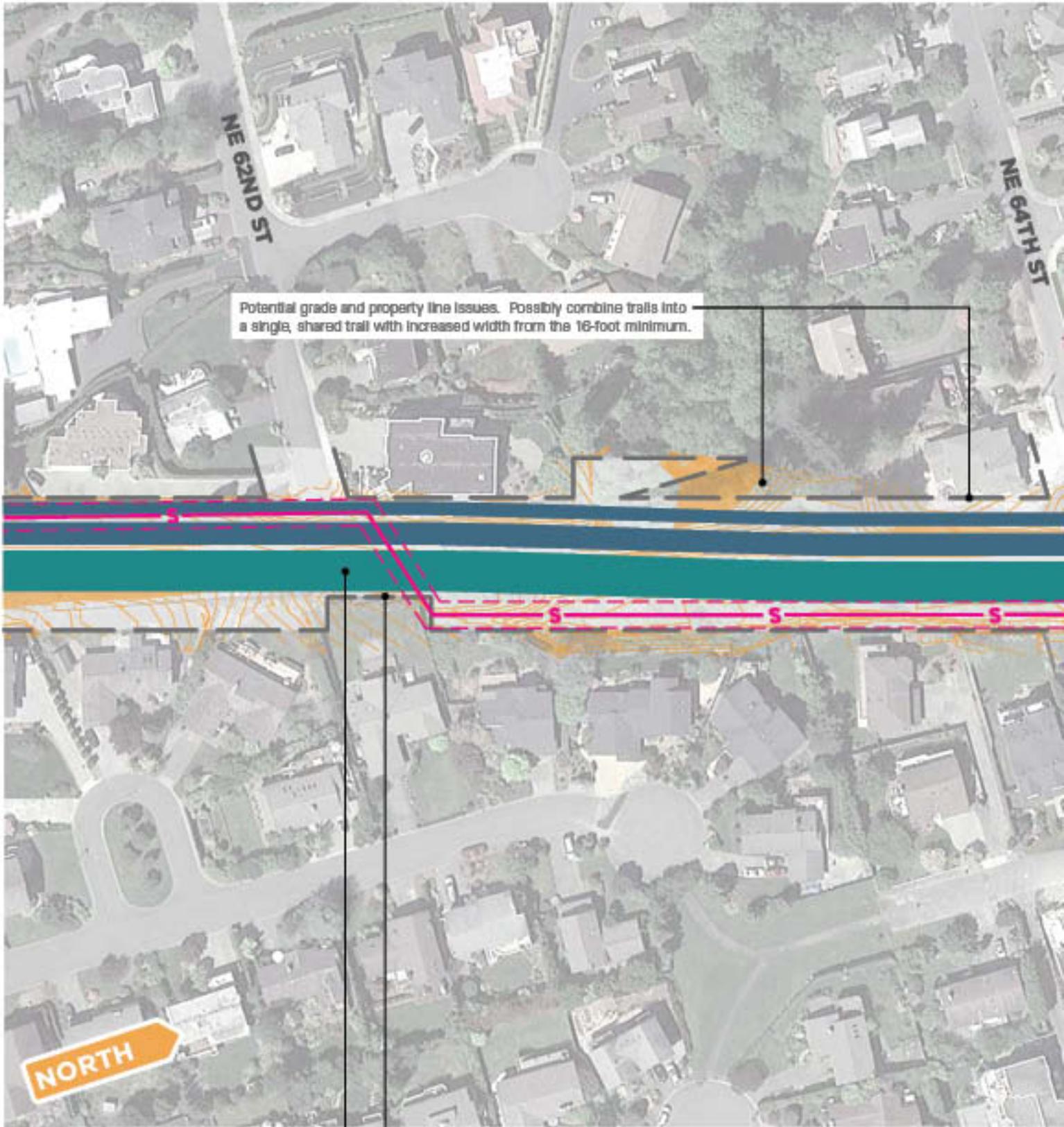
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Adjacent property pinch point

Metro Sewer line shifts from east to west



Potential grade and property line issues. Possibly combine trails into a single, shared trail with increased width from the 16-foot minimum.

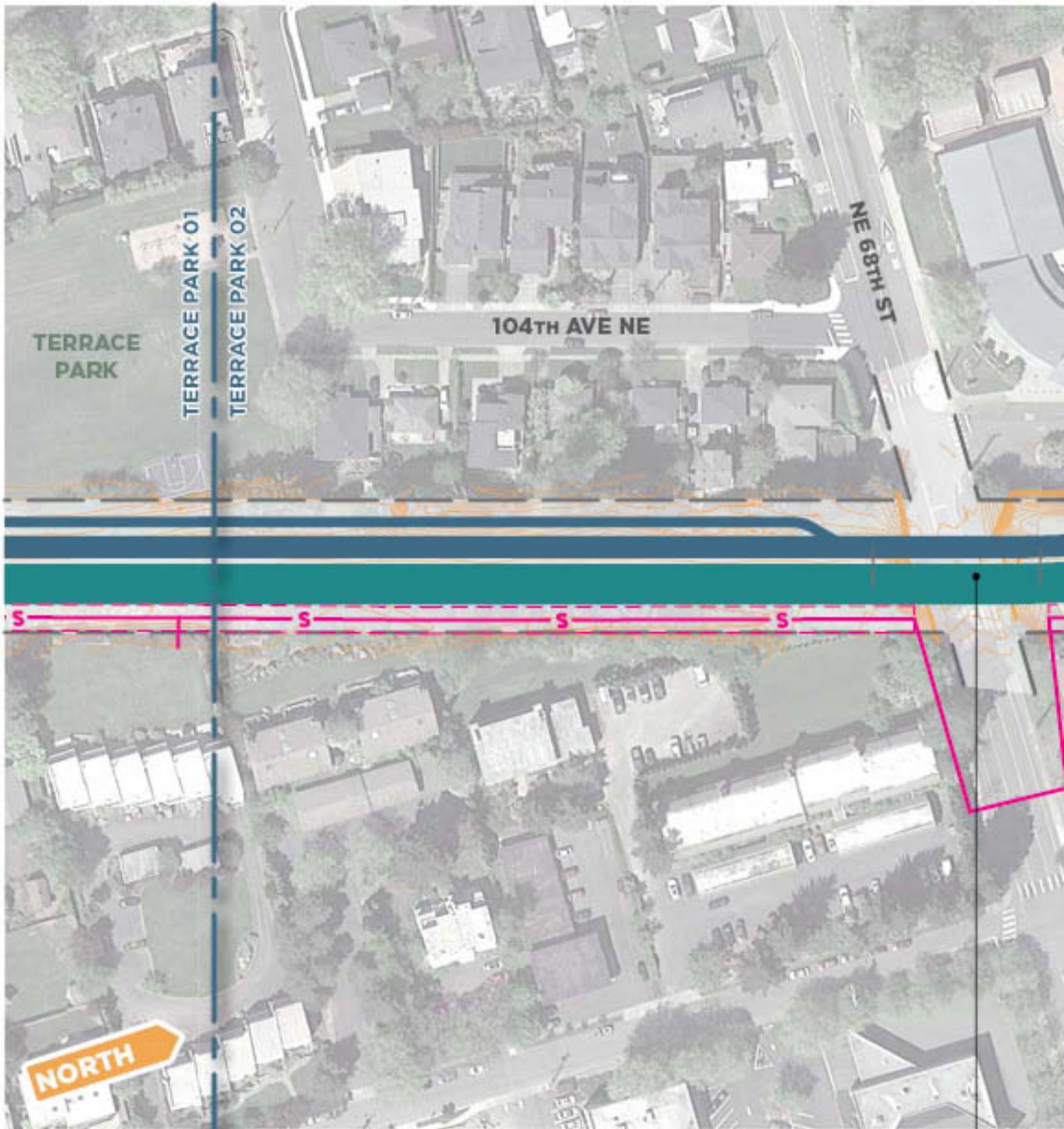
Possibly shift transitway to eliminate property pinch point. Transit shift could be significantly reduced with property acquisition.

Alignment Transition Zone: Realignment of trails includes a transition zone (beyond that shown on this plan) assumed to be up to 400 feet.

01B_Transit & Utility Conflict Zone Plan - TERRACE PARK 01 ALTERNATE

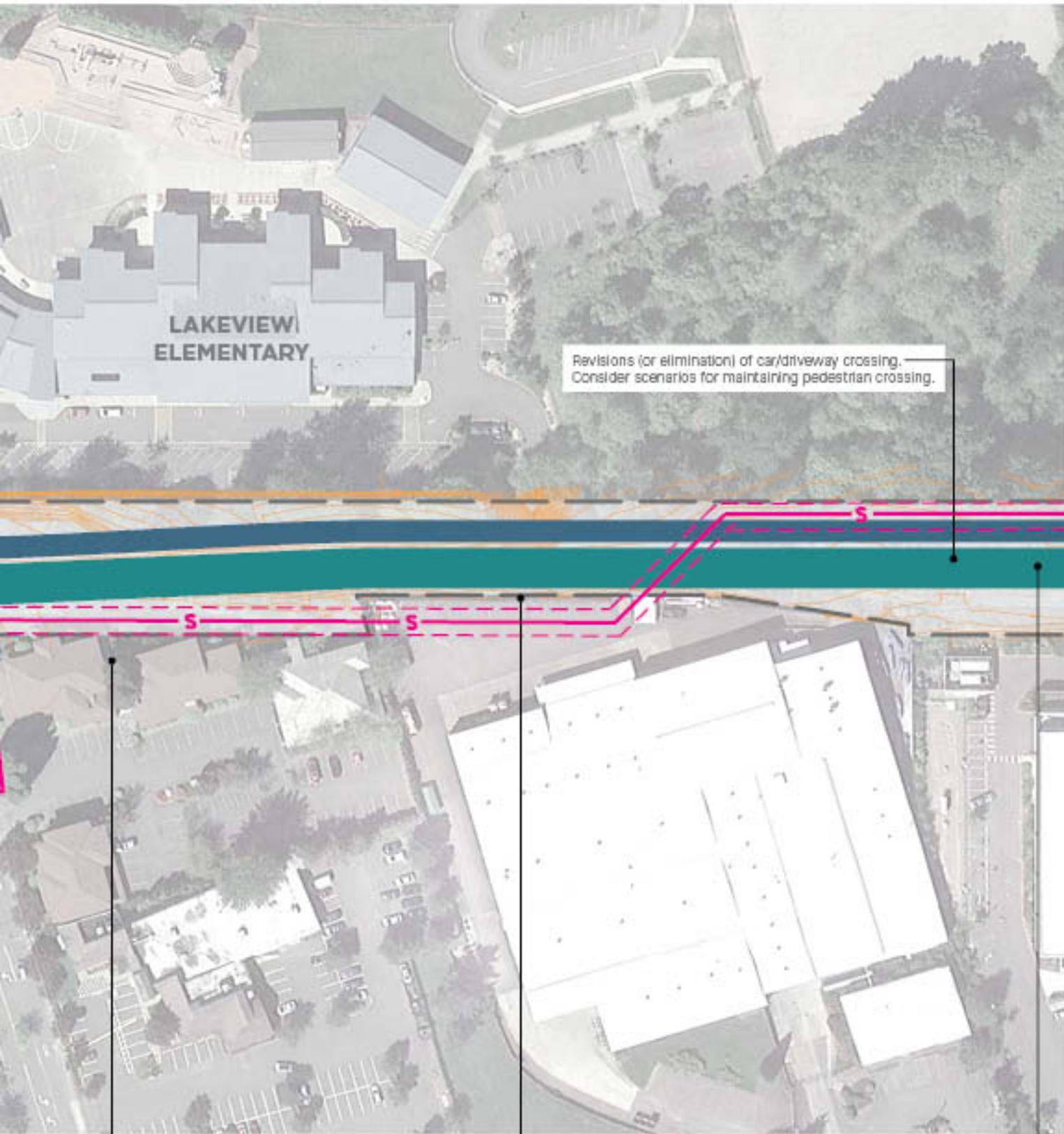


Proposed Alignment Revisions: The trackway is shifted westward to avoid conflict with the Metro sewer line and to avoid the existing property pinch point. Correspondingly, the trails are shifted westward, which could entail significant grading issues to the west. As an alternative, the trails may be combined into a single shared trail, possibly increased from the 16' minimum trail envelope width.



Assumes a fully rebuilt NE 68th bridge for both trail and transit.

02B_Transit & Utility Conflict Zone Plan - TERRACE PARK 02 ALTERNATE



**LAKEVIEW
ELEMENTARY**

Revisions (or elimination) of car/driveway crossing. Consider scenarios for maintaining pedestrian crossing.

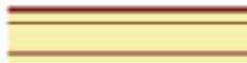
Possibly shift transitway to eliminate property pinch point.

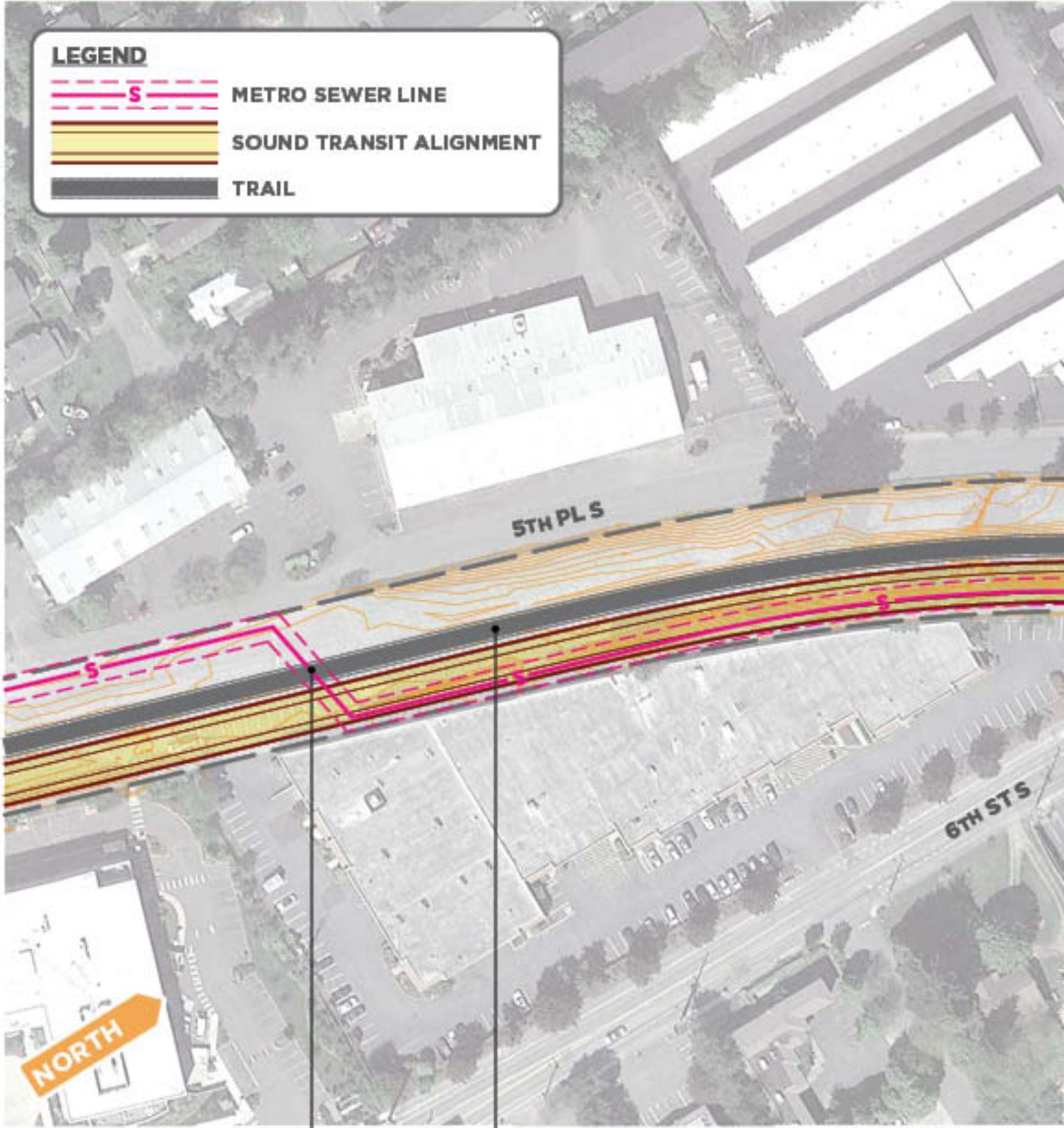
Alignment Transition Zone: Realignment of trails includes a transition zone (beyond that shown on this plan) assumed to be up to 400 feet.

Consider bike and pedestrian access from trail (west of transit) to business districts east of transit.

Proposed Alignment Revisions: The trackway is shifted westward to avoid conflict with the Metro sewer line and to avoid the existing property pinch point. Correspondingly, the trails are shifted westward, which could entail significant grading issues to the west. As an alternative, the trails may be combined into a single shared trail, possibly increased from the 16' minimum trail envelope width.

LEGEND

-  METRO SEWER LINE
-  SOUND TRANSIT ALIGNMENT
-  TRAIL



Trail through this section is proposed as a shared trail (width of shared trail subject to increase from the 16-foot minimum).

Metro Sewer line shifts from west to east

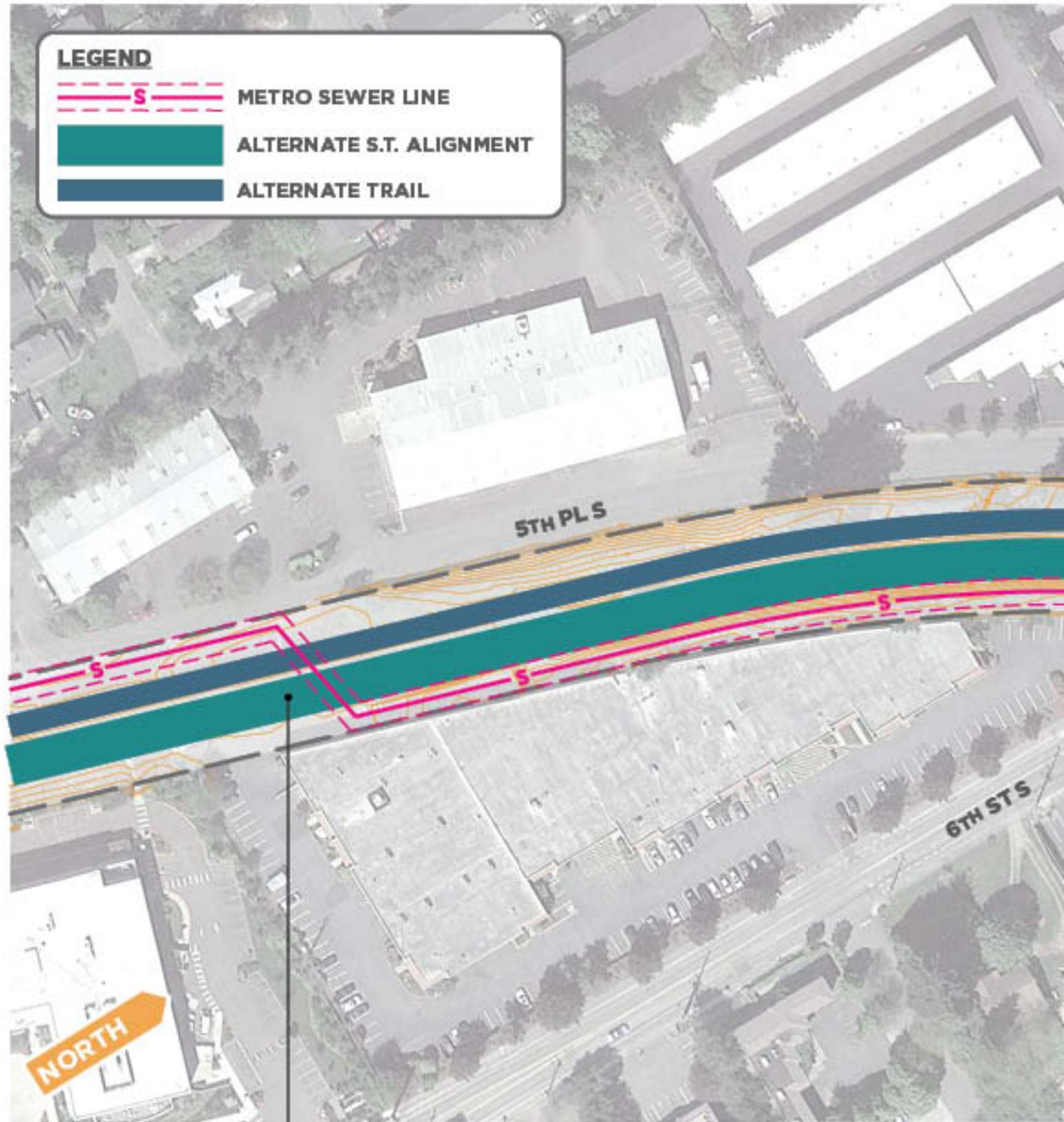
03_Transit & Utility Conflict Zone Plan - BUZZ ZONE NORTH



Metro Sewer line shifts farther west and out of conflict zone

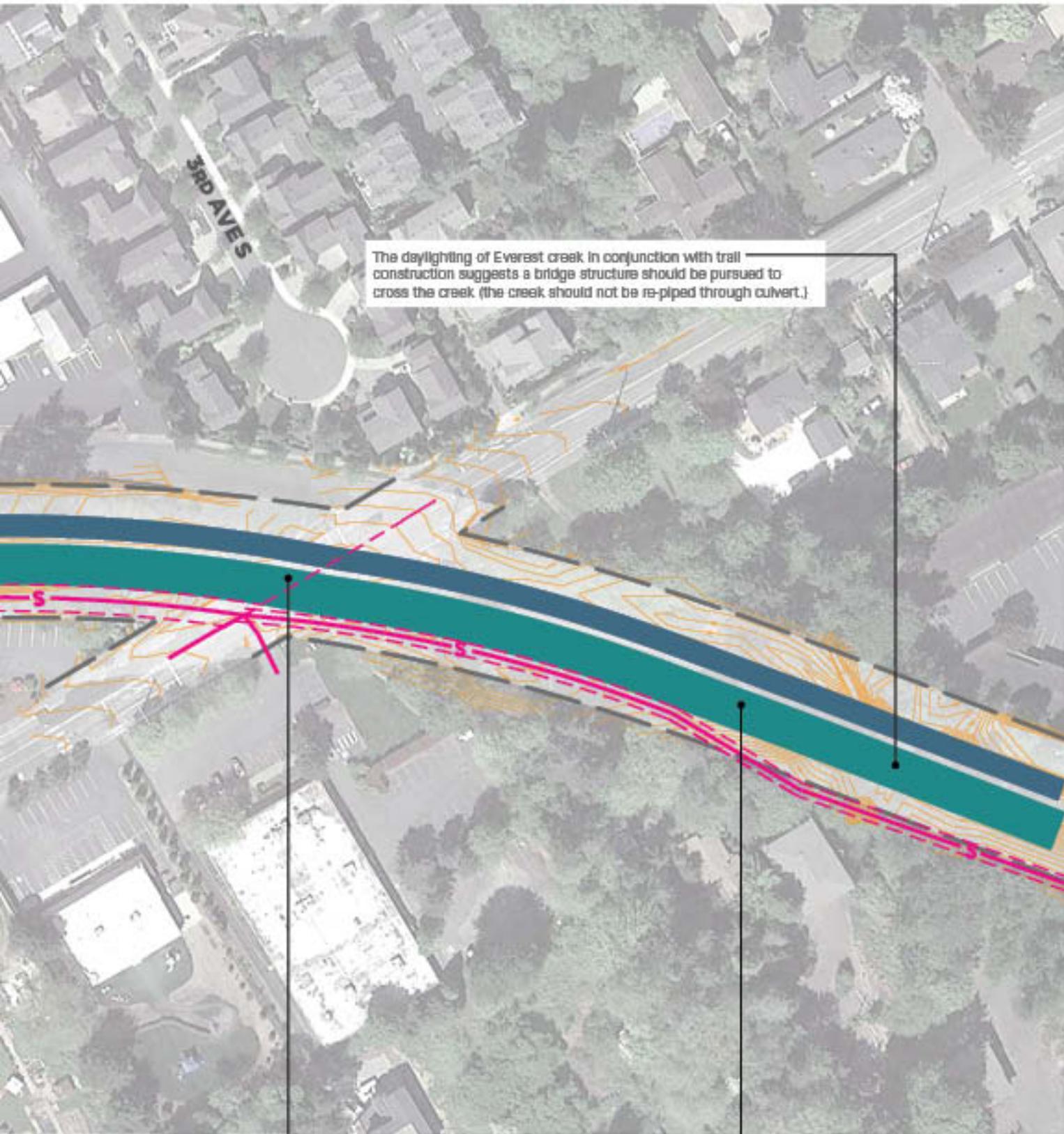
LEGEND

-  METRO SEWER LINE
-  ALTERNATE S.T. ALIGNMENT
-  ALTERNATE TRAIL



Alignment Transition Zone: Realignment of trails includes a transition zone (beyond that shown on this plan) assumed to be up to 400 feet.

03B_Transit & Utility Conflict Zone Plan - BUZZ ZONE NORTH ALTERNATE



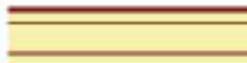
The daylighting of Everest creek in conjunction with trail construction suggests a bridge structure should be pursued to cross the creek (the creek should not be re-piped through culvert.)

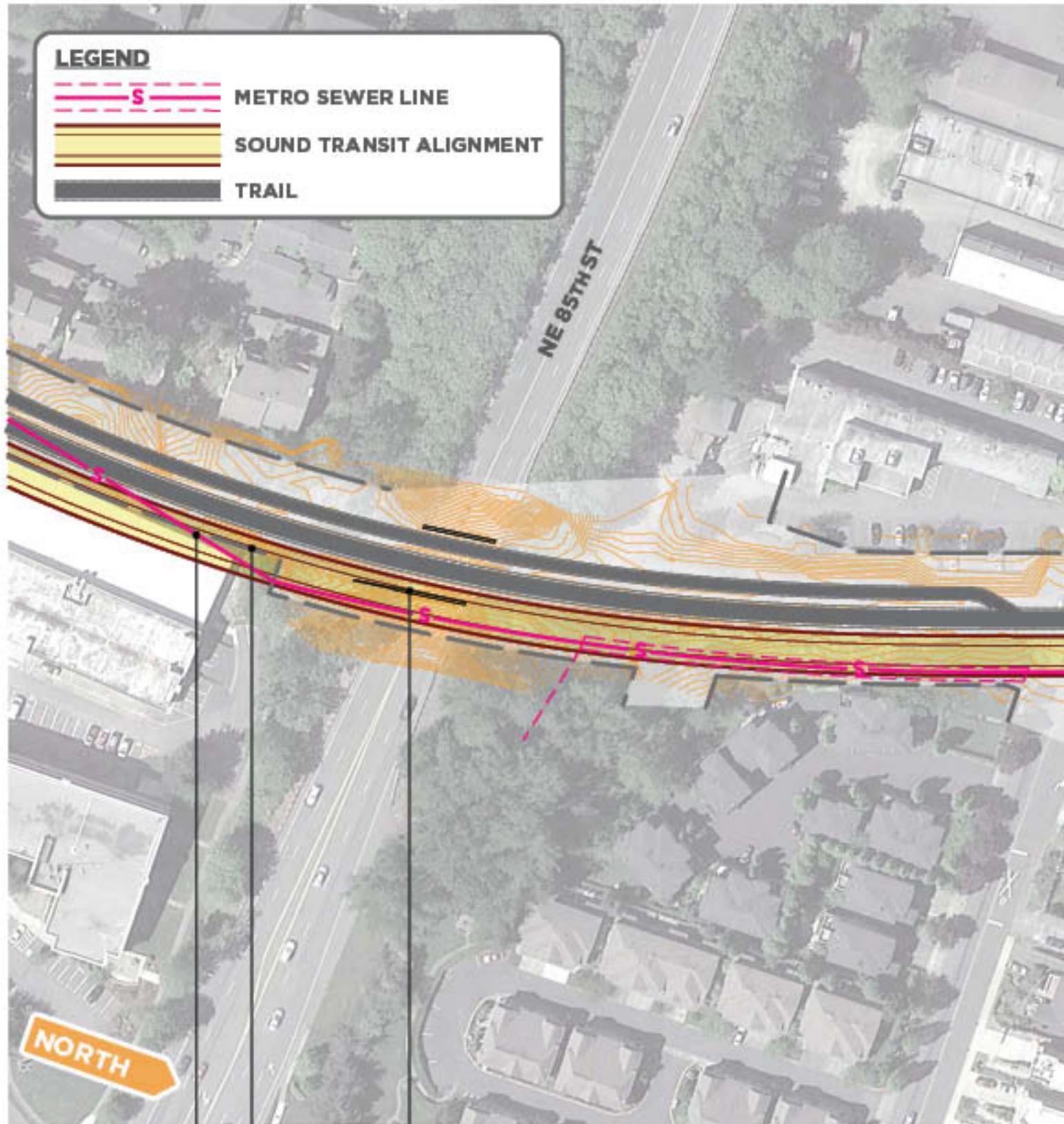
Assumes a fully rebuilt intersection for both trail and transit.

Alignment Transition Zone: Realignment of trails includes a transition zone (beyond that shown on this plan) assumed to be up to 400 feet.

Proposed Alignment Revisions: The trackway is shifted westward to avoid conflict with the Metro sewer line. Correspondingly, the trails are shifted westward.

LEGEND

-  METRO SEWER LINE
-  SOUND TRANSIT ALIGNMENT
-  TRAIL

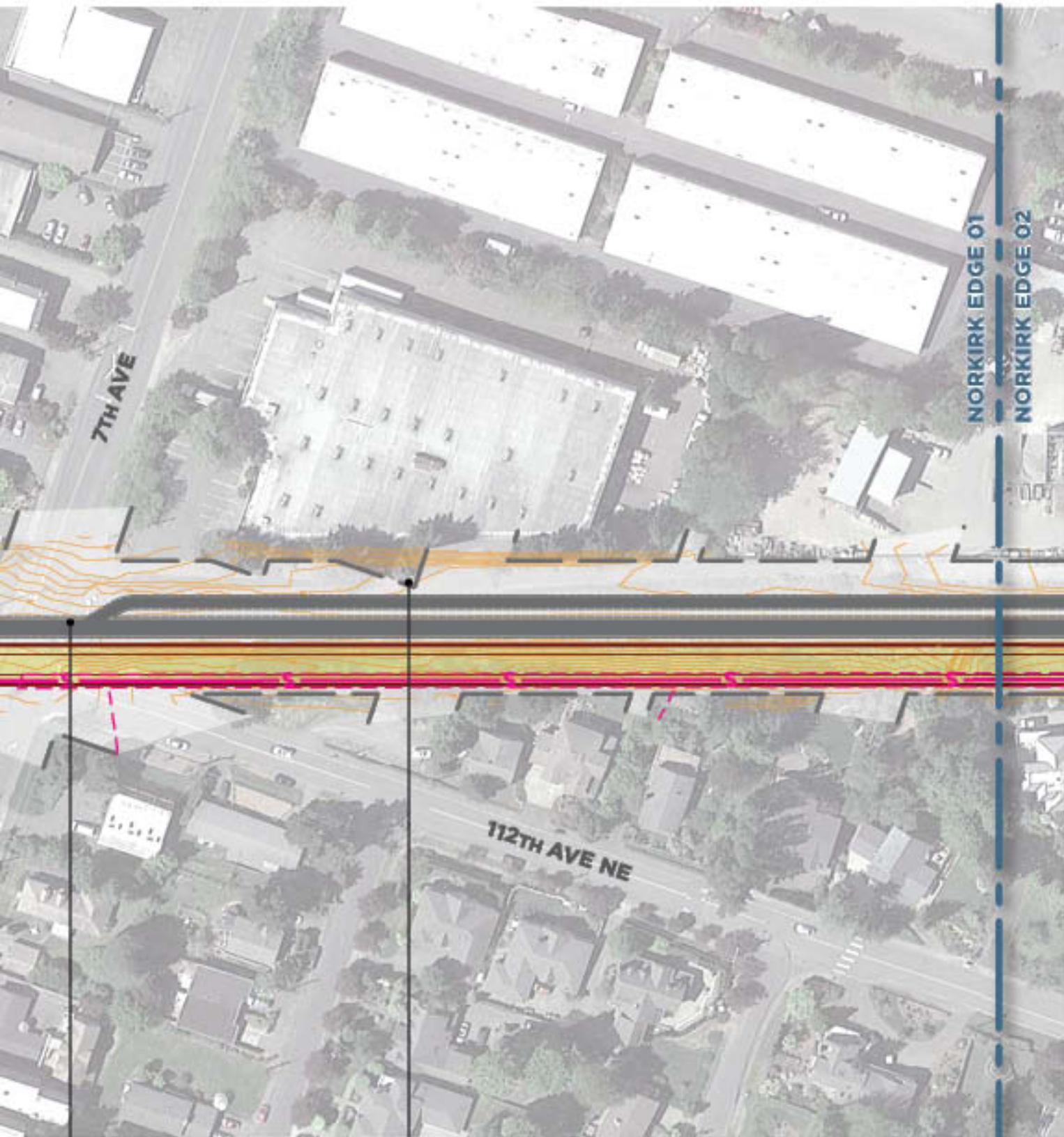


Transitway conflict with existing bridge supports

Adjacent property pinch point

Metro Sewer line shifts from west to east

04_Transit & Utility Conflict Zone Plan - NORKIRK EDGE 01



7TH AVE

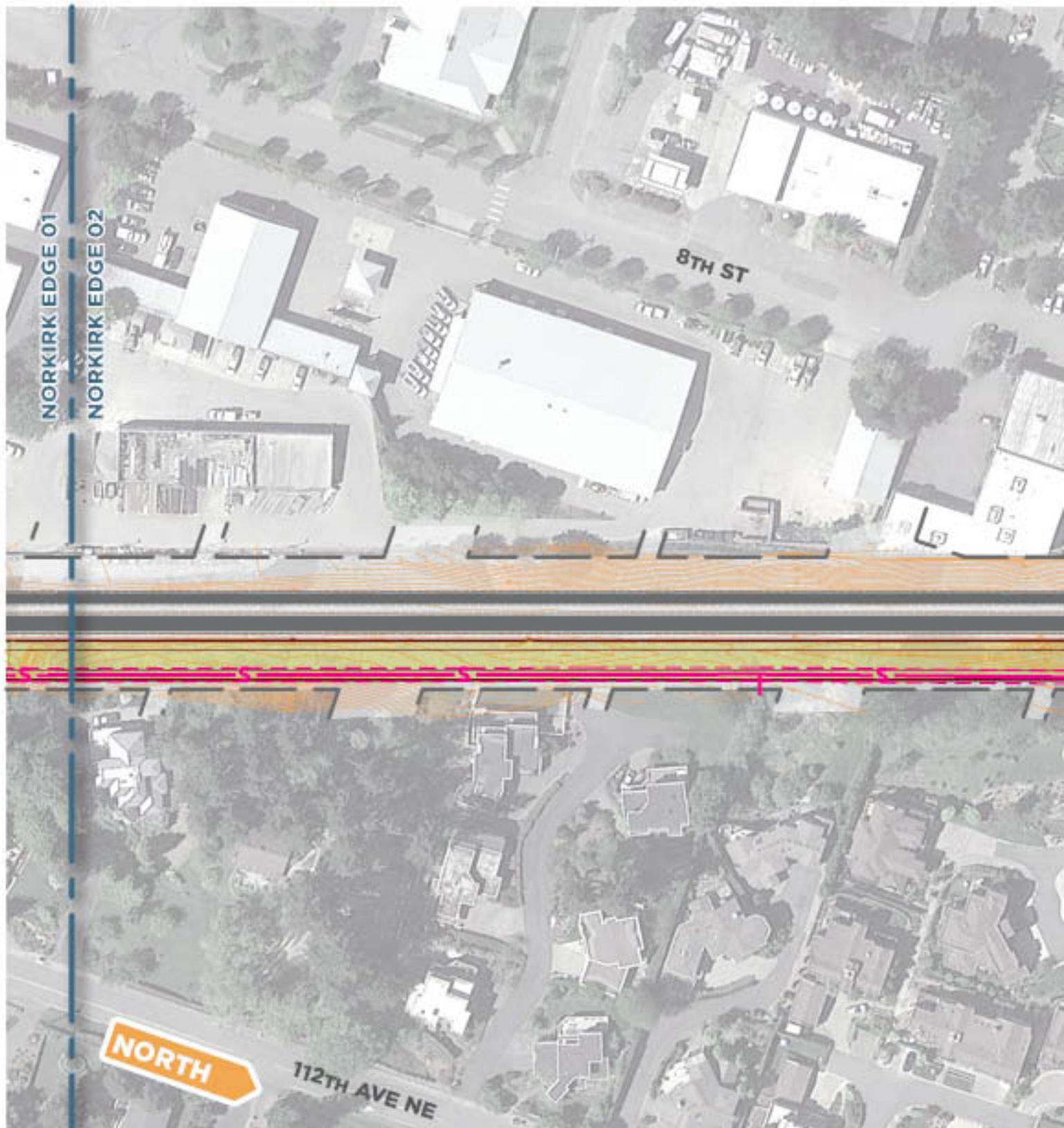
NORKIRK EDGE 01

NORKIRK EDGE 02

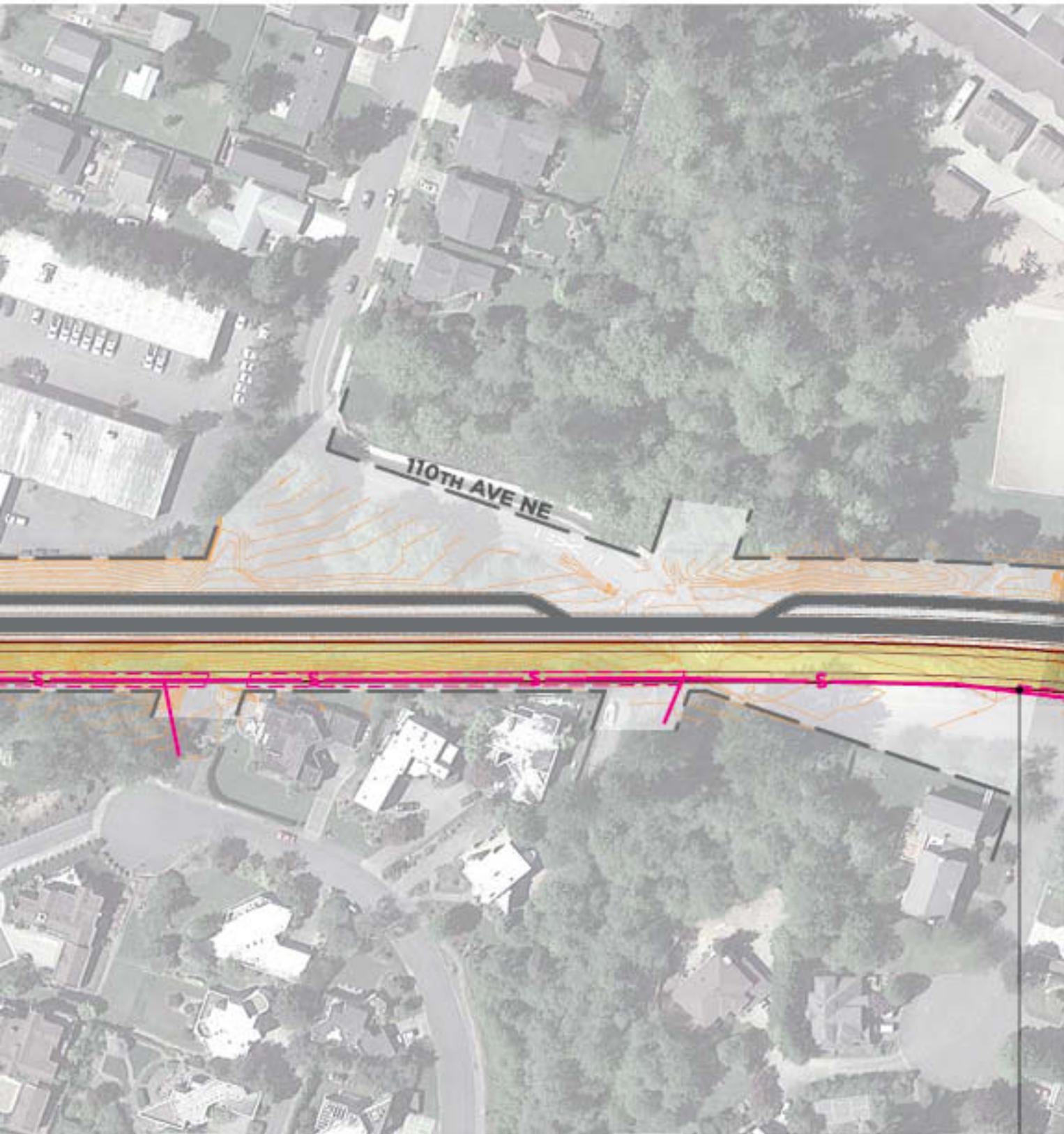
112TH AVE NE

Adjacent property pinch point

Significant steep cross slopes at merging streets



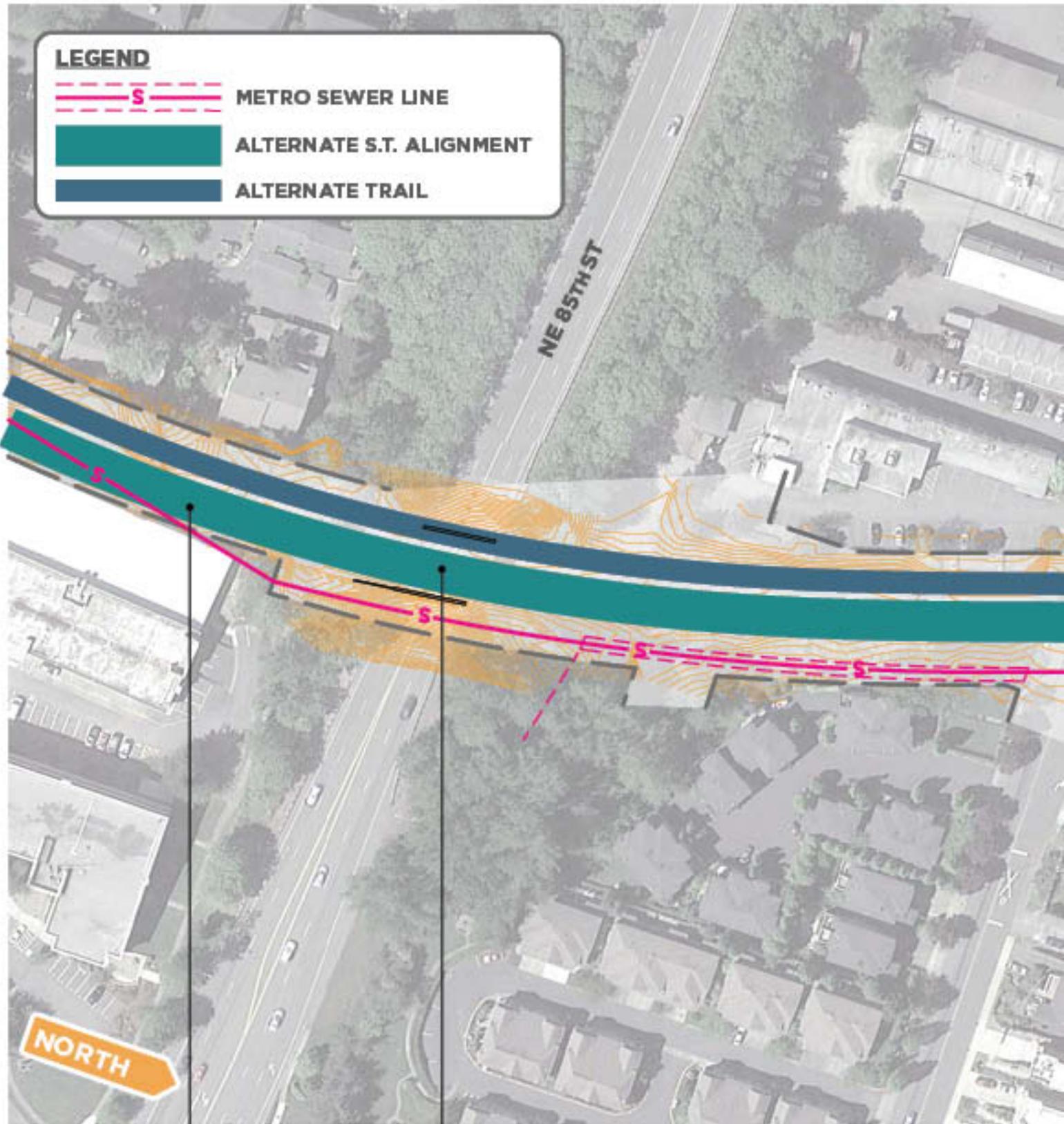
05_Transit & Utility Conflict Zone Plan - NORKIRK EDGE 02



Metro Sewer line shifts farther west and out of conflict zone

LEGEND

-  METRO SEWER LINE
-  ALTERNATE S.T. ALIGNMENT
-  ALTERNATE TRAIL



Alignment Transition Zone: Realignment of trails includes a transition zone (beyond that shown on this plan) assumed to be up to 400 feet.

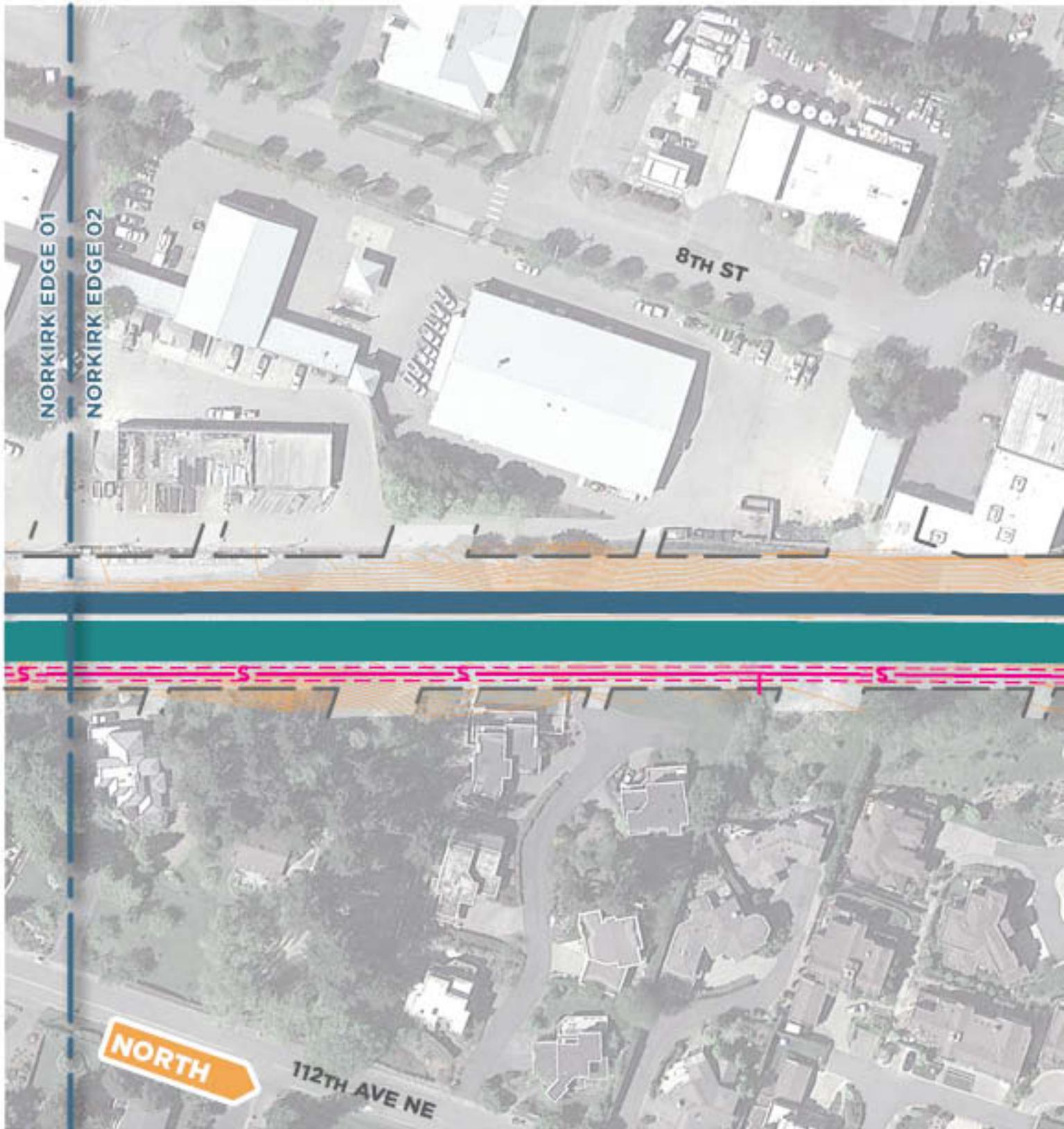
Reconfigured alignment to pass next to east columns. Reconfigured trail alignment may be located east or west of west columns as space allows.

04B_Transit & Utility Conflict Zone Plan - NORKIRK EDGE 01 ALTERNATE

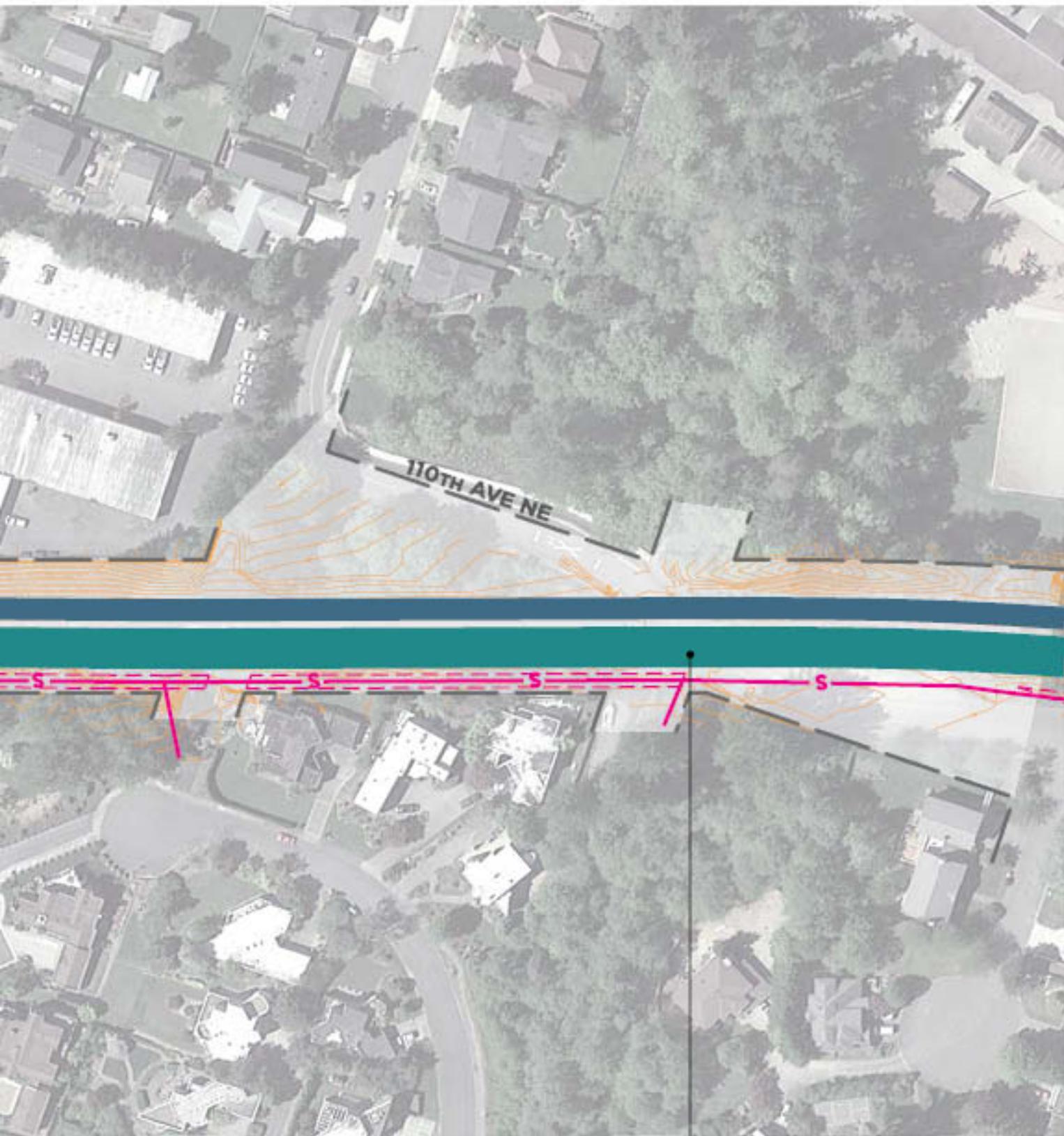


Assumes a fully rebuilt 7th Ave. Intersection for both trail and transit.

Proposed Alignment Revisions: The trackway is shifted westward to avoid conflict with bridge supports and the Metro sewer line. Correspondingly, the trails are shifted westward, and combined into a single shared trail, possibly increased from the 16-foot minimum trail envelope width.



05B_Transit & Utility Conflict Zone Plan - NORKIRK EDGE 02 ALTERNATE

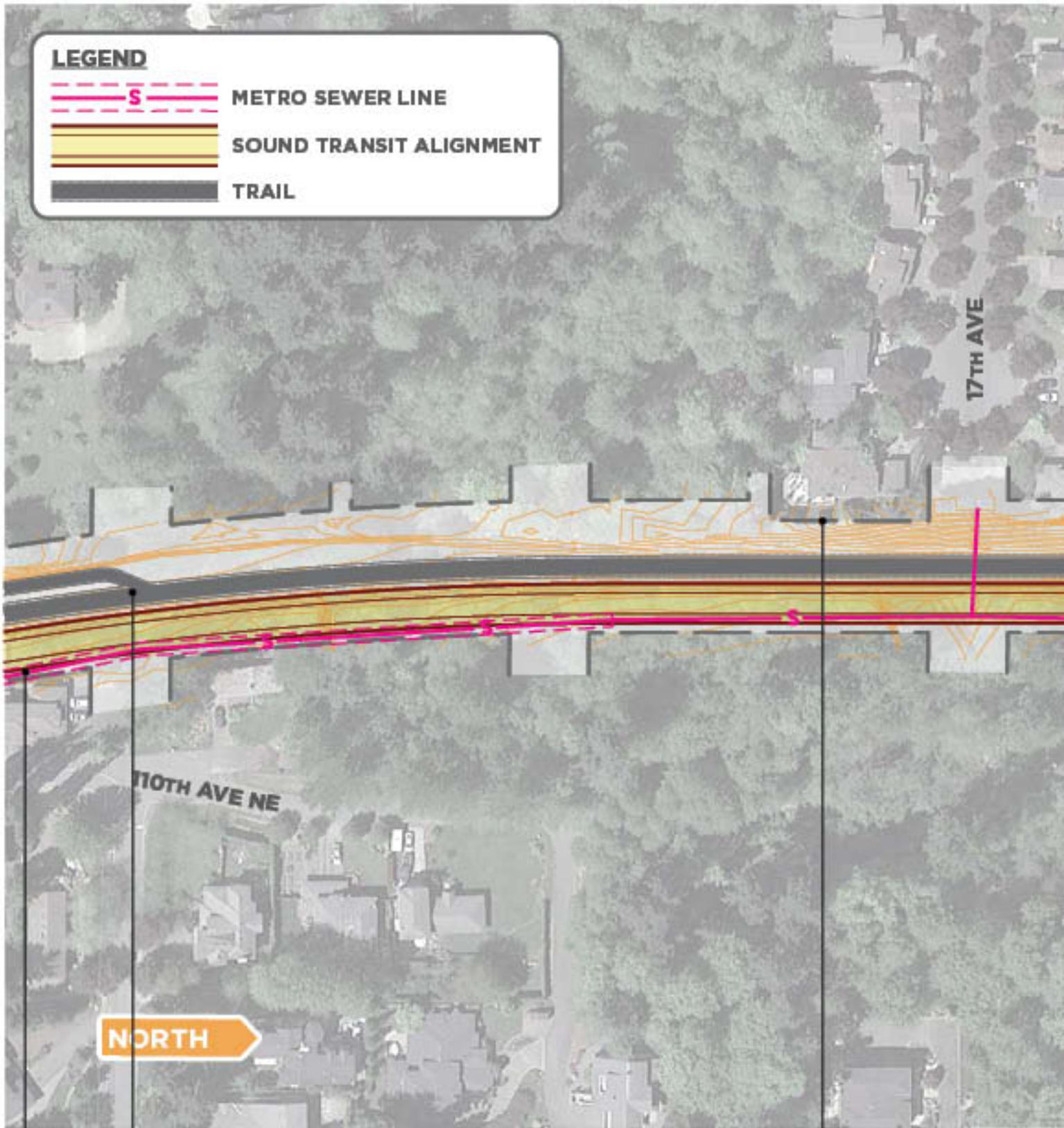


Alignment Transition Zone: Realignment of trails includes a transition zone (beyond that shown on this plan) assumed to be up to 400 feet.

Proposed Alignment Revisions: The trackway is shifted westward to avoid conflict with the Metro sewer line and to avoid the existing property pinch point. Correspondingly, the trails are shifted westward, which could entail significant grading issues to the west. As an alternative, the trails may be combined into a single shared trail, possibly increased from the 16' minimum trail envelope width.

LEGEND

-  METRO SEWER LINE
-  SOUND TRANSIT ALIGNMENT
-  TRAIL



Approximate limit of separated primary/secondary trails, transition to shared trail due to topography constraints (width of shared trail subject to increase).

Metro Sewer line shifts west into conflict with proposed trackway

Adjacent property pinch point

06_Transit & Utility Conflict Zone Plan - HIGHLANDS PASS 01

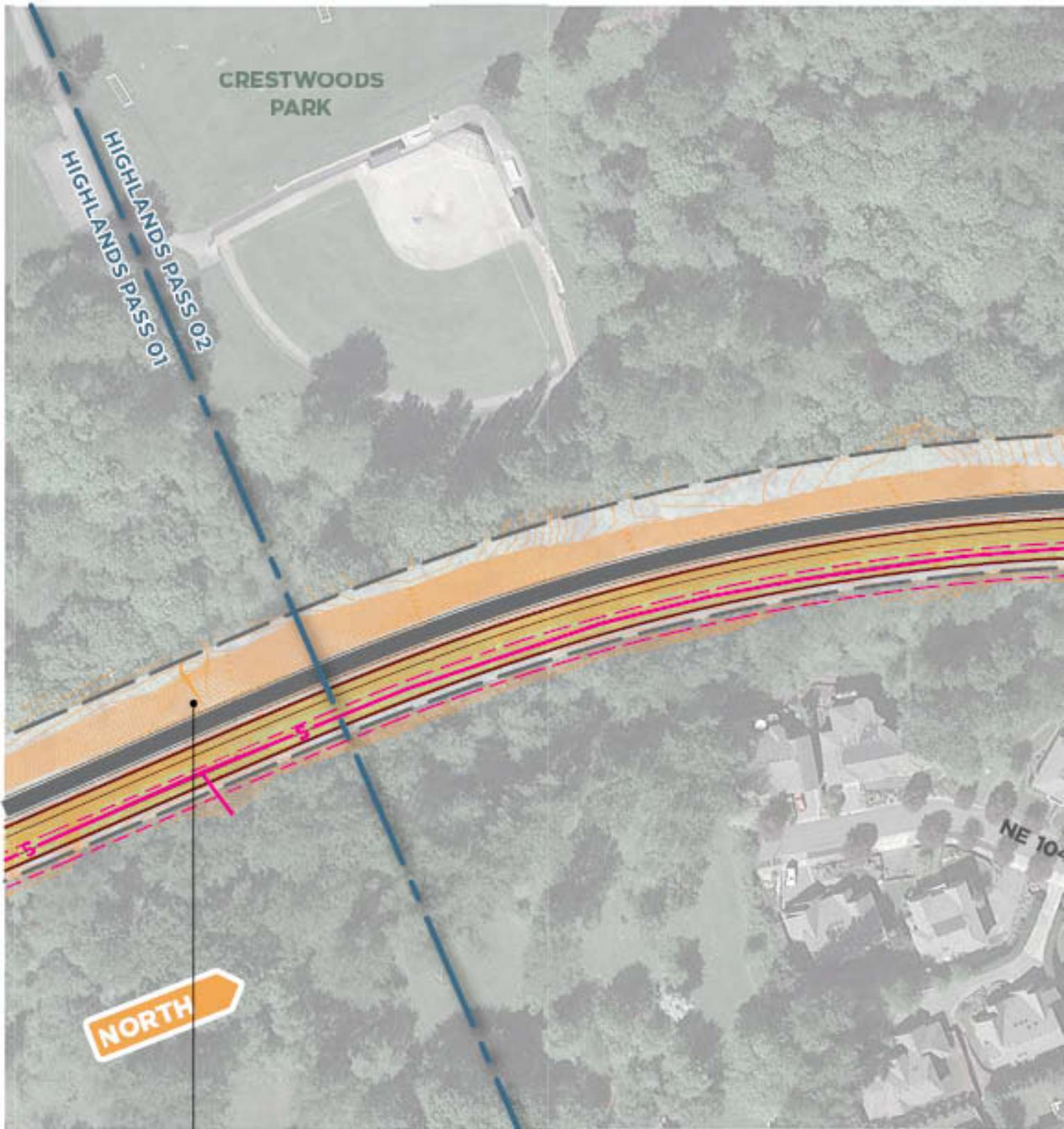


NE 100TH PL

HIGHLANDS PASS 01
HIGHLANDS PASS 02

Topographic pinch point as corridor passes through an excavated low point/trench.

Major east-west pedestrian/bike connection aligning with NE 100th

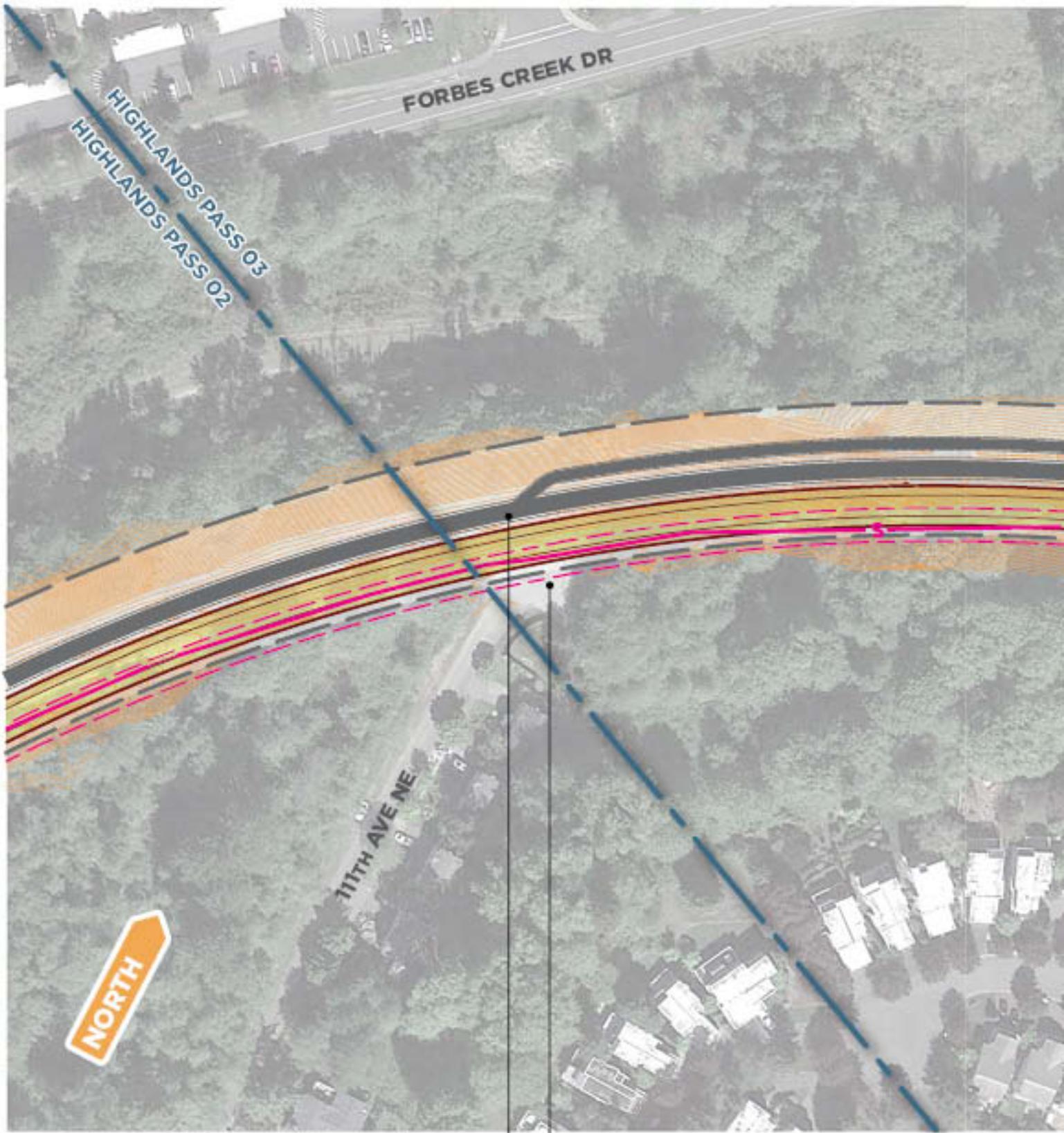


Topographic pinch point as corridor passes through an excavated low point/trench.

07_Transit & Utility Conflict Zone Plan - HIGHLANDS PASS 02



Possible steep grade issues



Approximate limit of separated primary/secondary trails, transition to shared trail due to topography constraints (width of shared trail subject to increase).

Major east-west pedestrian/bike connection aligning with NE 111th to path along Forbes Creek Drive

08_Transit & Utility Conflict Zone Plan - HIGHLANDS PASS 03

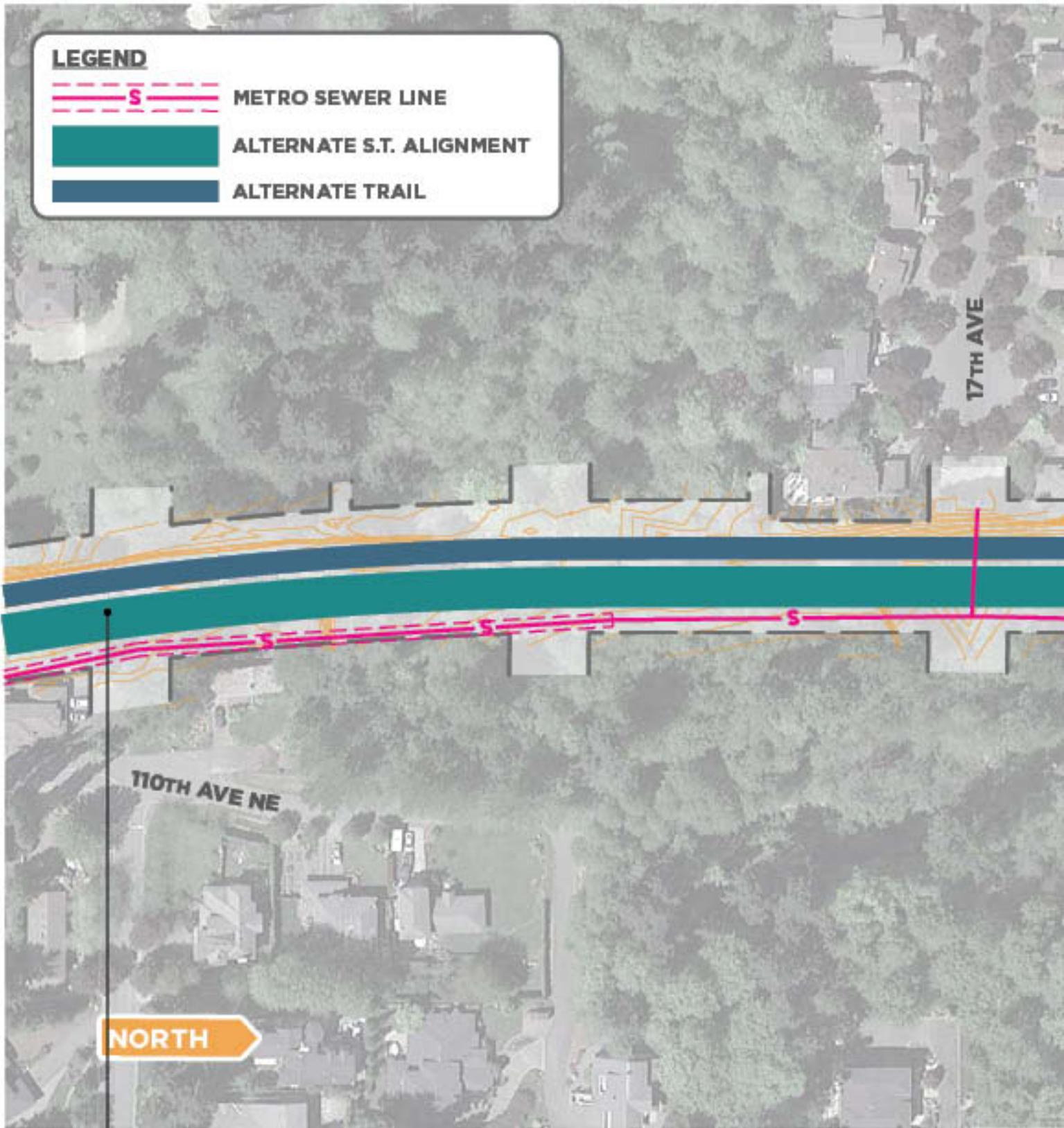
Alignment of PSE high transmission line (In design, location to be verified) may impact future transit alignment.



Metro Sewer line shifts farther west and out of conflict zone

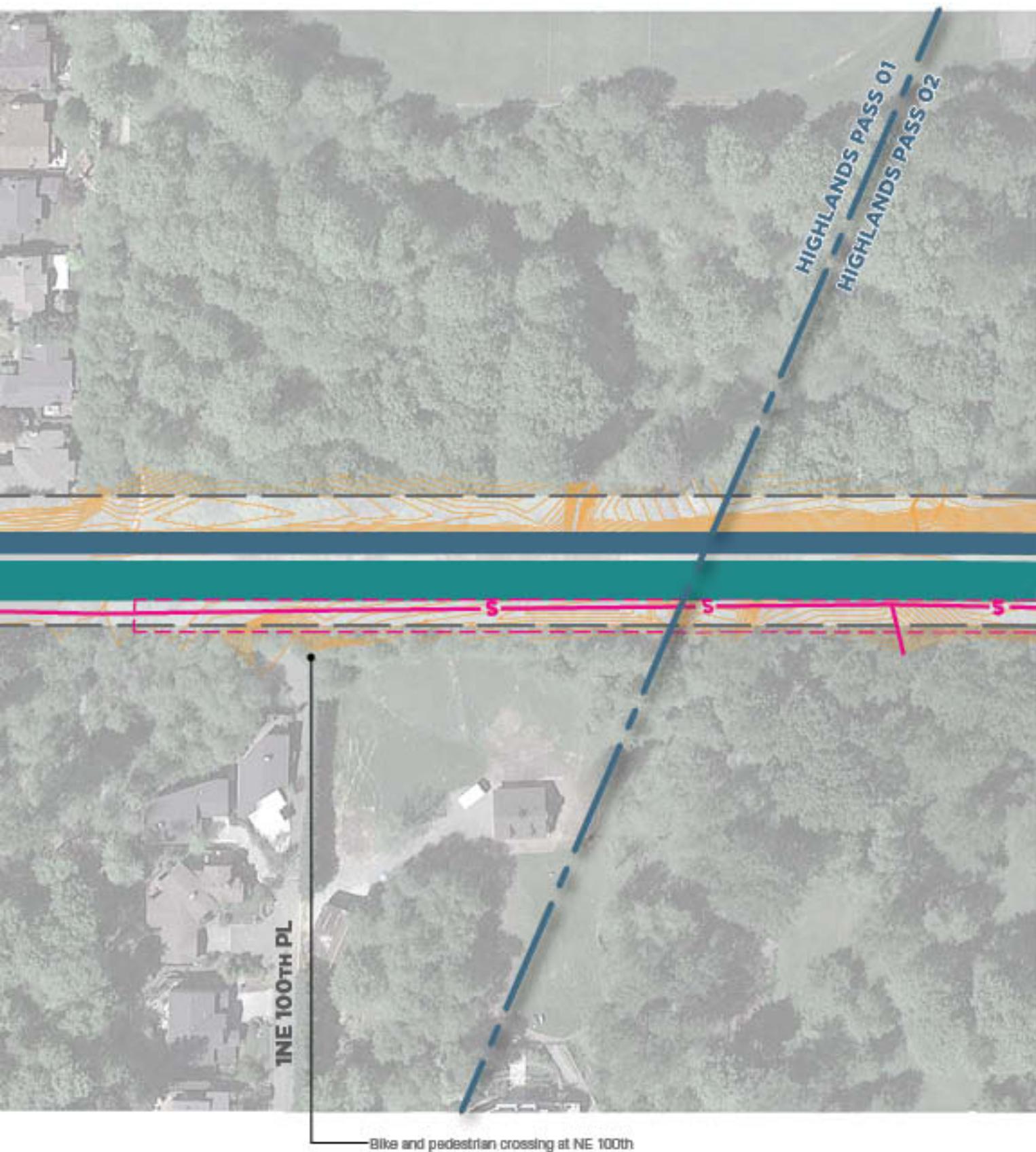
LEGEND

-  METRO SEWER LINE
-  ALTERNATE S.T. ALIGNMENT
-  ALTERNATE TRAIL



Alignment Transition Zone: Realignment of trails includes a transition zone (beyond that shown on this plan) assumed to be up to 400 feet.

06B_Transit & Utility Conflict Zone Plan - HIGHLANDS PASS 01 ALTERNATE



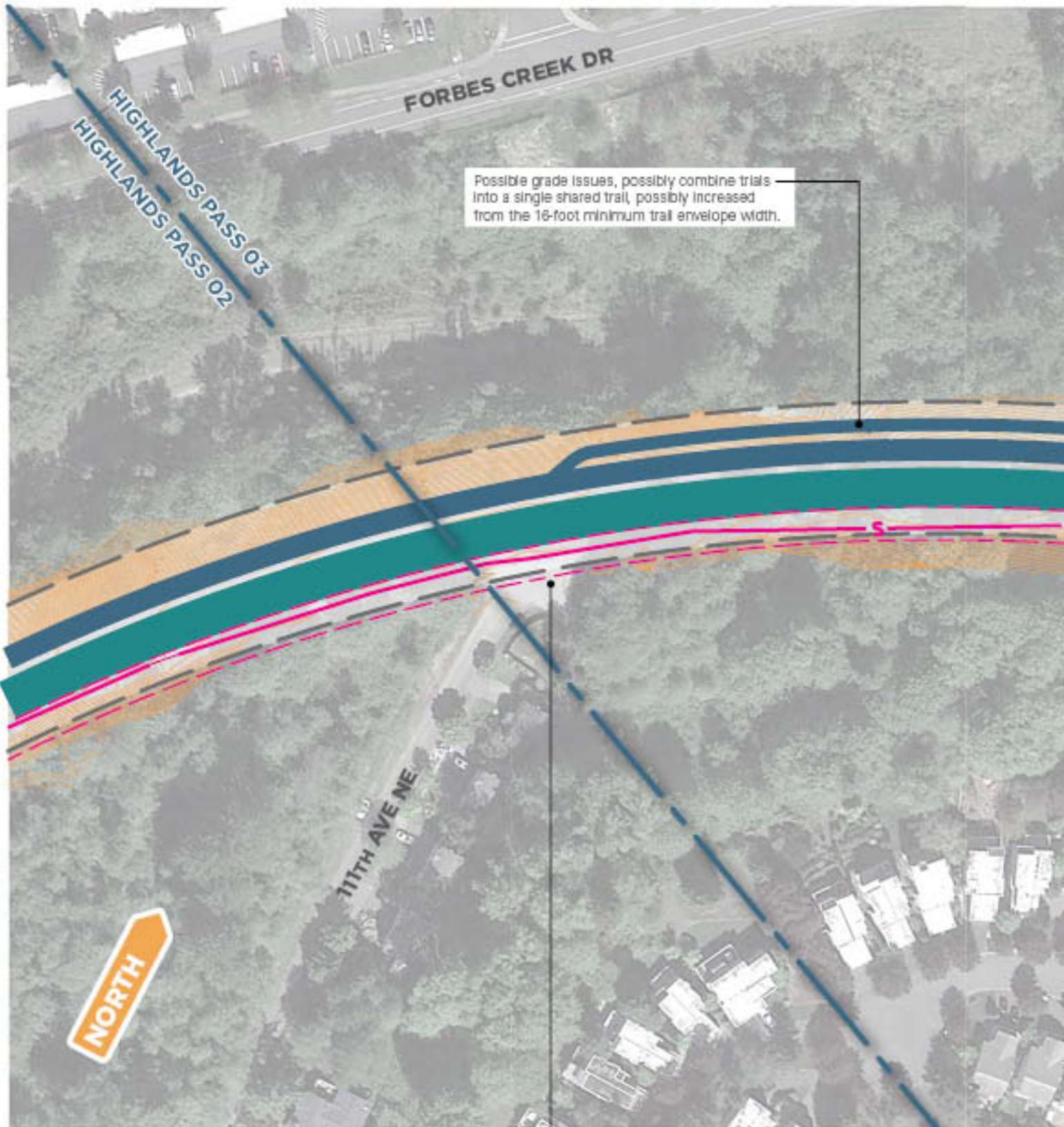
Proposed Alignment Revisions: The trackway is shifted westward to avoid conflict with the Metro sewer line. Correspondingly, the trails are shifted westward and combined into a single shared trail, possibly increased from the 16-foot minimum trail width (retaining structures and cut/fill required). An alternate consideration would be shifting the primary trail to the west side of the corridor and route the trail over Metro Sewer; however, this would involve an undesired trackway crossing.



07B_Transit & Utility Conflict Zone Plan - HIGHLANDS PASS 02 ALTERNATE



Proposed Alignment Revisions: The trackway is shifted westward to avoid conflict with the Metro sewer line. Correspondingly, the trails are shifted westward and combined into a single shared trail, possibly increased from the 16-foot minimum trail width (retaining structures and cut/fill required). An alternate consideration would be shifting the primary trail to the west side of the corridor and route the trail over Metro Sewer; however, this would involve an undesired trackway crossing.



Possible grade issues, possibly combine trails into a single shared trail, possibly increased from the 16-foot minimum trail envelope width.



Major east-west pedestrian/bike connection aligning with NE 111th to path along Forbes Creek Drive

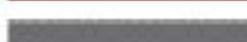
08B_Transit & Utility Conflict Zone Plan - HIGHLANDS PASS 03 ALTERNATE



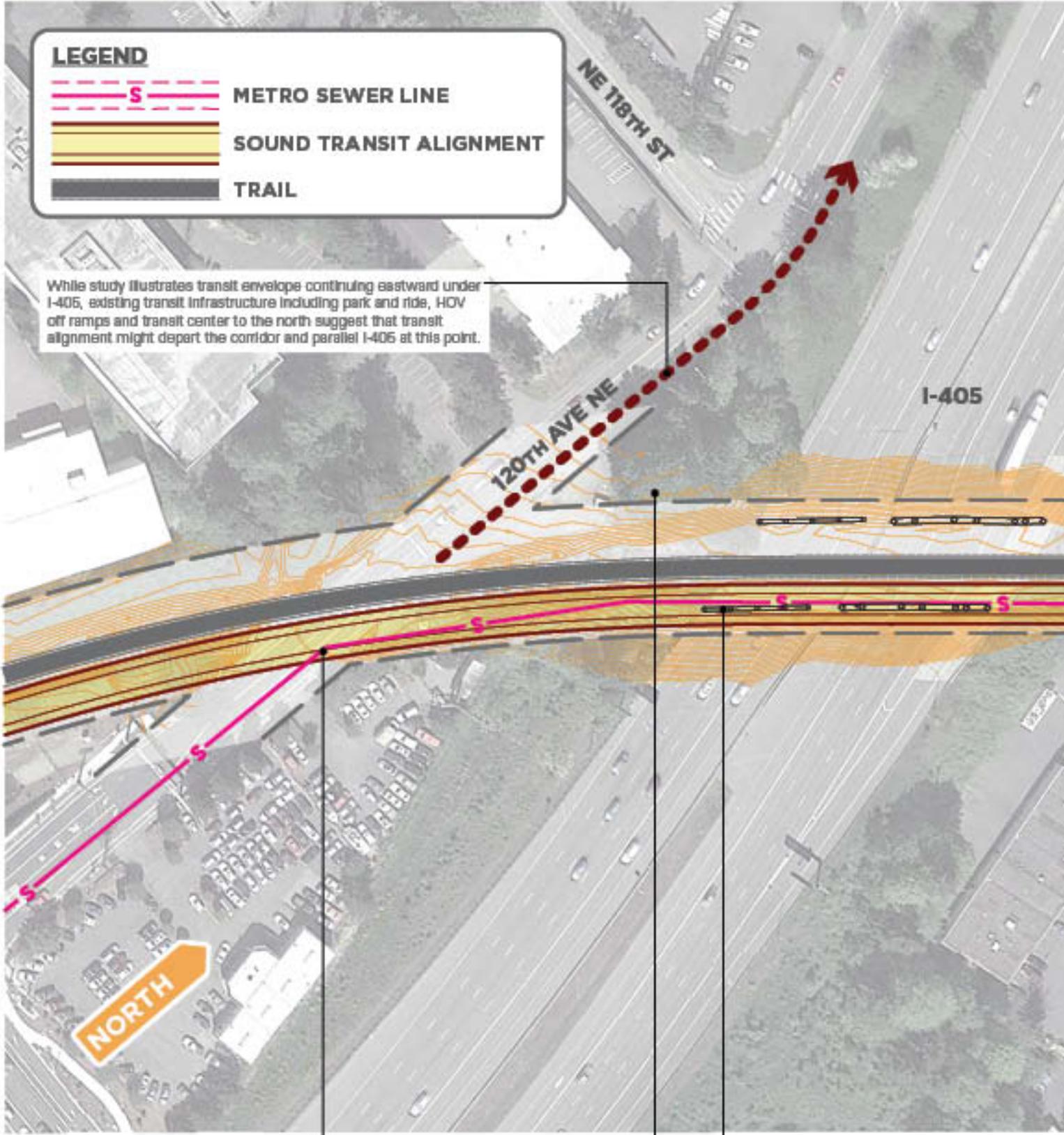
Alignment Transition Zone: Realignment of trails includes a transition zone (beyond that shown on this plan) assumed to be up to 400 feet.

Proposed Alignment Revisions: The trackway is shifted westward to avoid conflict with the Metro sewer line. Correspondingly, the trails are shifted westward and combined into a single shared trail, possibly increased from the 16-foot minimum trail width (retaining structures and cut/fill required). An alternate consideration would be shifting the primary trail to the west side of the corridor and route the trail over Metro Sewer; however, this would involve an undesired trackway crossing.

LEGEND

-  METRO SEWER LINE
-  SOUND TRANSIT ALIGNMENT
-  TRAIL

While study illustrates transit envelope continuing eastward under I-405, existing transit infrastructure including park and ride, HOV off ramps and transit center to the north suggest that transit alignment might depart the corridor and parallel I-405 at this point.

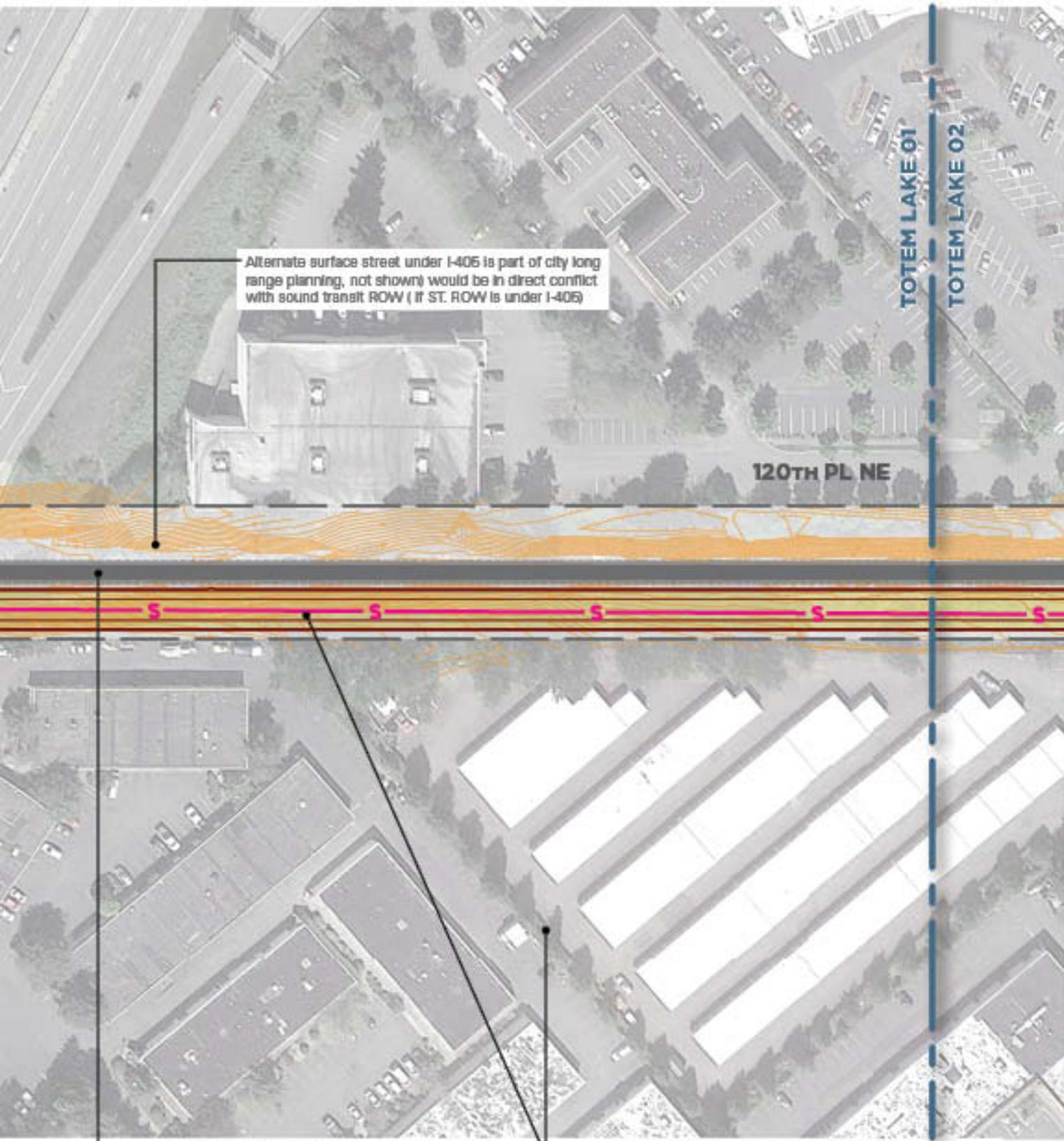


Metro Sewer line shifts into conflict with proposed trackway

The crossing of 120th and I-405 in close proximity will create engineering challenges.

Transit way conflict with existing bridge supports

09_Transit & Utility Conflict Zone Plan - TOTEM LAKE 01



Alternate surface street under I-405 is part of city long range planning, not shown) would be in direct conflict with sound transit ROW (if ST. ROW is under I-405)

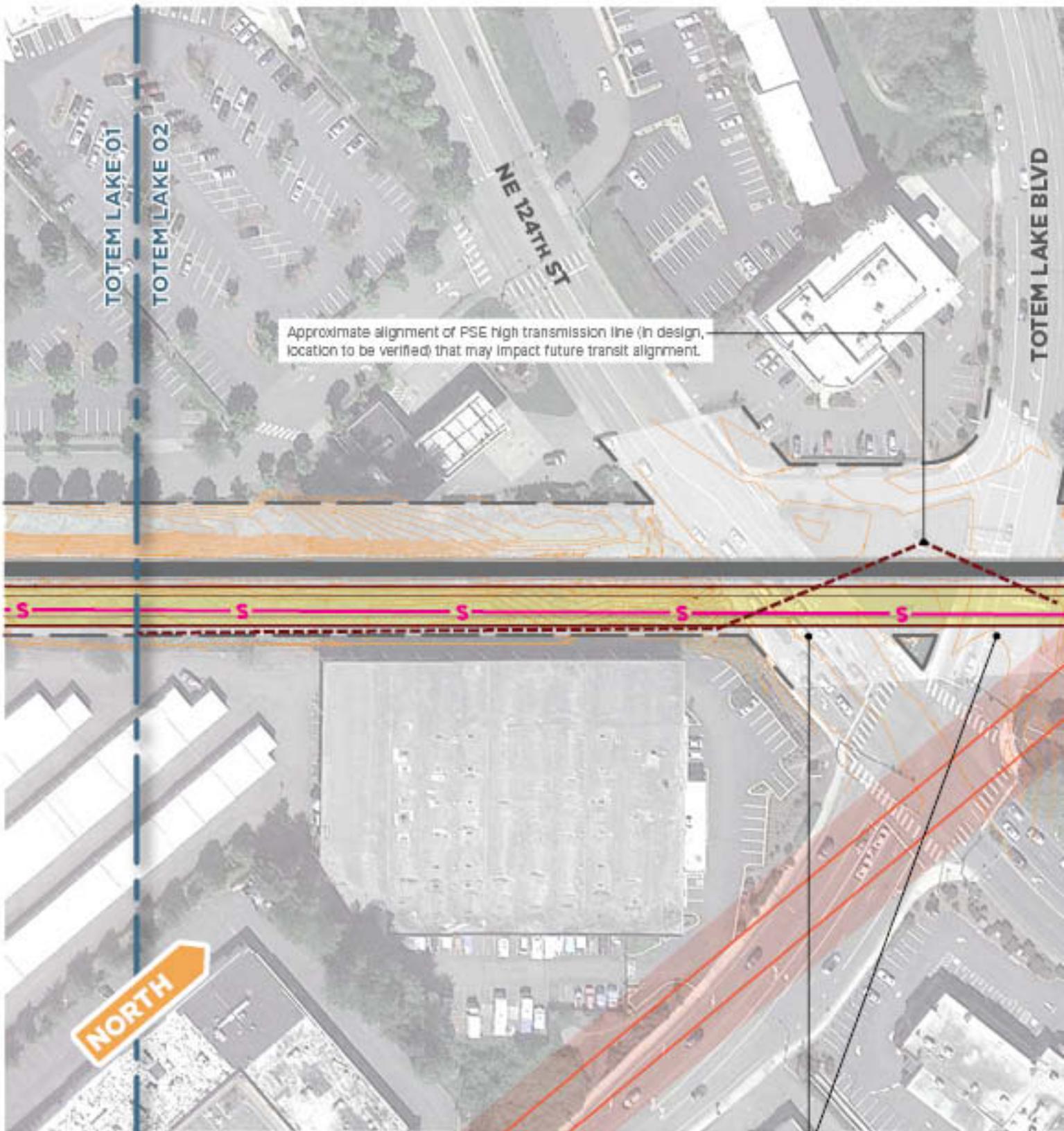
120TH PL NE

TOTEM LAKE 01

TOTEM LAKE 02

Trail through this section is proposed as a shared trail (width of shared trail subject to increase from the 16-foot minimum trail envelope width

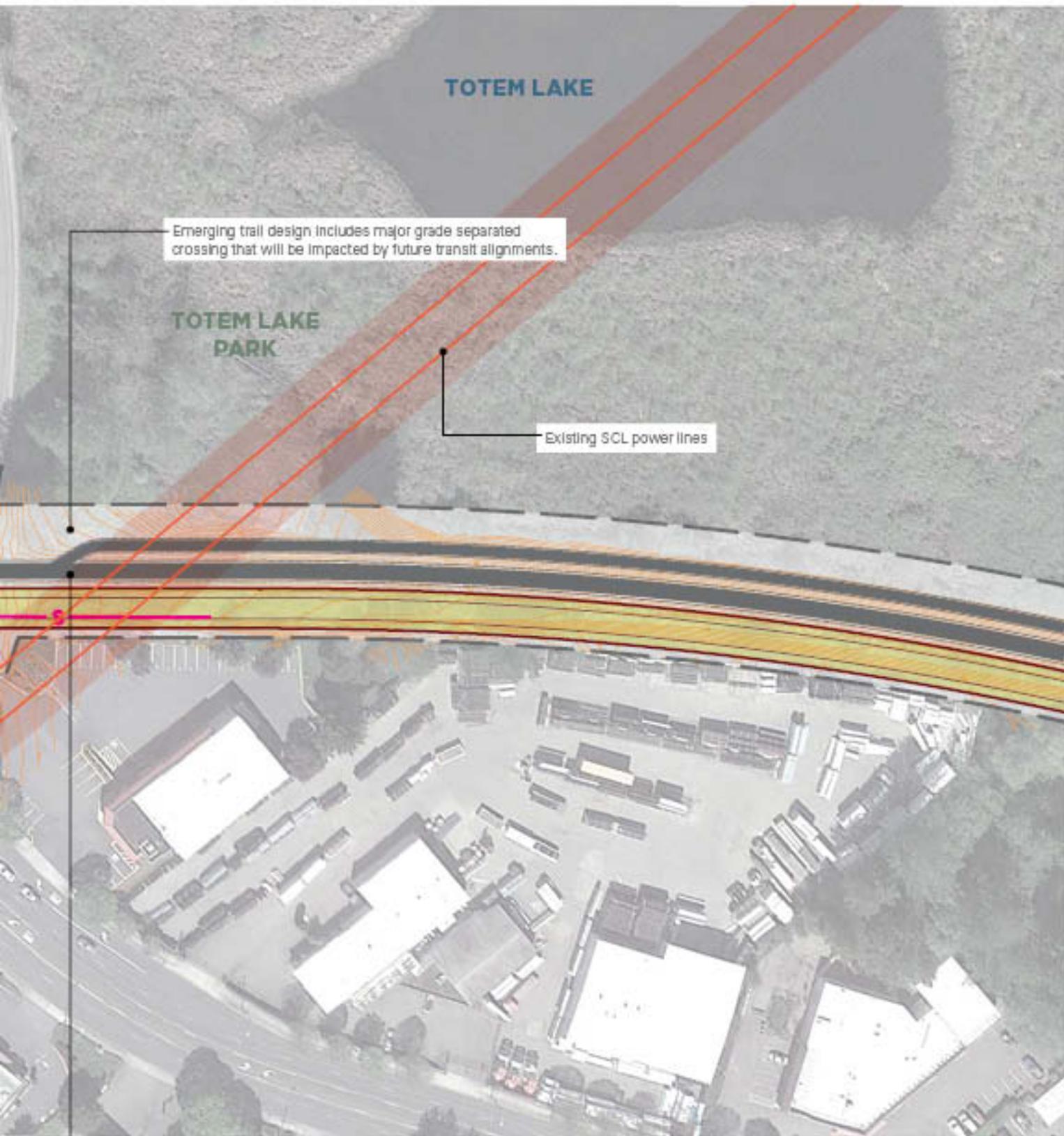
Alternate surface streets in East Totem Lake (part of city long range planning, not shown) would be in direct conflict with sound transit ROW (if ST. ROW is on grade)



Approximate alignment of PSE high transmission line (In design, location to be verified) that may impact future transit alignment.

Major high volume intersection and crossings require grade separation

10_Transit & Utility Conflict Zone Plan - TOTEM LAKE 02



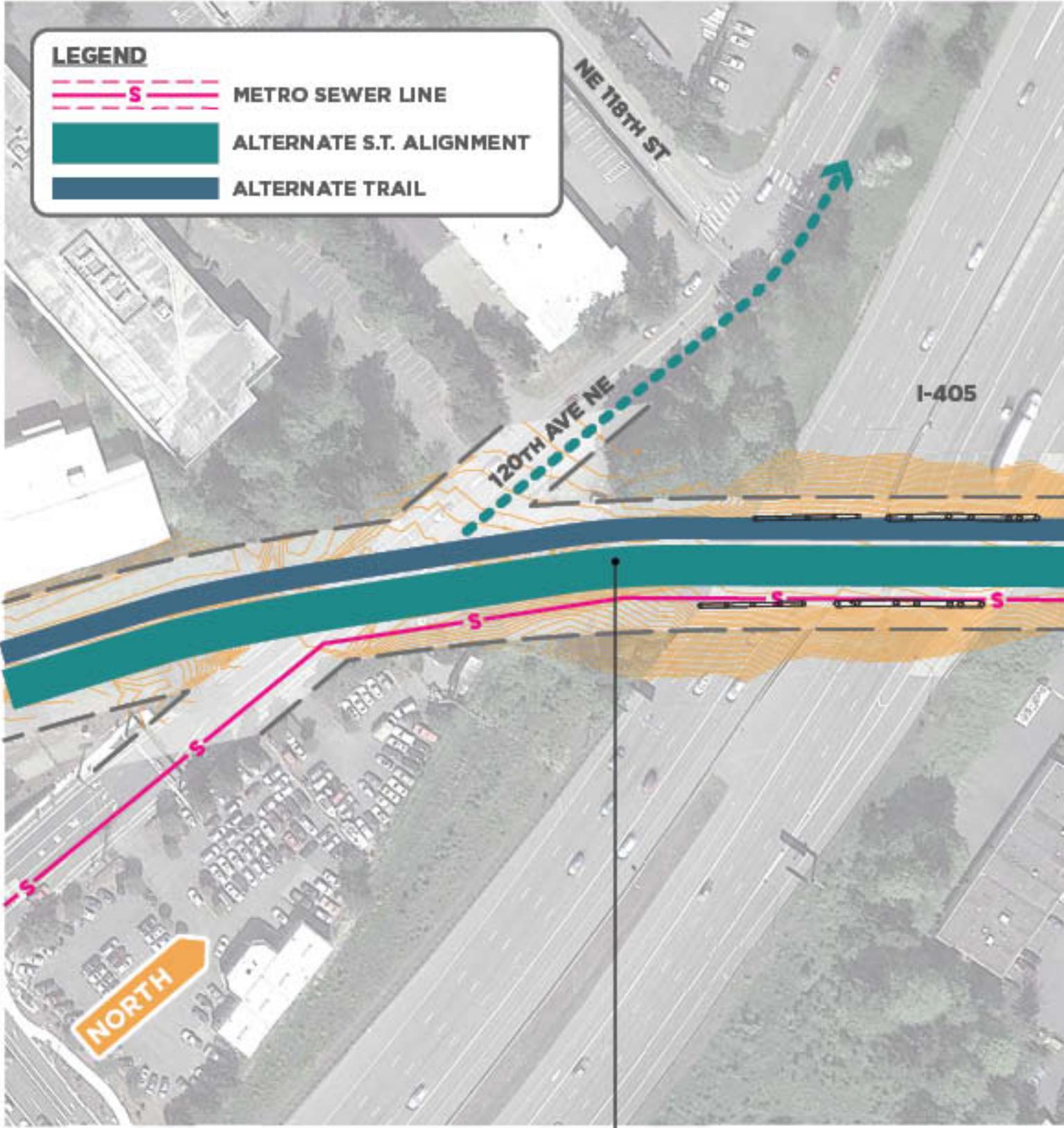
TOTEM LAKE

Emerging trail design includes major grade separated crossing that will be impacted by future transit alignments.

TOTEM LAKE PARK

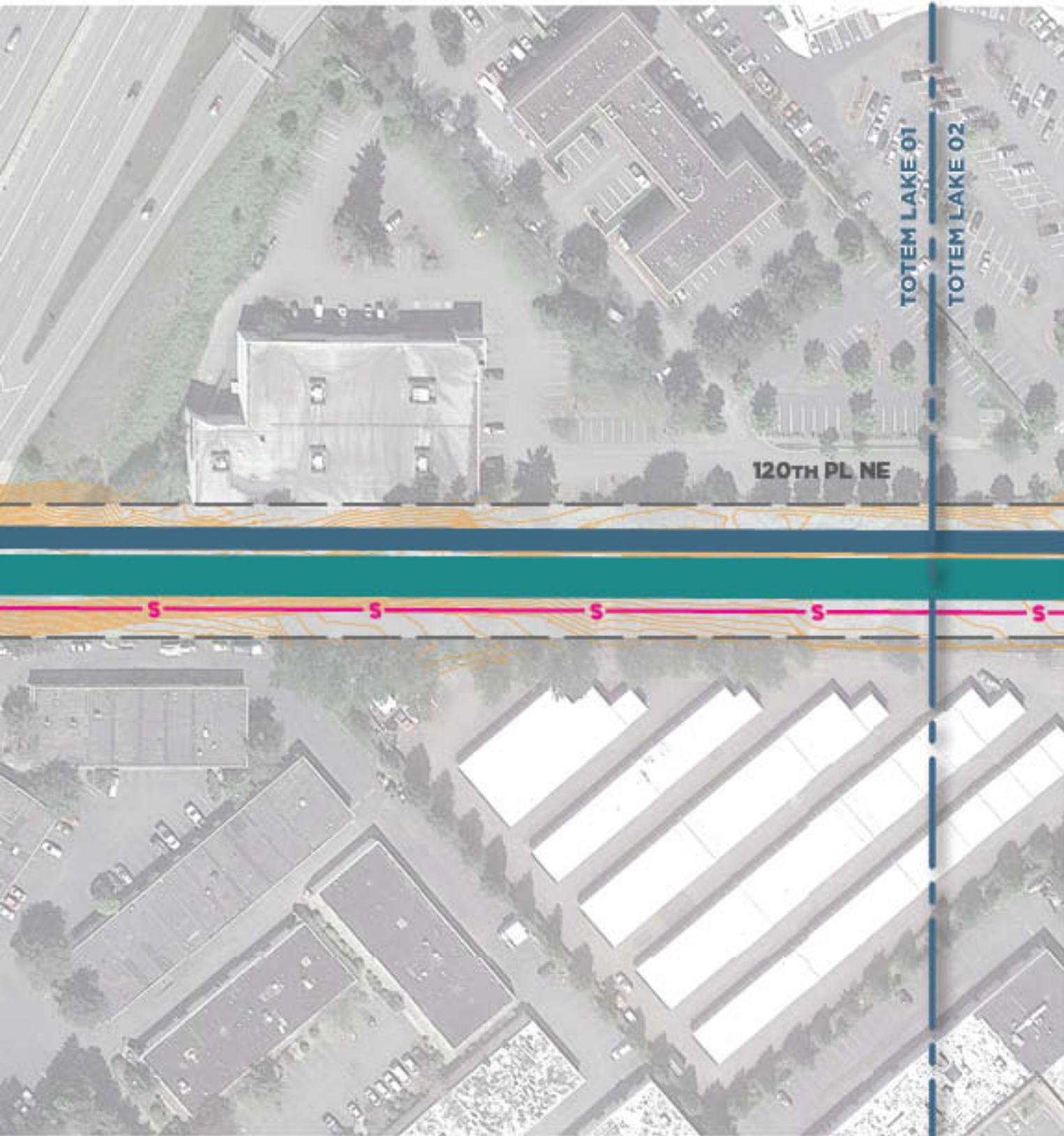
Existing SCL power lines

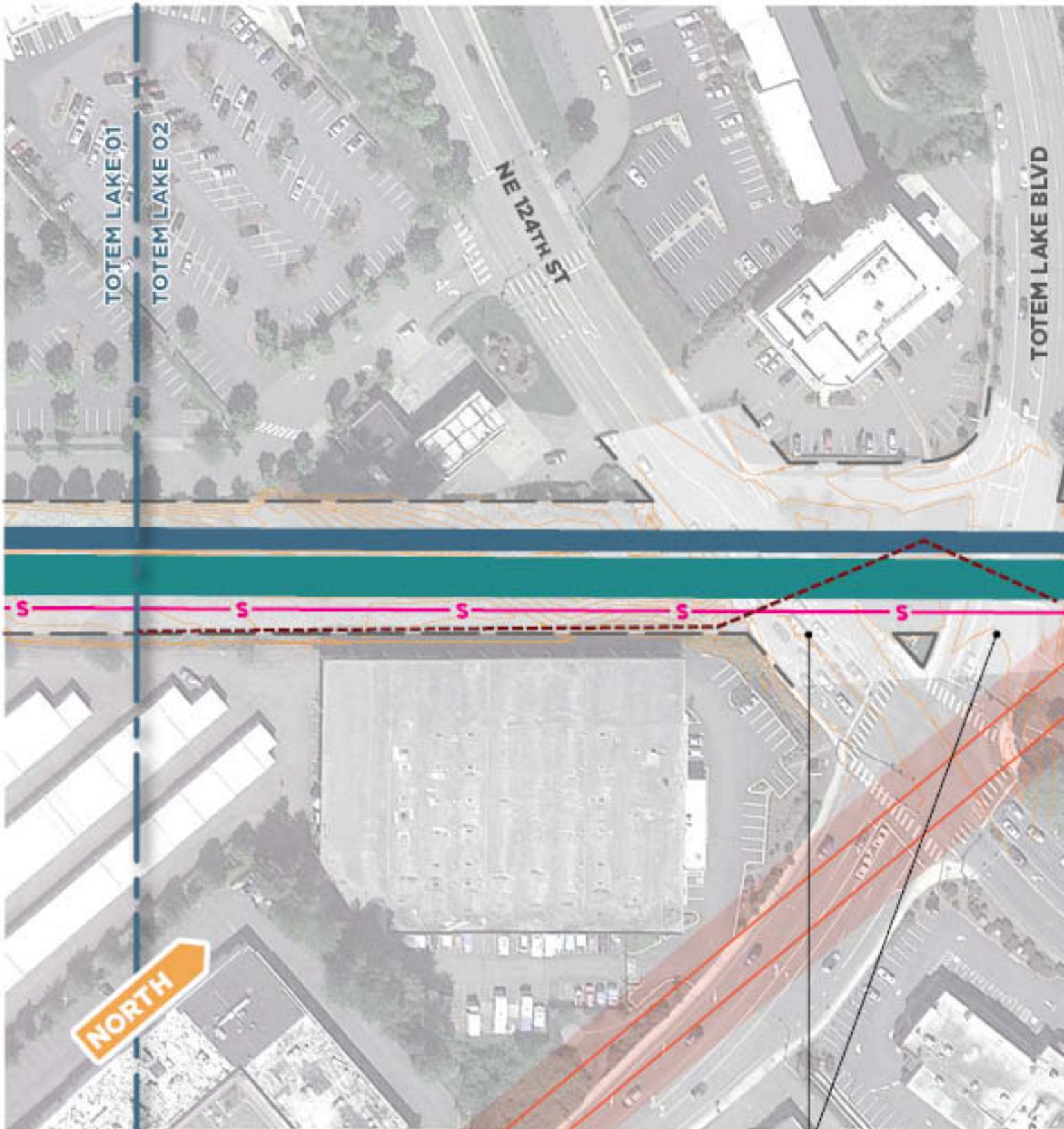
Approximate limit of separated primary/secondary trails, transition to shared trail due to topography constraints (width of shared trail subject to increase).



Proposed Alignment revisions: The trackway is shifted westward to avoid conflict with bridge supports and Metro sewer line. Correspondingly, the trail is shifted westward. An alternate option would be for transit to depart the corridor and parallel I-405 at this point.

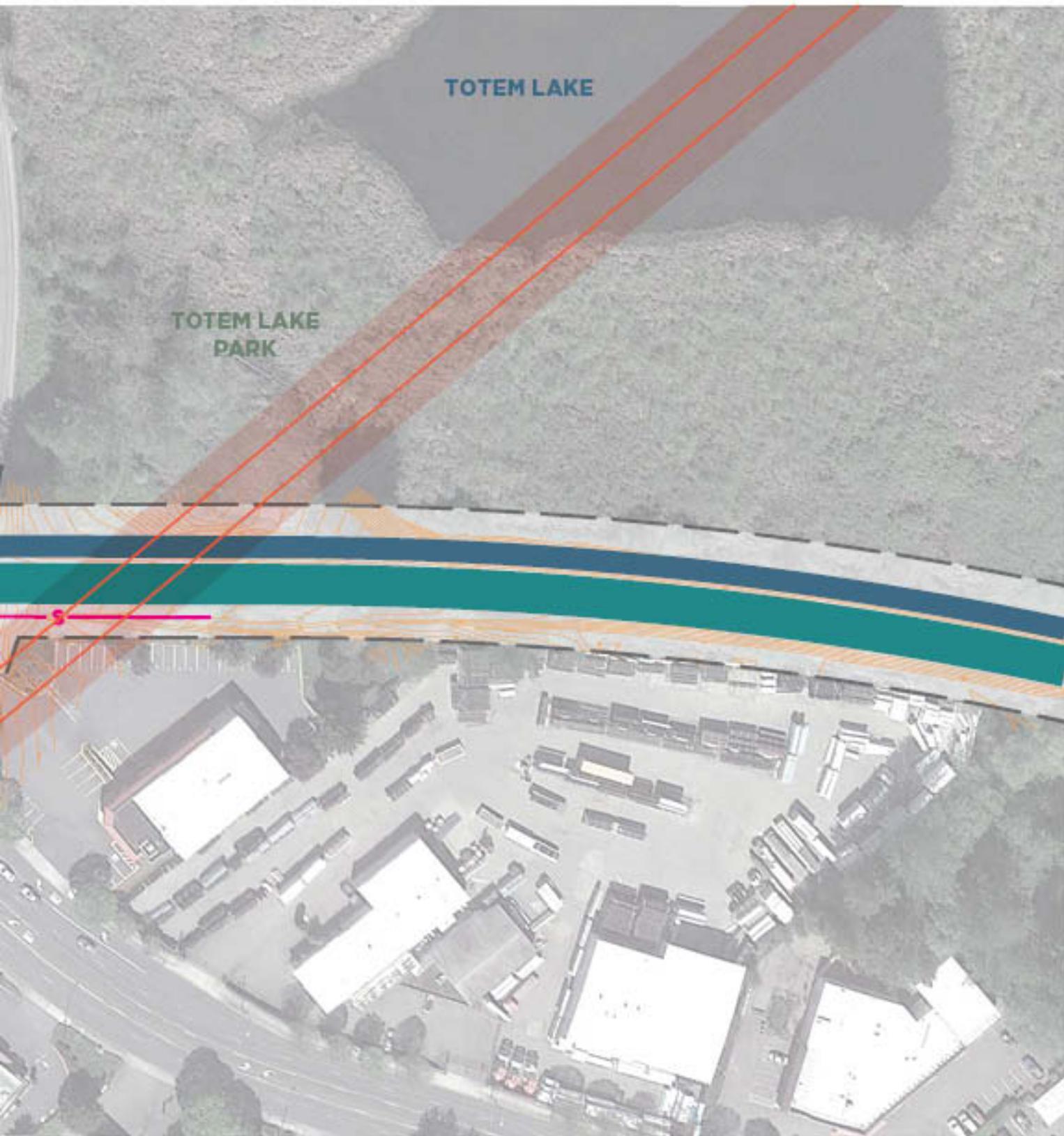
09B_Transit & Utility Conflict Zone Plan - TOTEM LAKE 01 ALTERNATE





Due to the high number of variables, it is counterproductive to assume what will be a highly engineered and likely grade separated crossing in this location.

10B_Transit & Utility Conflict Zone Plan - TOTEM LAKE 02 ALTERNATE



TOTEM LAKE

TOTEM LAKE
PARK

