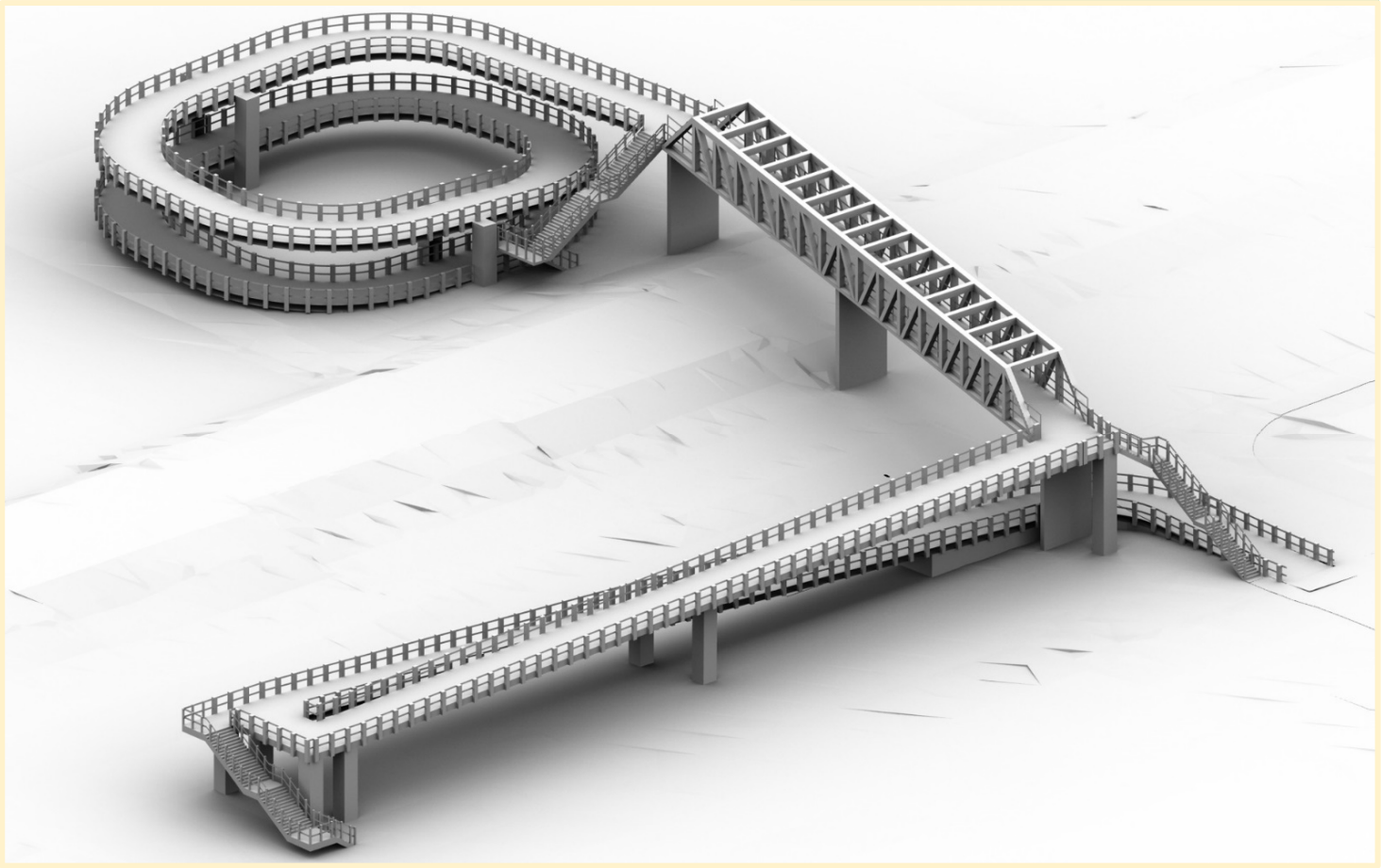
Hawthorne Crossing Preliminary Alignment Summary



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Oregon Department of Transportation

March 2020

TABLE OF CONTENTS

OVERVIEW

ODOT, in partnership with the City of Bend, has led a scoping effort for a bike/pedestrian overpass that connects NE Hawthorne Ave with NW Hawthorne Ave. This scoping effort is an element of the Active Transportation component of the US-97: Parkway Plan. The crossing is part of the City of Bend's Low Stress Network Plan, supports the parallel network of bike/pedestrian routes developed in the Parkway Plan and the City's TSP Update, and was identified as a high-priority crossing in the Parkway Plan due to the US-97 crossing spacing it provides in Bend's Core Area. The overpass will cross over the US-97 Dalles – California Parkway as well as the BNSF Railway which parallels US-97 at this location. Four (4) preliminary alignment options were considered during the scoping effort, which included:

Option 1 (Elevator): Overcrossing with Right off Parkway remaining open and Elevator

Option 2 (Snake/Spiral): Overcrossing with Right off Parkway remaining open and no Elevator

Option 3 (Switchback): Overcrossing with Full On/Off Closure

Option 4 (Undercrossing): Undercrossing with Right off Parkway remaining open

After developing and reviewing the four alignment options listed above, the scoping team identified Option 2 with Snake and Spiral ramps as the Preferred Alternative alignments for the eastern ramp approach to the overcrossing structure, with the Option 1 also warranting additional scoping. This document summarizes the design criteria used as well as summarizes the alignments considered during this scoping effort. The *City of Bend Alternative Evaluation Matrix* details the benefits of the various alignments.

DESIGN CRITERIA USED

Approach Ramp Grade: 3% preferred, 5% maximum preferred grade, 8.3% with level landings for short runs if absolutely required

Path Width: 14’ minimum, 20’ preferred. 18’ width is the typical structure width.

Structure Depth: Assume 3’ (Per ODOT Bridge Section)

Alignment: Hawthorne Ave (additional options analyzed)

Stairways: All options include stairways on both approaches

SUPPLEMENTARY DOCUMENTATION

A number of 2D and 3D exhibits were generated for this scoping effort as well as two (2) scoping-level estimates for the recommended option, Option 2. The final scoping estimates for Option 2 have been provided separately from this document. The aforementioned scoping exhibits have been incorporated into this document as appendices.

Appendix A: Option 1-4 Scoping 2D Alignment Alternative Exhibits

Appendix B: Refined Option 2 Scoping 2D Alignment Alternative Exhibits

Appendix C: Recommended Option 2 3D Renderings

PRELIMINARY SCOPING ALIGNMENT SUMMARY

Option 1 (Elevator): Overcrossing with Right off Parkway remaining open and Elevator

Option 2 (Snake/Spiral): Overcrossing with Right off Parkway remaining open and no Elevator

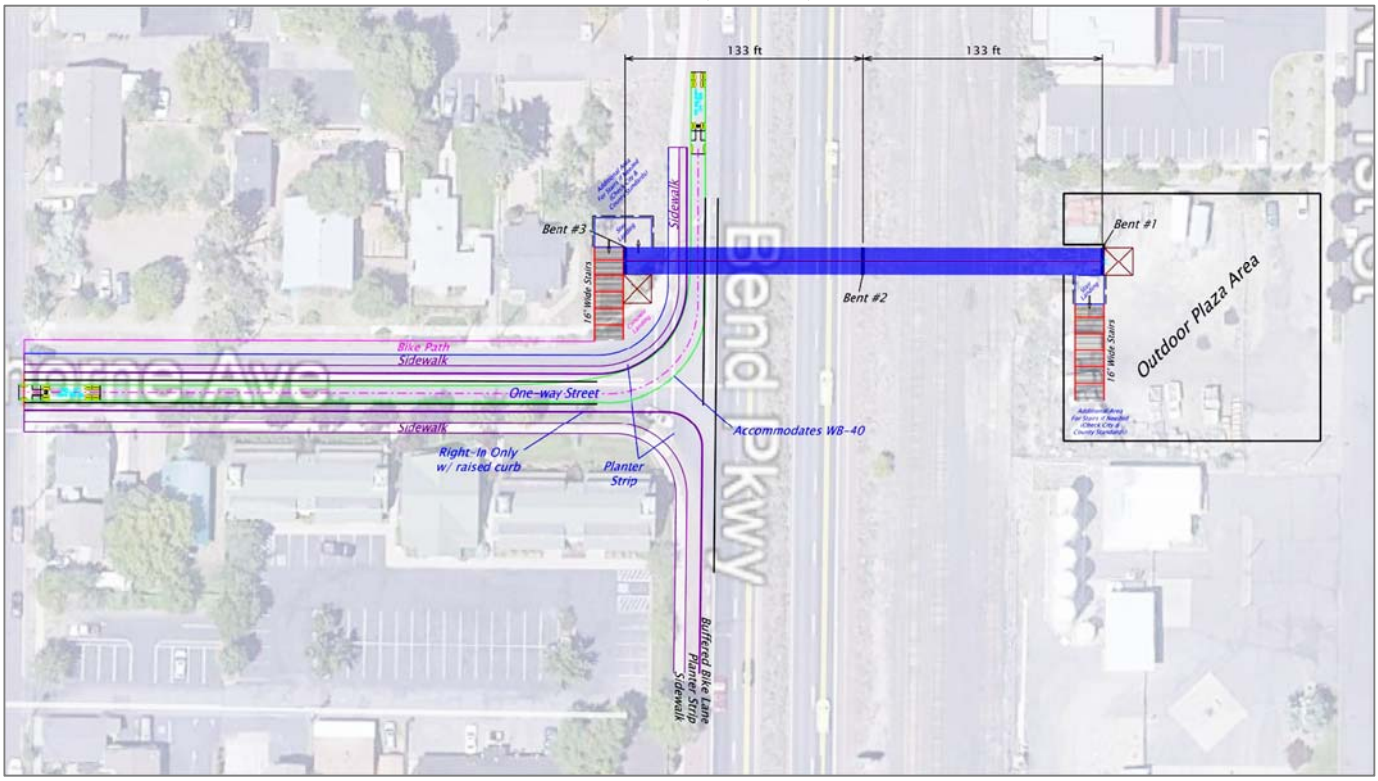
Option 3 (Switchback): Overcrossing with Full On/Off Closure

Option 4 (Undercrossing): Undercrossing with Right off Parkway remaining open

Option 1 (Elevator) – Overcrossing with Right-Off Parkway Open (Elevator)

- Structure Length: 266'
- Structure Width: 18' *(could be increased to 20')*
- Stairway Total Elevation Change: ~ 33' *(~57 continuous steps)*
- Right-Off of Parkway accommodates a WB-40 design vehicle (used for turn radii only)
- Anticipated Right of Way acquisition:
  - i. Westside – Minimal take for western part of structure, stairs and elevator area
  - ii. Eastside – Parcel north of extended Hawthorne Right of Way

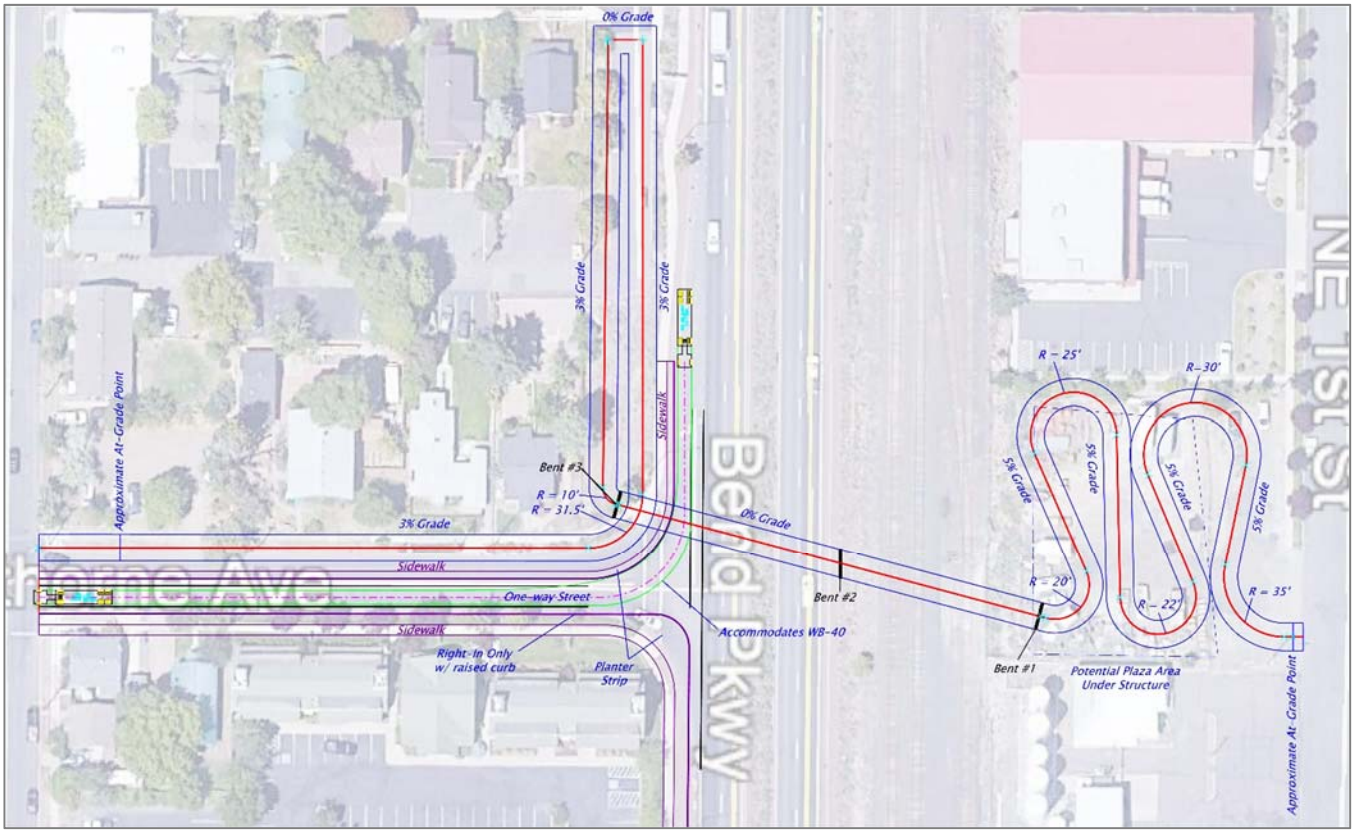
Alternative #1 (Elevator)



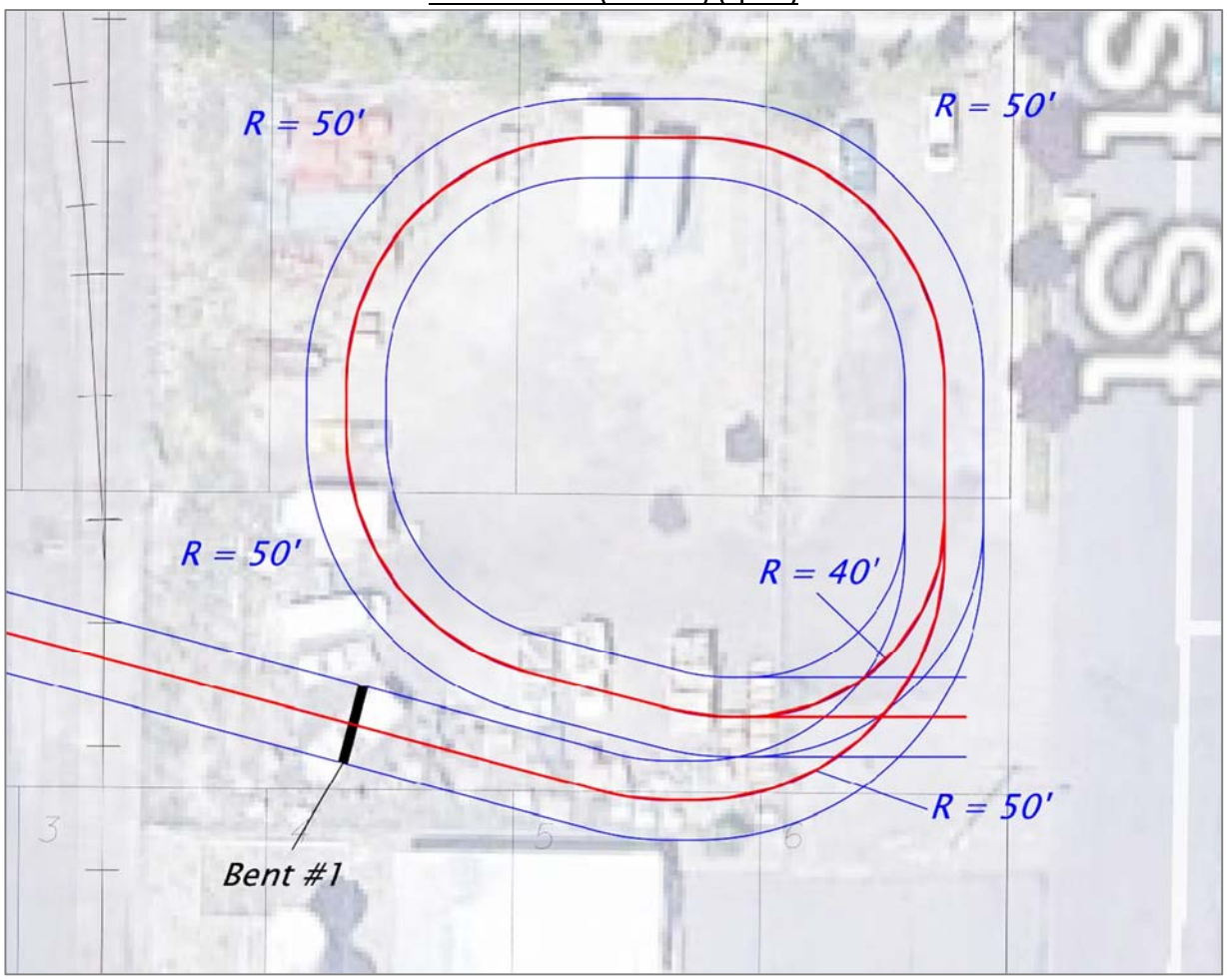
Option 2 (Snake/Spiral– Overcrossing with Right-Off Parkway Open (No Elevator)

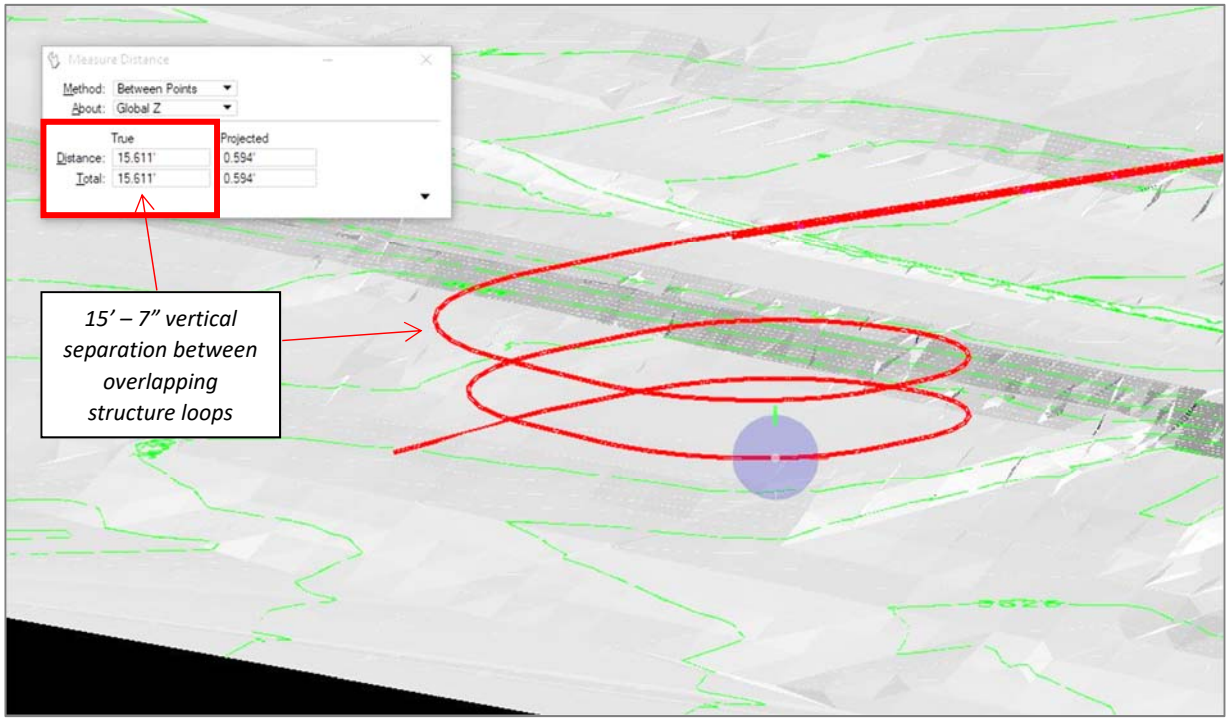
- Structure Length: 254'
- Structure & Ramp Width: 18'
- Ramp Grades:
  i. Eastern Ramp – 5% *(Alt. 1)* or 4% *(Alt. 2)*
  ii. Western Ramp – 3%
- Right-Off of Parkway accommodates a WB-40 design vehicle (used for turn radii only)
- Anticipated Right of Way acquisition:
  i. Westside - Alleyway along SB Parkway minimum
  ii. Eastside - Parcel north of extended Hawthorne Right of Way

Alternative #2 (Snake)



Alternative #3 (Eastside) (Spiral)

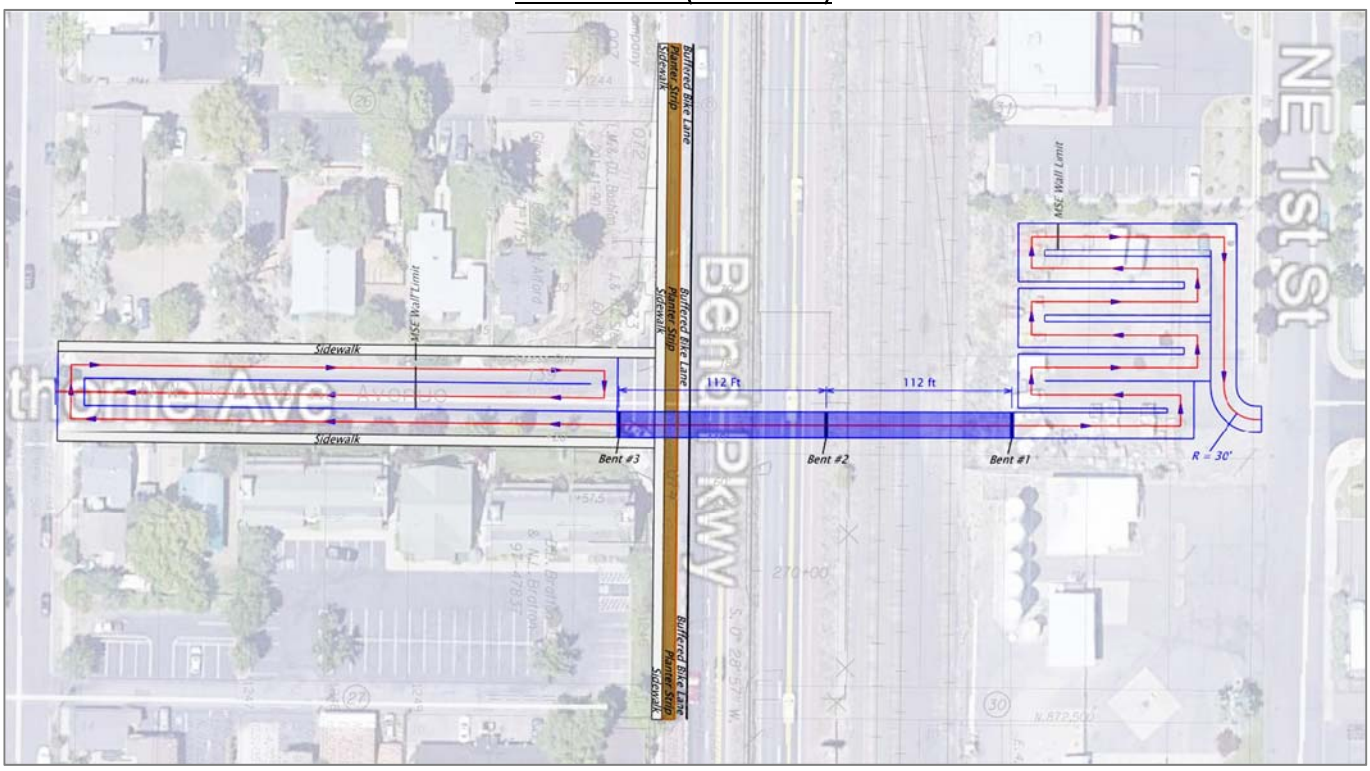




Option 3 (Switchback)– Overcrossing w/ Full Closure

- Structure Length: 224’
- Structure & Ramp Width: 18’
- Ramp Grades:
  i. Eastern Ramp – 4% w/ 0% Landings @ Switchbacks
  ii. Western Ramp – 3% w/ 0% Landings @ Switchbacks
- Anticipated Right of Way acquisition:
  i. Westside – Minimal for sidewalk relocation on Northside of Hawthorne
  ii. Eastside - Parcel north of extended Hawthorne Right of Way

Alternative #4 (Switchback)

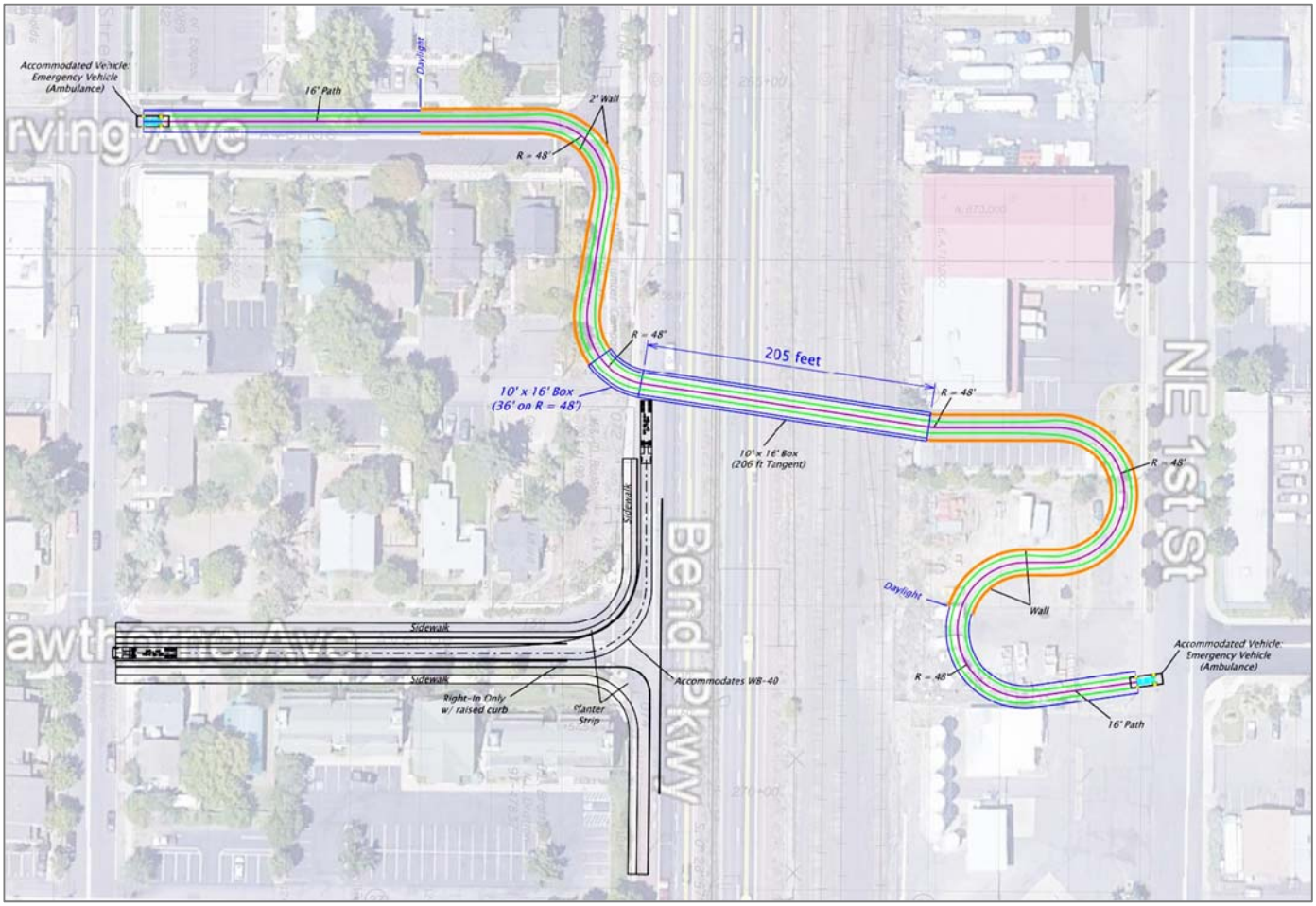


Option 4 (Undercrossing) – Undercrossing w/ Right-Off Parkway Open

Alternative #5

- Structure Length: 205' *(tangent)* + 36' *(on a 48' radius)*
- Structure & Ramp Width: 16'
- Ramp Grades:
  - iii. Eastern Ramp – 5%
  - i. Western Ramp – 5%
- Anticipated Right of Way acquisition:
  - i. Westside - Alleyway along SB Parkway minimum
  - ii. Eastside – ~15' of adjacent property to the south
- Accommodates Emergency Vehicle (Standard Ambulance)

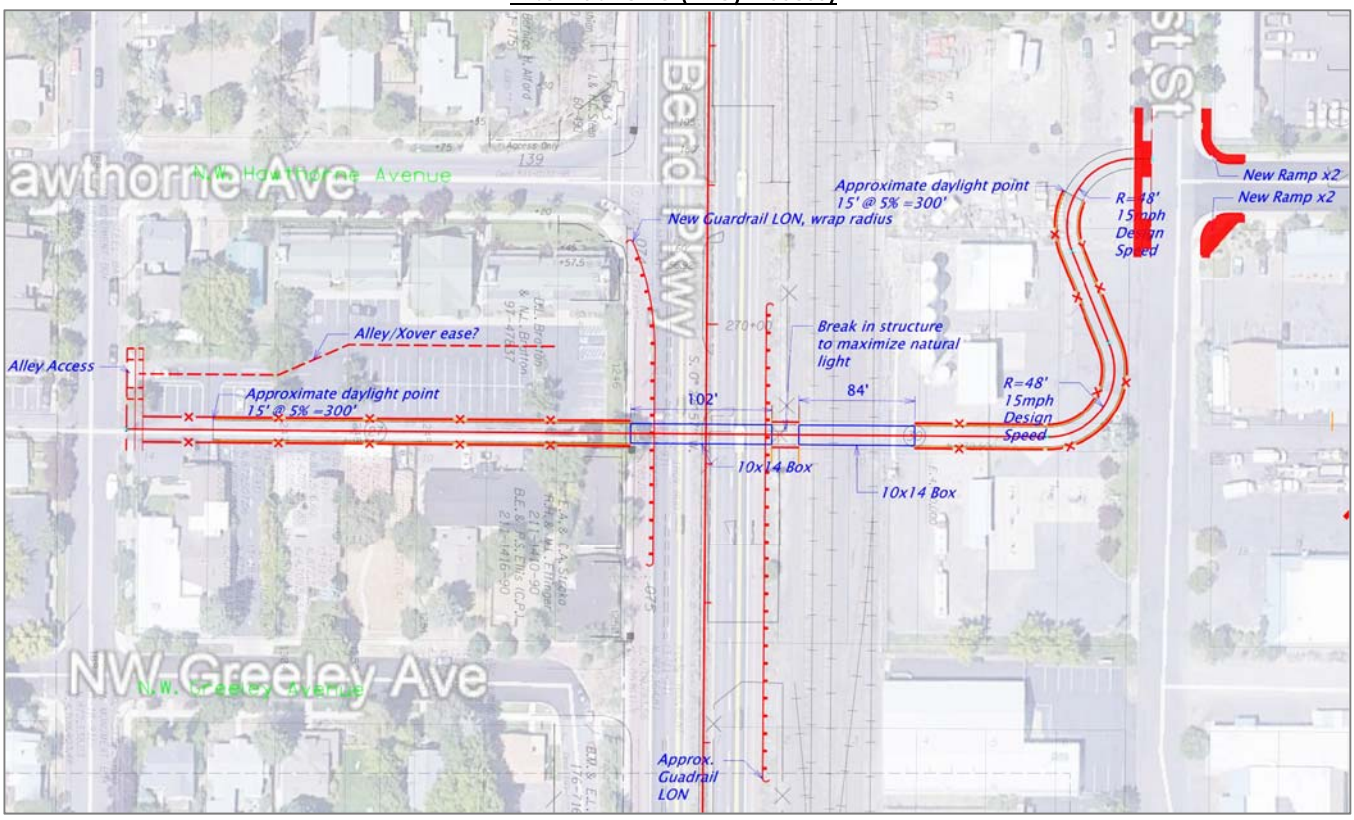
Alternative #5 (Irving Access)



Alternative #6

- Structure Length: 104' *(tangent)* + 84' *(tangent)*
- Structure & Ramp Width: 14'
- Ramp Grades:
  - iv. Eastern Ramp – 5%
  - ii. Western Ramp – 5%
- Anticipated Right of Way acquisition:
  - iii. Westside - Alleyway between Hawthorne Ave & Greeley Ave minimum
  - iv. Eastside – Entire property to the south
- No Emergency Vehicle Accommodation

Alternative #5 (Alley Access)



PRELIMINARY SCOPING ALIGNMENT EVALUATION

The proposed alignments were evaluated by the City of Bend and ODOT using the following criteria with a goal to enhance connectivity, capacity, safety, and user/comfort experience; and, provide an aesthetically pleasing public space while minimizing costs and ongoing maintenance/operational needs.

- **Connectivity/Convenience (Pedestrian & Bicycle):** Connectivity to the City's proposed low stress bicycle and pedestrian networks and overall convenience of using the facility (verses an alternative parallel route) through consideration of out-of-direction travel and time expected to use the facility for all users including ADA, elderly, and bicyclists.
- **Capacity (Pedestrian & Bicycle):** Capacity for all users (pedestrians, cyclists, ADA, and elderly). For example, the cyclist capacity of a stairway design is lower because it requires cyclists to dismount to use elevators and/or bicycle stairway ramps.
- **Safety:** Consideration of lighting, public safety including visibility and sightlines, covered areas, and other potential design elements that could have safety implications.
- **User Comfort/Experience:** Consideration of user comfort and experience including design elements such as bridge width as well as number of turn movements and maneuvering.
- **Urban Design/Public Realm:** Consideration of the aesthetics of the bridge structure, both as an iconic urban design element as well as the aesthetics and impacts on the streetscape, neighboring properties, and public realm specifically at the bridge landings.
- **Maintenance/Operations:** Ongoing maintenance and operation considerations such as snow plowing, maintenance equipment maneuvering/operations, as well as ongoing maintenance costs and feasibility.
- **Cost:** Project cost considerations including excavation, materials, design, and labor. Not all alternatives were fully costed however alternatives were evaluated relatively with higher cost alternatives scoring negatively.

Each Alignment Option and Alternative was rated using the following scale.

Rating	Description
	The alternative design elements support the goal/criteria.
	The alternative design elements partially address or make moderate improvements to address the goal/criteria.
	The alternative design elements do not support the intent, provide minor or incidental benefit, and/or negatively impact the goal/criteria.

	ALTERNATIVE EVALUATION MATRIX					
	OPTION 1 Overcrossing w/ RO Parkway Open *(Elevator)*	**OPTION 2** Overcrossing w/ RO Parkway *(No elevator)*		**OPTION 3** Overcrossing w/ Full Closure *(No elevator)*	**OPTION 4** Undercrossing	
2024 Cost	$9.9m	$21.1m	$21.2m	Not scoped	Not scoped	Not scoped
Access Alternatives	Alternative 1: Elevator	Alternative 2: Snake Ramp	Alternative 3: Spiral Ramp	Alternative 4: Switchback Ramp	Alternative 5: Irving access	Alternative 6: Alley access
Pedestrian Connectivity/ Convenience	●	◗	◗	◗	○	○
Bicycle Connectivity/ Convenience	◗	●	●	○	◗	◗
Pedestrian Capacity	●	◗	◗	◗	◗	◗
Bicycle Capacity	◗	●	●	◗	●	●
Safety	◗	◗	◗	◗	○	○
User Comfort/ Experience	◗	◗	◗	○	○	○
Maintenance/ Operations	◗	●	●	○	○	○
Urban Design/Public Realm	●	◗	◗	○	◗	◗
Cost	◗	○	○	◗	○	○
Notes	Elevators limit capacity (particularly for bicyclists) and typically have ongoing maintenance concerns and costs that are not prefferred by the City's Streets/ Operations Department unless the elevator has other user needs. However maintenance of ramps would also be reduced. Design elements such as bike runnels, wider/tiered stairway could encourage bicyclists to use facility without necessarily needing to use elevator. Preferred alternative for urban design/public realm.	Concern about space underneath snaking structure. Would need to make sure the space was activated to minimize sheltering opportunities and ensure public health, safety and security and to avoid graffiti, etc. Lacks opportunties for urban design "iconic" structure.	Concern about covered space on path providing sheltering opportunities. Would need to make sure space on structure and underneath is activated. Spiral leaves some space available for a plaza in the center. Lacks opportuntieis for urban design "iconic" structure.	Lack of space to store/push off snow for winter maintenance. Minimal turn radii results in EMS/maintenance access and biker usability concerns. Asthetically disruptive to existing Hawthorne properties and closing Parkway is not preferred alternative identified in Parkway Plan.	Not recommended due to safety, maintenance, site line, visibility, electrical needs, ventilation, security, grafitti, human waste, and stormwater concerns. Amount of time that user would be un-daylighted and amount of out of direction travel could result in unused facility.	

POTENTIAL DESIGN CHANGES

All designs provided during this scoping effort are high-level examples of potential designs that could be explored during future design phases. In addition to the design examples provided for the preferred alternative, a list of potential design changes has been provided in this section. Please note that this is not an exhaustive list.

Potential design changes include:

1. Landings & Rest Areas;
2. Stair Access;
3. Stair Alignment; and
4. Grades on Bridge Span.
5. Enclosed Structure

Landings & Rest Areas

The eastern approach ramp alternatives provided for Option 2 do not include landings or rest areas along the span of either ramp. The ramps are both designed using a constant 5% grade for 760 feet (Alternative #1) and 690 feet (Alternative #2). The addition of level landings along the ramps to allow for rest at appropriate intervals should be considered during future design phases.

Stair Access & Alignment

Stair access locations provided during scoping include stair accesses at both east and west ends of the structure spanning US-97 with a third providing access to NW Irving Avenue. Proposed stair locations as well as access points to stair locations should be re-evaluated at time of design to ensure optimal use. One example of this could include one (1) stairway providing access to multiple levels of approach ramp for Option 2, Eastern Ramp Alternative #1 (loop design).

Stair alignments should also be re-evaluated at time of design to ensure optimal use and footprint.

Grades on Bridge Span

The proposed scoping design includes two (2) approach ramps with a maximum 5% grade that tie into a bike and pedestrian structure which spans US-97 and the BNSF Railway at a consistent elevation. A structure with a maximum 5% grade which rises over the US-97 Parkway (and meets minimum vertical clearances for both highway and railway) should also be considered during the design phase to help shorten the west side approach ramp.

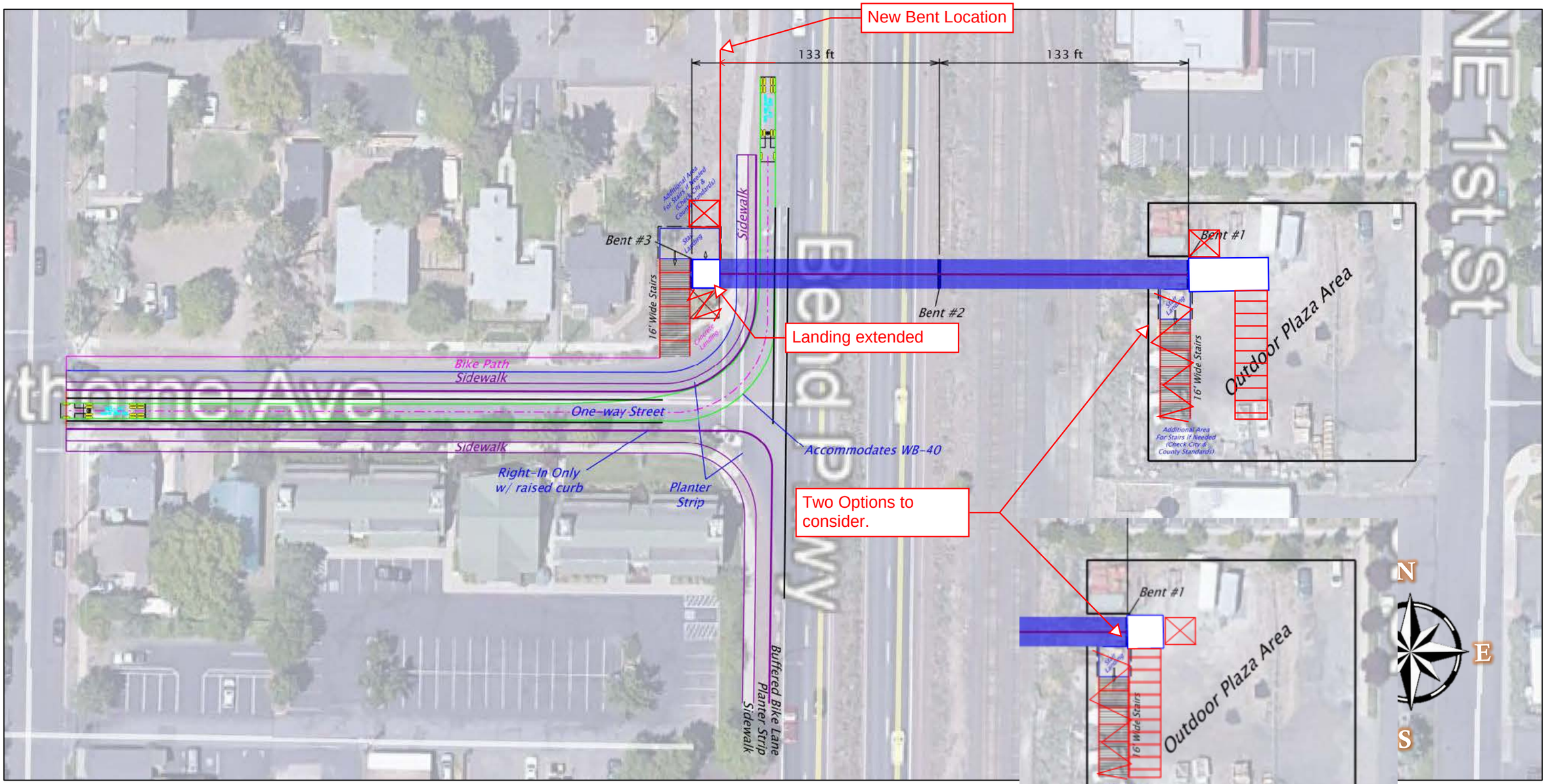
Enclosed Structure

The proposed scoping design includes an open bridge structure. This design presents potential snow removal challenges, especially for the section directly above the Parkway and Railway. Enclosed structure considerations are recommended to be evaluated at time of design.

APPENDIX A

Option 1-4 Scoping 2D Alignment Alternative Exhibits

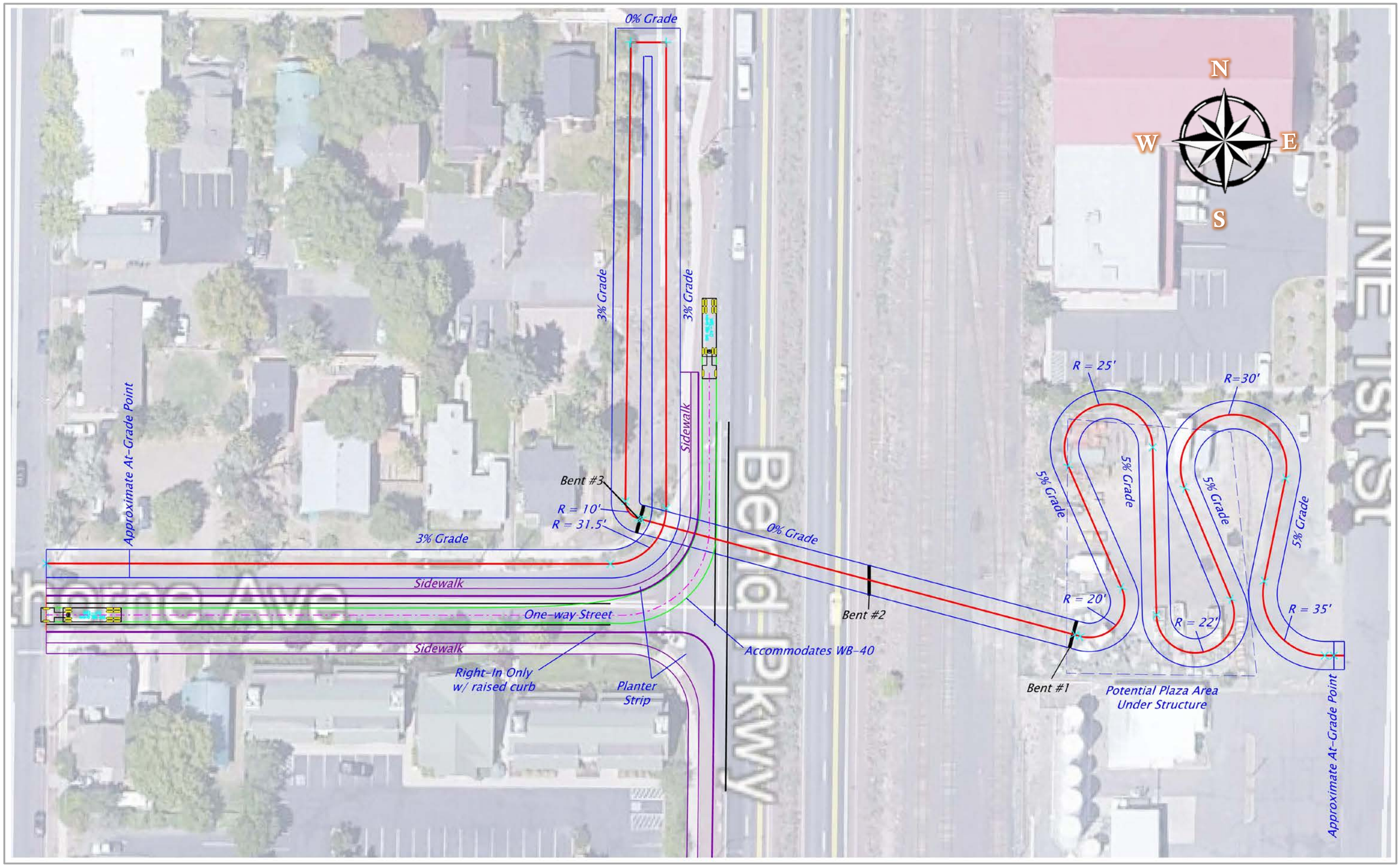
Option 1 - Overcrossing with Elevators & Right-In Only



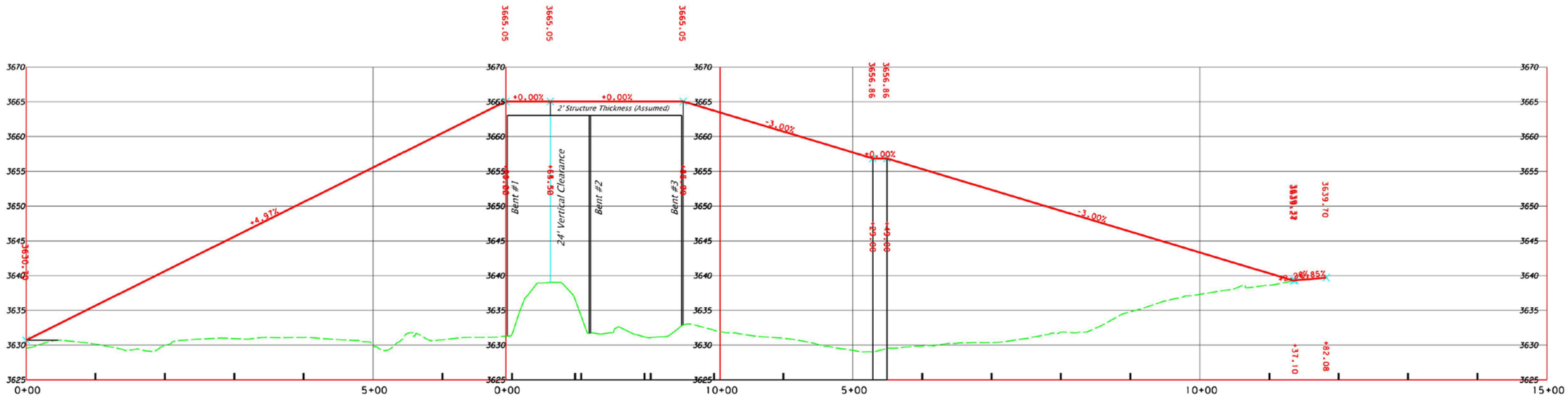
Proposed Design Information:

- Stairway Total Elevation Change: ~ 33 feet (~ 57 steps @ a total horizontal length of 52.25 feet)
- Structure Width: 16 feet

Option 2 - Overcrossing with Right off Parkway remaining open and no Elevator



Option 2 - Overcrossing with Right off Parkway remaining open and no Elevator



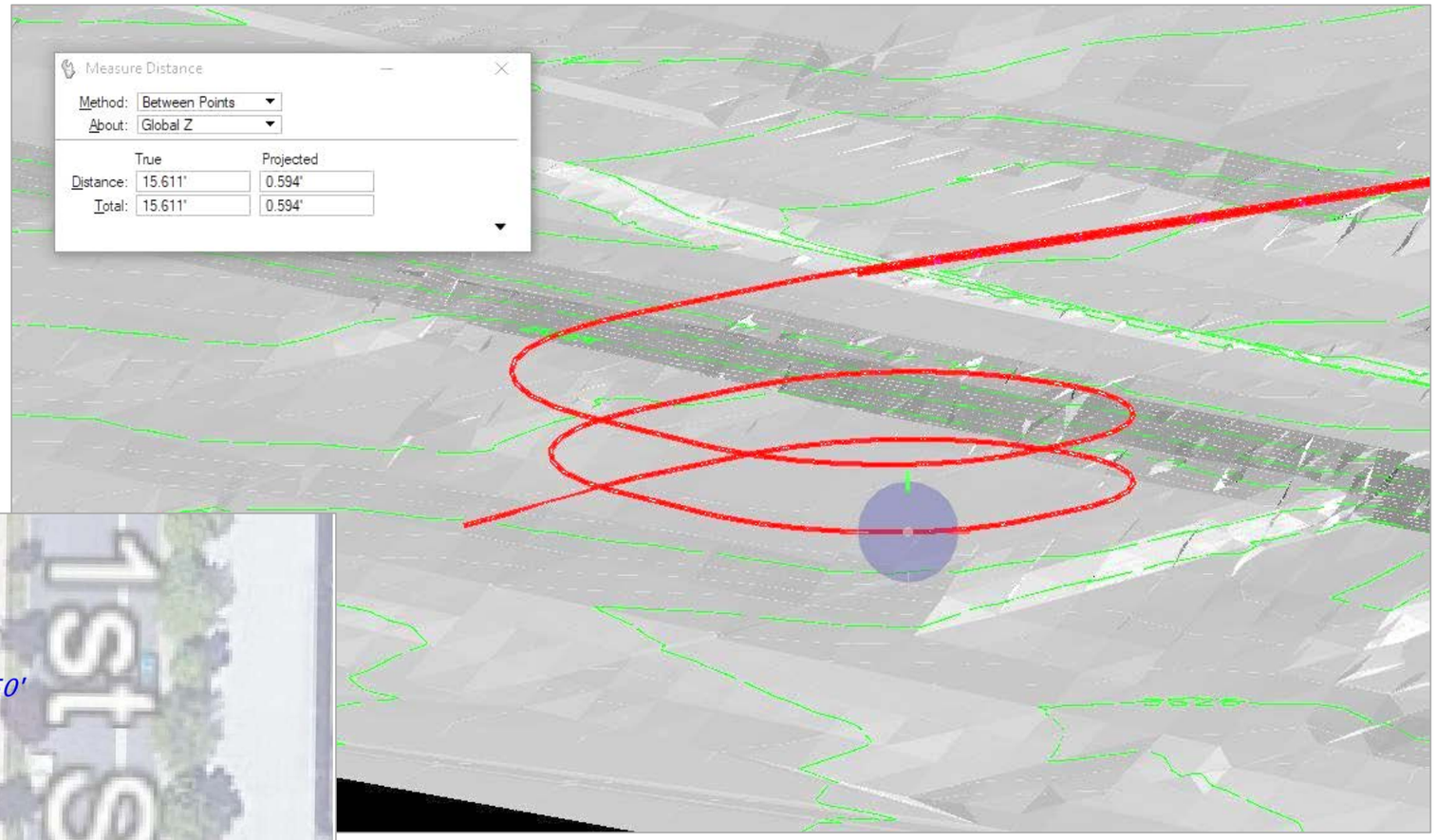
Proposed columns for ramp approaches:

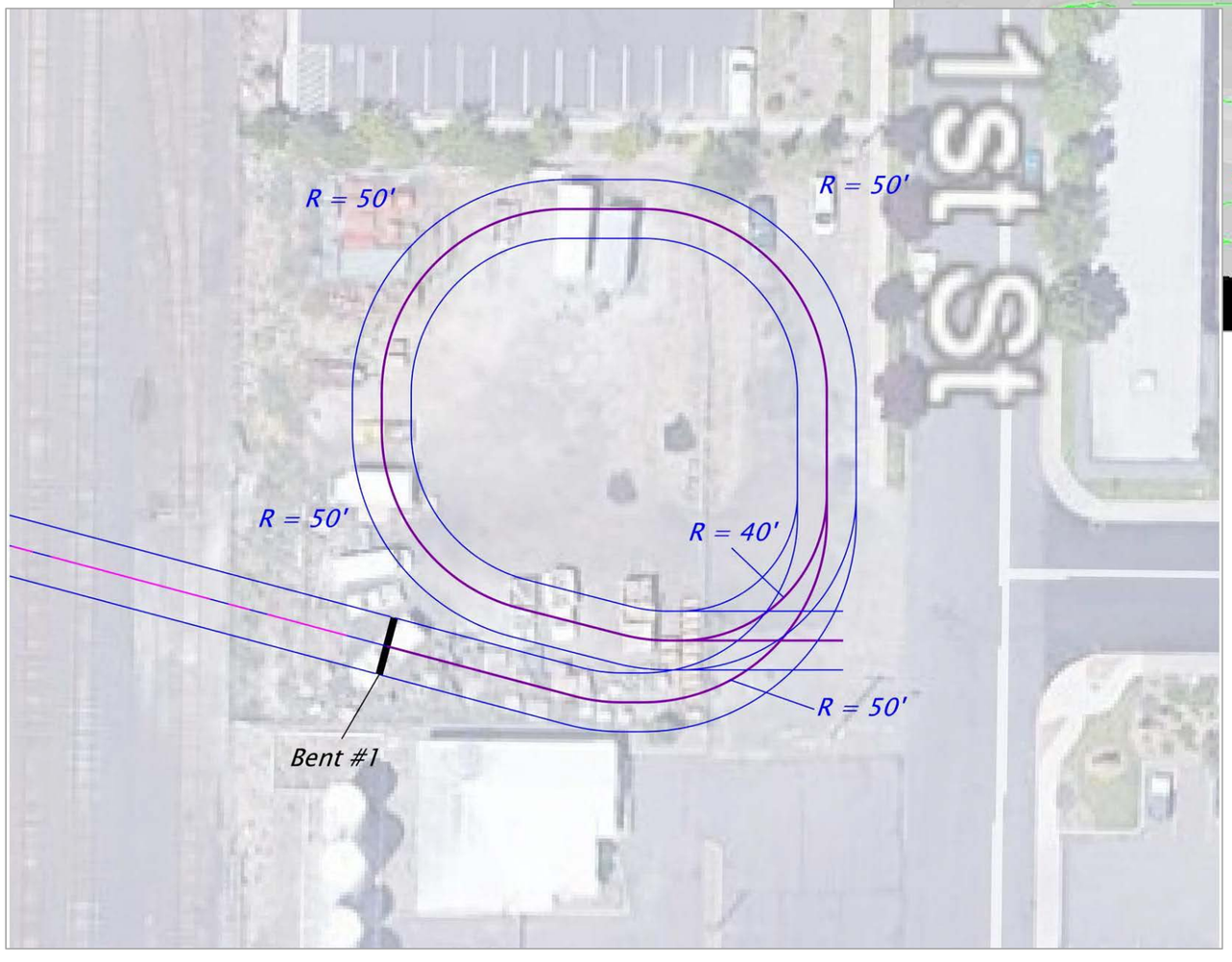
Proposed Design Information:

- Grade: 3% preferred grading on west side; 5% maximum preferred grade on east side
- Path Width: 16 feet

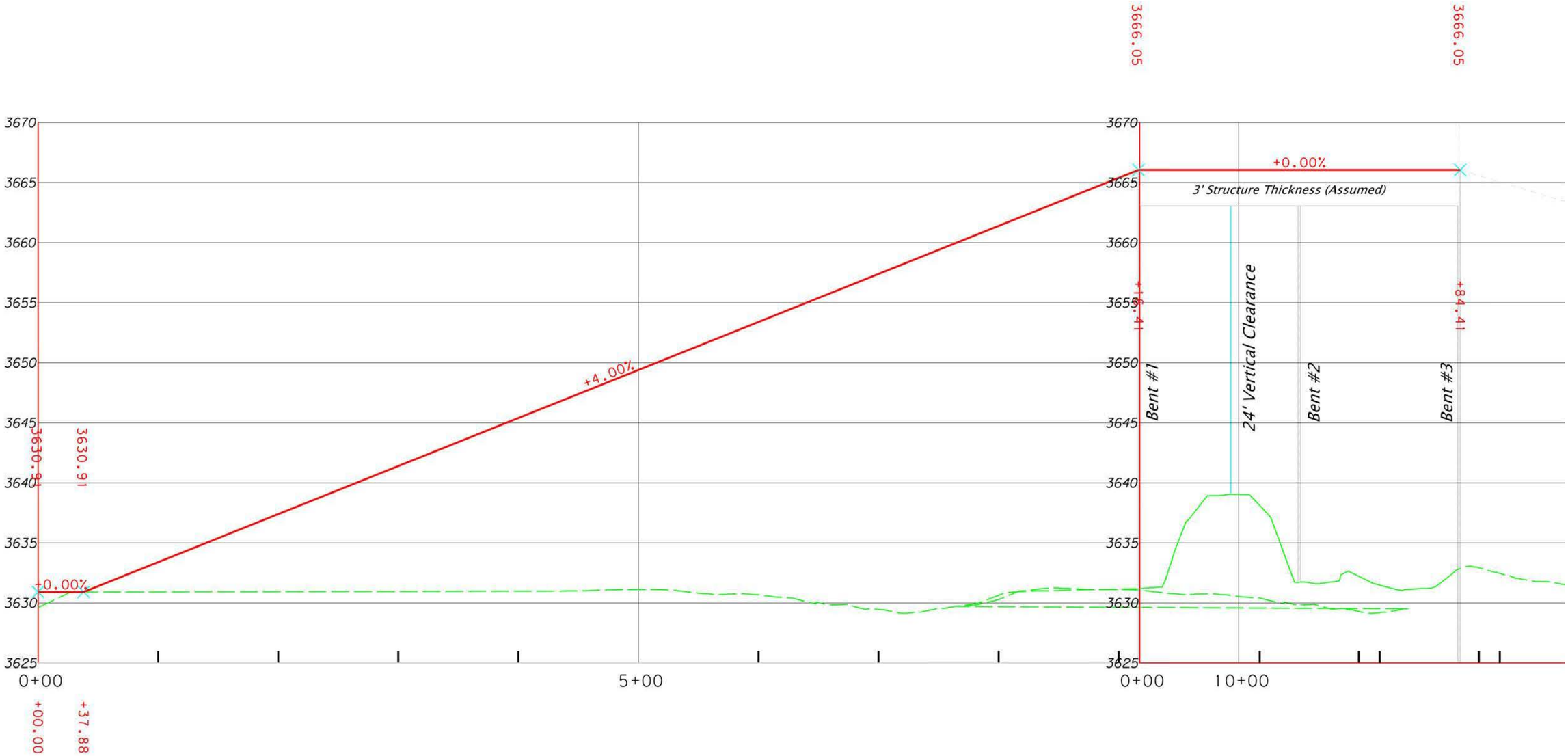
East Side Ramp – Option 2

Option 2 - Overcrossing with Right off Parkway remaining open and no Elevator

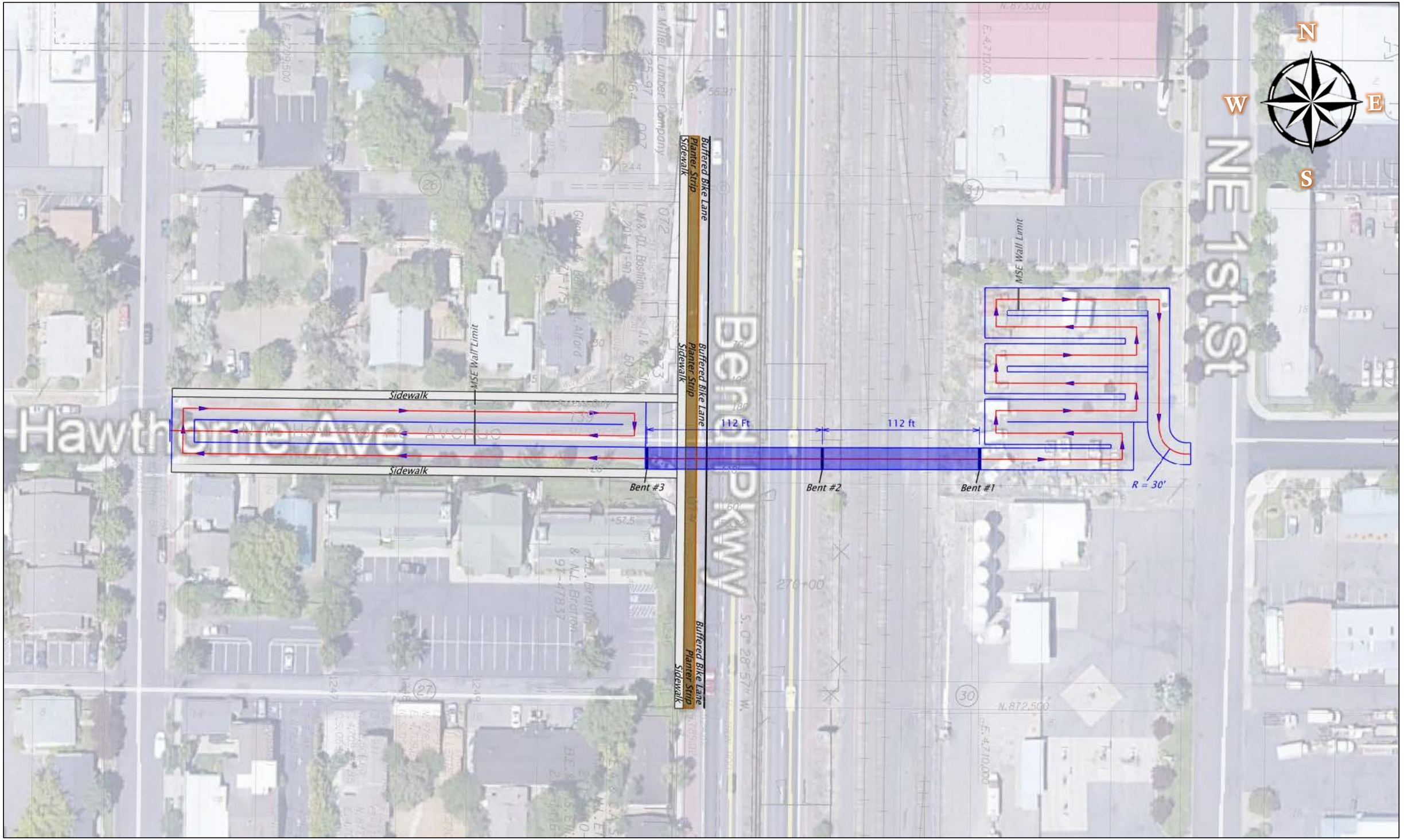




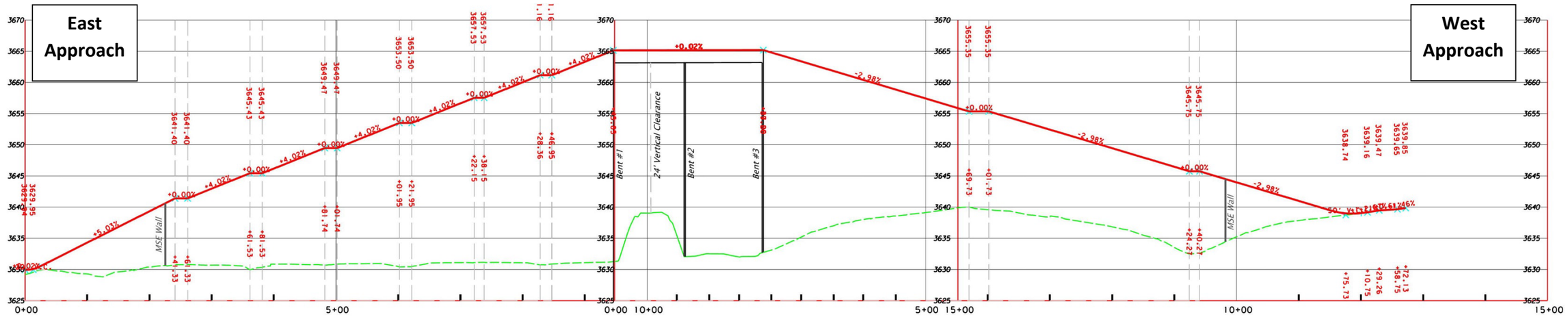
Option 2 - Overcrossing with Right off Parkway remaining open and no Elevator



Option 3 - Overcrossing with Full Closure



Option 3 - Overcrossing with Full Closure

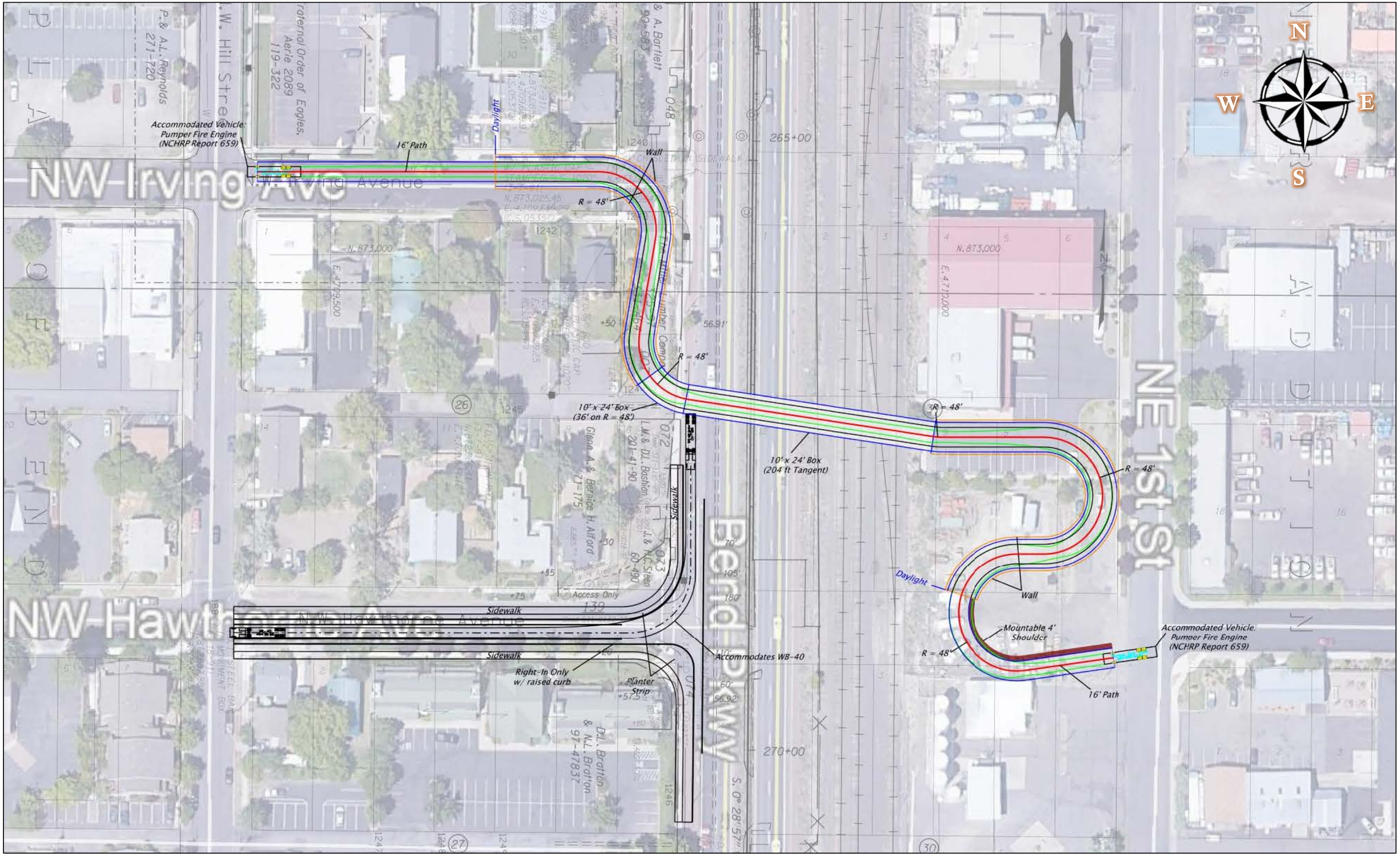


Proposed columns for bridge approaches:

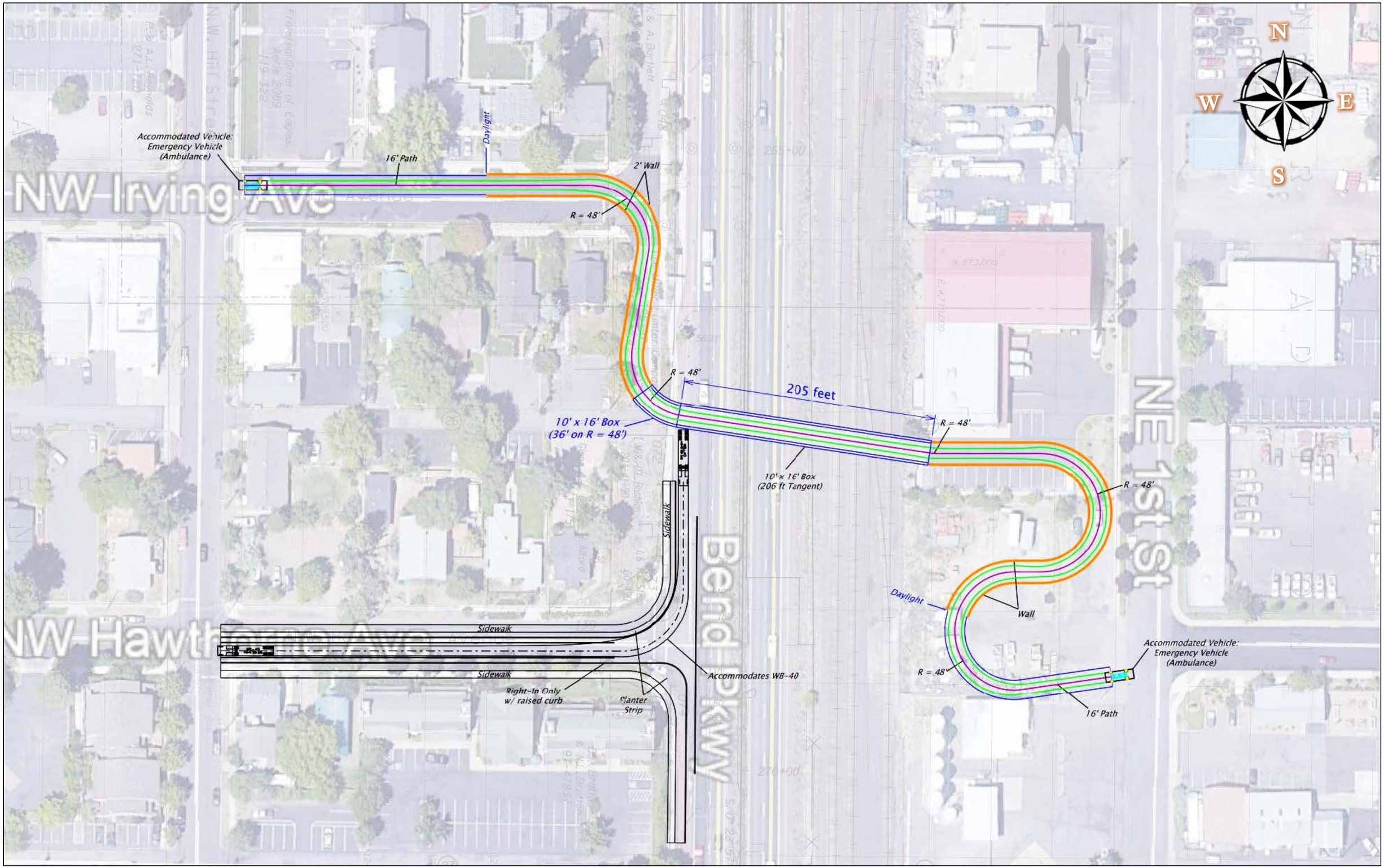
Proposed Design Information:

- Grade: 3% preferred grading on west side; 4-5% maximum preferred grade on east side
- Path Width: 16 feet
- 10-foot MSE Wall (East): 225 feet
- 10-foot MSE Wall (West): 218 feet

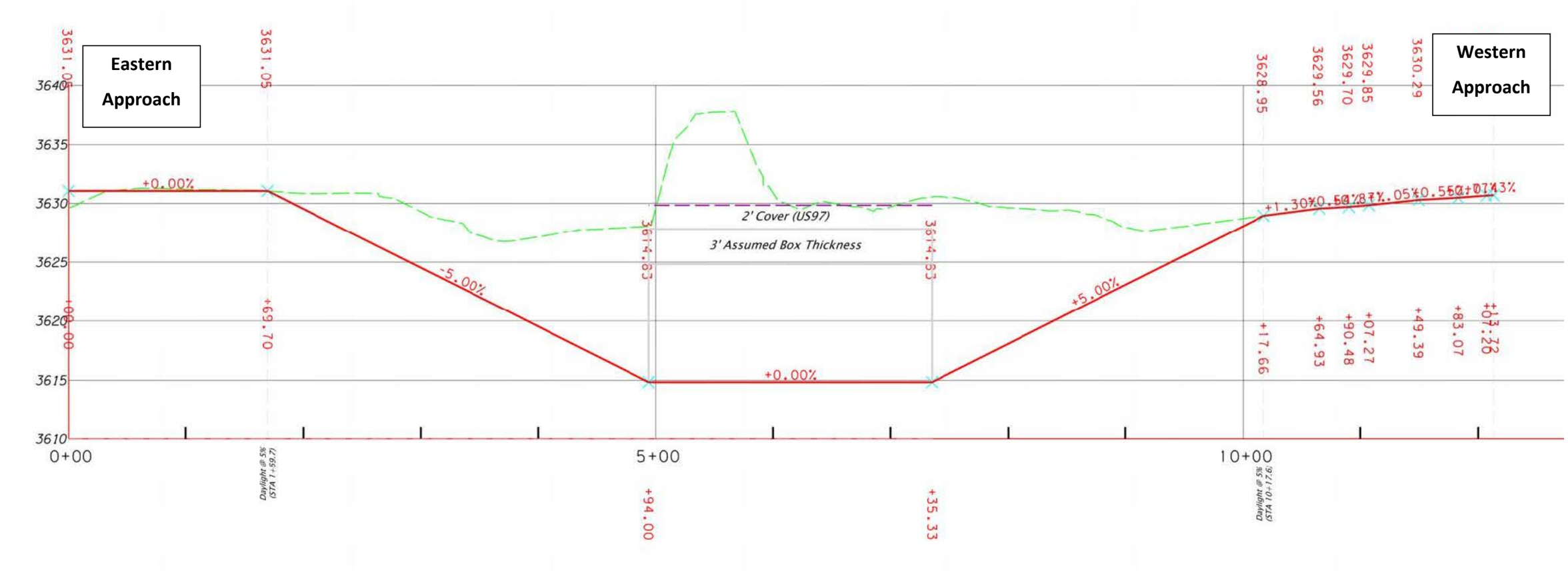
Option 4 – Undercrossing W/ Right-In Only



Option 4 – Undercrossing W/ Right-In Only



Option 4 – Undercrossing W/ Right-In Only



Proposed Design Information:

- Grade: 5% maximum preferred grade on both sides
- Path Width: 16 feet + 4’ Shoulders (Fire Engine Accommodation); 16 feet (Ambulance Accommodation)
- Structure Width: 24 feet (Fire Engine Accommodation); 16 feet (Ambulance Accommodation)
- Structure Length: 205 feet *(tangent)* + 36 feet *(48-foot Radius)*
- 2’ Proposed Retaining walls (both sides of path) between structure and Daylight locations
- Design Speed = 15 mph

APPENDIX B

Refined Option 2 Scoping 2D Alignment Alternative Exhibit

Option 2 - Overcrossing with Right off Parkway remaining open and no Elevator

Proposed Design Information:

Grade: 5% maximum preferred grade on both ramp approaches

Path Width: 18 feet

10' MSE Wall Lengths:

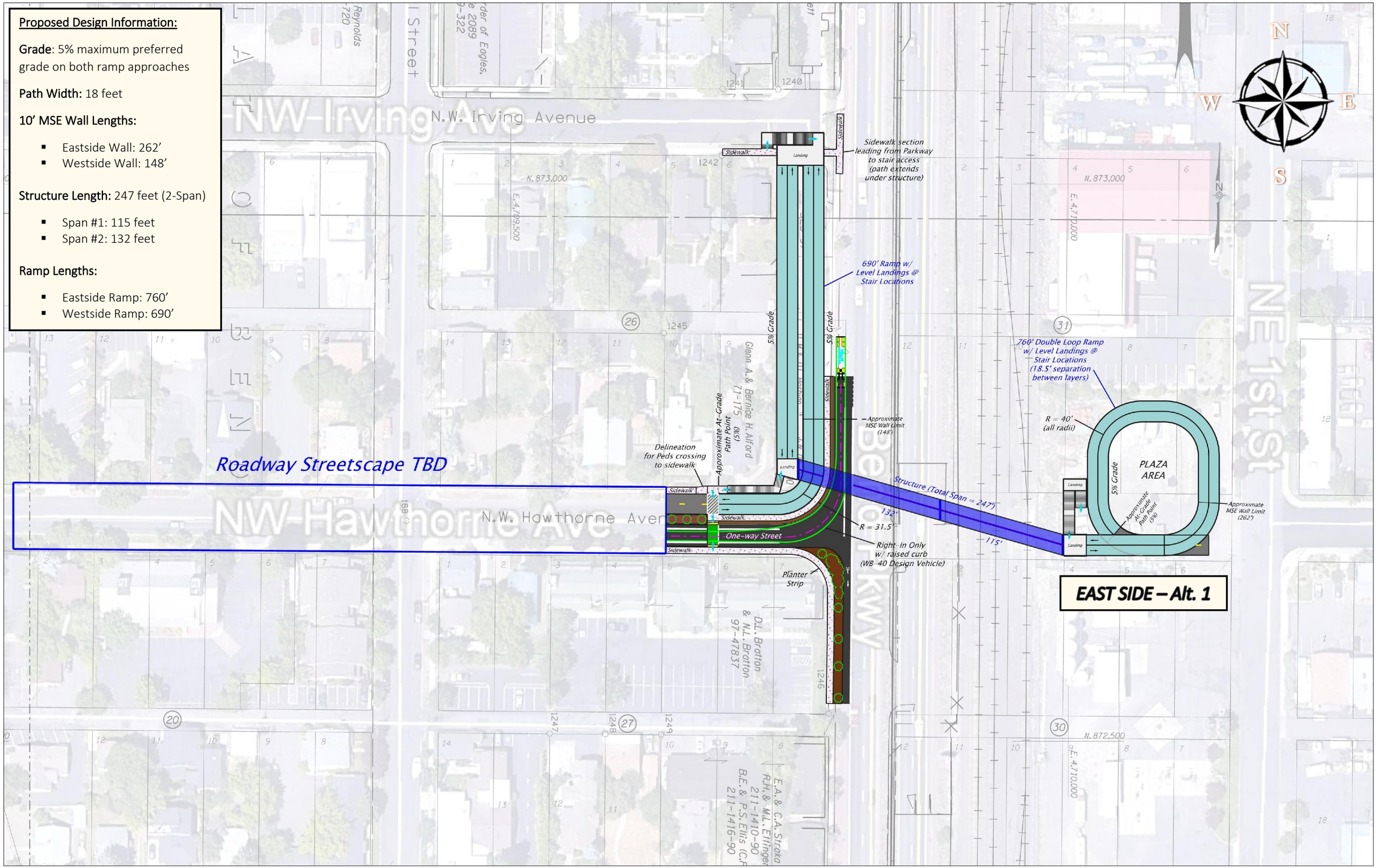
- Eastside Wall: 262'
- Westside Wall: 148'

Structure Length: 247 feet (2-Span)

- Span #1: 115 feet
- Span #2: 132 feet

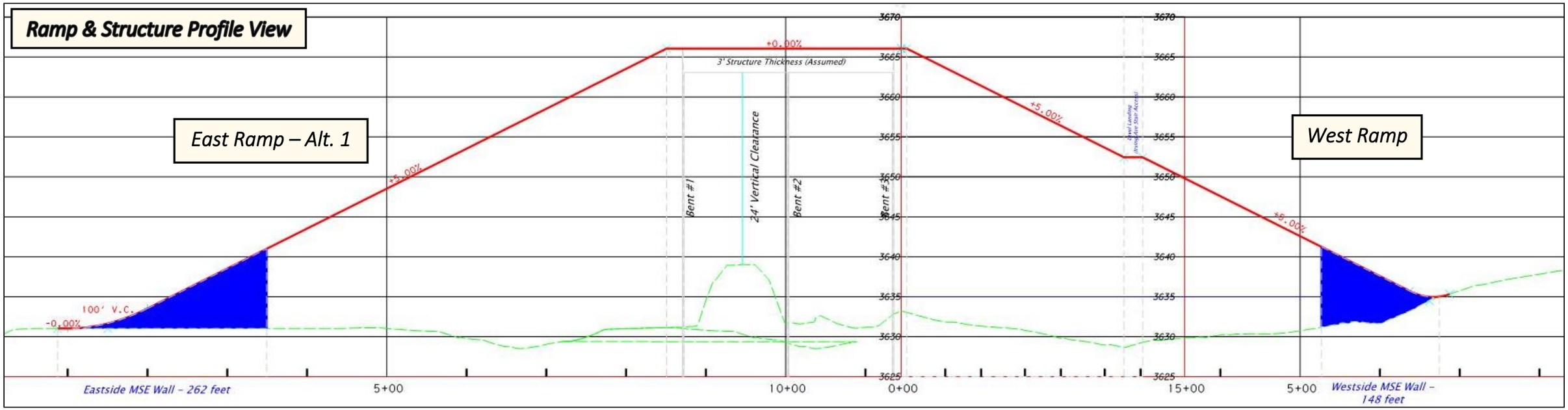
Ramp Lengths:

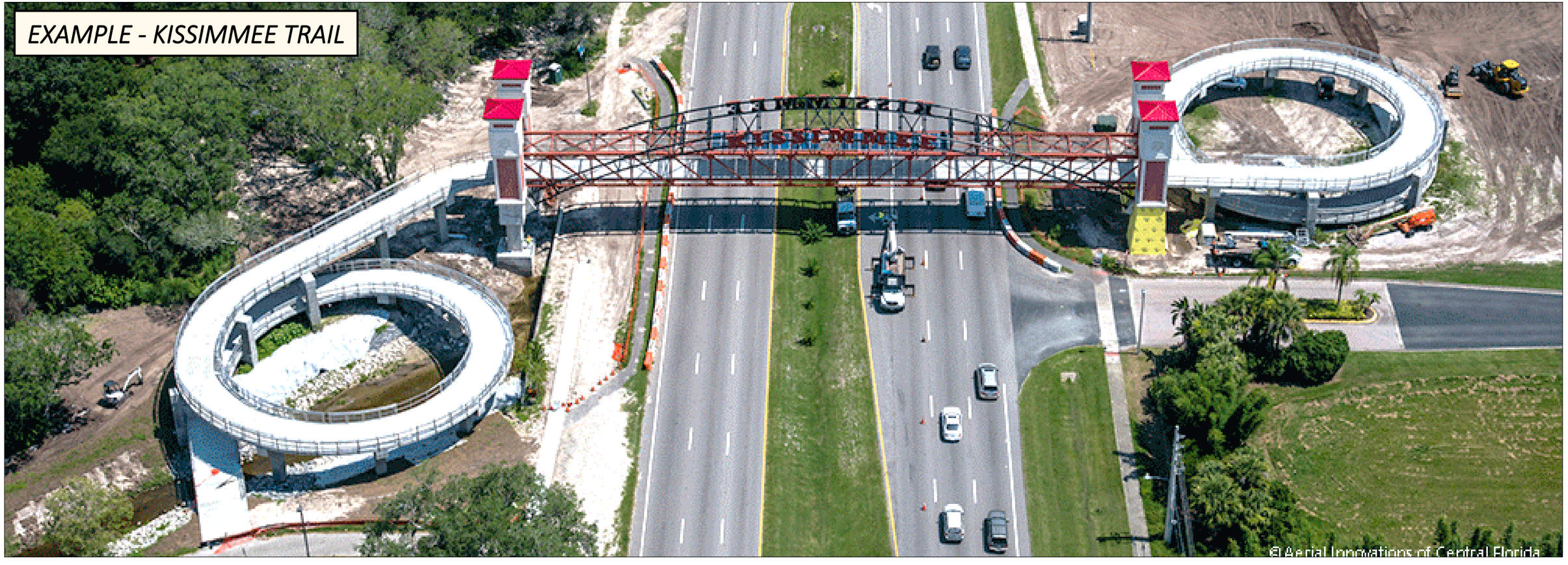
- Eastside Ramp: 760'
- Westside Ramp: 690'



EAST SIDE – Alt. 1

Option 2 - Overcrossing with Right off Parkway remaining open and no Elevator





Option 2 - Overcrossing with Right off Parkway remaining open and no Elevator

Proposed Design Information:

Grade: 5% maximum preferred grade on both ramp approaches

Path Width: 18 feet

10' MSE Wall Lengths:

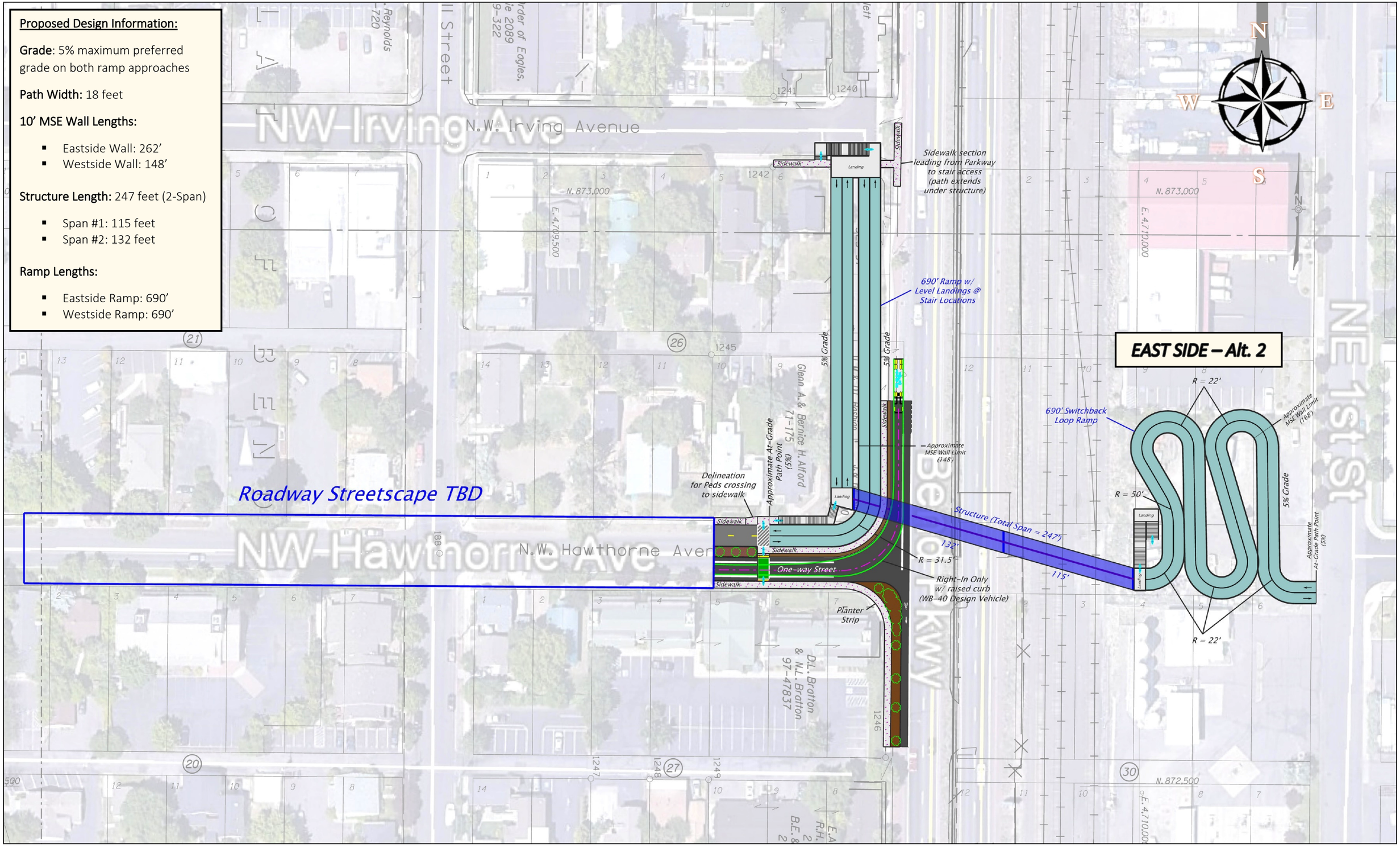
- Eastside Wall: 262'
- Westside Wall: 148'

Structure Length: 247 feet (2-Span)

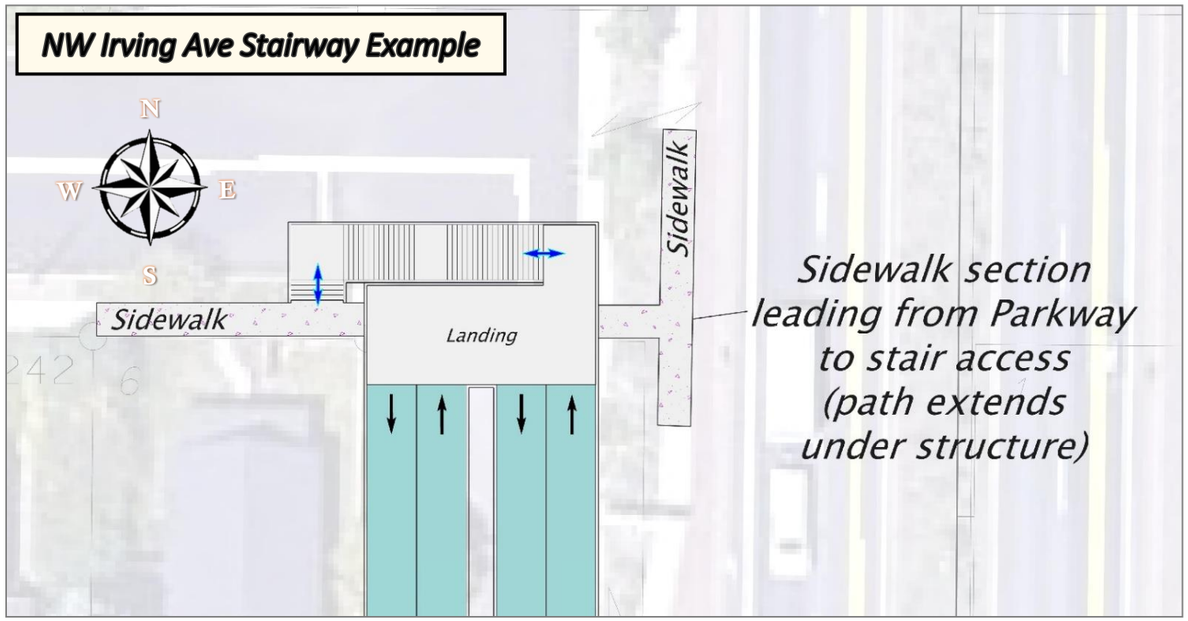
- Span #1: 115 feet
- Span #2: 132 feet

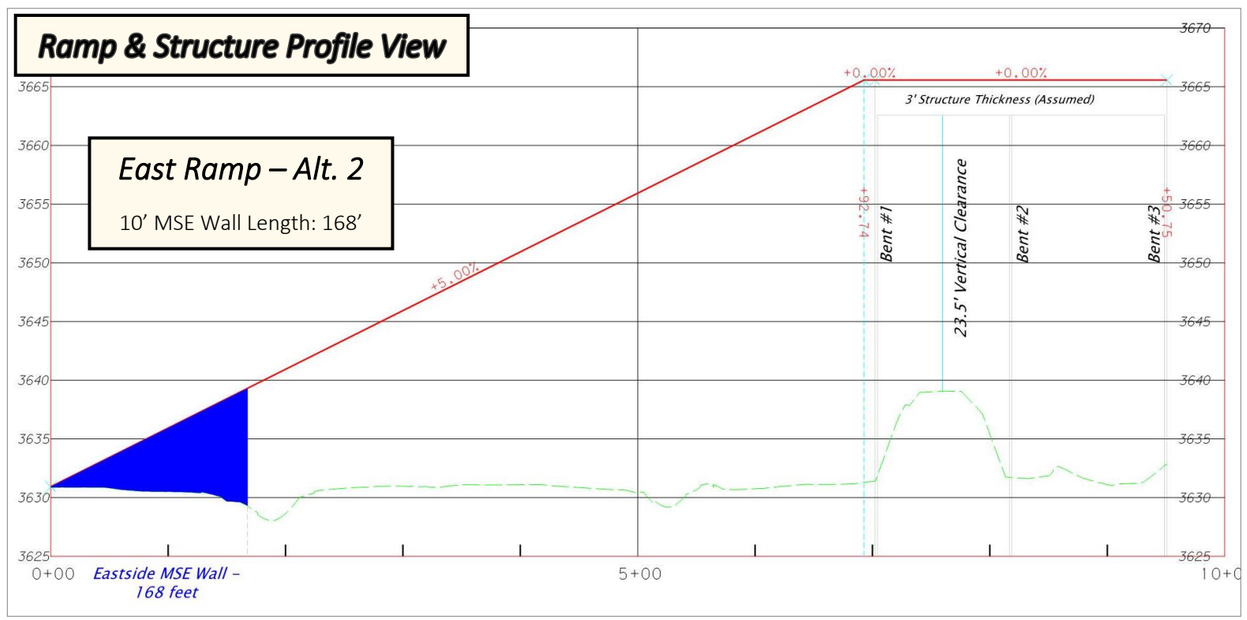
Ramp Lengths:

- Eastside Ramp: 690'
- Westside Ramp: 690'



Option 2 - Overcrossing with Right off Parkway remaining open and no Elevator





Proposed columns for ramp approaches:

APPENDIX C

Recommended Option 2 3D Renderings

HAWTHORNE CROSSING

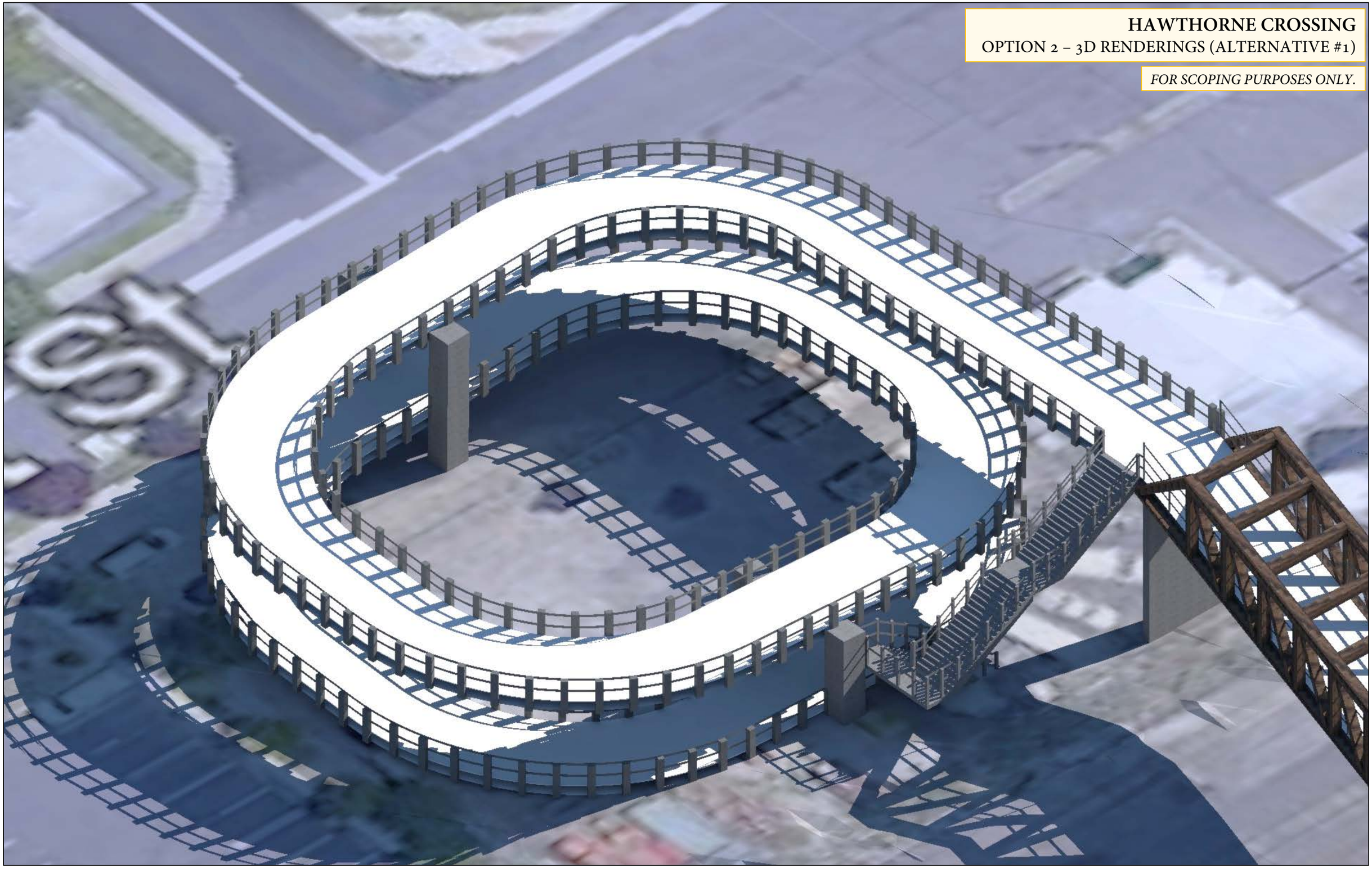
OPTION 2 – 3D RENDERINGS (ALTERNATIVE #1)

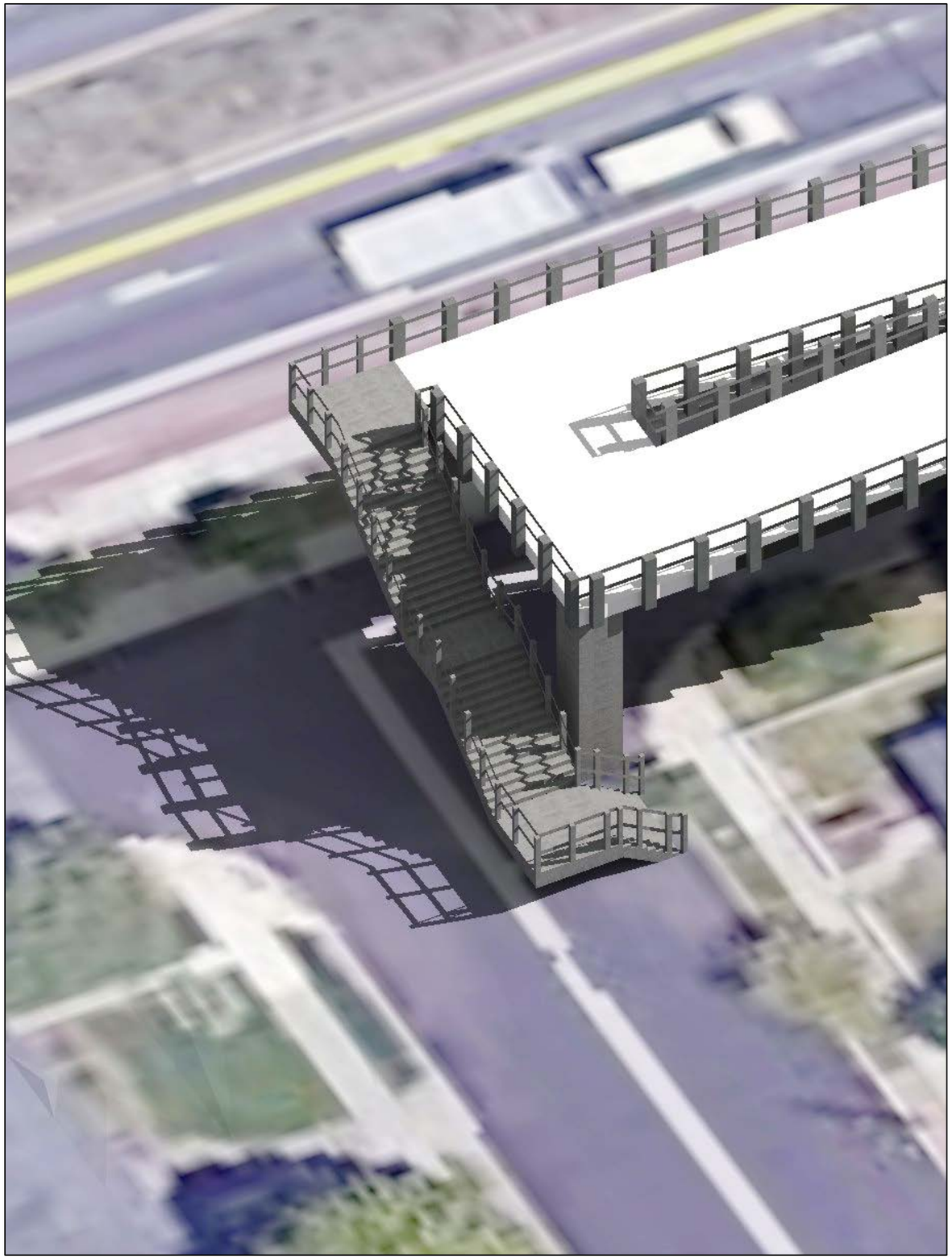
FOR SCOPING PURPOSES ONLY.

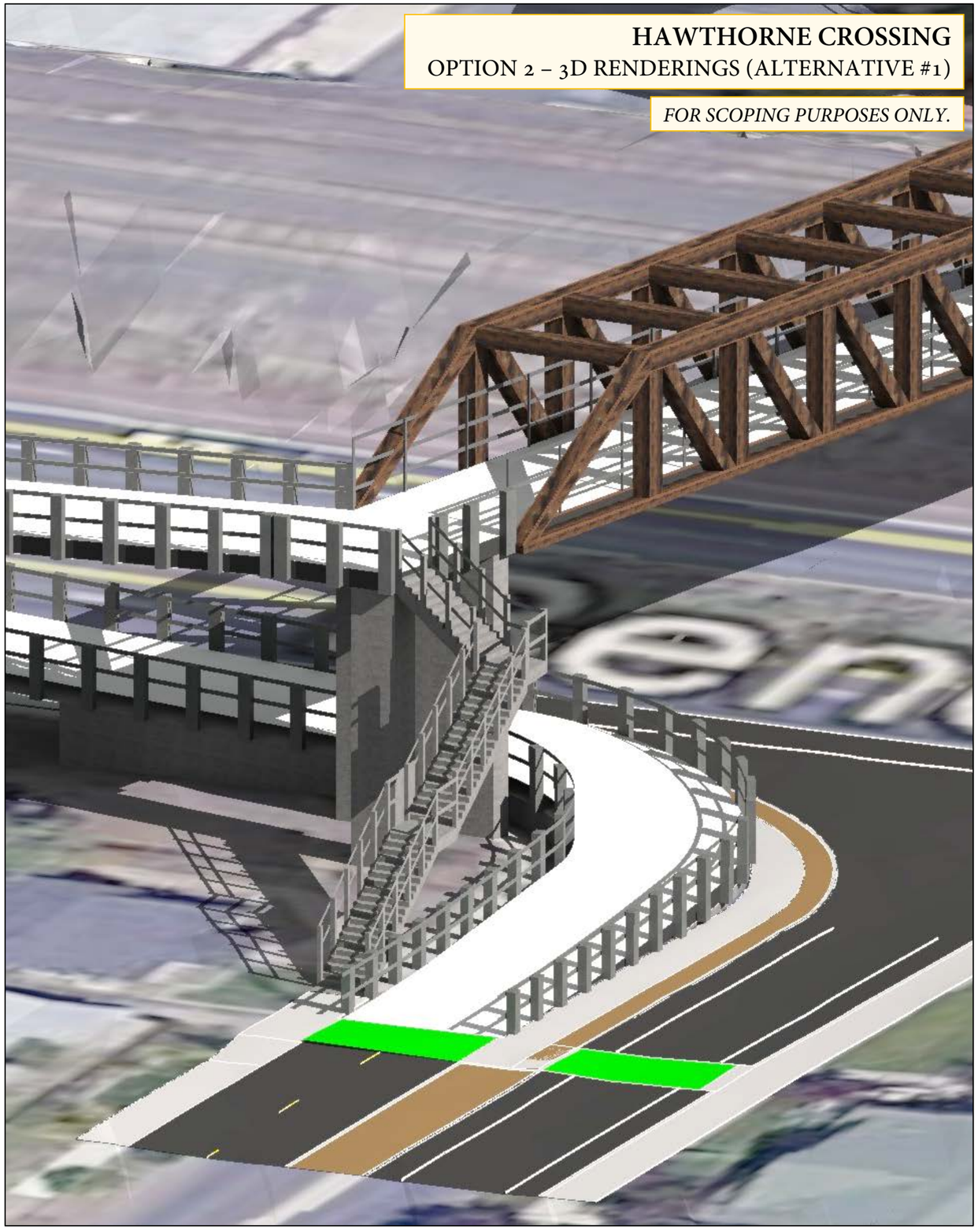
HAWTHORNE CROSSING

OPTION 2 – 3D RENDERINGS (ALTERNATIVE #1)

FOR SCOPING PURPOSES ONLY.







HAWTHORNE CROSSING

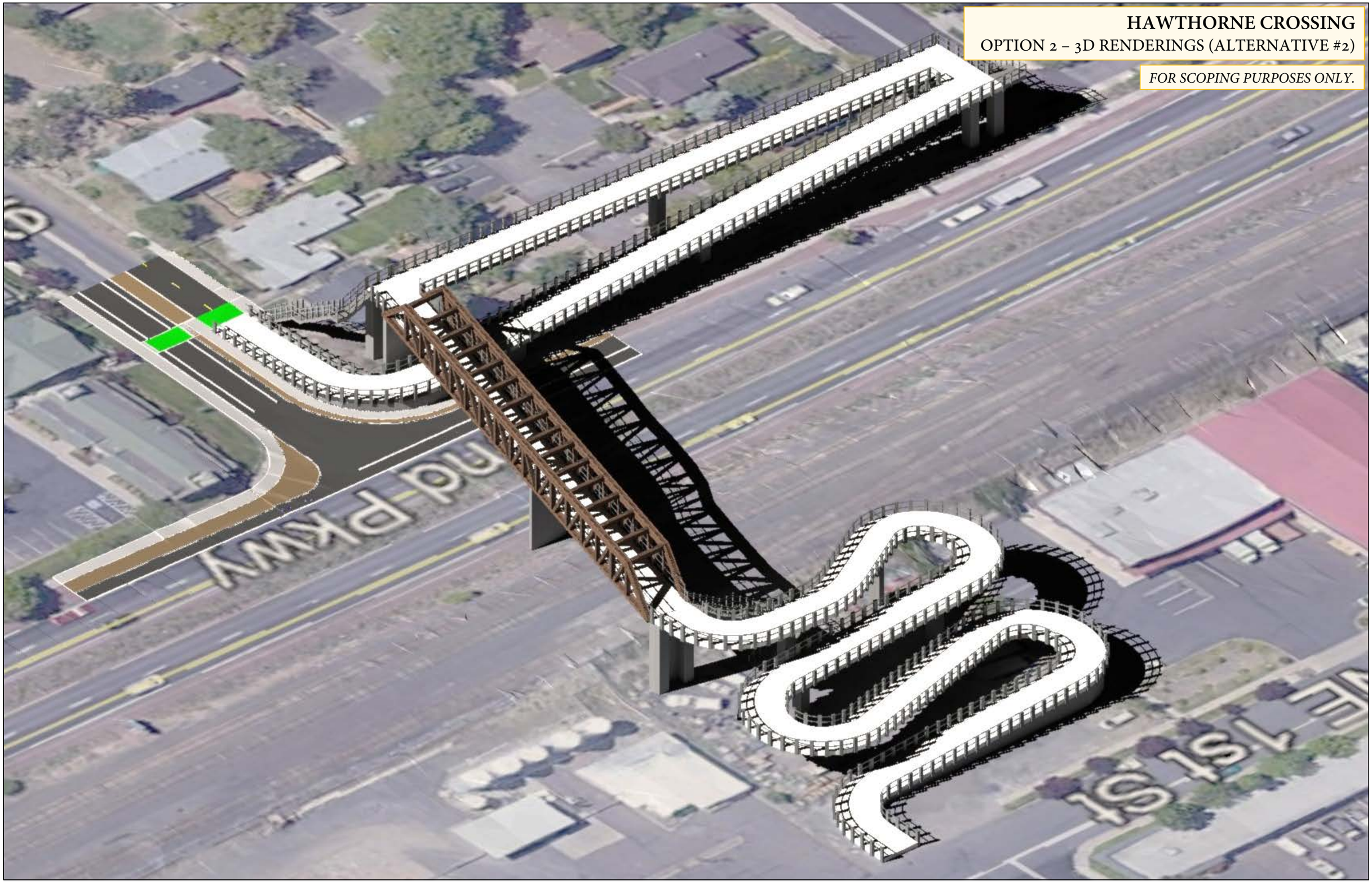
OPTION 2 – 3D RENDERINGS (ALTERNATIVE #1)

FOR SCOPING PURPOSES ONLY.

HAWTHORNE CROSSING

OPTION 2 – 3D RENDERINGS (ALTERNATIVE #2)

FOR SCOPING PURPOSES ONLY.



HAWTHORNE CROSSING

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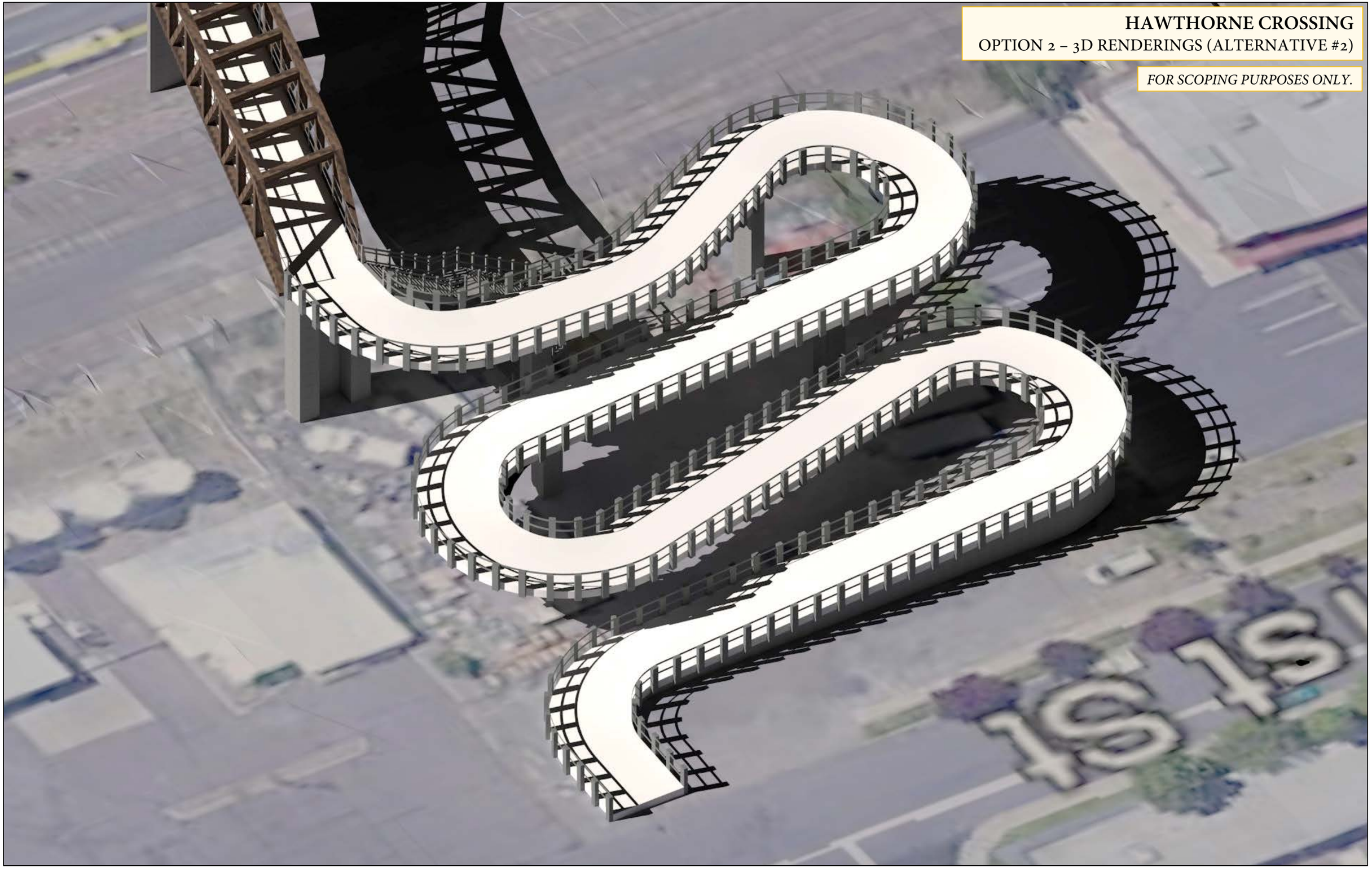

APPENDIX D

Alternative Cost Summary

PRELIMINARY CONSTRUCTION COST ESTIMATES

The proposed alternatives were evaluated by the scoping team from ODOT disciplines who conducted desk reviews of the ODOT/City of Bend vetted preferred alignments to determine scoping level construction costs. The construction cost is focused on building the basic ODOT structural requirements only, with no focus on aesthetics, placemaking, or streetscaping.

	Construction Costs	2024 Total Cost
Spiral Ramp	$14.7 million	$21.2 million
Snake Ramp	$14.7 million	$21.1 million
Elevator	$6.3 million	$9.9 million

The costs shown above reflect ODOT scoping-level estimates for a 2024 construction season.

Complete scoping cost details are shown on the ODOT Scoping Spreadsheets.

Potential Cost Savings Ideas to Consider:

- Reducing bridge and ramp width: the ramps and bridge are currently estimated at 18’ of usable width – reducing that width to 14’ can reduce the total costs for the Spiral and Snake ramped alternatives by $2.9 million or the elevator option by $600,000.
- Bridge sloping over the Parkway: the 23.5’ required vertical clearance over the railroad is the primary height determinant, and changing the design to have the bridge sloping over the Parkway will save ~132’ of ramp run. This would reduce the Spiral and Snake Ramp total costs by $1.4 million.
- Lighting: the current lighting estimate is $1.3 million – this cost is based 16 overhead luminaires and will be different depending on the scale of lighting chosen for the design but could be much lower.