Stantec

Memo

To:	CRO Planning & Design	From:	Stantec South Burlington
Project/File:	Essex Trails	Date:	July 16, 2025

Reference: Essex Trails Proposed 289 Path Alignment Review DRAFT

A proposed planning-level horizontal alignment for the 289 Corridor & Bike Path was provided by CRO Planning & Design (CRO) and can be seen in Figure 1 (attached). A review of the alignment was completed and documented below. The proposed shared use path will run from south to north along the easterly side of the VT 289 corridor from VT 117 to Exit 10. At Exit 10, the proposed path will tie into the Essex Transportation Path segment that runs along Essex Way. The path is also intended to connect to various trailheads along the easterly side of VT 289 that connect to residential neighborhoods as well as Founders Memorial School.

Design specifications for the 289 Corridor & Bike Path were also provided by CRO (attached). Stantec developed stationing and a vertical profile based on the CRO alignment in OpenRoads Designer. Based on the design specifications provided and the existing topography, Stantec prepared two alternate planning-level horizontal alignments in order to meet the design requirements.

Methodology

The following methodology was used to review CRO's proposed alignment.

1. QL 2 Lidar data (2014) was derived from the USGS online lidar explorer.
2. Using the lidar data, a terrain model for existing ground was made using OpenRoads Designer.
3. The proposed horizontal alignment, provided by CRO, was projected onto the existing ground terrain model and a planning-level vertical alignment was modeled based on the existing ground surface.
4. A planning-level profile was modeled by connecting tangents along the existing ground to approximate grades.
5. An aerial photo was displayed to provide context of where geographic features exist to inform the alignment revisions.
6. The horizontal and vertical alignment components were analyzed using the 289 Corridor & Bike Path design specifications provided by CRO.
7. A revised planning-level horizontal alignment (Stantec alignment 1) was created and projected onto the existing ground terrain model in OpenRoads designer.
8. For comparison, a second planning-level horizontal alignment (Stantec alignment 2) was created and projected onto the existing ground terrain model in OpenRoads designer.
9. A summary of comments from the analysis are below. Comments for specific locations along the paths are also shown in Figure 1 (attached).

Reference: Essex Trails Proposed Alignment

CRO Proposed Horizontal Alignment

CRO's horizontal alignment and the revised horizontal alignments prepared by Stantec, along with general comments can be seen on Figure 1 (attached). The corresponding profile along existing ground can be seen in Figure 2 (attached). In general, the CRO alignment crosses steep segments, exceeding 12%, the maximum allowed by VT 289 design specifications. A majority of the grades exceed the desired average 5% grade, with some grades exceeding 20%. It crosses Alder Brook at multiple locations, which would require pedestrian/bicycle bridges. It also crosses existing state right of way (ROW) at multiple locations.

Stantec Proposed Horizontal Alignments

Stantec's revised alignments were developed to maintain grades within the design specifications for the VT 289 Corridor & Bike Path, to reduce stream crossings, and to reduce or avoid impacts to ROW, cut and fill areas, and existing vegetation. The first 600' of the alignment that runs along the VT 289 northbound entrance ramp has multiple constraints and the constructability of a path in that area requires further analysis. It is likely that a retaining wall is needed in that area as well as a pedestrian/bicycle bridge over the Alder Brook.

The first iteration of a planning-level alignment attempts to maintain the "trail" like design of CRO's alignment in the sense that it travels relatively close to the tree line without impacting it, while designing within the VT 289 Corridor & Bike Path specifications. The Stantec alignment 1, shown in Figure 1 (attached), is a series of tangents, similar to CRO's alignment. The corresponding profile can be seen in Figure 2 (attached).

The second iteration of a planning-level alignment attempts to maintain a minimum 24' offset from the edge of VT 289, as outlined in the VT 289 Corridor & Bike Path design specifications. Stantec Alignment 2, shown in Figure 1 (attached), is a series of tangents and curves. The corresponding profile can also be seen in Figure 3 (attached).

Right of Way Impacts

Existing Vermont state right of way limits from the Vermont Right of Way Spatial Data Hub are shown in Figure 1 (attached). The CRO path alignment crosses existing right of way at multiple locations, as labeled on Figure 1 (attached). The two proposed Stantec alignments remain inside existing approximate ROW. The planning-level cut and fill limits were determined for the two proposed Stantec alignments. Stantec compared ROW impacts by quantifying the cut and fill limits for the Stantec Alignments 1 and 2 that are outside of the existing approximate ROW. For Stantec Alignments 1 and 2, the approximate area outside of the existing ROW is 89,000 square feet and 41,000 square feet, respectively. Stantec Alignment 2 has approximately half of the ROW impacts as Stantec Alignment 1. The cost for acquiring the necessary ROW for both alignments is unknown, but acquiring more ROW is associated with higher project costs.

Considerations

Stormwater management is a consideration that will impact the design that was not considered for the purpose of this analysis. Information regarding existing drainage infrastructure along VT 289 was not

Reference: Essex Trails Proposed Alignment

reviewed, but further consideration should be given to the alignment to avoid impacting the drainage infrastructure along VT 289, such as ditches, and to ensure proper drainage along the proposed path.

Geotechnical information will also influence the design. VT 289 is currently a two-lane highway that was originally intended to be four-lanes. It is evident that the eastern side of VT 289 was cleared and graded for the future addition of two lanes. It is unknown why some areas have not been cleared and graded. There is potential for the existence of ledge or less than ideal soil types along the VT 289 corridor.

Cost Estimate

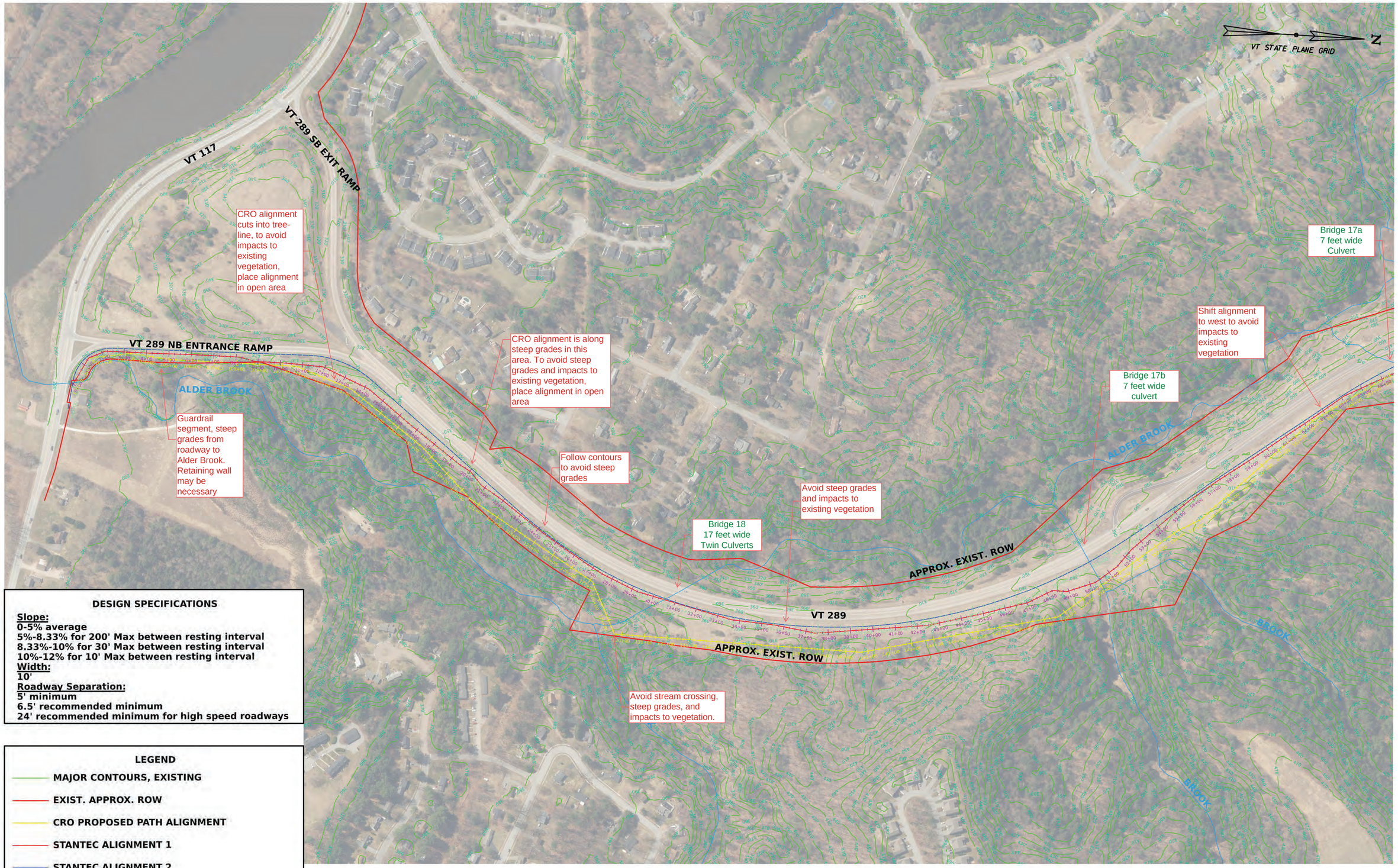
A rough order of magnitude construction cost was estimated by Stantec for the Stantec Alignment 1 and 2. The VTrans Report on Shared-Use Path and Sidewalk Costs (2020) provides construction cost information that can be used for planning purposes. For a 10’ wide bituminous concrete path, the total cost/foot is $342. For a 10’ wide aggregate surface path, the cost/foot is $301. The total cost/foot estimate accounts for “the combined cost of path construction with other costs that are incidental to the construction. For example, pavement markings, new signs, traffic control, drainage, and landscaping.” The cost estimates provided “do not include other costs associate with developing a shared-use path such as engineering, administration, right of way or construction inspection.” After reviewing several construction bids for nearby shared use path projects constructed within the last few years and discussing internally, it was determined that a cost/foot of $240 is more accurate than the $342 provided by VTrans. Previous bidders’ estimates were approximately $160/foot in 2020. To account for increasing costs of labor and materials, $240/foot is the estimated cost for 2025. A retaining wall will likely be needed for the portion of the path along the VT 289 NB entrance ramp. Assuming a 7 FT retaining wall across a 550 FT span, the construction cost is approximately $500,000. Assuming a cost/foot of $240 and an approximate project length of 11,200’, the total estimated construction cost is approximately $3.2 million for either Stantec Alignment 1 or Alignment 2.

Thank you,

Stantec Consulting Services Inc.

Lindsay Navickis
Civil Designer
Phone: (802) 497-6408
lindsay.navickis@stantec.com

Attachment: Figures 1 - 4: Essex Trails – VT 289 Path Alignment Graphic and Profiles, Figure 5: VT 289 Design Specifications



DESIGN SPECIFICATIONS

Slope:
0-5% average
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8.33%-10% for 30' Max between resting interval
10%-12% for 10' Max between resting interval
Width:
10'
Roadway Separation:
5' minimum
6.5' recommended minimum
24' recommended minimum for high speed roadways

LEGEND

- MAJOR CONTOURS, EXISTING
- EXIST. APPROX. ROW
- CRO PROPOSED PATH ALIGNMENT
- STANTEC ALIGNMENT 1
- STANTEC ALIGNMENT 2
- BROOK

FIGURE 1 ESSEX TRAILS - PROPOSED VT 289 PATH ALIGNMENT

0 200 400
SCALE IN FEET

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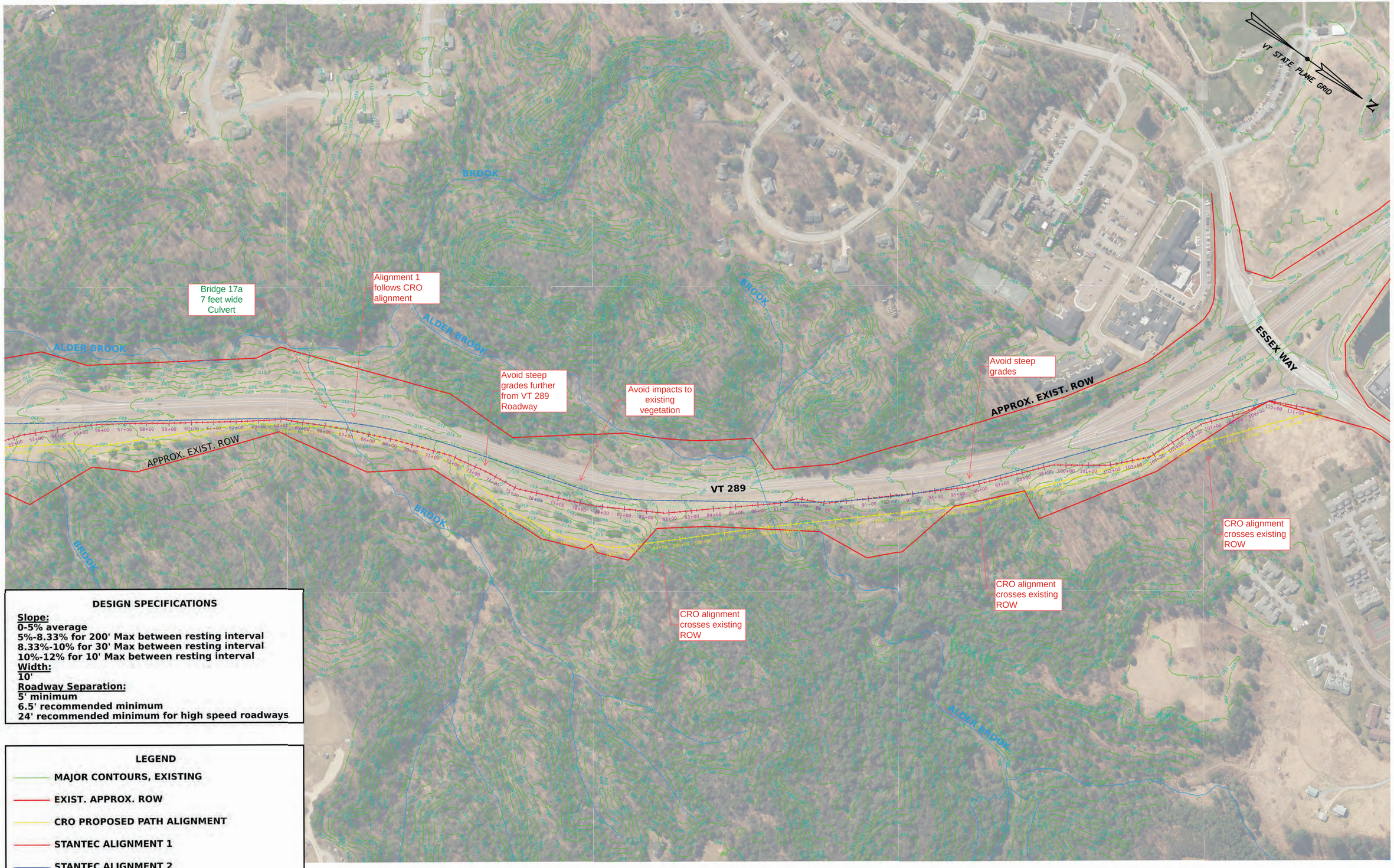

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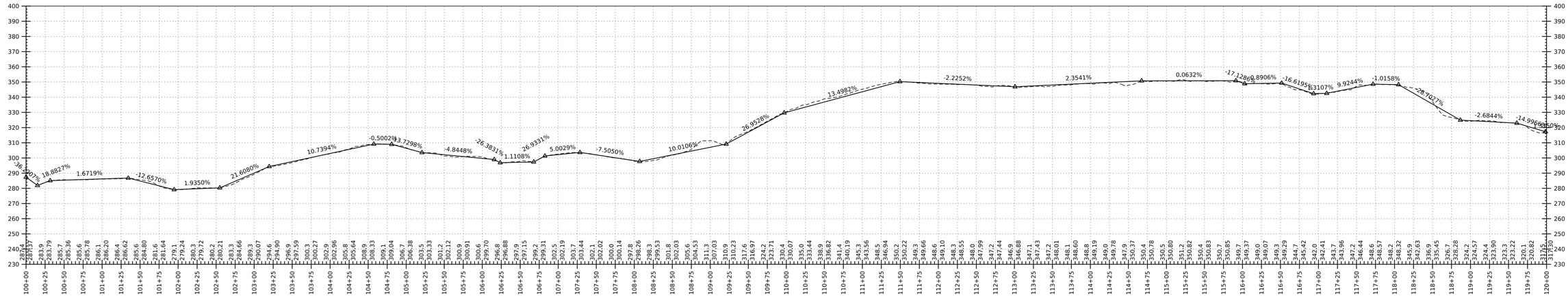
CRO Profile

FIGURE 2



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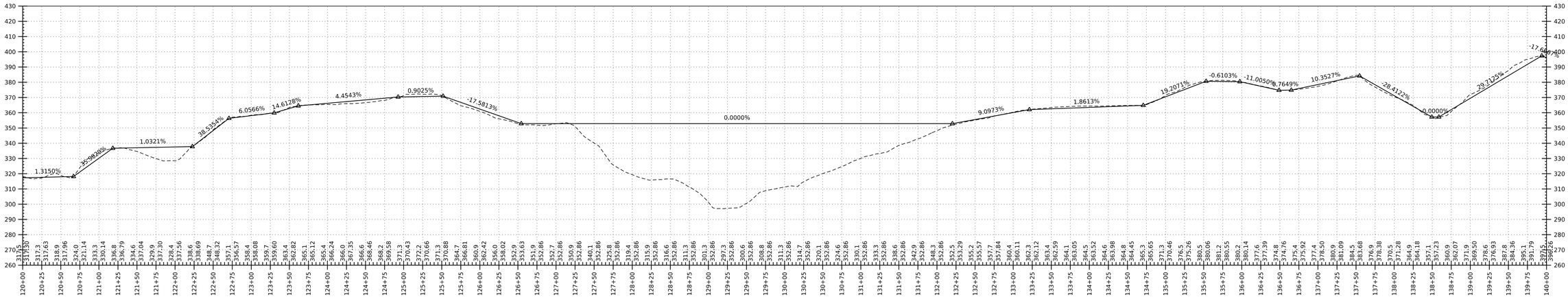

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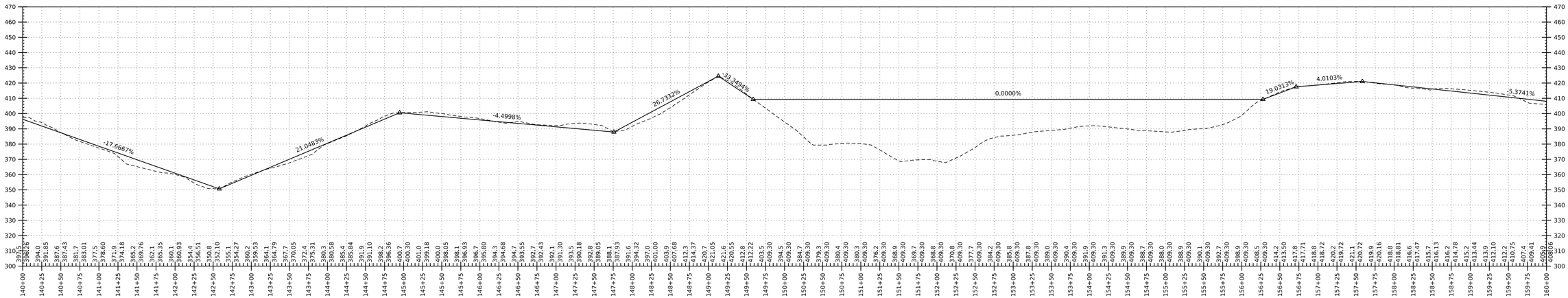

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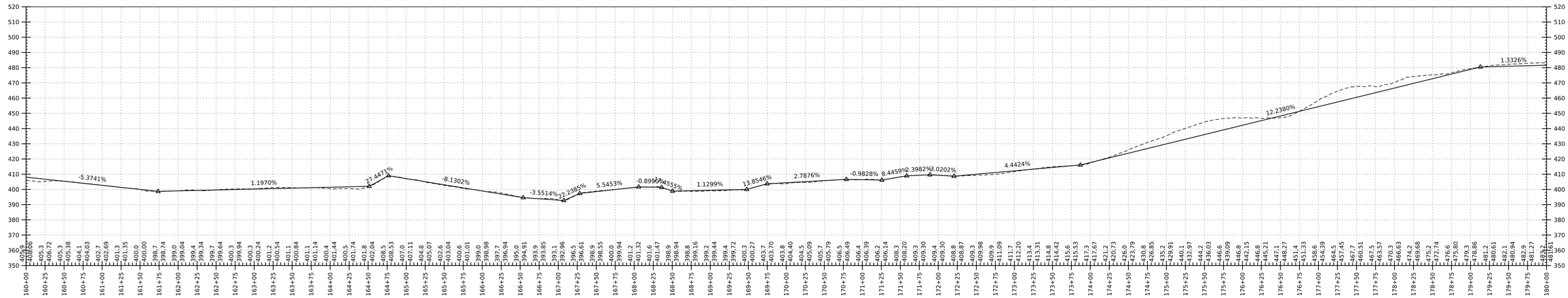

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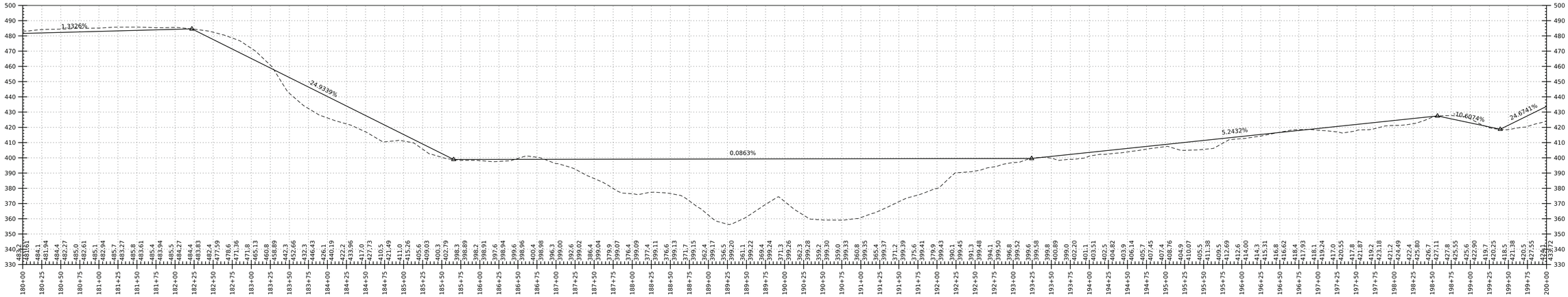

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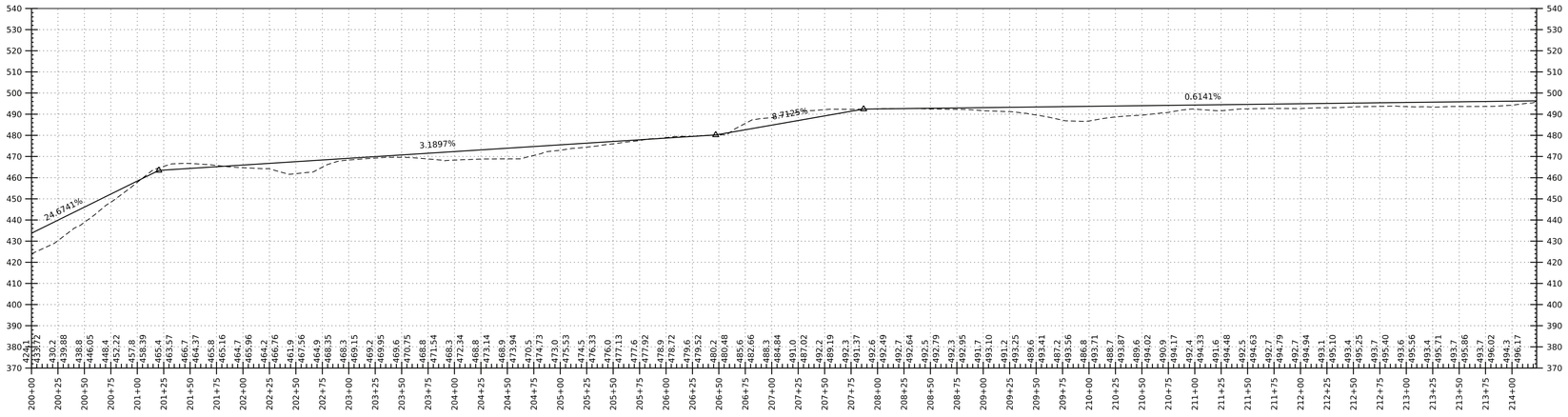

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Stantec Alignment 1 - Profile

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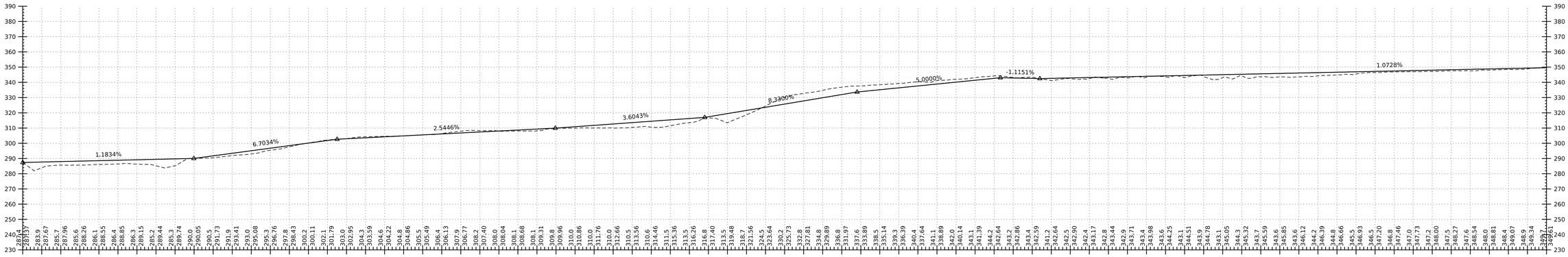

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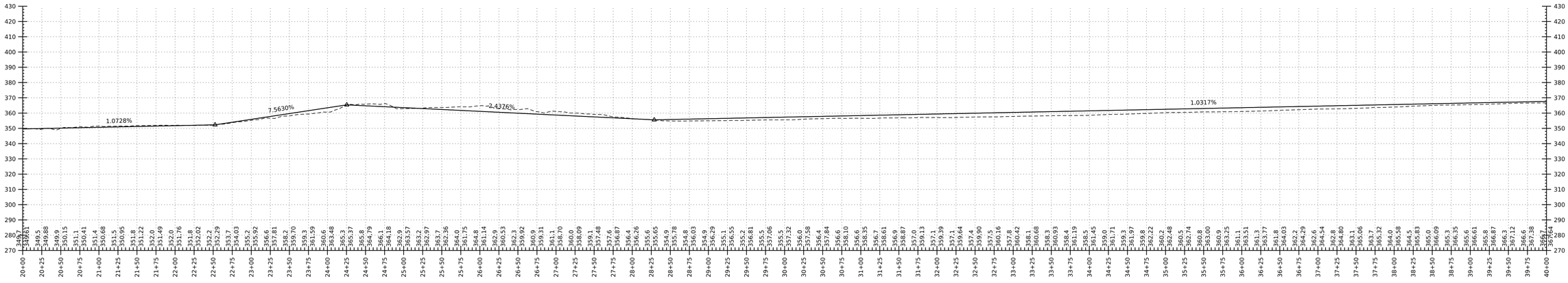

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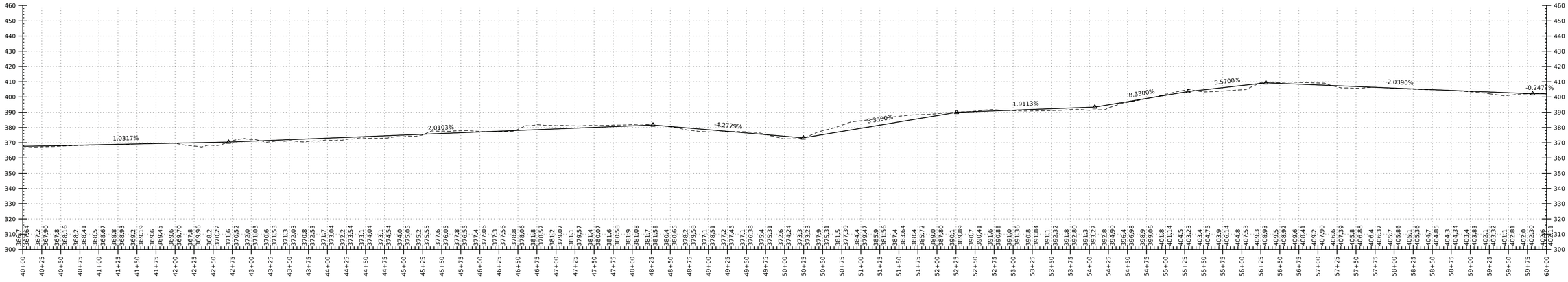

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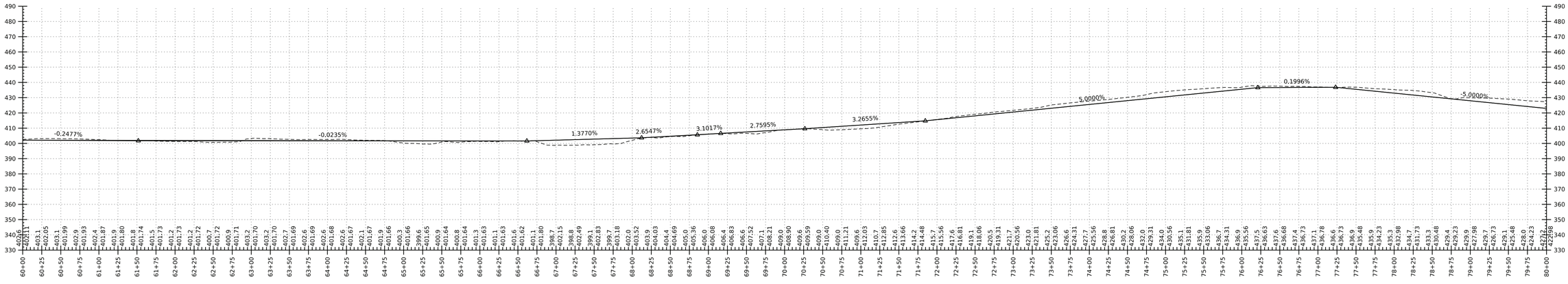

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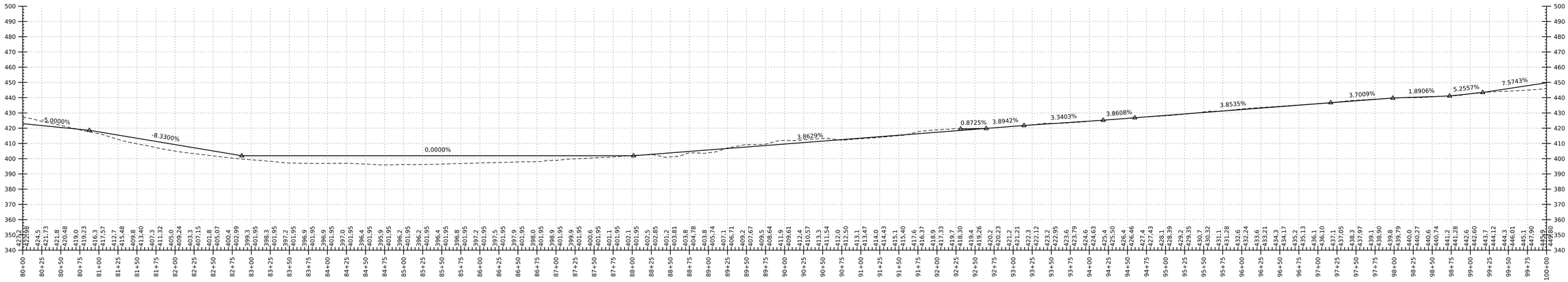

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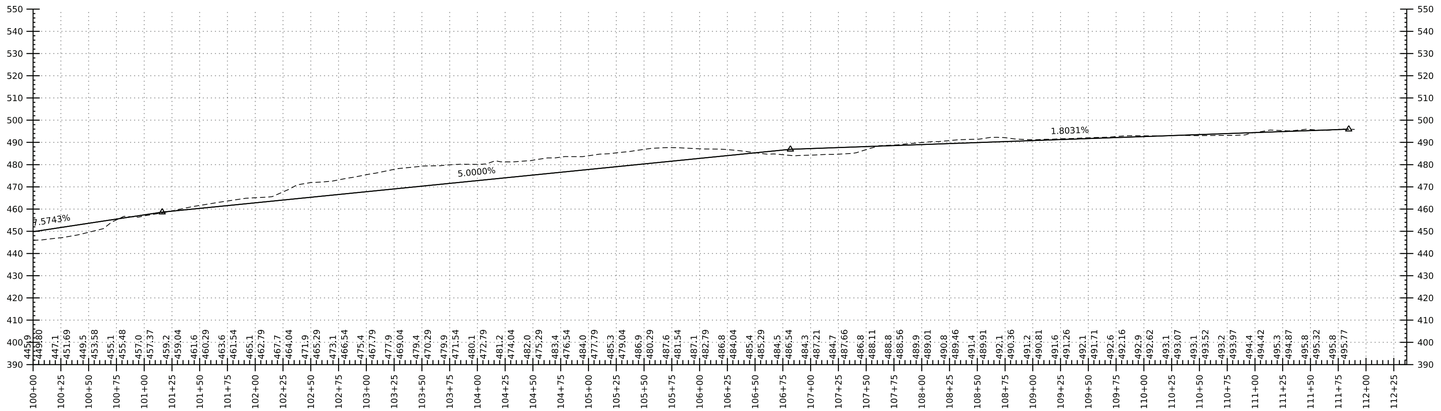

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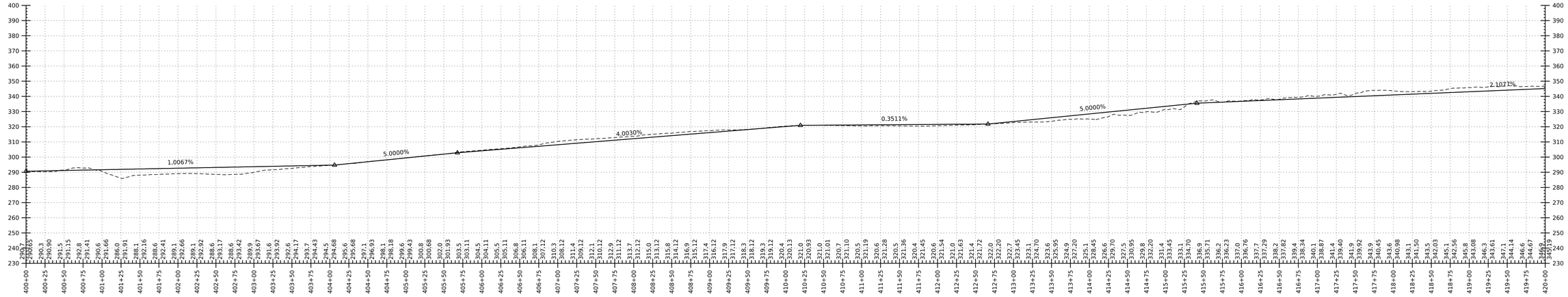

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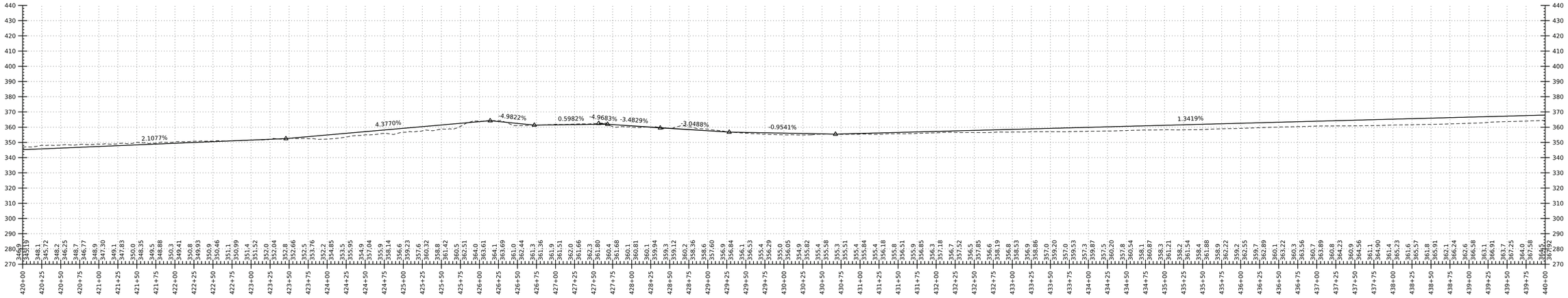

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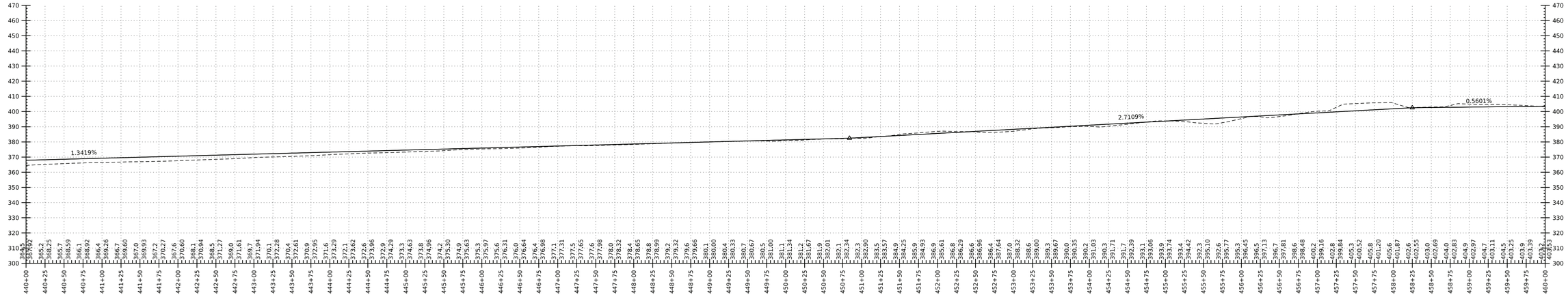

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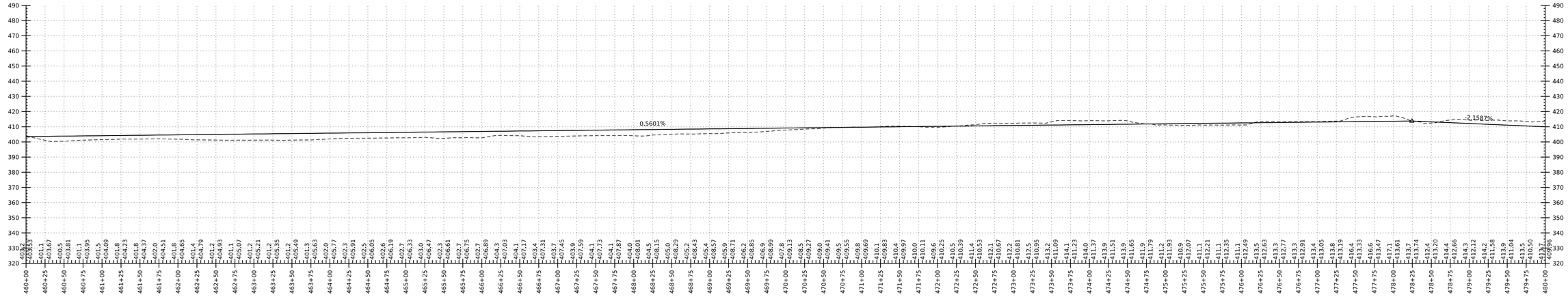

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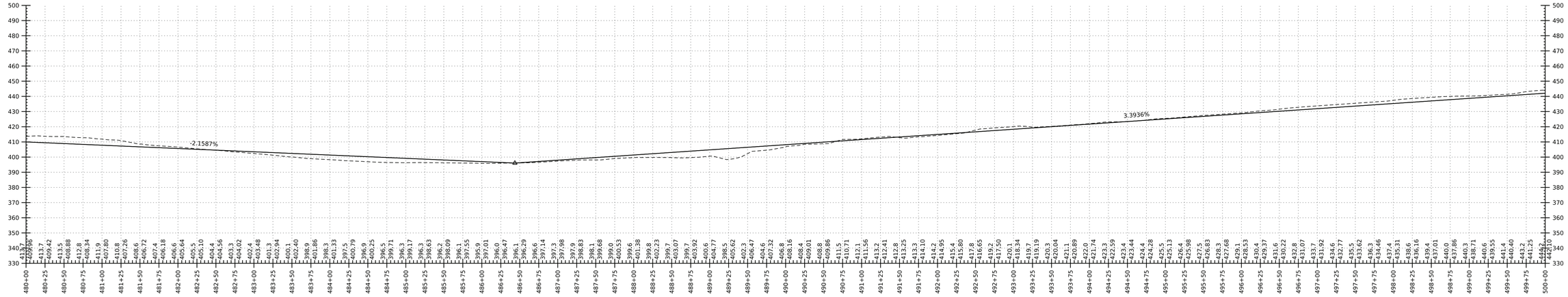

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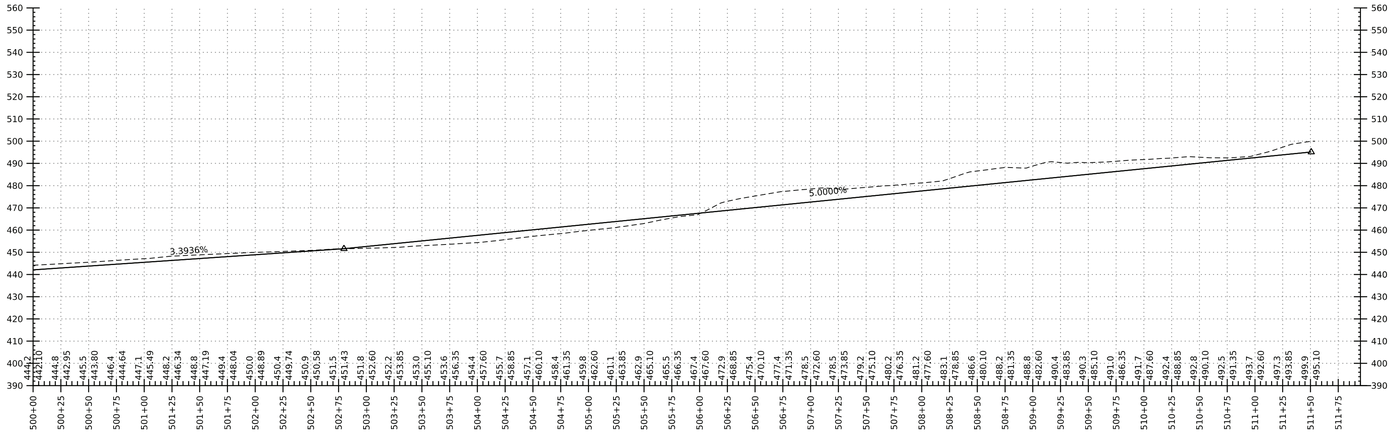

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FIGURE 5

289 Corridor & Bike Path

FHWA: Small Town and Rural Multimodal Networks

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Strava

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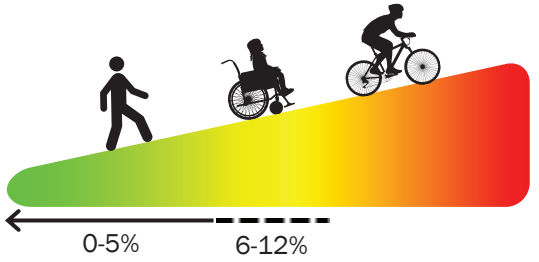

Shared Use Path (A, B, D): transportation and recreation path separate from road

Specs:
- 10ft trail width for moderate to heavy usage (keep between 8-14ft)
- 2ft shoulder on each side of the path, clear of obstruction

Signage: For mixed-use, include right of way signage

Road Crossings: For low-volume, low-speed streets, marked crosswalks are sufficient. For high-volume and/or high-speed streets, intersection enhancements are necessary (stoplight, flashing, etc)

Surfaces: Paved paths (A, B) are plowable and lower maintenance. Gravel (D) paths have better storm water absorption and provide a low--impact recreation surface

Sidepath (C): 2-way path next to high volume or high-speed road

Width:
- 10ft trail width for moderate to heavy usage (keep between 8-14ft)
- 2ft shoulder on each side of the path, clear of obstruction

Roadway separation: 5ft minimum, 6.5ft recommended minimum, up to 24ft for high-speed roads (>55mi/h)

Sources: Slope from 'Hiking (Universal Access)' trail character in VT Town Forest Trail Design Guide. Specs, Signage, Road Crossings, Roadway Separation from 'Shared Path' and 'Sidepath' in FHWA Small Town and Rural Multimodal Networks.

Stantec

September 26, 2025

Essex Trails – VT 289 Path & Crossings Next Steps

- VT 289 Path
  - Conduct scoping study to define the project, including developing and evaluating alternatives, and documenting the information required prior to obtaining funding and starting engineering design.
  - *Alternatives would include different possible alignments within the VT 289 corridor.*
  - This could be pursued through the Chittenden County Regional Planning Commission (CCRPC) or through the Vermont Agency of Transportation (VTrans).
  - Once a scoping study is completed, with a preferred alternative selected and endorsed by VTrans and the Town of Essex, funding for design and construction can be pursued.
  - Once funding is acquired, engineering design and plan development would occur.
  - After engineering design and plan development, the project would be bid for construction.
  - If VT 289 ROW has already been cleared through environmental, could save costs on environmental/archeologic/historic (NEPA), could save on costs during scoping.
  - $50,000 to $60,000+ for scoping study
- VT 289 Pedestrian/Bicycle Crossing
  - Conduct scoping study to define the project, including developing and evaluating alternatives, and documenting the information required prior to obtaining funding and starting engineering design.
  - *Alternatives would likely include a pedestrian/bicycle bridge and pedestrian/bicycle tunnel or could just look at tunnel with alternative locations*
  - This could be pursued through the CCRPC or VTrans.
  - Once a scoping study is completed, with a preferred alternative selected and endorsed by VTrans and the Town of Essex, funding for design and construction can be pursued.
  - Once funding is acquired, engineering design and plan development would occur.
  - After engineering design and plan development, the project would be bid for construction.
  - $30,000 to $60,000 for scoping study. It depends on number of alternatives and amount of resource identification (survey/wetlands/archeological) vs waiting for some resource ID during conceptual design.
- VT 289 Wildlife Crossing
  - Conduct scoping study to define the project, including developing and evaluating alternatives, and documenting the information required prior to obtaining funding and starting engineering design.
  - *Alternatives would likely include converting an existing culvert to a bridge for wildlife to cross below, a wildlife bridge overpass above VT-289, and a wildlife tunnel.*
  - This could be pursued through the CCRPC or VTrans.
  - Once a scoping study is completed, with a preferred alternative selected and endorsed by VTrans and the Town of Essex, funding for design and construction can be pursued.
  - Once funding is acquired, engineering design and plan development would occur.
  - After engineering design and plan development, the project would be bid for construction.
  - $30,000 to $60,000 for scoping study. It depends on number of alternatives and amount of resource identification (survey/wetlands/archeological) vs waiting for some resource ID during conceptual design.
- If all three projects were combined into one scoping study, there could be some overall cost savings. That kind of scoping study would be closer to $100,000.