

MEMORANDUM

Date:	April 28, 2021	TG:	18149.00
To:	Jeremy Metzler, Public Works Director, City of Edgewood		
From:	Brett Schock, PE, AICP, RSP2i, Transpo Group		
Subject:	36th Street E/Chrisella Road E/SR 161 (Meridian Ave E) Alternatives Evaluation		

The City of Edgewood is seeking to alleviate concerns related to pedestrian and driver safety, multimodal connectivity and traffic operations at the existing intersection of 36th Street E, Chrisella Road E, and SR 161 (Meridian Ave E). Several alternatives are being evaluated and the following memorandum documents an alternatives assessment at the intersection.

Evaluation Summary

The purpose of the alternatives evaluation is to further assist the City in evaluating the preferred approach to addressing safety, connectivity, and traffic operations at the existing intersection. The four alternatives that were evaluated are:

- **Alternative 1: No-Build**
Alternative 1 makes no changes and maintains the existing configuration at the intersection.
- **Alternative 2: Realignment of Chrisella Road E**
Alternative 2 relocates the roadway alignment of Chrisella Road E to a new stop-controlled tee intersection with 36th Street E approximately 400 feet east of the existing intersection. Chrisella Road E would deviate from the current alignment approximately 600 feet south of 36th Street E.
- **Alternative 3: 5-leg Roundabout**
Alternative 3 replaces the existing signalized intersection with a 5-leg roundabout. The roundabout would be a two-lane approach in the north/south direction. The east-west approaches and Chrisella Road E would remain single-lane approaches to the roundabout. Chrisella Road E would stay in the existing alignment, except for required deviations at the immediate approach to the roundabout.
- **Alternative 4: Traffic Signal Modification with Minor Realignment**
Alternative 4 realigns the northern 100 feet of Chrisella Road E, relocating the northwestbound approach, the southbound entry and northbound right turns from Meridian Avenue E. Chrisella Road E is provided with a dedicated traffic signal phase and added signal heads. The east-west phases for 36th Street E would also be split to accommodate the realigned approach of Chrisella Road E.

Each of the four alternatives were compared on the basis of criteria that align with the City's goals for the study of a realignment of Chrisella Road E. The criteria were discussed with City Staff for input and equally weighted. Criteria include:

- Traffic Operations
- Traffic Safety
- Pedestrian Connectivity and Safety
- Property Impacts
- Coordination with the City's Parallel Roads Ordinance

- Project Costs

The assessment of alternatives against the criteria identified Alternative 2, the realignment of Chrisella Road E, as the preferred alternative to address the City's goals of addressing safety, connectivity and operations.

Existing Conditions

The existing 36th Street E, Chrisella Road E, and SR 161 (Meridian Ave E) intersection is signalized with approaches from the north and south (Meridian Ave E), east and west (36th Street E) and a fifth northwesterly approach (Chrisella Road E) in the southeast corner of the intersection. The southeastern movement to Chrisella Road E, perpendicular to 36th Street E, is stop controlled. Meridian Ave E has two lanes in the northbound direction and one lane in the southbound direction, with dedicated left turn lanes at the intersection. 36th Street E is a single lane in each direction. 36th Street E does not outlet west of Meridian Ave E.

The parcels south of 36th Street E on both sides of Meridian Ave E near the intersection are developed, with existing buildings and parking lots. 36th Street E east of Meridian Ave E is developed on the south side with a mix of residential and commercial properties, and currently undeveloped on the north. 36th Street E has large lot single family residential development on both sides west of Meridian Ave E. The parcels north of 36th Street E are generally undeveloped, but the northeast corner is being developed by the City into a new park as of the writing of this memo. Meridian Ave E is undeveloped south of 36th Street E, with steep topography and a winding horizontal alignment. Chrisella Road E is only developed on the east side with single family residential, and also has steep topography and a winding horizontal alignment.

The signal currently operates with protected lefts for the north/south approach and permissive lefts for the east/west approach. The existing signal system consists of single mast arms poles serving the southbound and westbound direction while the northbound and eastbound directions are served by a single double mast arm pole. Existing overhead utilities cross the intersection in the east/west direction and the north/south direction, with two poles near the intersection. The signal has pedestrian signal heads, but the pushbuttons are not fully APS.

Sidewalks are present at the southwest corner of the intersection and along the south side of 36th Street, with separated pathways to be constructed at the northeast corner in conjunction with the proposed park. There are marked crosswalks on the western, northern, and eastern legs of the intersection. The eastern crosswalk is 90 feet in length and crosses both the eastern leg of the intersection and the northwestern approach of Chrisella Road E, without provision of a pedestrian refuge area or physical barrier to Meridian Ave E. The existing design of the crosswalk leads to longer crossing times for pedestrians, and potential conflicts with vehicles turning left and right onto two different roadways. In particular, the left turn onto Chrisella Road E is very shallow, which could lead to higher turning speeds through the crosswalk.

Based on 2021 traffic volumes, the intersection operates at LOS C – meeting the City of Edgewood's LOS E or better standard for intersections along Meridian Avenue E. However, the stop-controlled approach of Chrisella Road E, directly east of the intersection may be impacted by westbound queues, which extend approximately 80 feet (three to four car lengths) from the intersection. This may result in difficulty turning left from Chrisella Road E to 36th Street E, which is the predominant move at this approach.

While there were no recorded collisions directly at the intersection between 2014 and 2018, there were several collisions along Chrisella Road E, directly south of the intersection along the

roadways horizontal curve. Two crashes involved drivers who were impaired, and two crashes involved drivers who were exceeding a reasonably safe speed.

Evaluation of Alternatives

To understand the high-level impacts, improvements, and areas of concern related to the intersection alternatives, several criteria were defined for evaluation. These criteria best capture the goals of the project in relation to existing concerns at the intersection as well as the desired future development of the surrounding area. The following section defines the evaluation criteria and summarizes the evaluation of each intersection alternative.

Evaluation Criteria

The evaluation methods for each criterion are described below.

Traffic Operations

PM peak hour levels of service (LOS), delays, queues and as applicable, volume-to-capacity (v/c) ratios were calculated for each intersection alternative, to determine each alternative's compliance with the City of Edgewood's LOS E or better standard for intersections along Meridian Avenue E and LOS D or better standard for all other intersections. As a basis for this analysis, 2021 existing volumes were grown by 1 percent annually to develop 2023 traffic volumes – the assumed project completion date.

For alternatives including signals and stop-controlled intersections, operations were evaluated using *Synchro 10* software and for alternatives including a roundabout, operations were evaluated using *Sidra 8*. Sidra model settings used for roundabout analyses were based on the guidelines in the *WSDOT Sidra Policy Settings*, October 2019.

In addition to LOS results, the potential for future traffic growth and the ability to address existing traffic operations concerns were considered in the evaluation.

Traffic Safety

Evaluation of traffic safety used crash data from the City's Local Road Safety Plan (LRSP) as a baseline and assessed each alternative based on Crash Modification Factors, priority risk factors from the LRSP and a qualitative assessment of safety impacts for each alternative.

Pedestrian Connectivity and Safety

Each alternative was evaluated based on its qualitative impact on pedestrian connectivity and safety, including improvements from existing conditions, connections to the existing and future roadway network and planned park, and proven safety countermeasures.

Property Impacts

Each alternative was evaluated based on the potential impacts to surrounding properties and associated right-of-way needs.

Coordination with the City's Parallel Roads Ordinance

The alternatives were evaluated based on their adherence with the City of Edgewood's Parallel Roads Ordinance, as updated in 2019, which was developed to address a vision for alternative access to parcels that would develop in the future, with frontage on Meridian Avenue. The primary goals of the ordinance are as follows:

1. Encouragement of efficient multimodal transportation systems
2. Balance the transportation needs of community and the region and maintain LOS
3. Limit access points to Meridian Avenue for safety and efficiency

Project Cost

The planning-level estimated cost, which is based on known project elements, and recent bid results, with lump sum estimates used to address elements that are not designed at the 10% level used for the concepts in the study, was used to compare each alternative. Costs were escalated to represent likely costs in 2023.

Alternatives Evaluation

Based on the above criteria, the four intersection alternatives were evaluated:

Alternative 1: No Build

Traffic operations would generally remain consistent with existing conditions. As such, Alternative 1 meets the City's LOS standards, but does not address westbound queues and the impacts to vehicles turning left onto 36th Street E from Chrisella Road E. Under this alternative there would be no implementation of traffic safety improvements, pedestrian connectivity and safety improvements, or measures to address the City's Parallel Road Ordinance. This alternative does not result in any impacts to adjacent properties and there are no associated project costs.

Alternative 2: Realignment of Chrisella Road E

This alternative involves relocating the roadway alignment of Chrisella Road E, through three parcels not currently designated as right of way, to a new tee intersection at 36th Street E approximately 400 feet east of the existing intersection. The proposed roadway cross section includes a single 12-foot lane in each direction with a 6-foot sidewalk behind the curb. The existing Chrisella Road E approach at the 36th Street E and Meridian Ave E intersection would be redesigned to remove the Chrisella Road E approach. The north end of the existing Chrisella Road E would be terminated in a cul-de-sac, hammerhead or other turnaround, north of the deviation point from the existing alignment, to serve the residents and emergency access along Chrisella Road E. The existing signalized intersection would be configured to a traditional four-legged intersection. A preliminary concept is provided in Attachment A.

Traffic Operations

Under Alternative 2, the intersection of Meridian Avenue and 36th Street E operates at LOS C, consistent with existing conditions. The realignment of Chrisella Road E results in a new stop-controlled intersection with 36th Street E approximately 400 feet east of the existing intersection. The new intersection would be side-street stop-controlled with the Chrisella Road approach operating at LOS B and free-flowing traffic along 36th Street E. The intersection would likely not meet warrants for an all-way stop. Both intersections meet the City's LOS standards, while also addressing westbound queues at the signal and the impacts to vehicles turning left onto 36th Street E from Chrisella Road E.

Traffic Safety

One of the high priority risk factors identified in the City's LRSP is the existing presence of sharp horizontal and vertical curves, such as those that exist along Chrisella Road E approaching 36th Street E/Meridian Avenue. The City has plans to implement hardscape improvements along Chrisella Road E south of the 36th Street to address existing issues, and the realignment of Chrisella Road E would further advance the effectiveness of these improvements by softening an existing sharp horizontal curve that has observed multiple crashes over the last several years.

Pedestrian Connectivity and Safety

The realigned segment of Chrisella Road E would include a 6-foot sidewalk, providing a dedicated pedestrian walkway where one does not currently exist. Additionally, a north-south crosswalk along 36th Street E would be installed to provide access to the planned park at the northeast corner of Meridian Avenue E and 36th Street E. The crosswalk would be recommended for enhancement with a Rectangular Rapid Flashing Beacon (RRFB) to increase safety, comfort and visibility for crossing pedestrians.

The existing intersection of Meridian Avenue/36th Street E would be redesigned such that the crosswalk along the eastern leg of the intersection is shortened and pedestrian connectivity at the intersection is improved. Additionally, APS pushbuttons would be installed at each corner.

Property Impacts

To construct Alternative 2, three properties (3621 Chrisella Road E, 3703 Chrisella Road E, and 10218 36th Street E) would be affected and approximately 42,000 square feet of right-of-way would need to be acquired. Relocations would be required as part of the right of way acquisition.

Coordination with City's Parallel Road Ordinance

While the realignment of Chrisella Road E is not directly defined in the recommended Parallel Road network, Alternative 2 effectively meets the goals of the ordinance by reducing direct access from Meridian Avenue.

Project Cost

The planning-level cost estimate for Alternative 2, escalated to 2023 costs is \$4,100,000.

Alternative 3: 5-leg roundabout

Alternative 3 removes the existing signalized intersection and replaces it with a 5-leg roundabout. The roundabout would consist of two-lane approaches in the north and south directions, and single lane approaches on other legs. Chrisella Road E would not be realigned with Alternative 3, except for the required changes to meet the roundabout entry point and deflection angles. A preliminary concept for Alternative 3 is included in Attachment A. As a 5-leg roundabout, access to Chrisella Road E is still restricted from some approaches, due to the circulation paths as shown in Attachment A. Removing the access to Chrisella Road entirely, and creating a 4-leg roundabout intersection could reduce property impacts and cost. A reduced size, 4-leg roundabout was not designed for this analysis.

Traffic Operations

The 5-leg roundabout is projected to operate at LOS A with a maximum v/c of 0.61 in the southbound direction. The design would adequately accommodate all 95th percentile vehicular queues. Overall, the intersection would experience improved vehicular operations over existing conditions.

Traffic Safety

Roundabouts are considered safer than traffic signals as they have fewer conflict points, lower speeds, and only require crossing one direction of traffic at a time. However, some of the safety benefits are diluted as additional legs are added to the roundabout; particularly if optimal entry angles aren't achievable, which is the case for the 5-leg roundabout alternative. A roundabout at the intersection would result in traffic safety improvements over existing conditions, but safety could be improved by considering other alternatives such as a 4-leg roundabout.

Pedestrian Connectivity and Safety

The roundabout alternative would provide significant safety improvements for pedestrians. Sidewalks, crosswalks and ADA-compliant curb ramps would be provided at the splitter islands

along all approaches, resulting in a pedestrian crossing along the southern leg where one does not currently exist and improved pedestrian connectivity.

Property Impacts

To construct Alternative 3, right-of-way would need to be acquired at all corners of the intersection, totaling approximately 29,000 square feet. Relocations may be avoidable, depending on the final layout of the Alternative 3 roundabout. In order to minimize impact to the existing properties on the southwest and southeast corners, the overall roundabout footprint would be shifted north. Notably, this would result in design impacts to the planned park at the northeast corner of the intersection. Addressing restricted access to some legs of a 5-leg roundabout would increase the size of the roundabout and property impacts. A 4-leg roundabout could reduce the impact.

Coordination with City's Parallel Road Ordinance

This alternative does not preclude the development of recommended parallel roadways; however, it does not further the goals of the ordinance.

Project Cost

The planning-level cost estimate for Alternative 3, as shown in Attachment A, escalated to 2023 costs is more than \$7,000,000. Eliminating the 5th leg of the intersection could reduce the size and cost of the roundabout by as much as 20%.

Alternative 4: Chrisella Road Traffic Signal Modification

Alternative 4 realigns approximately 100 feet of Chrisella Road E northbound approach such that the approach is brought into the signal at Meridian and 36th as a standalone roadway with a new, separate phase. For vehicles turning right onto 36th Street E from Chrisella Road E, a channelized, stop-controlled turn lane would be constructed on Chrisella Road E such that vehicles do not enter the signalized intersection. The pedestrian crossing along the eastern leg would be divided into two shorter crossings with improved delineation and northbound right turns onto Chrisella Road E would be restricted by physical channelization devices. A preliminary concept is included in Attachment A.

Traffic Operations

The 5-leg signalized intersection is projected to operate at LOS C. The intersection would meet the City's LOS standards, while also addressing impacts to vehicles turning left onto 36th Street E from Chrisella Road E by bringing the approach into the intersection; however, the addition of a standalone phase results in increased overall delay compared to existing conditions and increased delay for vehicles along SR 161. Additionally, a standalone phase for Chrisella Road E limits flexibility in signal timing adjustments to accommodate future growth.

Traffic Safety

While the alternative more actively controls vehicular traffic traveling to and from Chrisella Road E, a 5-legged signalized intersection has its own traffic safety considerations. It results in less efficient operations and creates additional conflict points within the intersection. Additionally, this alternative does not adequately address existing vertical sight distance challenges or the long distance between signal heads and the stop bars for vehicles traveling northbound. The northbound right-turn restriction, while addressing these conditions to an extent, also leads to the potential for violation by drivers used to make the turn, which could be a safety concern.

Pedestrian Connectivity and Safety

Alternative 4 addresses the existing crosswalk issue along the eastern leg of the intersection by bisecting the crosswalk and adding a pedestrian refuge space in the middle. This design also improves predictability at the intersection as it relates to vehicle-pedestrian conflict points. APS pushbuttons would be installed at each corner.

Property Impacts

Alternative 4 could be constructed within the existing right-of-way and would not result in impacts to adjacent properties. However, the design includes the restriction of northbound right turns onto Chrisella Road E which may impact access to small number of homes and businesses.

Coordination with City's Parallel Road Ordinance

Alternative 4 does not preclude the development of recommended parallel roadways; however, it does not further the goals of the ordinance.

Project Cost

The planning-level cost estimate for Alternative 4, escalated to 2023 costs is \$470,000.

Evaluation Matrix

To help select the most desirable alternative, a three-point scale was developed based on the information provided above for each alternative and the evaluation methodology for each criteria, as follows:

- Traffic Operations
 - Degradation from existing conditions – 1 point
 - Limited or no change from existing conditions – 2 points
 - Improvement from existing conditions – 3 points
- Traffic Safety + Pedestrian Connectivity and Safety
 - Limited or no change from existing conditions – 1 point
 - Minor improvement from existing conditions – 2 points
 - Significant improvement from existing conditions – 3 points
- Property Impacts
 - Significant ROW acquirement necessary – 1 point
 - Minor access impacts – 2 points
 - No access impacts or ROW needed – 3 points
- Parallel Road Ordinance
 - In opposition to ordinance – 1 point
 - Does not preclude, but does not support ordinance – 2 points
 - Meets at least one ordinance goal – 3 points
- Project Cost
 - Cost above \$1 million – 1 point
 - Cost below \$1 million – 2 points
 - No cost – 3 points

. A summary of the ranking for each alternative is shown in Table 1.

Table 1. High Level Evaluation of Alternatives

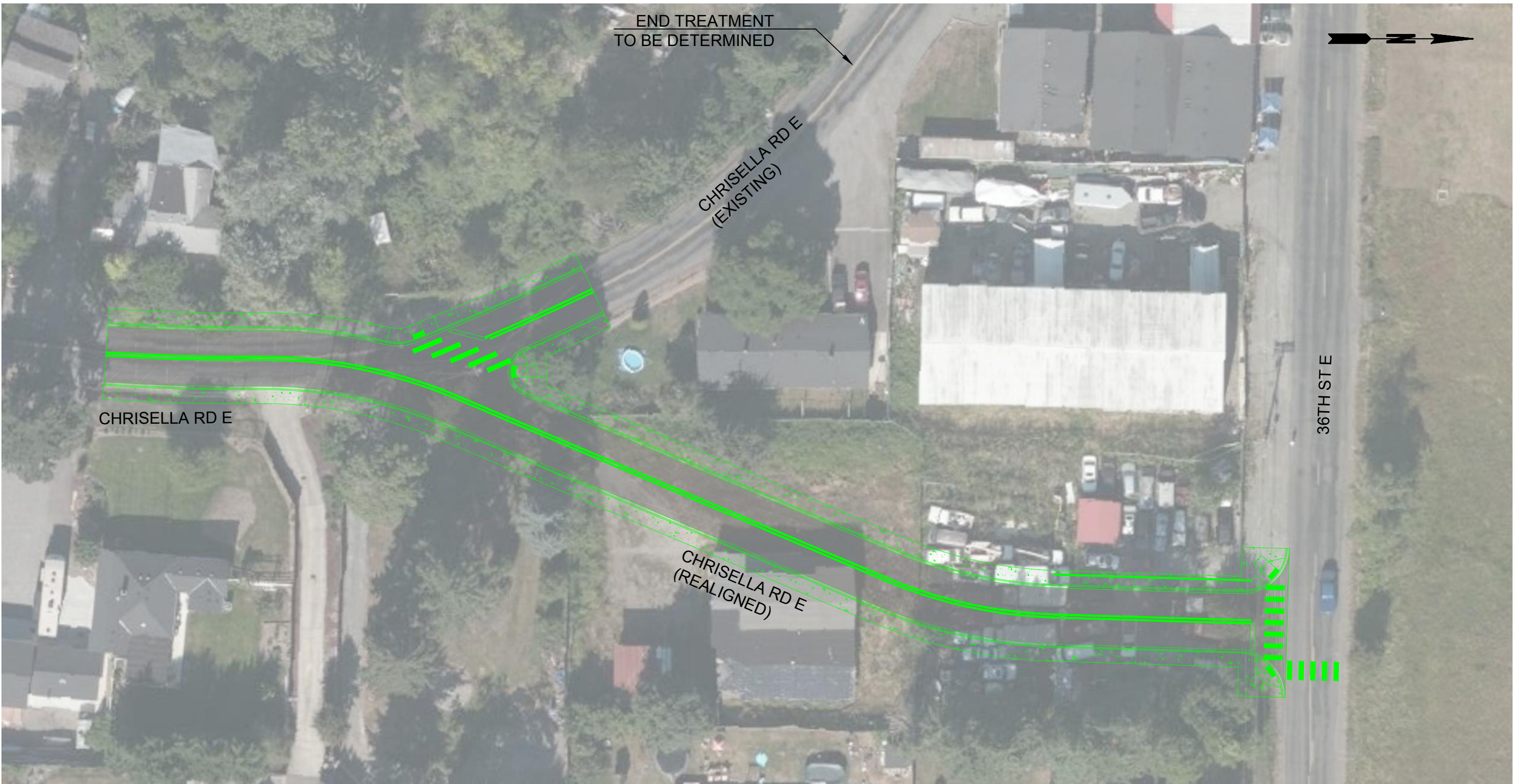
Alternative	Traffic Operations	Traffic Safety	Pedestrian Connectivity and Safety	Property Impacts	Parallel Roads Ordinance	Project Cost	Total
Alternative 1 <i>No Build</i>	2	1	1	3	2	3	12
Alternative 2 <i>Chrisella Realignment</i>	3	3	3	1	3	1	14
Alternative 3 <i>5-Leg Roundabout</i>	3	2	3	1	2	1	12
Alternative 4 <i>Traffic Signal Mod</i>	2	2	2	2	2	2	12

Selection of a Preferred Alternative

Based on the above analysis, the preferred alternative is Alternative 2, the realignment of Chrisella Road E in a new right of way. The preferred alternative meets the City's goals, and most satisfies the evaluation criteria. Most notably, the alternative addresses key vehicular and pedestrian safety concerns, while improving overall traffic operations. By realigning Chrisella Road E to the east of its existing location, left turns from Chrisella Road E to 36th Street E will no longer be impacted by vehicle queues leading up to the traffic signal, the existing horizontal curve along Chrisella Road E is significantly lessened, pedestrian safety and connectivity is improved at the intersection of Meridian Ave and 36th Street E by removing the Chrisella Road E approach, and additional pedestrian connectivity to the planned park is achieved,

Attachment A

Chrisella Road E Realignment Concepts



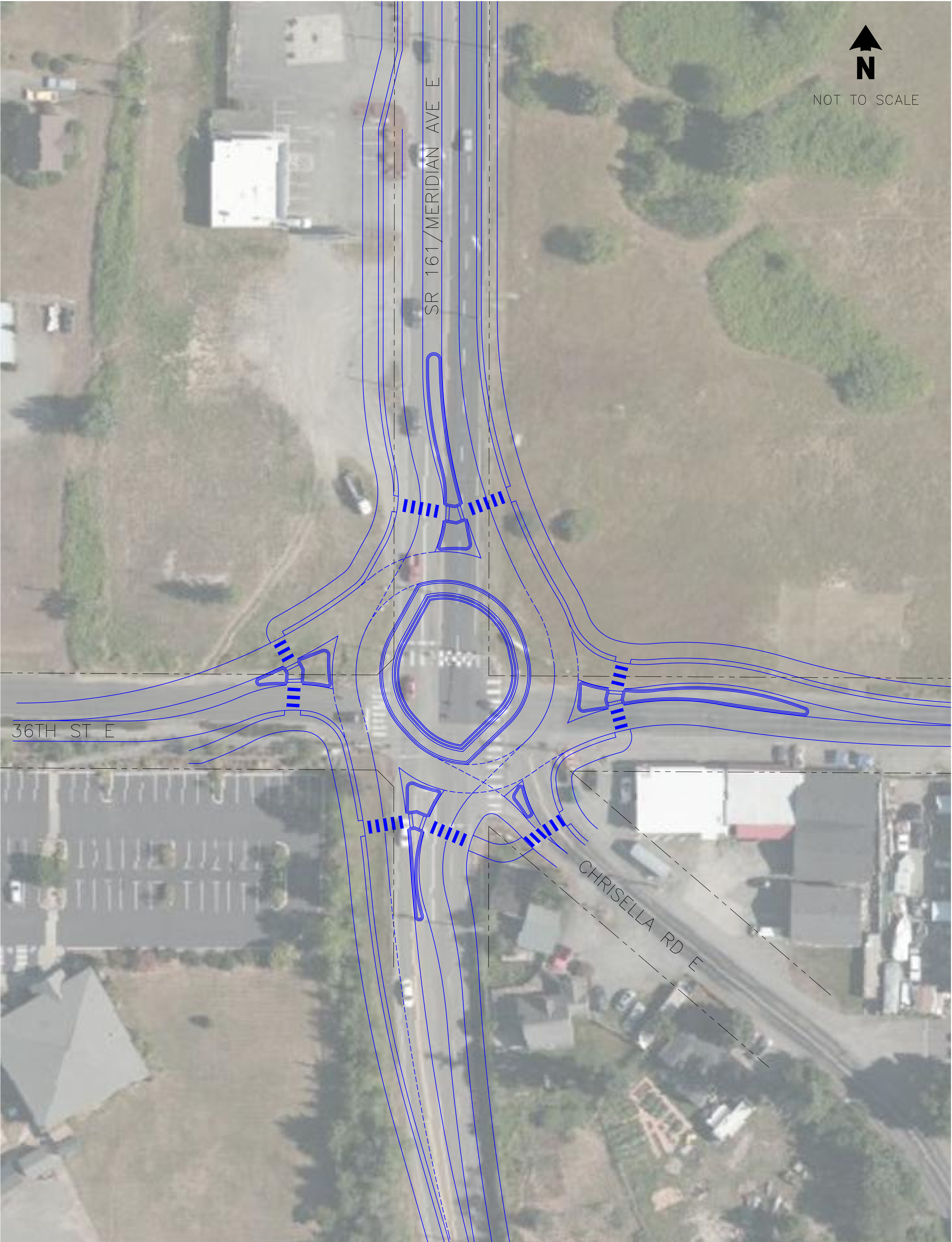
Alternative 2 - Chrisella Rd E / 36th St E / SR 161 (Meridian Ave E) Traffic Signal Modification Concept

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May 04, 2021 - 1:34pm tuann M:\181\1.18149.00 - 2018 City of Edgewood On-Call\Task 23 - Chrisella Road Realignment\Engineering\CAD\Conceptual\Chrisella Road Realigned Roadway.dwg Layout: Alternative C

May 4, 2021





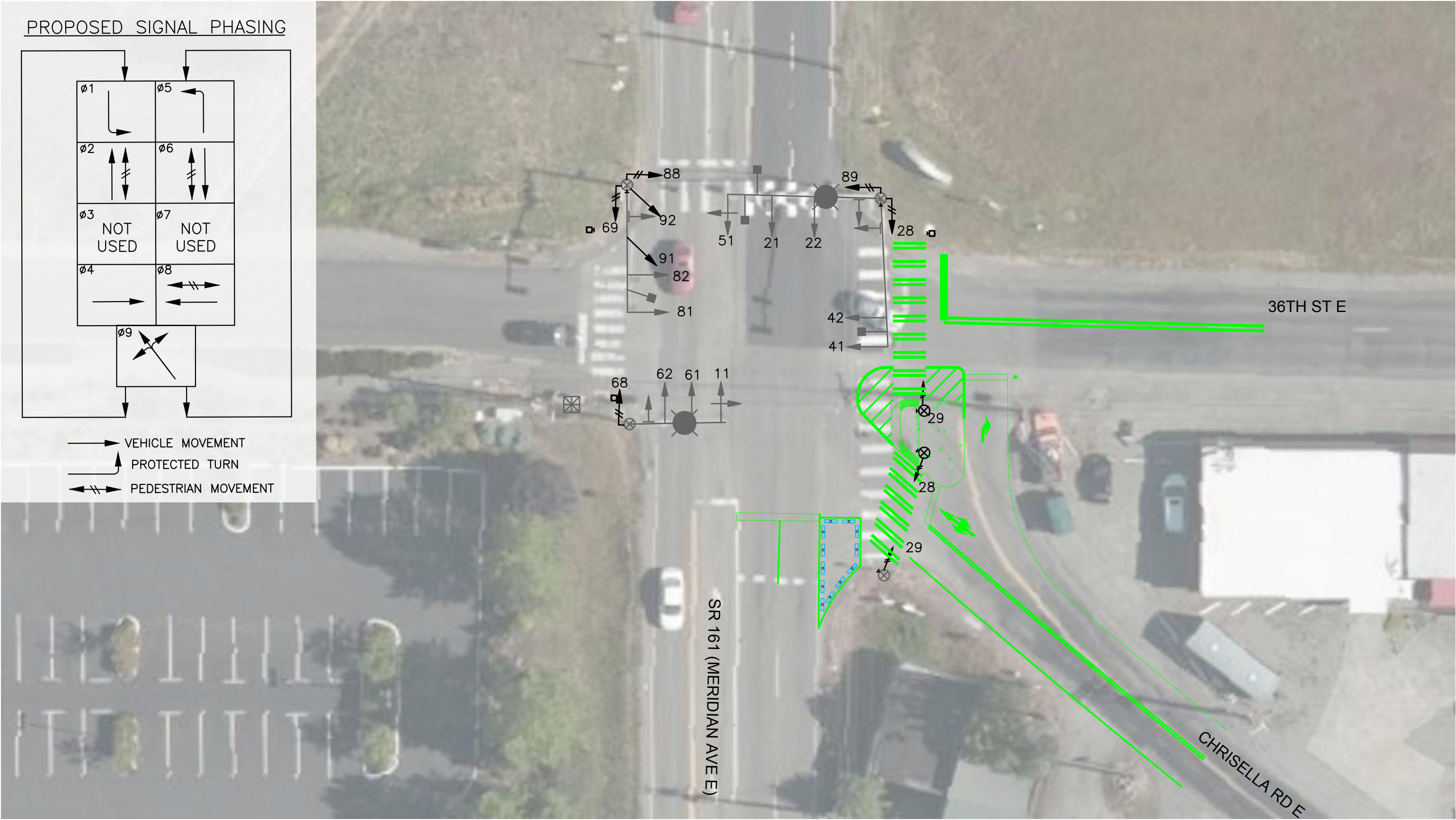
LEGEND	
DESCRIPTION	SYMBOL
RIGHT-OF-WAY	<div></div>
PROPOSED FEATURE	<div></div>

Alternative 3
SR 161/Meridian Ave E & 36th St E - Roundabout Concept - 5-Leg Option

April 23, 2021

FIGURE
2

City of Edgewood On-Call



Alternative 4 - Chrisella Rd E / 36th St E / SR 161 (Meridian Ave E) Traffic Signal Modification Concept

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March 12, 2021



FIGURE

3