TRANSIGHT CONSULTING, LLC
Transportation Engineering and Planning Services

Date:	May 31, 2024
To:	Andrea Riner, Lincoln City Casey Knecht, PE, ODOT Region 2
From:	Joe Bessman, PE
Project Reference No.:	1881
Project Name:	Lincoln City Mental Health Housing/Clinic Transportation Impact Analysis

This memorandum is intended to address the City's Transportation Impact Analysis requirements for the proposed Mental Health Housing and Clinic. This report follows the Transportation Scoping Report and discussions with City and ODOT staff. The project site is located west of the US 101/NE Devils Lake Road intersection, with a property address of 4225 N Highway 101 (map tax lot 071102B00100000). The location of the site is shown in Figure 1 for area context.

Figure 1. Site Vicinity Map. *Source: Lincoln County GIS.*

The site is zoned and designated within the City's Comprehensive Plan as *General Commercial (C-1),* which allows the proposed clinic and mental health housing uses outright.

PROJECT CONTEXT

The proposed development will replace an existing single-family home that is located within the site. The property is located along a slope, increasing in elevation by about 30 feet from the highway toward the subdivision that is located north of the property and toward the undeveloped lands to the immediate west, beyond which is the Lighthouse Square retail center. On the opposite side of the highway directly south is the Wildflower Grill and a Farmers Insurance office. The topography of the area is steeply graded from the north toward Devils Lake, with the grade of the Wildflower Grill approximately 8- to 10-feet below the grade of US 101.

As initially proposed, the development was planned to retain the existing residential driveway access from onto US 101. The existing driveway was present prior to January 1, 2014 and is *presumed to be permitted.* This driveway location is situated where the grades are less steep, but is offset from the Wildflower Grill access. The trip generation potential of the project does not trigger ODOT's Change of Use criteria (as contained within OAR 734-051-3020), but sight lines are a concern for this site (Intersection Sight Distance and Stopping Sight Distance) as they are limited by the adjacent grades and vegetation. Intersection sight distance dimensions as identified within OAR 734-051-4020 (Standards and Criteria for Approval of Private Approaches) are not met at the existing residential access today, so efforts were made to improve sight lines to conform with ODOT requirements as further detailed within this report, and the driveway was relocated to align with the Wildflower Grill, which requires more substantial grading modifications as the access shifts into the steeper hillside, but improves internal queue storage.

In addition to the access relocation, improvements will also be required along the property frontage, including sidewalks and bicycle lanes as outlined within the adopted Transportation System Plan. Regrading the hillside to provide these roadside elements, along with supplemental vegetation trimming and removal will also benefit sight lines, extending the clear vision triangles available within the driveway vicinity. As the driveway is being shifted east to align with the Wildflower Café, staff considers the connection a "new access to US 101" thereby elevating the report to a formal Transportation Impact Analysis. The elevation of the report from a trip generation letter to a formal traffic study requires an operational assessment of US 101 and review of left-turn lane warrants to further assess whether additional capacity-based improvements are required. As any intersection serving more than 10 peak hour trips will meet the minimum volume thresholds for a left-turn lane, these criteria will be met at the access, and the design team has developed a revised layout that now incorporates a left-turn lane along US 101 into the frontage design, as shown in Figure 2 and further discussed within this report.

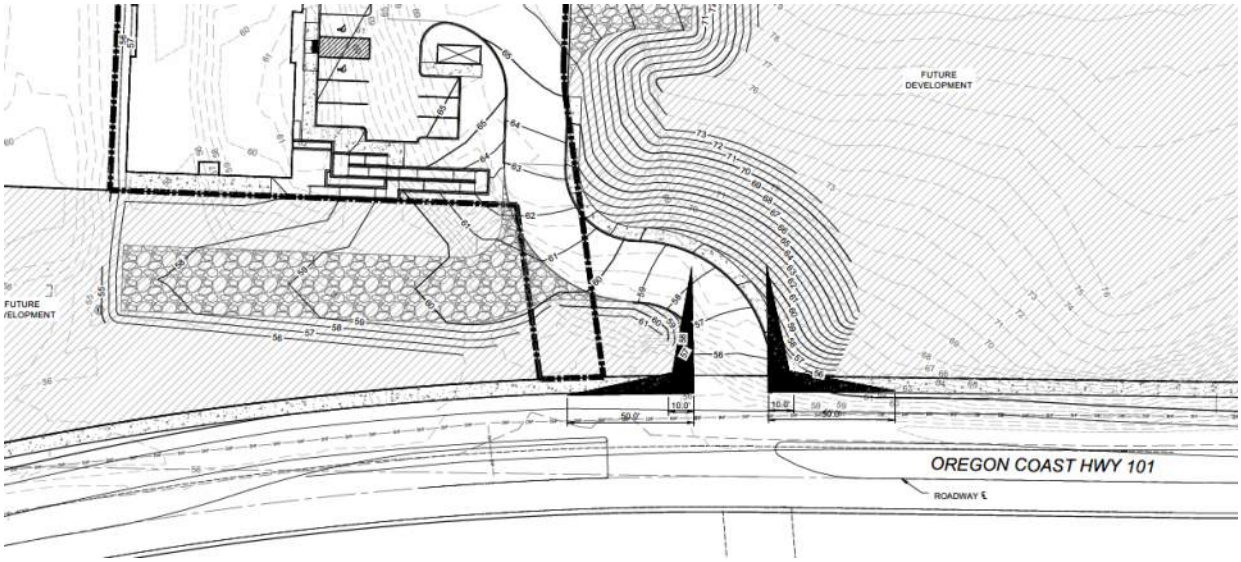

Figure 2. Proposed US 101 improvements. *Source: Akana Preliminary Grading Plan.*

PROPOSED DEVELOPMENT PLAN

The development plan for this property includes subdividing the property into three separate tax lots, as shown in Figure 3 (the specific boundaries will be revised to accommodate the access modifications). The southwestern tax lot, which will be the first access point encountered after exiting the highway, will include an approximately 5,000 square-foot clinic. A surface parking area will be graded onto this site providing approximately 23 perpendicular parking stalls.

Parcel 2, located north of the clinic will include a 24,000 square-foot building supporting 28 housing units for severe and persistent mental care. The residents of this housing do not drive, and the consolidated parking (approximately 17 to 20 stalls) shown in the preliminary site layout are provided for staff, service trips, and visitors.

Parcel 3 is provided for a future multifamily site within approximately 1.49 acres. This site contemplates development with approximately 30 to 40 multifamily units, with the specific unit count pending detailed design plans. The tentative plans include about 57 parking stalls with a "T" turnaround design at the eastern terminus (not pictured), but further refinement of the specific unit and parking layout will occur in the future. For purposes of this transportation assessment, the maximum contemplated density of 40 units will be assumed within a 2-3 story (low-rise) building.

Figure 3. Preliminary Site Layout. *Source: Open Concept Architecture*

TRIP GENERATION

Consistent with City policy, trip generation estimates were prepared for the development based on the most current edition of the Institute of Transportation Engineers' (ITE) standard reference *Trip Generation, 11th Edition.* Credits for the existing single-family residence were applied to these estimates. For the proposed uses, the following ITE Land Use classifications were assigned:

> ***ITE 630 - Clinic:*** A clinic is a facility that provides limited diagnostic and outpatient care but is unable to provide prolonged in-house medical and surgical care. A clinic may have a lab facility and supporting pharmacy but typically does not have the equipment and medical personnel available at an urgent care site. A clinic typically offers a wide range of services which makes it distinct from a medical office building that typically houses specialized or individual physicians.
>
> ***ITE 223 – Affordable Housing (Special Needs):*** Affordable housing includes all multifamily housing that is rented at below market rate to households that include at least one employed member. Eligibility to live in affordable housing can be a function of limited household income and resident age. Land Use Subcategory Data are presented for three subcategories for this land use: (1) sites with income limitations for its tenants (denoted as income limits in the data plots), (2) sites with both minimum age thresholds and income limitations for its tenants (denoted as senior in the data plots), and (3) sites designed for and occupied by residents with special needs, such as persons with physical and mental impairments, single mothers, recovering addicts and others living in a group setting.

As noted in the description, the proposed land use classification is a specialized form of affordable housing. This subset of ITE data is limited to sites that are located within *Dense Multi-Use Urban* areas rather than the *General Suburban/Urban* setting that this site in Lincoln City would be more accurately described with. The trip rates provided within this report were increased using the trip ratio between multifamily housing within these two varying settings, resulting in trip rates that are approximately 70% higher than those reported in the ITE manual.

> ***ITE 220 – Multifamily Housing (Low-Rise):*** Low-rise multifamily housing includes apartments, townhouses, and condominiums located within the same building with at least three other dwelling units and that have two or three floors (levels). Various configurations fit this description, including walkup apartment, mansion apartment, and stacked townhouse.
>
> - A walkup apartment typically is two or three floors in height with dwelling units that are accessed by a single or multiple entrances with stairways and hallways.
> - A mansion apartment is a single structure that contains several apartments within what appears to be a single-family dwelling unit.
> - A fourplex is a single two-story structure with two matching dwelling units on the ground and second floors. Access to the individual units is typically internal to the structure and provided through a central entry and stairway.
> - A stacked townhouse is designed to match the external appearance of a townhouse. But, unlike a townhouse dwelling unit that only shares walls with an adjoining unit, the stacked townhouse units share both floors and walls. Access to the individual units is typically internal to the structure and provided through a central entry and stairway.

Table 1 shows the overall trip generation estimates for the site.

Table 1. Estimated Trip Generation (Source: *ITE Trip Generation, 11th Edition*)

Land Use	ITE Code	Size (Units)	Weekday Daily Trips	Weekday PM Peak Hour		
				Total	In	Out
Trip Credits (Existing Uses)						
Primary Dwelling Unit *Single-Family Detached Housing*	210	-1 Unit	-9 *9.43 Trips/Unit*	-1 *0.94/Unit*	-1 *63%*	0 *37%*
Proposed Uses						
Clinic *Average Rate Equation*	630	5,000 SF	188 *37.6/KSF*	18 *3.69/KSF*	6 *30%*	12 *70%*
Affordable Housing *(Special Needs)*[1]	223	28 Residents	31 *0.79*1.7/Res*	2 *0.05*1.7/Res*	1 *50%*	1 *50%*
Multifamily Housing (Low-Rise) *Average Rate Equation*	220	Up to 40 Units	270 *6.74/Unit*	20 *0.51/person*	13 *63%*	7 *37%*
Total Trips			**480**	**39**	**19**	**20**

[1] The area setting for Affordable Housing (Special Needs) is only available for dense urban areas. These values were adjusted using the weekday p.m. peak hour trip generation ratio of multifamily housing within General Urban/Suburban settings (0.51/unit) to Dense Urban (0.30/unit), or a factor of 1.7.

TRIP DISTRIBUTION AND ASSIGNMENT

Trips from the site will be reliant on the US 101 highway system as the only connection to the public street network. Based on review of historical traffic counts within Volume 2 of the City's Transportation System Plan, it is expected that travel from the site will follow similar patterns to those experienced at West Devil's Lake Road, with about 65 percent of the site-generated trips traveling to and from the west and 35 percent traveling to the east. Figure 4 illustrates the estimated trip distribution pattern and assignment at the site access driveway onto US 101.

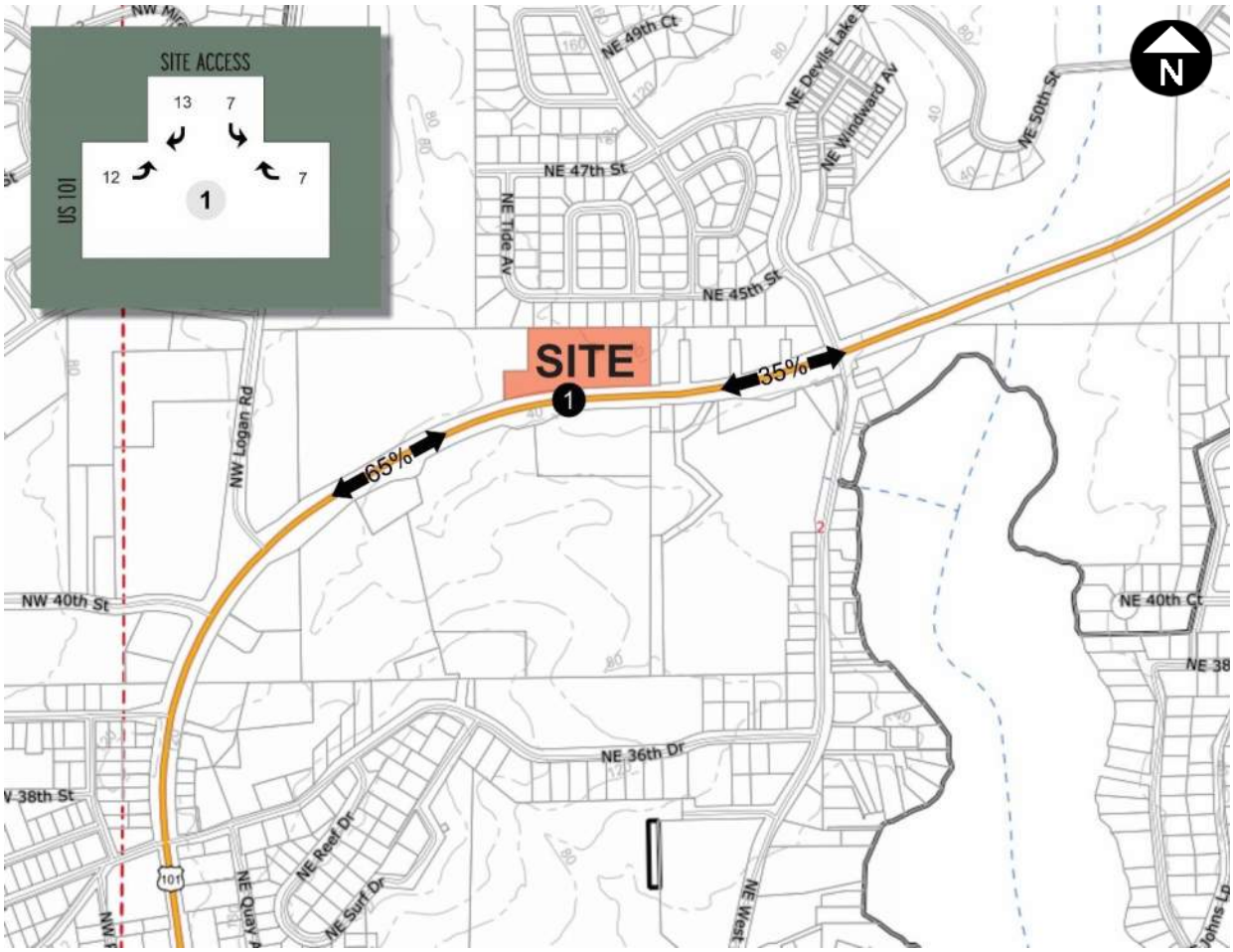

Figure 4. Estimated trip distribution and assignment, weekday p.m. peak hour.

The trip generation and assignment shows 25 site-generated trips traveling to and from the west and 14 site-generated trips headed to and from the east. ODOT TIA guidelines indicate that study intersections include locations that are impacted by more than 50 weekday p.m. peak hour trips (and Lincoln City has no identified significance thresholds), so the study area of this TIA only includes the site access connection to US 101.

HISTORICAL SAFETY REVIEW

A safety review was conducted based on review of historical crash data as well as field observations of the site. The most recent five years of crash data available within the ODOT Crash Analysis Reporting System (CARS) database extends from January 2017 through December 2021 (2022 data was recently

released but remains preliminary). In Oregon, crashes that are required for reporting involve at least one motor vehicle and result in $2,500 or more in property damage (increased from $1,500 in 2018), or any level of personal injury.

The crash records indicate that there have been seven crashes in the five-year review period adjacent to the project, as described below. None of these crashes appear to have been attributable to the existing residential driveway onto the property.

- A single-vehicle fixed-object crash was reported in December 2021 at 2:00 p.m. The crash records indicate that the motorist was inattentive and struck a street sign or utility pole. The database further indicates that the motorist was improperly using the median or shoulder. The collision resulted in minor injuries.
- A rear-end collision was reported in June 2021 at 11:00 a.m. The crash records indicate that one motorist was stopped in traffic when they were struck. The crash was not investigated by police and no injuries were reported.
- A rear-end collision was reported at noon on November 22, 2019. The crash records cite that a non-contacting vehicle was involved in the collision, with careless driving and inattention cited as crash causes. The collision resulted in minor/possible injuries.
- A non-injury turning movement crash was reported at 9:00 p.m. on August 2, 2017 when an inbound motorist headed toward the Wild Flower Grill failed to yield the right-of-way.
- A sideswipe collision was reported on September 17, 2017 at 10:00 a.m. The collision involved two vehicles traveling in the same direction. The collision resulted in minor/possible injuries.
- A rear-end collision occurred at 11:00 a.m. on August 16, 2019. The crash records cite a non-contact vehicle that led to the collision. Only minor/possible injuries were reported.
- A rear-end collision was reported at 11:00 a.m. on March 6, 2021 that resulted in minor/possible injuries. This crash also cited a non-contact vehicle as the precipitating event.

The reported crashes are primarily rear-end collisions, which are likely attributable to congested area conditions on US 101, although it was noted that only three of the collisions occurred during the peak summer travel months. Based on preliminary review, it appears that trimming and removal of vegetation around the horizontal curve could help improve sight lines and driver expectation. The TSP does identify intersection improvements on the highway at West Devils Lake Road and Logan Street, which could help alleviate queuing in the area. It was also noted that the site frontage is not included within ODOT's Safety Priority Index System (SPIS).

AASHTO Intersection Sight Distance

The shared access to the site will connect to US 101 along flat section of US 101 with horizontal curvature. Sight distance information and requirements are based both on the standard reference *A Policy on Geometric Design of Highways and Streets, 7th Edition* published by the American Association of State Highway and Transportation Officials (AASHTO) in 2018, commonly referred to as the *Green Book,* and on ODOT's separate guidance for sight distance. Intersection sight distance was field reviewed at the critical highway connection in September 2023 to ensure that the site can adequately support the AASHTO recommended sight distances as well as those identified within Division 051.

For minor-street stop-control intersections onto a two-lane highway, intersection sight triangles are based on AASHTO guidance cited within Condition B2 (right-turn from minor road) of the *Green Book*. All distances are measured from a vertex point located 14.5 feet from the major-road travel way along the center of the approaching travel lane, accounting for comfortable positioning distance from the travel way (6.5 feet) and the distance from the front of the vehicle to the driver eye (8.0 feet). The assumed eye

height is 3.5 feet above the departing road for passenger vehicles. The object height is also 3.5 feet above the major road, providing enough space on the approaching vehicle to recognize it. As widening of the highway is planned to accommodate a new left-turn lane into the site, these dimensions increase for left-turns to reflect the wider crossing distance to enter the northbound US 101 travel lane, as shown in Figure 5.

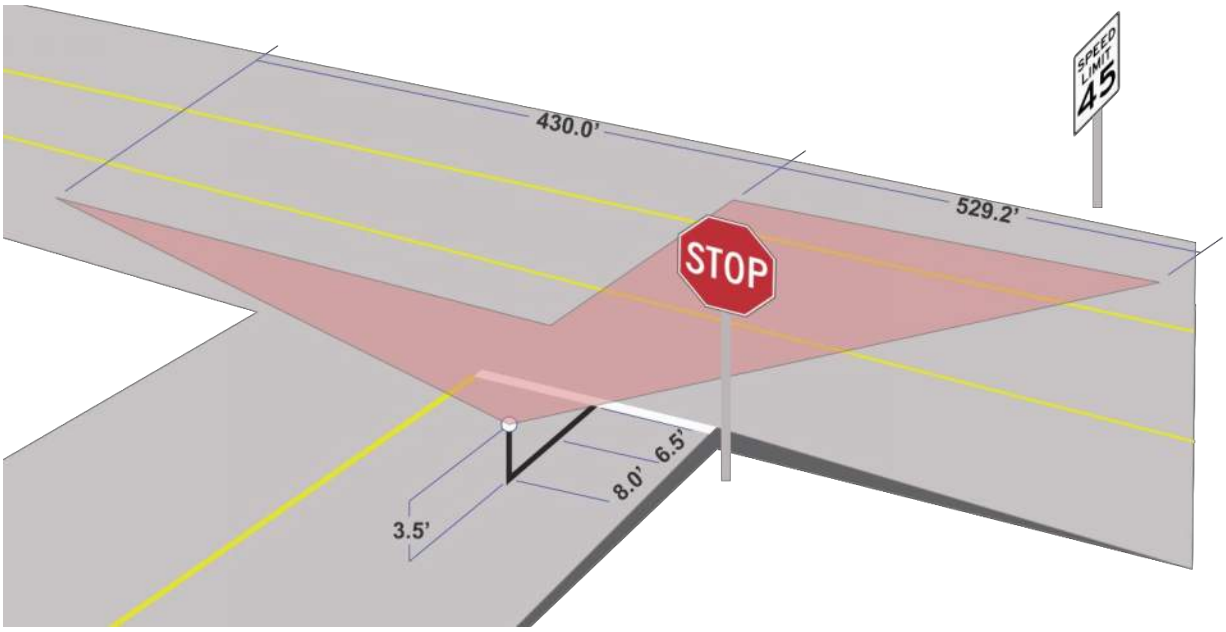

Figure 5. Recommended Intersection Sight Distance onto US 101 with widening for a three-lane section.

Figures 6 and 7 illustrate the current sight lines onto the highway and sight lines from the relocated access. For approaching northbound US 101 vehicles (views from the driveway toward the southwest) this distance is reached just beyond the southern edge of the Lighthouse Square entrance, and for approaching southbound US 101 vehicles this dimension is reached just beyond the eastern edge of the Farmers Insurance building.

Figure 6a. Existing view from the residential driveway facing toward northbound US 101. The figure shows that the full width of the Lighthouse Square access is visible; trimming of vegetation within highway right-of-way along the curve and relocation of the tourist information sign would be necessary to provide the recommended 530-foot AASHTO-recommended sight distance.

Figure 6b. Realigned access location facing toward northbound US 101. The spring 2024 figure shows filtered views are available past the ODOT tourist guide sign, but these views could still be improved through vegetation trimming.

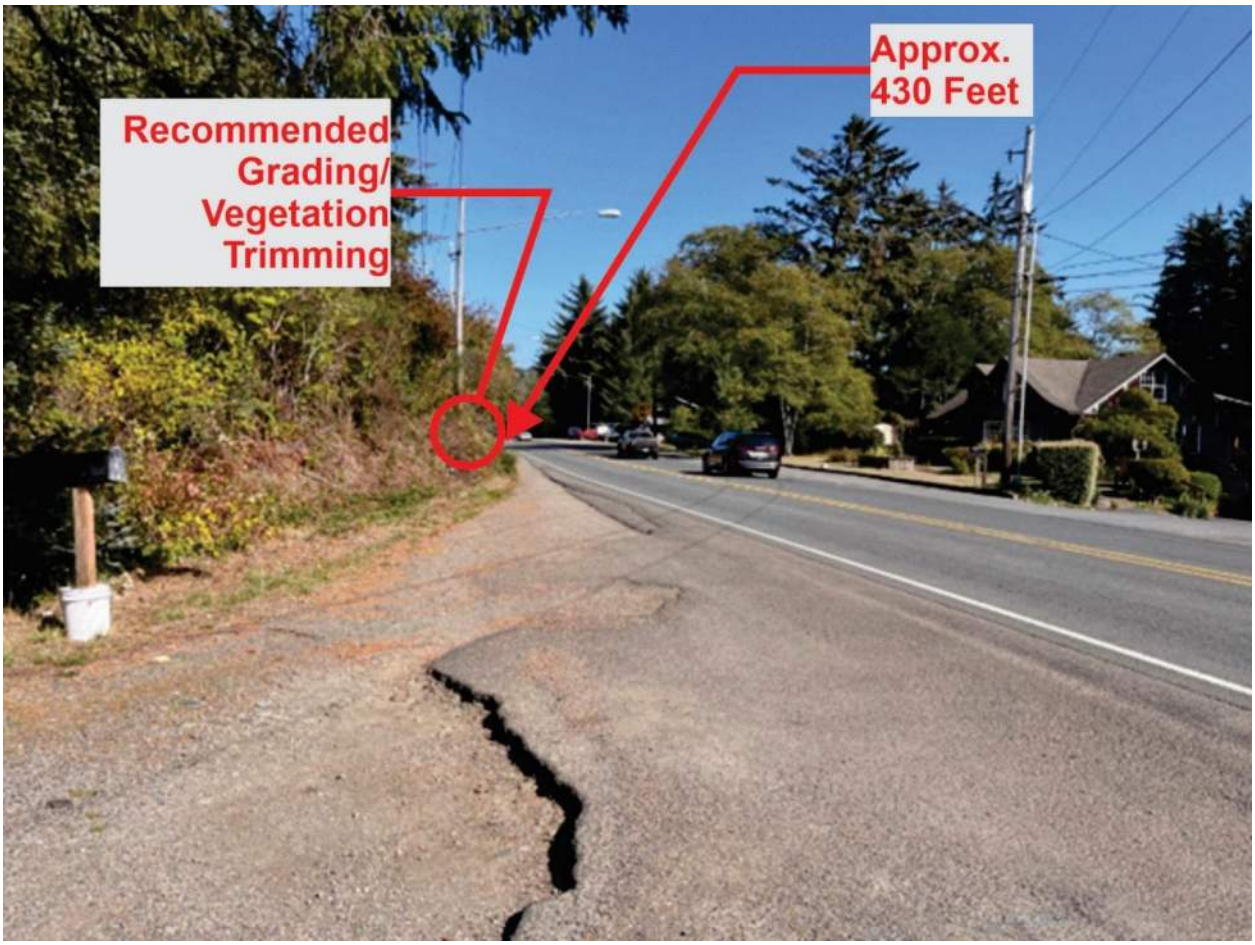

Figure 7a. Existing view of southbound US 101. The shows that the embankment limits existing sight lines, and minor trimming and/or grading could be beneficial in further improving these views.

Figure 7b. View toward Southbound US 101 from the realigned access showing that regrading of the hillside will be required to obtain adequate sight lines. Regrading and widening will occur to support the new left-turn lane and sidewalks along US 101 as part of site frontage improvements.

The existing sight lines from the realigned access will require modifications to the adjacent hillside and trimming/removal of vegetation. The location of the proposed access on the outside of the curve will provide better sight lines than those of the opposing Wildflower Grill access, and as urbanization occurs throughout this portion of US 101 it is recommended that the City and ODOT consider changes in the posted speed to reflect the urbanizing environment.

ODOT Intersection Sight Distance

ODOT provides more stringent intersection sight distance dimensions than the national AASHTO publication within its access requirements contained in OAR 734-051-4020, and for a road with a posted speed of 45 miles per hour ODOT requires assessment of an "assumed design speed" of 55 miles per hour (under the premise that some vehicles will travel faster than the posted speed). In adopting the AASHTO sight distance requirements ODOT recreated and re-labeled the AASHTO intersection sight distance table, and with the relabeling of the table there is confusion as to which dimension applies for the right-turn maneuver (exiting right-turns facing toward southbound US 101 traffic).

While all ODOT publications reference AASHTO standards (including ODOT Table 2 within Division -051, the Highway Design Manual, and the Analysis Procedures Manual), common practice within ODOT Region 2 is to apply the left-turn dimension to both the left- and right- directions. Based on discussions with ODOT's Transportation Planning and Analysis Unit this appears to be a common (and conservative)

simplification. The intent of the table, whether on a one-way or two-way road, is to distinguish how many lanes need to be crossed to establish the appropriate time gap for left- and right-turn maneuvers, with dimensions for left- and right-turns separately calculated as identified within AASHTO and referenced within the Table 2 footnotes. A left-turn onto a one-way highway does not require crossing any lanes, and similarly, a right-turn onto a two-way highway also does not require crossing any lanes. While the table was written to account for all the highway configuration permutations, it could have been simplified by directly referencing AASHTO or identifying dimensions where "no lanes" are crossed instead of labeling the right-turn dimension a "One-Way Highway" with its actual description buried within footnote 4.

While a sight distance approach of applying the left-turn dimension in both directions also provides (conservatively) acceptable sight distances, within constrained areas (such as the proposed site) this can mistakenly indicate that sight lines are inadequate when they do comply with the standards, or otherwise require excessive mitigation through regrading or construction of retaining walls. This often includes cascading impacts onto other properties and structures.

Table 2. Existing Intersection Sight Distance (per OAR 734-051-4020, Table 2)

Direction	ODOT Minimum Recommendation (55 mph Design Speed, 3-Lane Section)	Available Sight Distance	Acceptable Today?
Facing Left (Toward Southbound US 101)	530 Ft	Limited by Hillside	✗
Facing Right (Toward Northbound US 101)	650 Ft	~550 feet (Filtered View)	✗

Table 2 shows that the current sight lines will require mitigation to address intersection sight distance at the proposed access point. Based on review of aerial photos, whether at the current access location or a realigned connection approximately 60-feet east to the Wildflower Grill, intersection sight distance can comply with ODOT standards through grading modifications along the frontage and within the ODOT right-of-way, as shown in Figure 8. These recommended dimensions have been incorporated into the civil grading and infrastructure plans, and show that with the proposed sidewalks (which are consistent with TSP Project P3) only limited additional grading will be required to meet these recommendations.

Table 1: Financially Constrained and Aspirational Project List

Project #	Project Description	Project Elements*	Estimated Cost (2014 Dollars)	Primary Funding Source**	Package ***
P3	Highway Improvements Segment 1	Install sidewalk along the north side of US 101 from NE West Devils Lake Road to NW Logan Road. Includes the 350' segment on the east side of Logan Road, at the US 101 intersection.	$3,600,000	ODOT	4

Figure 8. TSP Project P3 Description.

Frontage improvements are planned to include a 6-foot shoulder, five-foot landscape swale (where feasible), and 6-foot sidewalk, along with 12-foot travel lanes and a 14-foot center turn lane, retaining the southern shoulder stripe and widening to the north due to the steep grades to the south.

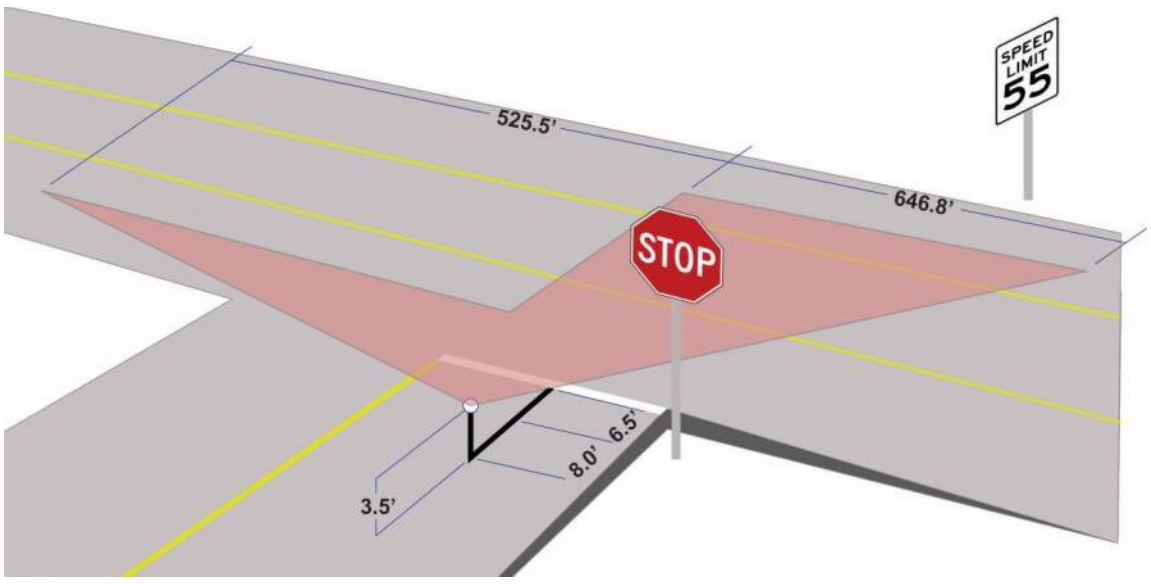

Table 2: Intersection Sight Distance Standards (ISD)[1]

Posted Speed (mph)	Assumed Design Speed[2] (mph)	Two-Way Highway -- Number of Lanes Crossed by Vehicle Making Left Turn from Approach[3]			One-Way Highway[4]
		1 Lane	2 Lanes	3 Lanes	
		ISD (ft)			
20	25	280	295	315	240
25	30	335	355	375	290
30	35	390	415	440	335
35	40	445	475	500	385
40	45	500	530	565	430
45	55	610	650	690	530
50	65	720	765	815	625
55	70	775	825	875	670
60	70	775	825	875	670
65	70	775	825	875	670

[1] Standards in Table 2 are based on the methodology for sight distance calculations for passenger vehicles in the 2011 AASHTO Policy on Geometric Design of Highways and Streets.

[2] Assumed design speed is shown for purpose of correlating generally accepted highway design speeds with posted speeds. If the department establishes a higher design speed for a highway segment, the higher design speed, rather than the assumed design speed, shall be used to determine Intersection Sight Distance (ISD) in accordance with the methodology for sight distance calculations in the 2011 AASHTO Policy on Geometric Design of Highways and Streets.

[3] Left turn made from approach to nearest lane in direction of travel. Number of lanes includes right and left turn lanes and traversable medians. Calculation of ISD in this table is based on the methodology for sight distance calculations in the 2011 AASHTO Policy on Geometric Design of Highways and Streets for left turn from stop-controlled minor road. Four or more lanes require calculation of ISD in accordance with AASHTO procedure.

[4] Left or right turn made to nearest lane in direction of travel. Calculation of ISD in this table is based on 2011 AASHTO Policy on Geometric Design of Highways and Streets methodology for the right turn from stop-controlled minor road. Standards also apply to sections of highway where turning movements are restricted to right turns only by a non-traversable median and to approaches that prohibit left turns from the approach across opposing traffic.

Intersection sight distance is based on approaches , so this means most commonly from opposing (and conflicting directions on the side street) directions under two-way conditions. The APM mentions this and that ISD should be computed on every approach and I would assume that two-way or one-way conditions would apply based on what are the roadway directions available on each approach. The Two-way/left turn is based on turning across a set of lanes going the opposite direction while the “one-way” is about turning into the nearest direction (as per footnote) which could be from the minor street. The footnotes are subtly different and apply to different conditions. The one-way direction appears that it could be on a one-way roadway where a left turn could be done , but also something like a divided highway with separated directions with a raised median where all turns are RIROs makes sense that the “one -way” values are less than the two-way as the overall travel needed across the intersection is less, so I would expect different values for a left turn from a side street versus the right turn. The sight distance triangles for both directions are typically not the same size. Applying the same value for both turns would be conservative (I recall doing it that way long long ago when measuring for sight distance triangles for proposed approaches in the field for driveway permits – this was for a county ,not ODOT). The important thing is that the minimum SSD is still satisfied regardless.

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Figure 9. AASHTO and ODOT Table 2 Intersection sight distance for a 55 mph (three-lane) roadway.

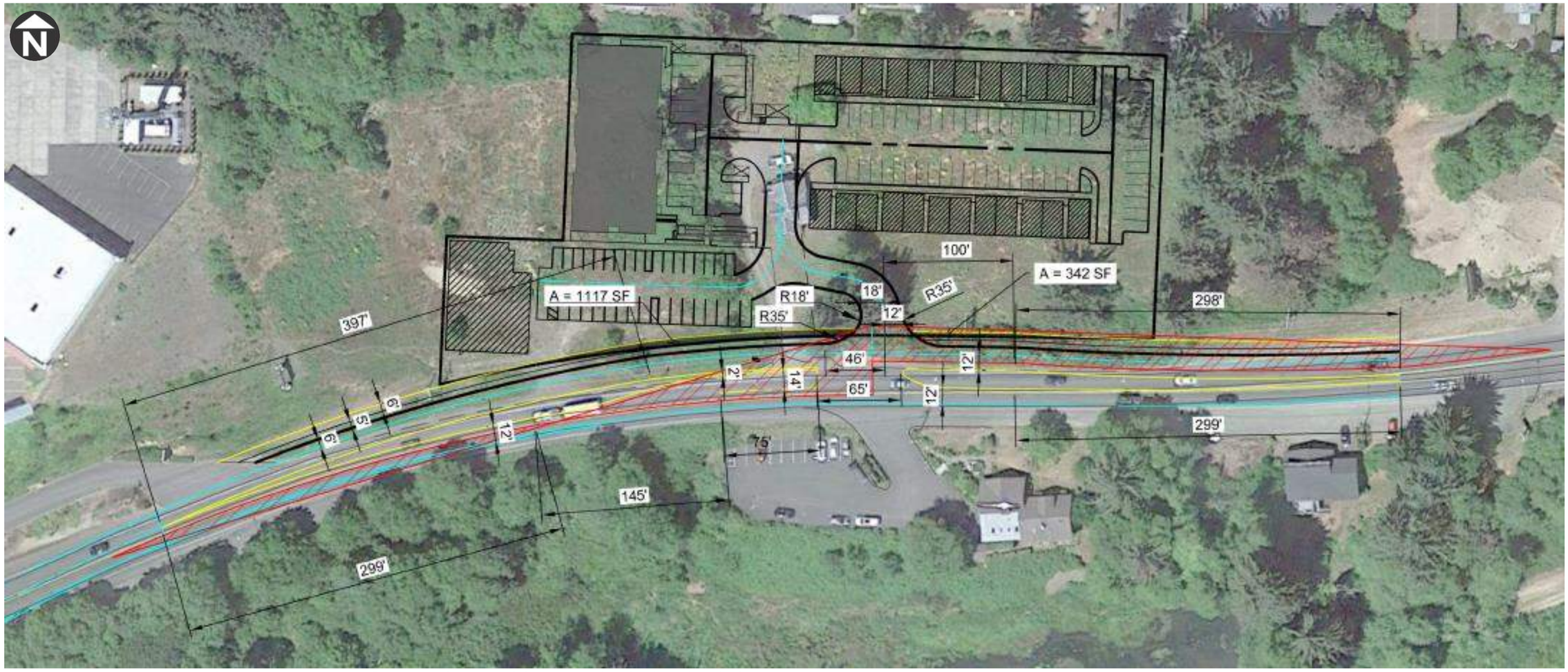

Figure 10. ODOT Intersection Sight Distance Dimensions for a 55 mph assumed design speed and a three-lane highway cross-section. Source: AKANA, May 2024.

Stopping Sight Distance

ODOT Division 051 requires that stopping sight distance be provided equivalent to ten times the posted speed (45 miles per hour). This dimension reflects the ability for a motorist along US 101 to stop for an object or a vehicle. Unlike intersection sight distance, these measurements are taken to the center of the travel lane rather than from a setback position and utilize a 2-foot object height, which is commonly representative of the taillight or headlight height. This requirement results in 450-foot stopping sight distance in either direction of the access. The existing stopping sight distance currently complies with these requirements, though again, with limited margin beyond these minimum recommendations. Figure 11 shows that northbound US 101 travelers situated south of the Lighthouse Square access (a point approximately 500-feet from the driveway is shown in the figure) can see the access, but have their view of motorists and the access filtered by the tourist information sign due to the slight downgrade on the approach. It is recommended that this sign be relocated outside of the horizontal curve to avoid this impact to both intersection and stopping sight distance.

Figure 11. Stopping sight distance from 500’ south of the access. The access is visible, but partially blocked by the tourist information sign.

Table 3. Summary of ODOT Stopping Sight Distance

Direction	ODOT Minimum Recommendation	Available Sight Distance	Acceptable?
Northbound US 101	450 feet	>500 feet	✓
Southbound US 101	450 feet	>500 feet	✓

TRAFFIC STUDY REQUIREMENTS

Lincoln City's Transportation Impact Analysis requirements are contained within Section 17.52.300 of the City's Development Code. This requires elevation of the study in the following circumstances:

- An amendment to the Lincoln City Comprehensive Plan or Zoning Map.
  Response: This does not occur with the subject application.
- A new direct property approach road to US 101.
  Response: Based on ODOT and City guidance, the new access will be shifted approximately 60-feet east of the existing access to directly align with the Wildflower Grill access. While this shift does not benefit sight lines (and requires additional site grading), ODOT considers this realignment beneficial by allowing the consolidation of turning and through movements at a single conflict point. In addition, with the proposed left-turn lane, the Wildflower Grill access will also benefit from the use of a widened (tapering) center median to turn left. While these modifications are intended to benefit the geometry of the connection, Lincoln City has requested that the report be elevated to a formal TIA to demonstrate the safety and adequacy of the intersection.
- Likely generation of 50 or more p.m. peak hour trips on US 101, or 100 or more p.m. peak hour trips on the local transportation system.
  Response: Per the trip generation estimates shown in Table 1, the project does not meet this threshold as it generates less than 50 weekday p.m. peak hour trips.
- An existing or proposed access driveway that does not meet minimum spacing or sight distance requirements, or a driveway located where vehicles entering or leaving the property are restricted, or such vehicles are likely to queue or hesitate at an approach or access connection, thereby creating a safety hazard.
  Response: As addressed within the intersection sight distance/stopping sight distance review, intersection sight distance does not comply with ODOT (or AASHTO) standards today. Mitigation is planned to comply with these requirements, and has been incorporated into the project civil plans.
- A change in internal traffic patterns that may cause safety problems, such as back-up onto the highway or traffic crashes in the approach area.
  Response: These conditions were not identified within the site plan layout. The circulation allows vehicles to park, maneuver, and face forward when entering the highway. The realigned access proposed increases the available queue storage space from the original design.

In addition to these criteria, ODOT has its own separate Change of Use criteria that it applies to properties as outlined within Division 051 for *Change of Use*, as outlined within Oregon Administrative Rule 734-051-3020, which governs changes to a private approach to a state highway. Where a Change of Use occurs, a new application is required for the purpose of permitting connections to a highway.

- The number of peak hour trips increases by 500 trips or more from that of the property's prior use and the increase represents a 20 percent or greater increase in the number of peak hour trips from that of the property's prior use.
  Response: As outlined above, since the site generates only 39 weekday p.m. peak hour trips this criterion is not met.
- The average daily trips increases by five hundred trips or more from that of the property's prior use and the increase represents a twenty percent or greater increase in the average daily trips from that of the property's prior use.

Response: As shown, with the maximum density assumed for Parcel 3 this threshold is not met, with the site producing +480 weekday daily trips in comparison to the existing residence.

- The daily use of a connection increases by ten or more vehicles with a gross vehicle weight rating of twenty-six thousand pounds or greater.
  Response: With the proposed institutional/residential uses there are no anticipated increase in the number of heavy trucks traveling to this site.
- ODOT demonstrates that safety or operational concerns related to the connection are occurring as identified in OAR 734-051-4020.
  Response: ODOT has not identified any safety or operational concerns at the access location, but has noted that grading around the access and removal of vegetation may be required to ensure clear sight lines are provided for site egress. As documented in this report, this is recommended as part of this project.
- Stopping sight distance of ten times the speed limit or the designated posted speed is required.
  Response: The posted speed in the area surrounding the driveway is 45 miles per hour, requiring 450 feet of stopping sight distance which is currently available in both directions. These sight lines can be further improved with vegetation trimming and relocation of the tourist information sign as proposed to meet Intersection Sight Distance.

Based on the criteria identified above, a formal traffic study is required with this application to realign the site access with the Wildflower Grill, as provided within this report.

TRAFFIC COUNTS

Traffic counts were collected at the US 101/Wildflower Grill access connection between 4:00 and 6:00 p.m. on Thursday, April 25, 2024. These counts were collected to reflect typical midweek conditions, and as an off-peak count require seasonal adjustments to reflect peak summertime traffic levels. There are four permanent traffic count stations surrounding Lincoln City; Automatic Traffic Recorder (ATR) 21-007 is situated at W Devils Lake Road, and so is within the immediate project vicinity. The seasonal adjustment table shows that mid-April and mid-May traffic counts are between 26% and 30% lower than peak summertime travel on the highway, with the April 25 count date factored by 29% percent to approximate 30th highest hourly design conditions.

Table 4. ODOT ATR 21-007 (W Devils Lake Road) Seasonal Adjustment Factors

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2022	85	91	97	91	97	108	120	119	109	99	79	77
2021	79	82	98	103	102	116	123	119		90		
2020	89	98	83	60	87	112	128	134	105	110	90	218
2019	79	74	92	89	94	105	118	119	102	90	83	80
2018	77	79	91	94	92	104	120	117	103	90	80	78
Min	77	74	91	89	92	104	118	117	102	90	79	77
Max	85	91	98	103	102	116	123	119	109	99	83	80
Avg	79	80.5	94.5	92.5	95.5	107	120	119	103	90	80	78
Adj	1.52	1.49	1.27	1.30	1.26	1.13	1.00	1.01	1.17	1.33	1.50	1.54

A summary of the manual turning movement counts, without seasonal adjustment factors, are illustrated in Figure 12.

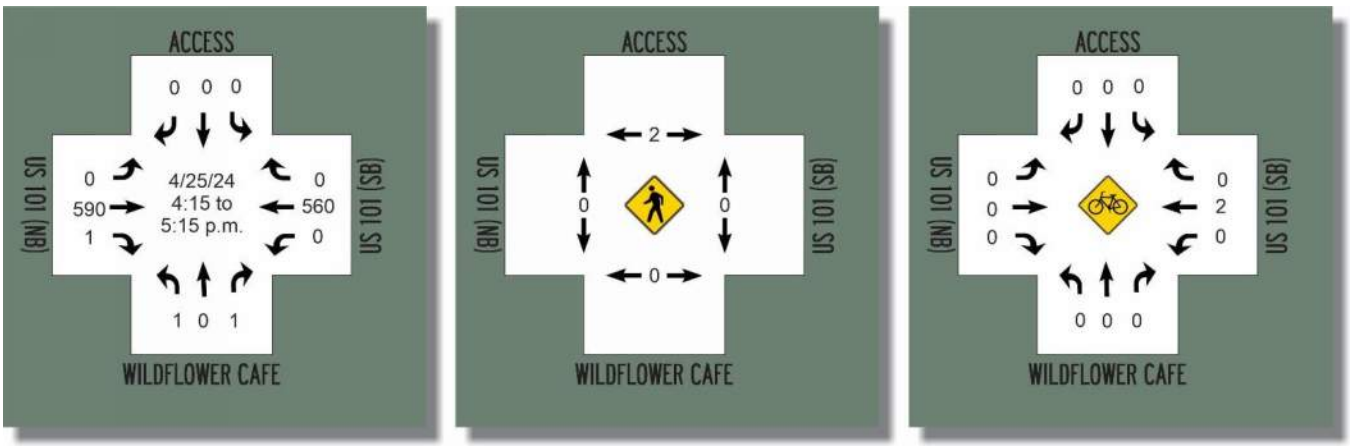

Figure 12. Summary of unadjusted April 25, 2024 traffic volumes, weekday PM peak hour

OPERATIONAL ANALYSIS

An operational analysis was conducted using the Highway Capacity Manual methodologies and Synchro analysis software. The existing conditions operational analysis was conducted using the seasonally-adjusted traffic volumes, and includes an account of trucks, pedestrians, and cyclists.

To develop future volumes, three methodologies were reviewed: 1) historical growth, 2) projected growth, and 3) planned growth, as detailed below.

- Review of historical growth was conducted through recordings of average annual daily traffic trends along US 101 from Automatic Traffic Recorder 21-007 located near W Devils Lake Road. This counter showed 15,983 vehicles in 2009 and 15,986 vehicles in 2022 (the most recent year available), indicative of flat historical growth along US 101 despite the comparison of recession-era volumes and more stable economic conditions.
- Similarly, ODOT's future volume tables shows a 2022 AADT of 17,249 vehicles, and a projected 20-year volume of 17,300 vehicles, again indicative of flat growth.
- In review of the 2015 Transportation System Plan, population projections for Lincoln County indicate about a 7,000-person population increase between 2020 and 2040, with annual near-term population growth of about 0.65%. Growth rates at W Devils Lake Road identified 16% growth between 2009 and 2031, or about 0.68% annual growth. Despite this growth rate, a comparison of existing [2012] and projected [2035] traffic volumes at the W Devils Lake Road intersection (see Figures 13 and 14) showed about a 1.3% annual volume increase.

Based on these various projections, a conservative annual growth rate of 1.0 percent was applied to the roadway system to project future year 2030 conditions.

A summary of the existing (adjusted design hour) and projected year 2030 traffic conditions are summarized in Table 5. This shows that the existing "T" access to the Wildflower Grill operates acceptably today, and in the future with the northern connection to the site. This operations analysis was conducted assuming the existing two-lane highway section within existing and "without project" conditions, and a widened three-lane cross-section along US 101 (as further addressed within this report). The realigned access with the Wildflower Café will provide a single shared lane at its highway connection, so that side-by-side motorists do not further impede the already constrained sight lines.

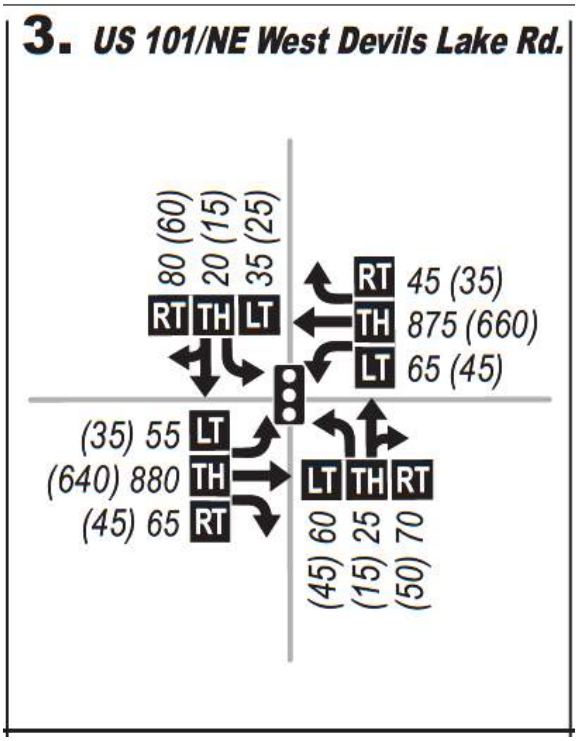

Figure 13. Existing Year 2012 Design Hour Traffic Volumes
Source: Lincoln City TSP.

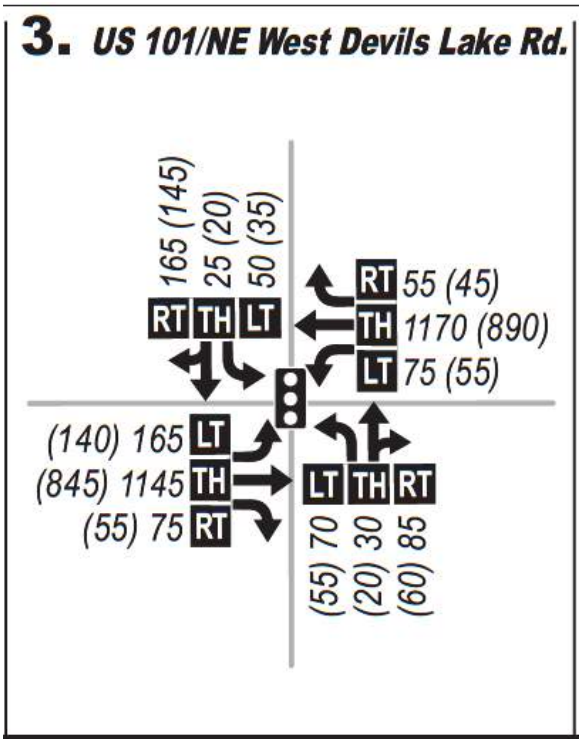

Figure 14. Future Year 2035 Projected Design Hour Traffic Volumes. *Source: Lincoln City TSP.*

Table 5. Summary of Intersection Operations, 30th Highest Design Hour Volumes

Scenario	Performance Standard	Level of Service	Delay (s)	v/c Ratio	95th Percentile Queue	Acceptable?
Existing Conditions	Approach v/c < 0.90	NB: LOS C	NB: 23.8 s	NB: 0.01	NB: 25 ft	Yes
Year 2030 Without Project		NB: LOS D	NB: 26.1 s	NB: 0.01	NB: 25 ft	Yes
Year 2030 With Project		NB: LOS E SB: LOS D EBL: LOS A	NB: 35.0 s SB: 30.7 s EBL: 9.4 s	NB: 0.02 SB: 0.13 EBL: 0.02	NB: 25 ft SB: 25 ft EBL: 25 ft	Yes

As shown in Table 5, with the proposed lane configuration the realigned intersection can operate within acceptable ODOT performance standards during the peak summertime fifteen-minute period through 2030 with limited queues. High delays will be experienced for any left-turn maneuver onto the highway, but the movement will operate well within its carrying capacity and gaps from the nearby traffic signal may help create better operations than the random arrivals shown. With the limited queuing within the left-turn bay, and for a use that generates very few truck trips, minimal queue storage dimensions should be pursued as part of this project for the proposed eastbound left-turn lane along US 101 northbound.

LEFT TURN LANE WARRANTS

Left-turn lane warrants were reviewed using the ODOT methodology. This assessment is premised on the simplified Harmelink curves that were originally prepared by the Texas Transportation Institute, and accounts for the posted speed and turning and conflicting traffic volumes. Essentially, the left-turn lane warrants provide a cost-benefit assessment of whether the potential rear-end crash reductions outweighs the improvement cost. The tradeoff with a new left-turn lane is that it creates a wider intersection, and within a sight-line constrained area it can make it more difficult for left-turns to access US 101 as these movements will have a wider pavement section to cross. Figure 15 illustrates this assessment.

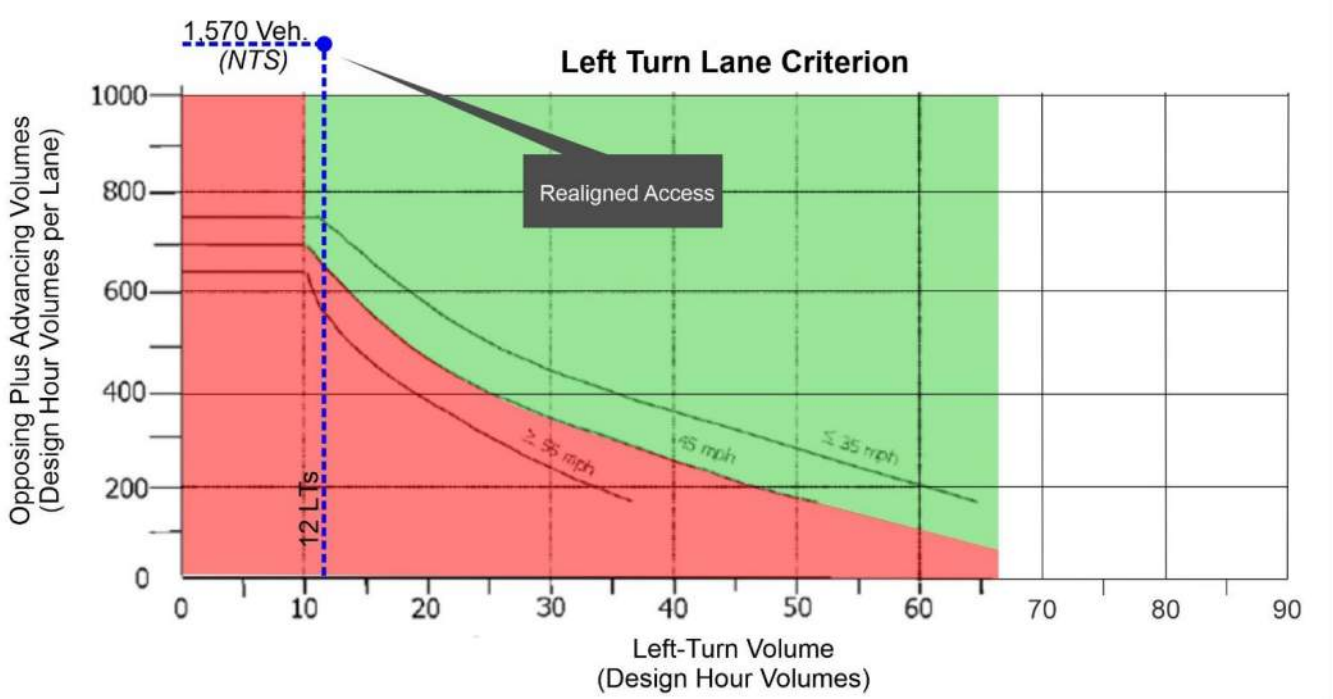

Figure 15. ODOT Left-turn lane warrants at the realigned access, year 2030 "With Project" conditions shown.

As shown, the volumes along US 101 during the peak summer season (and even during April) are very high, so that any intersection with more than 10 left-turns will warrant a turn lane. More critically, this assessment highlights the broader need for a three-lane cross-section along US 101 between Logan Road and W Devils Lake Road, as traffic volumes at many of these businesses can also exceed 10 left-turns within a given hour.

FINDINGS AND RECOMMENDATIONS

This Transportation Impact Analysis was prepared to address impacts associated with build-out of the proposed Mental Health Housing and Clinic. The report shows that the site remains below the adopted trip generation significance thresholds, but the study was elevated to a formal analysis to justify realignment of the existing (presumed to be permitted) residential access to US 101 with the Wildflower Grill, and to address sight distance concerns.

Based on our meetings with City and ODOT staff, the revised site layout includes highway widening for a new left-turn lane along northbound US 101 into the site along with other required frontage improvements, such as shoulder bicycle lanes, a northern sidewalk, and a planter swale (of tapering width

based on right-of-way), which are consistent with the improvements identified in the City's adopted Transportation System Plan. These treatments will also benefit the Wildflower Grill, which will be provided adequate median space to also separate entering from through highway traffic. While this overall system of improvements are complicated by adjacent topography, the improvements build toward City- and ODOT-adopted plans and needs within this area, and show that they can support build-out of the site and provide compliant Intersection Sight Distance and Stopping Sight Distance not only for the posted speed of 45 miles per hour, but for ODOT's presumed design speed of 55 miles per hour.

Thank you for the opportunity to provide these materials, and the collaboration with Lincoln City and ODOT staff. I can be reached at (503) 997-4473 or via email at joe@transightconsulting.com if you have any questions, comments, or feedback on this analysis.

Attachments:

- Traffic Count Worksheets
- LOS Analysis Worksheets
- Conceptual Left-Turn Lane Design (AKANA)

Northbound Street:	Wildflower Café Access
Southbound Street:	Residential Access
Eastbound Street:	US 101 Northbound
Westbound Street:	US 101 Southbound
Count Date:	Thursday, April 25, 2024
Weather Conditions:	Cloudy and Rainy
Counted By:	JWB

All Vehicles	Southbound: Residential Access				Northbound: Wildflower Café Access				Eastbound: US 101 Northbound				Westbound: US 101 Southbound				Total
	SB LT	SB TH	SB RT	U-Turn	NB LT	NB TH	NB RT	U-Turn	EB LT	EB TH	EB RT	U-Turn	WB LT	WB TH	WB RT	U-Turn	
4:00 PM																	
4:05 PM																	
4:10 PM	0	0	0		0	0	0			131				133			264
4:15 PM																	
4:20 PM																	
4:25 PM	0	0	0		0	0	0			148	1			124			273
4:30 PM																	
4:35 PM																	
4:40 PM	0	0	0		0	0	1			149				150			300
4:45 PM																	
4:50 PM																	
4:55 PM	0	0	0		0	0	0			144				133			277
5:00 PM																	
5:05 PM																	
5:10 PM	0	0	0		1	0	0			149				153			303
5:15 PM																	
5:20 PM																	
5:25 PM	0	0	0		0	0	0			127	1			121			249
5:30 PM																	
5:35 PM																	
5:40 PM	0	0	0		0	0	0			135				114			249
5:45 PM																	
5:50 PM																	
5:55 PM	0	0	0		0	0	0			102				100			202

Heavy Vehicles	Southbound: Residential Access				Northbound: Wildflower Café Access				Eastbound: US 101 Northbound				Westbound: US 101 Southbound			
	SB LT	SB TH	SB RT	U-Turn	NB LT	NB TH	NB RT	U-Turn	EB LT	EB TH	EB RT	U-Turn	WB LT	WB TH	WB RT	U-Turn
4:00 PM																
4:05 PM																
4:10 PM										3				0		
4:15 PM																
4:20 PM																
4:25 PM										3				3		
4:30 PM																
4:35 PM																
4:40 PM										2				2		
4:45 PM																
4:50 PM																
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5:00 PM																
5:05 PM																
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5:15 PM																
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5:25 PM										0				2		
5:30 PM																
5:35 PM																
5:40 PM										1				0		
5:45 PM																
5:50 PM																
5:55 PM																

On-Street Bicycles	Southbound: Residential Access				Northbound: Wildflower Café Access				Eastbound: US 101 Northbound				Westbound: US 101 Southbound			
	SB LT	SB TH	SB RT	U-Turn	NB LT	NB TH	NB RT	U-Turn	EB LT	EB TH	EB RT	U-Turn	WB LT	WB TH	WB RT	U-Turn
4:00 PM																
4:05 PM																
4:10 PM																
4:15 PM																
4:20 PM																
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5:50 PM																
5:55 PM																

Pedestrians and Cyclists at Crossings	Pedestrian Crossings			
	Northern Crosswalk	Southern Crosswalk	Eastern Crosswalk	Western Crosswalk
	Residential Access	Wildflower Café Access	US 101 Southbound	US 101 Northbound
4:00 PM				
4:05 PM				
4:10 PM				
4:15 PM				
4:20 PM				
4:25 PM				
4:30 PM				
4:35 PM				
4:40 PM	1			
4:45 PM				
4:50 PM				
4:55 PM				
5:00 PM				
5:05 PM				
5:10 PM	1			
5:15 PM				
5:20 PM				
5:25 PM				
5:30 PM				
5:35 PM				
5:40 PM				
5:45 PM				
5:50 PM				
5:55 PM				

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	749	1	0	711	0	1	0	1	0	0	0
Future Vol, veh/h	0	749	1	0	711	0	1	0	1	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	16965	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	1	0	0	1	0	0	0	0	0	0	0
Mvmt Flow	0	788	1	0	748	0	1	0	1	0	0	0

Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	-	0	0	789	0	0	1537	1537	789
Stage 1	-	-	-	-	-	-	789	789	-
Stage 2	-	-	-	-	-	-	748	748	-
Critical Hdwy	-	-	-	4.1	-	-	6.4	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	5.4	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.4	5.5	-
Follow-up Hdwy	-	-	-	2.2	-	-	3.5	4	3.3
Pot Cap-1 Maneuver	0	-	-	840	-	0	129	117	394
Stage 1	0	-	-	-	-	0	451	405	-
Stage 2	0	-	-	-	-	0	471	423	-
Platoon blocked, %		-	-		-				
Mov Cap-1 Maneuver	-	-	-	840	-	-	129	0	394
Mov Cap-2 Maneuver	-	-	-	-	-	-	129	0	-
Stage 1	-	-	-	-	-	-	451	0	-
Stage 2	-	-	-	-	-	-	471	0	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	23.8
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	194	-	-	840	-
HCM Lane V/C Ratio	0.011	-	-	-	-
HCM Control Delay (s)	23.8	-	-	0	-
HCM Lane LOS	C	-	-	A	-
HCM 95th %tile Q(veh)	0	-	-	0	-

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	795	1	0	755	0	1	0	1	0	0	0
Future Vol, veh/h	0	795	1	0	755	0	1	0	1	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	16965	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	1	0	0	1	0	0	0	0	0	0	0
Mvmt Flow	0	837	1	0	795	0	1	0	1	0	0	0

Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	-	0	0	838	0	0	1633	1633	838
Stage 1	-	-	-	-	-	-	838	838	-
Stage 2	-	-	-	-	-	-	795	795	-
Critical Hdwy	-	-	-	4.1	-	-	6.4	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	5.4	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.4	5.5	-
Follow-up Hdwy	-	-	-	2.2	-	-	3.5	4	3.3
Pot Cap-1 Maneuver	0	-	-	805	-	0	113	102	369
Stage 1	0	-	-	-	-	0	428	384	-
Stage 2	0	-	-	-	-	0	448	402	-
Platoon blocked, %		-	-		-				
Mov Cap-1 Maneuver	-	-	-	805	-	-	113	0	369
Mov Cap-2 Maneuver	-	-	-	-	-	-	113	0	-
Stage 1	-	-	-	-	-	-	428	0	-
Stage 2	-	-	-	-	-	-	448	0	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	26.1
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	173	-	-	805	-
HCM Lane V/C Ratio	0.012	-	-	-	-
HCM Control Delay (s)	26.1	-	-	0	-
HCM Lane LOS	D	-	-	A	-
HCM 95th %tile Q(veh)	0	-	-	0	-

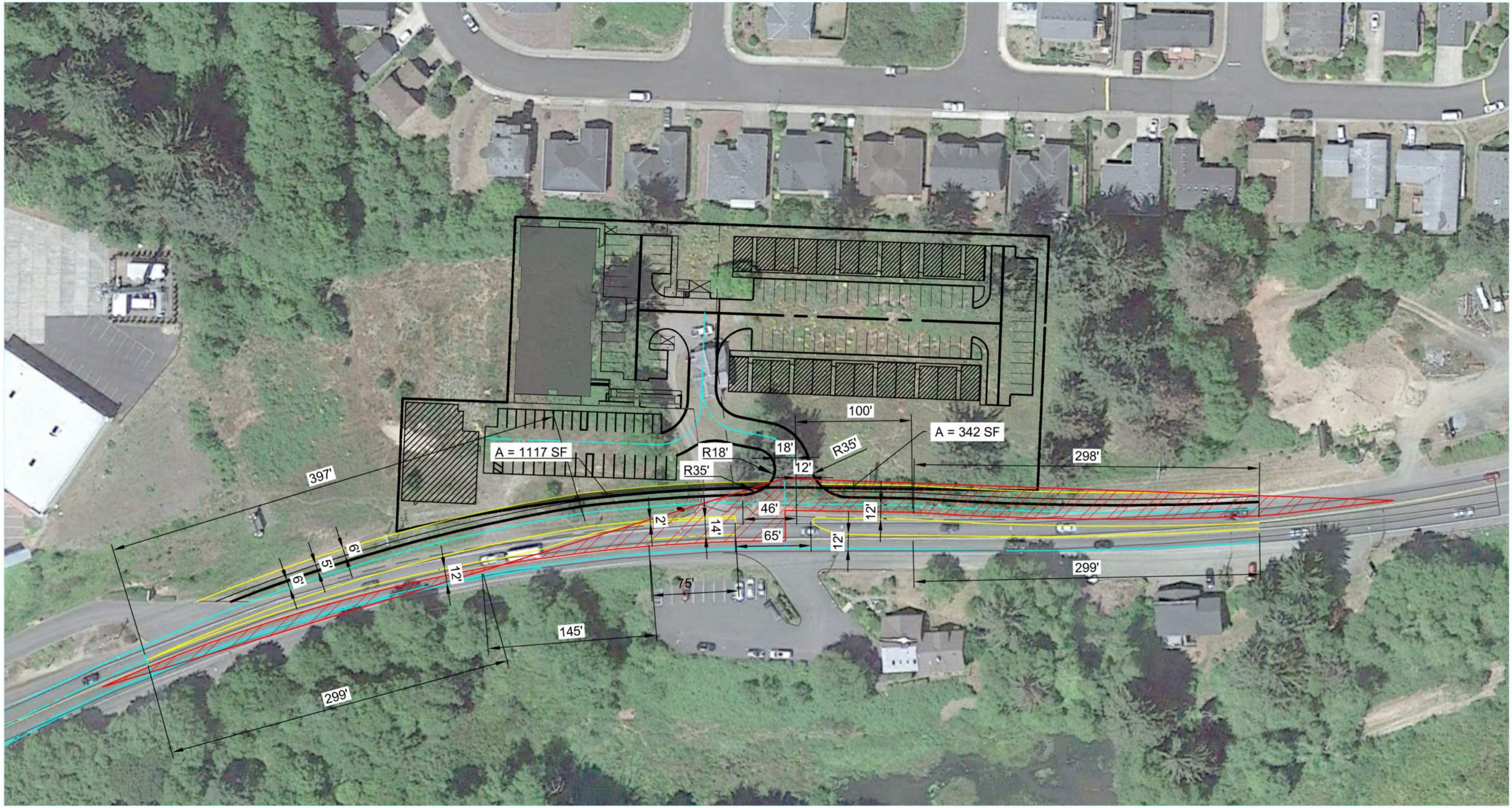
Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	12	795	1	0	755	7	1	0	1	7	0	13
Future Vol, veh/h	12	795	1	0	755	7	1	0	1	7	0	13
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	75	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	1	0	0	1	0	0	0	0	0	0	0
Mvmt Flow	13	837	1	0	795	7	1	0	1	7	0	14

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	802	0	0	838	0	0	1670	1666	838	1663	1663	799
Stage 1	-	-	-	-	-	-	864	864	-	799	799	-
Stage 2	-	-	-	-	-	-	806	802	-	864	864	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	830	-	-	805	-	-	77	98	369	78	98	389
Stage 1	-	-	-	-	-	-	352	374	-	382	401	-
Stage 2	-	-	-	-	-	-	379	399	-	352	374	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	830	-	-	805	-	-	73	96	369	77	96	389
Mov Cap-2 Maneuver	-	-	-	-	-	-	73	96	-	77	96	-
Stage 1	-	-	-	-	-	-	346	368	-	376	401	-
Stage 2	-	-	-	-	-	-	366	399	-	345	368	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0	35	30.7
HCM LOS			E	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	122	830	-	-	805	-	-	161
HCM Lane V/C Ratio	0.017	0.015	-	-	-	-	-	0.131
HCM Control Delay (s)	35	9.4	-	-	0	-	-	30.7
HCM Lane LOS	E	A	-	-	A	-	-	D
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0.4



40 0 40 80
(IN FEET)

PLAN VIEW
SCALE: 1"=80'

DRAFT ODOT FRONTAGE IMPROVEMENTS

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