October 6, 2021

Mr. Jed Morris
Bar X Farms, LLC
8430 Rovana Circle, Suite 100
Sacramento, CA 95828

Focused Transportation Analysis for the Bar X Ranch Cultivation Project

Dear Mr. Morris;

As requested, W-Trans has prepared a focused transportation analysis for the proposed Bar X Ranch Cultivation Project to be located on four parcels at 18655, 19395, 20103 and 20333 SR 29 in the County of Lake. The purpose of this letter is to present an analysis of the potential need for left-turn channelization on SR 29 at the project driveways and an evaluation of the project's transportation impact on Vehicle Miles Traveled (VMT), as required under the California Environmental Quality Act (CEQA). The following analysis was completed in accordance with criteria and methodologies typically accepted by the County of Lake and Caltrans District 1 and is consistent with standard traffic engineering techniques.

Transportation Setting

The study area includes the section of SR 29 along the project frontage. The directionality of SR 29 alternates as the roadway winds its way between the communities of Middletown and Hidden Valley, though the section along the project frontage is mostly oriented north-south. In the project vicinity, SR 29 is a two-lane highway through rolling terrain with a posted speed limit of 55 miles per hour (mph) and a 12-foot travel lane and an eight- to ten-foot shoulder in each direction. Based on count data collected in July 2021 specifically for this analysis, the roadway has an average daily traffic (ADT) volume of approximately 12,950 vehicles, with an a.m. peak hour volume of 740 vehicles and a p.m. peak hour volume of 1,070 vehicles.

Collision History

The collision history for the approximately 2.6-mile section of SR 29 between St. Helena Lane and Grange Road was reviewed to determine any trends or patterns that may indicate a safety issue in the vicinity of the project site. Collision rates were calculated based on records available from the California Highway Patrol (CHP) as published in their Statewide Integrated Traffic Records System (SWITRS) reports. For the most current complete five-year study period for which data is available prior to the COVID-19 public health pandemic between January 1, 2015, and December 31, 2019, there were 37 collisions reported on the study segment, which translates to a calculated collision rate of 0.60 collisions per million vehicles miles (c/mvm). This calculated collision rate was compared to the average collision rate for similar facilities statewide, as indicated in *2016 Collision Data on California State Highways*, California Department of Transportation (Caltrans). The statewide average collision rate for a conventional two-lane highway in a rural environment with a posted speed limit less than or equal to 55 mph and a rolling terrain type is 1.10 c/mvm. Since the study segment has a calculated collision rate well below the statewide average for similar facilities, it appears that the roadway is performing acceptably with regards to safety.

The individual collisions that occurred on the study segment that involved injuries were further reviewed using the Transportation Injury Mapping System (TIMS) database to determine if there are any existing documented safety issues associated with motorists accessing the project driveways. It was determined that there were no injury-related collisions involving motorists turning into or out of any of the three project driveways; however, a fatal collision did occur near the northern project driveway opposite the Glider Port access point. A southbound motorist improperly navigated a horizontal curve and collided head-on with a northbound motorist, which was

fatal for the southbound motorist who was found to be at-fault. A copy of the segment collision rate calculation is enclosed.

Project Description

Bar X Ranch is located on the west side of SR 29 approximately two miles north of the community of Middletown in the unincorporated area of Lake County. As proposed, the project would be constructed in two phases, the first of which would require 10 full-time employees and 120 seasonal laborers. The second phase would be an expansion that would result in 20 full-time employees and 195 seasonal laborers. At buildout, the proposed cultivation operation would occupy approximately 80 acres of the 1,595-acre ranch property; the remainder of the ranch would continue to operate as it currently does for cattle ranching and hay production. The site is served by three existing driveways on the west side of SR 29. All project access would occur at the middle driveway, which is the existing Bar X Ranch main entrance; the north and south driveways would be gated and reserved for emergency access only. All seasonal laborers would be required to vanpool to and from the site.

The proposed employment plan at full buildout and during the peak season is summarized below:

- 10 full-time cultivation employees
- 120 seasonal cultivation laborers
- 10 full-time processing employees
- 75 seasonal processing laborers

The project site plan is enclosed for reference.

Trip Generation

The project site is an existing hay and cattle ranch with employees living on-site. The applicant estimates that the site currently generates about 10 daily trips on average, most of which occur during off-peak hours, though for the purpose of estimating the peak hour trip generation associated with the existing uses, it was assumed that there would be a single round trip during each peak hour, which could represent an employee making a trip to pick up supplies or materials.

The trip generation for the proposed project was estimated for buildout conditions based on the proposed employment count and project-specific characteristics of the operational plan provided. At the request of Caltrans, the trip generation for the peak season was estimated without and with proposed vanpooling measures. To be consistent with studies prepared for numerous other commercial cannabis projects in Humboldt, Sonoma, and Lake Counties, the trip generations for the full-time year-round employees and seasonal employees under the scenario without vanpooling were estimated using standard rates for "General Light Industrial" (Land Use #110) published by the Institute of Transportation Engineers (ITE) in the *Trip Generation Manual*, 10th Edition, 2017. In our experience, application of rates using employees as the independent variable, rather than floor area, is better suited for cultivation and accessory cannabis land uses since these uses generally require a substantially lower number of employees for a given floor area compared to other industrial uses.

The applicant anticipates the need for one daily shipment or delivery during typical operations and two daily shipments or deliveries during the peak season, though these trips would generally not occur during peak hours. While the standard ITE rates applied to the full-time employees and seasonal laborers would be expected to have some level of trucking activity associated with deliveries and shipments of product already included in the rates, this component of the project was broken out separately to be conservative. It is also noted that while some employees would be expected to leave the site for lunch on occasion, there are plans to offer on-site food service in the form of a food catering truck, which would reduce the need for off-site trips.

As shown in Table 1, the proposed project is expected to result in an average of 63 trips per day at buildout during typical operation, with 10 trips during each peak hour. During the peak harvest and processing seasons and without vanpooling for seasonal laborers, the project would result in an average of 660 daily trips with 111 trips during the a.m. peak hour and 106 trips during the p.m. peak hour. When added to the existing trips that would continue to occur at the site, the property would generate 73 daily trips on average during typical operation and 670 daily trips during the peak season.

Table 1 – Buildout Trip Generation Summary (Without Vanpool)

Land Use	Units	Daily		AM Peak Hour			PM Peak Hour		
		Rate	Trips	Trips	In	Out	Trips	In	Out
Existing									
Cattle Ranch & Hay Production	n/a	n/a	10	2	1	1	2	1	1
Proposed Typical Operation									
Full-time Employees	20	3.05	61	10	9	1	10	2	8
Deliveries/Shipments	1	2.00	2	0	0	0	0	0	0
Total Typical Operation Trips			*63*	*10*	*9*	*1*	*10*	*2*	*8*
Proposed Peak Season									
Full-time Employees	20	3.05	61	10	9	1	10	2	8
Seasonal Laborers	195	3.05	595	101	84	17	96	21	75
Deliveries/Shipments	2	2.00	4	0	0	0	0	0	0
Total Peak Season Trips			*660*	*111*	*93*	*18*	*106*	*23*	*83*
Existing + Typical Trips			**73**	**12**	**10**	**2**	**12**	**3**	**9**
Existing + Peak Trips			**670**	**113**	**94**	**19**	**108**	**24**	**84**

As proposed, seasonal laborers would be contracted though a company that specializes in this type of labor during the harvest and processing periods and would arrive to and depart from the site in vans. To estimate the trip generation for this component of the project it was assumed that the vans would have an occupancy of eight seasonal laborers each, which translates to the need for 25 vans based on 195 laborers. These vans would result in one inbound trip each during the a.m. peak hour and one outbound trip each during the p.m. peak hour meaning that the vans would be parked on-site during the workday.

As shown in Table 2, the proposed project is expected to result in an average of 115 daily trips during the peak processing and harvest periods with implementation of the proposed vanpooling measures, including 35 trips during each peak hour. When added to the existing trips that would continue to occur at the site, the property would generate 125 daily trips during the peak season. Vanpooling for seasonal laborers would result in 545 fewer daily trips than without vanpooling.

Table 2 – Buildout Trip Generation Summary (With Vanpool)

Land Use	Units	Daily		AM Peak Hour			PM Peak Hour		
		Rate	Trips	Trips	In	Out	Trips	In	Out
Proposed Peak Season									
Full-time Employees	20	3.05	61	10	9	1	10	2	8
Seasonal Laborers	195	0.26	50	25	25	0	25	0	25
Deliveries/Shipments	2	2.00	4	0	0	0	0	0	0
Total Peak Season Trips			*115*	*35*	*34*	*1*	*35*	*2*	*33*
Existing + Peak Trips			**125**	**37**	**35**	**2**	**27**	**3**	**34**

Trip Distribution

The pattern used to allocate project trips to the street network was based on knowledge of the area and the surrounding region as well as the anticipated travel patterns for the proposed uses at the project site. Employees would be responsible for the largest percentage of project trips and are anticipated to live primarily in the surrounding communities of Middletown and Hidden Valley as well as the City of Clearlake. Given that the County's largest housing base is in Clearlake, a distribution of 60 percent to and from the north on SR 29 and 40 percent to and from the south was applied.

Vehicle Miles Traveled

Traffic impacts under CEQA have traditionally been assessed based on increases in intersection delay, which is measured by Level of Service (LOS). With the passage of SB 743, LOS can no longer be used as a measure to determine traffic impacts under CEQA; instead, these impacts are to be measured based on the VMT generated by a project. Like many other jurisdictions in California, the County of Lake has not yet adopted a policy or threshold of significance regarding VMT so the project-related VMT impacts were assessed based on guidance provided by the California Governor's Office of Planning and Research (OPR) in the publication *Transportation Impacts (SB 743) CEQA Guidelines Update and Technical Advisory*, 2018 as well as information contained within the *Senate Bill 743 Vehicle Miles Traveled Regional Baseline Study* (RBS), Fehr & Peers, 2020, prepared for the Lake Area Planning Council (LAPC).

The OPR Technical Advisory and the RBS identify several criteria that may be used to identify certain types of projects that are unlikely to have a significant VMT impact and can be "screened" from further analysis. One of these screening criteria pertains to "small projects," which are defined as generating fewer than 110 new vehicle trips or 1,393 VMT per typical weekday. This means that for uses which have trip generation characteristics that vary over the course of the year, the annualized average trip generation should be taken into consideration when assessing VMT impacts. Annualized average values are used in other CEQA topic areas including Air Quality and Green House Gas (GHG) emissions analyses, and the State's GHG reduction targets, a primary motivation for the transition away from LOS to VMT-based analysis, are also based on annual averages. While assessment of worst-case seasonal conditions can be relevant for LOS and operational analyses such as queuing, it would be inconsistent with typical VMT practices. This is also supported by the fact that the thresholds recommended in the RBS are based on average VMT data between 2015 to 2018, not peak seasonal data.

As shown in Table 1, buildout of the proposed project is anticipated to result in 63 new daily trips during typical operation and 660 new daily trips during the peak season without vanpooling. However, with vanpooling for seasonal laborers the project would result in 115 new daily trips during the peak season as indicated in Table 2. Accounting for a peak season that occurs for four months out of the year, the annual average daily trip generation

for the project would be 262 trips without vanpooling and 80 trips with vanpooling. The latter falls well below the small project threshold of 110 daily trips. As a result, it is reasonable to conclude that the project can be presumed to have a less-than-significant transportation impact on VMT with implementation of vanpool measures. While use of a vanpool for seasonal laborers is proposed as part of the project, it is recommended that full-time employees also be encouraged to carpool to the site in an effort to further reduce VMT.

Finding – Based on OPR guidance and information contained in the LAPC Regional Baseline Study, the project can be presumed to have a less-than-significant transportation impact on VMT with the proposed vanpool requirement for seasonal laborers.

Recommendation – In addition to vanpooling for seasonal laborers which is proposed as part of the project, it is recommended that full-time employees also be encouraged to carpool to the site in an effort to further reduce VMT.

Vehicle Access

The section of SR 29 adjacent to the Bar X Ranch is designated as an "access-controlled expressway," which means that Caltrans has acquired access rights to parcels adjacent to the highway. The project site has three existing driveways, all on the west side of SR 29. The south driveway is located on a straight segment of roadway at Post Mile (PM) 7.31, though there is a crest vertical curve to the south of the driveway; the middle driveway is located just north of a horizontal curve in the roadway alignment at PM 7.80; and the north driveway is located in the center of a horizontal curve at PM 8.15. The existing driveways do not have left-turn channelization, though an eight- to ten-foot shoulder allows southbound motorists to move out of the travel lane when completing right turns into the site.

Sight Distance

At driveways, a substantially clear line of sight should be maintained between the driver of a vehicle waiting at the crossroad and the driver of an approaching vehicle. Adequate time must be provided for the waiting vehicle to either cross the street, turn left, or turn right, without requiring the through traffic to radically alter their speed. Sight distances along SR 29 at the three project driveways were evaluated using sight distance criteria contained in the *Highway Design Manual* (HDM) published by Caltrans. The recommended sight distances for driveway approaches are based on stopping sight distance with approach travel speed used as the basis for determining the recommended sight distance.

For speeds of 55 mph, the minimum stopping sight distance needed is 500 feet. As contained in a letter from Mr. Jesse Robertson with Caltrans to Mr. Eric Porter with the County of Lake Community Development Department dated July 2, 2021, Caltrans measured sight lines and determined that they extend a minimum of 550 in each direction at all three driveways, which is adequate for speeds in excess of 55 mph. Additionally, adequate stopping sight distances are available for following drivers to notice and react to a preceding motorist slowing to turn right or stopped waiting for an acceptable gap to turn left into any of the driveways, though again motorists are expected to use the roadway shoulders to move out of the travel lane when turning right into the site.

Finding – Existing sight lines are adequate to accommodate all turns into and out of the project driveways.

Left-Turn Lane Warrants

The need for a left-turn lane on SR 29 along the project frontage was evaluated using the methodology from the American Association of State Highway and Transportation Officials (AASHTO), which is typically used by Caltrans District 1. Based on Existing plus Project volumes at full-buildout and during the peak season with proposed vanpooling, 14 vehicles would be expected to make left turns into the site during the a.m. peak hour and one vehicle would be expected to make a left turn into the site during the p.m. peak hour. Using a standard regression

analysis to interpolate between the various threshold values shown in the enclosed AASHTO warrant table, installation of a left-turn lane would not be warranted during the a.m. peak hour even if all left-turns occurred at a single driveway. A sensitivity analysis was performed, and it determined that approximately 32 left turns would be needed during the a.m. peak hour at one driveway in order for the warrant to be met. However, volumes would be sufficient to warrant installation of a left-turn lane during the p.m. peak hour with just a single left turn due to the high advancing volumes on SR 29 during this period. Therefore, installation of a left-turn lane is warranted under existing conditions during the p.m. peak hour without even considering project trips. Copies of the turn lane warrant evaluation worksheets are enclosed.

Since the north and south driveways would be reserved for emergency access only, it is recommended that a single left-turn lane be constructed at the middle driveway and internal access connections be provided throughout the site so that all inbound left turns could occur at one location. Further, a review of roadside conditions indicates that a substantial amount of earthwork would likely be required at the south driveway which may result in other environmental impacts if the improvement were to be made at this location.

Since the proposed project is anticipated to result in few inbound trips during the peak hour for which volumes meet the AASHTO warrant for a turn lane (most p.m. peak hour project trips will be outbound, not inbound), and since there have been no documented historical safety issues associated with motorists accessing the site, it would be reasonable for the project to be allowed to operate prior to completing construction of a turn lane so long as no inbound left turns are made during the p.m. peak hour.

Finding – Installation of a left-turn lane would not be warranted during the a.m. peak hour but is warranted during the p.m. peak hour under existing conditions and would continue to be warranted with the project.

Recommendation – It is recommended that a single left-turn lane be constructed at the middle driveway and internal access connections be provided on-site so that all areas of the property could be reached from the middle driveway. The north and south driveways should facilitate emergency access only, as proposed.

Turn Lane Dimensions

The required dimensions of a left-turn lane were calculated based on design criteria presented in Section 405.2, Left-turn Channelization, of the Caltrans *Highway Design Manual* (HDM). Left-turn lanes on highway facilities should include an appropriate bay taper and deceleration space so that turning vehicles have sufficient space to decelerate as they approach the turn without impacting through traffic. The HDM states that partial deceleration is permitted in the through lane and the design speed for the facility may be reduced by up to 20 mph for design of the deceleration space; however, Caltrans staff has historically indicated that left-turn lanes should be designed assuming that no deceleration would occur in the through travel lane, unless there is an obvious design constraint. Per Table 101.2 of the HDM, a minimum design speed of 70 mph should be applied for expressways in rural areas. For speeds of 70 mph, 615 feet of deceleration space is required, including a 120-foot bay taper.

In a letter dated September 1, 2021 from Mr. Jesse Robertson with Caltrans to Ms. Annje Dodd with Northpoint Consulting Group, Caltrans staff indicated that the design queue for the left turn lane should be based on three vehicles, or 75 feet of stacking length. In order to determine if 75 feet would be sufficient to accommodate the maximum anticipated queue, the two-way stop-controlled intersection queuing methodology developed by the Oregon Department of Transportation was used, as this is the most current widely-used methodology available and has been accepted by Caltrans District 1 when evaluating other projects. Based on existing plus project buildout volumes during the peak season and with no trip reductions for vanpooling in order to reflect worst-case conditions, the maximum queue in the turn lane was determined to be two vehicles during both the weekday a.m. and p.m. peak hours. Therefore, a storage length of 75 feet, or three vehicles, would be adequate. Copies of the queuing calculations are enclosed.

The left-turn lane would need to be designed to include a channelizing line length of 570 feet and a 120-foot bay taper for a total length of 690 feet, including 75 feet for storage and 615 feet for deceleration. If all roadway widening were to occur on one side of the highway then 840 feet of transition would be necessary for realignment, though if widening were to be split evenly on both sides then only 420 feet of transition would be required. Turn lane dimension evaluation worksheets are enclosed for both widening options.

Finding – To meet Caltrans design standards, a left-turn lane on SR 29 would need to include a channelizing line length of 570 feet and a 120-foot bay taper for a total length of 690 feet, including 75 feet for storage and 615 feet for deceleration.

Conclusions and Recommendations

- The study segment of SR 29 between St. Helena Lane and Grange Road had a calculated collisions rate well below the statewide average for similar facilities for the five-year period reviewed, indicating that the roadway is performing acceptably with regards to safety. Further, there were no injury collisions reported involving a motorist turning into or out of the project driveways.

- The proposed project is expected to result in an average of 63 trips per day at buildout during typical operation, with 10 trips during each peak hour. During the peak harvest and processing seasons, the project is anticipated to result in an average of 115 daily trips with 35 trips during each peak hour accounting for seasonal laborers to be shuttled to the site in eight-passenger vans.

- The annualized average daily trip generation for the project with implementation of vanpool measures is expected to be 80 trips, which falls well below the small-project threshold of 110 daily trips; therefore, it is reasonable to conclude that the project can be presumed to have a less-than-significant transportation impact on VMT.

- In addition to vanpooling for seasonal laborers, it is recommended that full-time employees also be encouraged to carpool to the site in an effort to further reduce VMT.

- Based on sight line measurements provided by Caltrans, existing sight lines are adequate to accommodate all turns into and out of the project driveways.

- Volumes would not meet the AASHTO left-turn lane warrant during the a.m. peak hour, but a turn lane is warranted based on existing volumes during the evening peak hour with just a single left turn.

- It is recommended that a single left-turn lane be constructed at the middle driveway and internal access connections be provided on-site so that all areas of the property could be reached from the middle driveway.

- Since the proposed project is anticipated to result in few inbound trips during the peak hour for which volumes meet the AASHTO warrant for a turn lane, and since there have been no documented historical safety issues associated with motorists accessing the site, it would be reasonable for the project to be allowed to operate prior to completing construction of a left-turn lane so long as no inbound left turns are made during the p.m. peak hour.

- To meet Caltrans design standards, a left-turn lane on SR 29 would need to include a channelizing line length of 570 feet and a 120-foot bay taper for a total length of 690 feet, including 75 feet for storage and 615 feet for deceleration.

Thank you for giving W-Trans the opportunity to provide these services. Please call if you have any questions.

Sincerely,

Cameron Nye, EIT
Associate Engineer

Dalene J. Whitlock, PE, PTOE
Senior Principal

DJW/cn/LKX086.L1

Enclosures: Collision Rate Calculation
Site Plan
AASHTO Turn Lane Warrant Thresholds Table
Turn Lane Warrant Worksheets
Queuing Calculations
Turn Lane Dimensions

Roadway Segment Collision Rate Worksheet

Bar X Ranch Cultivation Project

Location: SR 29 - Between St. Helena Ln and Grange Rd

Date of Count: Thursday, August 19, 2021
Average Daily Traffic (ADT): 12,900

Number of Collisions: 37
Number of Injuries: 20
Number of Fatalities: 2
Start Date: January 1, 2015
End Date: December 31, 2019
Number of Years: 5

Highway Type: Conventional 2 lanes or less
Area: Rural
Design Speed: ≤55
Terrain: Rolling/Mountain

Segment Length: 2.6 miles
Direction: North/South

$$\text{Collision Rate} = \frac{\text{Number of Collisions} \times 1 \text{ Million}}{\text{ADT} \times \text{Days per Year} \times \text{Segment Length} \times \text{Number of Years}}$$

$$\text{Collision Rate} = \frac{37 \times 1{,}000{,}000}{12{,}900 \times 365 \times 2.6 \times 5}$$

	Collision Rate		Fatality Rate	Injury Rate
Study Segment	**0.60**	**c/mvm**	**5.4%**	**54.1%**
Statewide Average*	**1.10**	**c/mvm**	**2.5%**	**46.6%**

Notes
ADT = average daily traffic volume
c/mvm = collisions per million vehicle miles
* 2016 Collision Data on California State Highways, Caltrans

COVER SHEET - Bar X Ranch Cultivation

APN: 014-250-(05, 07, 10, 14)

18655 S STATE HIGHWAY 29, MIDDLETOWN, CA

PROPERTY OWNER

Name: LAKE COUNTY NATURAL HEALTH
Address: 8430 ROVANA CIRCLE
SACRAMENTO, CA 95828
Phone: (510) 560-6010
Email:CPRICE@GREENMATTER.COM

APPLICANT

Name: BAR X FARMS LLC
Address: 20333 S. STATE STREET
MIDDLETOWN, CA 95461
Email: JMORIS@GREENMATTER.COM

WELL LOCATIONS

	LATITUDE	LONGITUDE
WELL #1	38°46'05.23" N	122°35'28.41"W
WELL #2	38°46'09.56"N	122°35'49.25"W

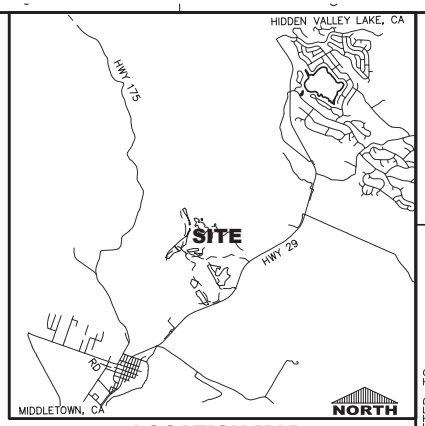
SITE PLAN DATA

A.P.N.	014-250-05	014-250-07	014-250-10	014-250-14
ADDRESS	20103 S STATE HWY 29	19395 S STATE HWY 29	18655 S STATE HWY 29	20333 S STATE HWY 29
AREA OF PROPERTY	2.8 ACRES (AC)	564.9 AC	511.0 AC	515.9 AC
CULTIVATION AREA	N/A	39 ACRES	N/A	36.6 AC
CANOPY AREA	N/A	1,545,000 SF (35.5 AC)	N/A	1,160,000 SF (26.6 AC)
ZONING	RL	RL / A	RL	RL / A

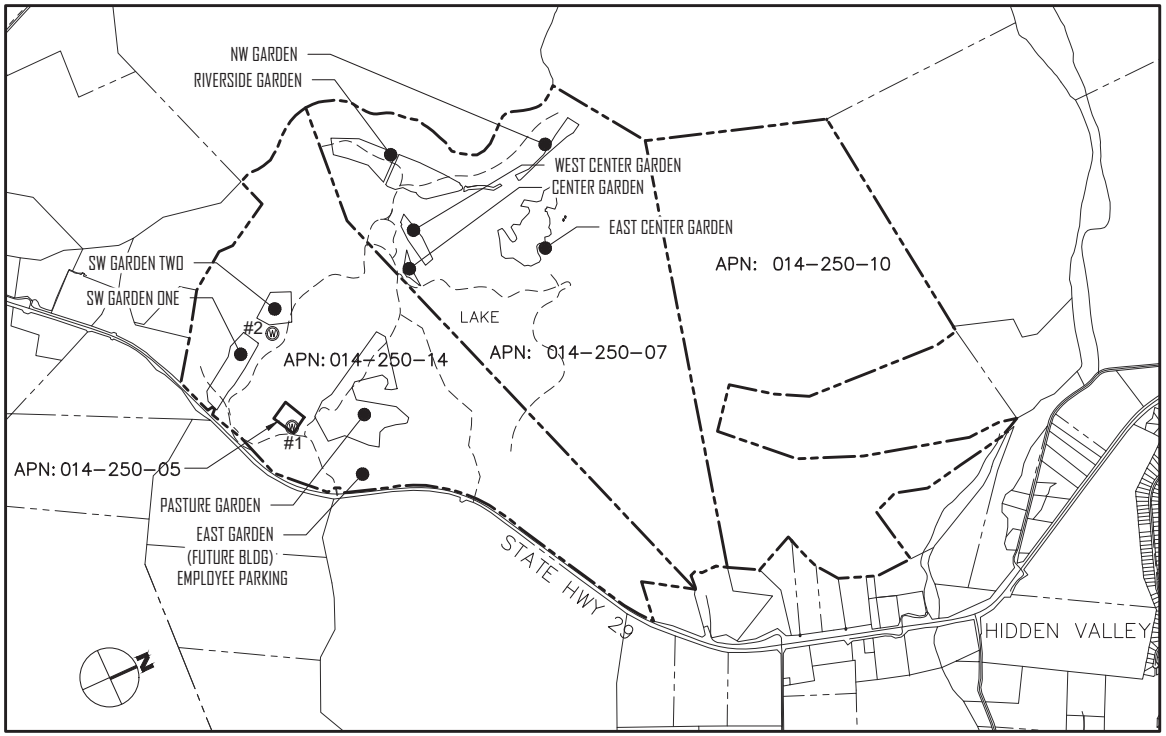
STORMWATER BMPS LEGEND*

- FIBER ROLLS (SE-5)
- SURFACE STABILIZATION (EC-2,6,7,8,15,16)
- SILT FENCE (SE-1)
- ROAD — ROAD/PARKING LOT MGT (SC-40,43,44)
- PILE — STOCK PILE MGT (WE-1, WM-1,3)
- CHEM — CHEMICAL HANDLING BMP (WM-1,2,3,4,5,6)
- SWALE — SWALE MGT (EC-9, SE-6,8,9)
- WASTE — WASTE MANAGEMENT (WM-5,6,7, SC-3,4)
- SED — SEDIMENT TRAP/BASEIN (SE-2,3)
- WATER QUALITY MONITORING LOCATION

* ALL STORMWATER BMPS SHALL BE INSTALLED AND MAINTAINED AS PER CALIFORNIA STORMWATER BMP HANDBOOK.



LOCATION MAP



LOCATION & SITE MAP

0 1000 2000 Feet

LEGEND

- PROPERTY LINE
- CREEKS
- SETBACK LINE
- CULTIVATION FENCE
- CATTLE FENCE
- ACCESS ROAD/DRIVEWAY
- OAK TREE LINE
- E — POWER LINE (E)
- IRRIGATION PIPE (P)
- WELL
- UTILITY POLE (P)
- FIRE HOSE (E)
- TREE (E)
- LANDSCAPING TREE (P)
- STREET LIGHT (P)
- THERMAL CAMERA VIEW SHED (P)
- NON-THERMAL CAMERA VIEW SHED (P)

SITE PLAN INDEX

SUBMITTED TO:
LAKE COUNTY
COMMUNITY DEVELOPMENT DEPT
COUNTY OF LAKE
LAKEPORT, CA

VanDerWall Engineering, Inc.
PO BOX 431
KELSEYVILLE, CA 95451
707-279-4887

COVER SHEET

APN: 014-250-(05, 07, 10, 14)
BAR X RANCH CULTIVATION
MIDDLETOWN, CALIFORNIA

VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

DATE	APR 2021
PROJ	20-49
DWG	
SHEET	1

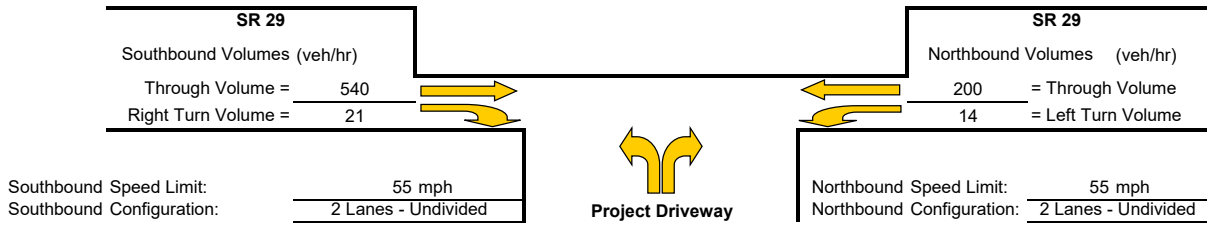
Opposing Volume, VPH	Advancing Volume, VPH			
	5% Left Turns	10% Left Turns	20% Left Turns	30% Left Turns
40-mph Operating Speed				
800	330	240	180	160
600	410	305	225	200
400	510	380	275	245
200	640	470	350	305
100	720	575	390	340
50-mph Operating Speed				
800	280	210	165	135
600	350	260	195	170
400	430	320	240	210
200	550	400	300	270
100	615	445	335	295
60-mph Operating Speed				
800	230	170	125	115
600	290	210	160	140
400	365	270	200	175
200	450	330	250	215
100	505	370	275	240

Table V-1 Warrants for left-turn lanes on two-lane highways. (Source: Ref. 2)

Turn Lane Warrant Analysis - Tee Intersections

Study Intersection: SR 29/Bar X Ranch Driveway
Study Scenario: AM Existing + Project Peak Season Buildout

Direction of Analysis Street: North/South
Cross Street Intersects: From the West



Southbound Speed Limit: 55 mph
Southbound Configuration: 2 Lanes - Undivided

Northbound Speed Limit: 55 mph
Northbound Configuration: 2 Lanes - Undivided

Southbound Right Turn Lane Warrants

1. Check for right turn volume criteria

NOT WARRANTED Less than 40 vehicles

2. Check advance volume threshold criteria for turn lane

Advancing Volume Threshold	AV =	-
Advancing Volume	Va =	561
If AV<Va then warrant is met		-

Right Turn Lane Warranted: **NO**

Southbound Right Turn Taper Warrants
(evaluate if right turn lane is unwarranted)

1. Check taper volume criteria

Thresholds not met, continue to next step

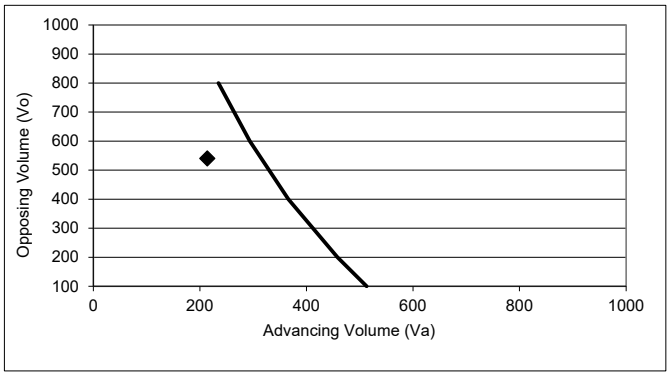
2. Check advance volume threshold criteria for taper

Advancing Volume Threshold	AV =	490
Advancing Volume	Va =	561
If AV<Va then warrant is met		Yes

Right Turn Taper Warranted: **YES**

Northbound Left Turn Lane Warrants

Percentage Left Turns %lt 6.5 %
Advancing Volume Threshold AV 316 veh/hr
If AV<Va then warrant is met



◆ Study Intersection
Two lane roadway warrant threshold for: 55 mph
Turn lane warranted if point falls to right of warrant threshold line

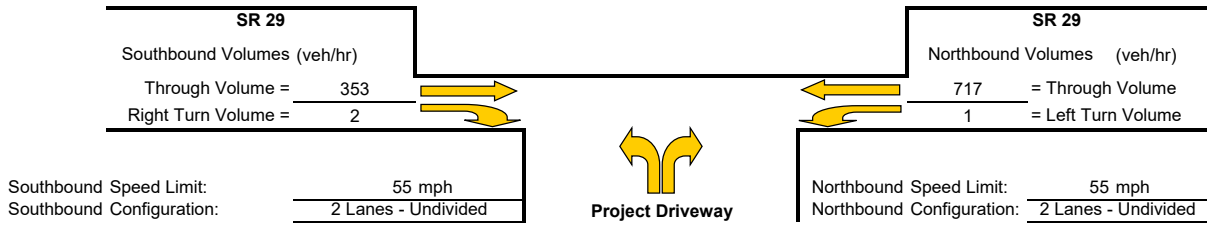
Left Turn Lane Warranted: **NO**

The right turn lane and taper analysis is based on work conducted by Cottrell in 1981.
The left turn lane analysis uses a regression based on work conducted by M.D. Harmelink in 1967, as presented in the California Department of Transportation's Guide of Intersections (1985) and AASHTO's Policy on Geometric Design of Highways and Streets (7th ed.).

Turn Lane Warrant Analysis - Tee Intersections

Study Intersection: SR 29/Bar X Ranch Driveway
Study Scenario: PM Existing + Project Peak Season Buildout

Direction of Analysis Street: North/South
Cross Street Intersects: From the West



Southbound Speed Limit: 55 mph
Southbound Configuration: 2 Lanes - Undivided

Northbound Speed Limit: 55 mph
Northbound Configuration: 2 Lanes - Undivided

Southbound Right Turn Lane Warrants

1. Check for right turn volume criteria

NOT WARRANTED Less than 40 vehicles

2. Check advance volume threshold criteria for turn lane

Advancing Volume Threshold	AV =	-
Advancing Volume	Va =	355
If AV<Va then warrant is met		-

Right Turn Lane Warranted: **NO**

Southbound Right Turn Taper Warrants
(evaluate if right turn lane is unwarranted)

1. Check taper volume criteria

NOT WARRANTED - Less than 20 vehicles

2. Check advance volume threshold criteria for taper

Advancing Volume Threshold	AV =	-
Advancing Volume	Va =	355
If AV<Va then warrant is met		-

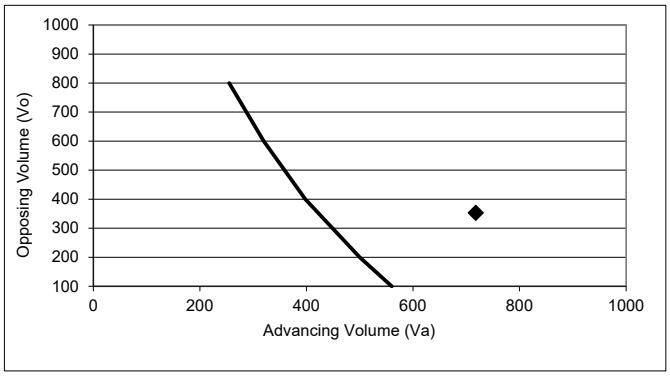
Right Turn Taper Warranted: **NO**

Northbound Left Turn Lane Warrants

Percentage Left Turns %lt 0.1 %

Advancing Volume Threshold AV 422 veh/hr

If AV<Va then warrant is met



◆ Study Intersection

Two lane roadway warrant threshold for: 55 mph

Turn lane warranted if point falls to right of warrant threshold line

Left Turn Lane Warranted: **YES**

The right turn lane and taper analysis is based on work conducted by Cottrell in 1981.
The left turn lane analysis uses a regression based on work conducted by M.D. Harmelink in 1967, as presented in the California Department of Transportation's Guide of Intersections (1985) and AASHTO's Policy on Geometric Design of Highways and Streets (7th ed.).

Queue Length Estimation at Two-Way STOP Controlled Intersection

Project Information

Analyst:	W-Trans	Agency/Co.:	Caltrans
Analysis Time Period:	AM Peak (No Vanpool)	Project ID:	LKX086
Date Performed:	8/20/2021	Scenario	AM Existing + Project
Jurisdiction:	County of Lake		
Intersection:	SR 29/Project Driveway		
East/West Street:	Project Driveway		
North/South Street:	SR 29		

Instructions

Step 1 Input Volumes on **Volumes** sheet

Lane Group Code :			
	MJL	1	Major street separate left turn lane / TWLT
	MNLTR	2	Minor street shared left, through and right lane
	MNLR	3	Minor street shared left, and right lane
	MNL	4	Minor street separate left turn lane
	MNR	5	Minor street separate right turn lane

Step 2 Calculate Input Parameters

Calculate Lane Group Volumes, % Heavy Vehicles, and Conflicting Volumes (2.0% default)

Identify the presence of an upstream signal within 1/4 mile on major approches (Signal, 0 default)

Identify the presence of a separate LT lane / TWLT on major street approaches (LT, 1 default)

Verify the input ranges to feed into the models (see QueueLengthsModels sheet)

Step 3 **Obtain** queue lengths in feet from **Results** column

Note: ***Round off queue lengths to the next highest 25 feet when reporting***

Input							**Results**
Approach	Lane Group, Code	Volume, veh/hr	% Heavy Vehicles	Conflicting Volume,veh/hr	Signal (0 or 1)	Left Turn Lane (0 or 1)	Queue Length Feet
EB	MNLTR	19	2.0%	2256	0	0	**50**
EB	MNLR	19	2.0%	1412	0	0	**50**
EB	MNL	11	2.0%	844	0	0	**75**
EB	MNR	8	2.0%	568	0	0	**50**
WB	MNLTR	0					
WB	MNLR	0					
WB	MNL	0					
WB	MNR	0					
NB	MJL	38	2.0%	596	0	1	**50**
SB	MJL	0					

Queue Length Estimation at Two-Way STOP Controlled Intersection

Project Information

Analyst:	W-Trans	Agency/Co.:	Caltrans
Analysis Time Period:	PM Peak (No Vanpool)	Project ID:	LKX086
Date Performed:	8/20/2021	Scenario	PM Existing + Project
Jurisdiction:	County of Lake		
Intersection:	SR 29/Project Driveway		
East/West Street:	Project Driveway		
North/South Street:	SR 29		

Instructions

Step 1 Input Volumes on **Volumes** sheet

Lane Group Code :			
	MJL	1	Major street separate left turn lane / TWLT
	MNLTR	2	Minor street shared left, through and right lane
	MNLR	3	Minor street shared left, and right lane
	MNL	4	Minor street separate left turn lane
	MNR	5	Minor street separate right turn lane

Step 2 Calculate Input Parameters

Calculate Lane Group Volumes, % Heavy Vehicles, and Conflicting Volumes (2.0% default)

Identify the presence of an upstream signal within 1/4 mile on major approches (Signal, 0 default)

Identify the presence of a separate LT lane / TWLT on major street approaches (LT, 1 default)

Verify the input ranges to feed into the models (see QueueLengthsModels sheet)

Step 3 **Obtain** queue lengths in feet from **Results** column

Note: ***Round off queue lengths to the next highest 25 feet when reporting***

Input							Results
Approach	Lane Group, Code	Volume, veh/hr	% Heavy Vehicles	Conflicting Volume,veh/hr	Signal (0 or 1)	Left Turn Lane (0 or 1)	Queue Length Feet
EB	MNLTR	84	2.0%	2554	0	0	**100**
EB	MNLR	84	2.0%	1457	0	0	**100**
EB	MNL	50	2.0%	1097	0	0	**100**
EB	MNR	34	2.0%	360	0	0	**50**
WB	MNLTR	0					
WB	MNLR	0					
WB	MNL	0					
WB	MNR	0					
NB	MJL	10	2.0%	367	0	1	**50**
SB	MJL	0					

Left Turn Channelization Dimensions

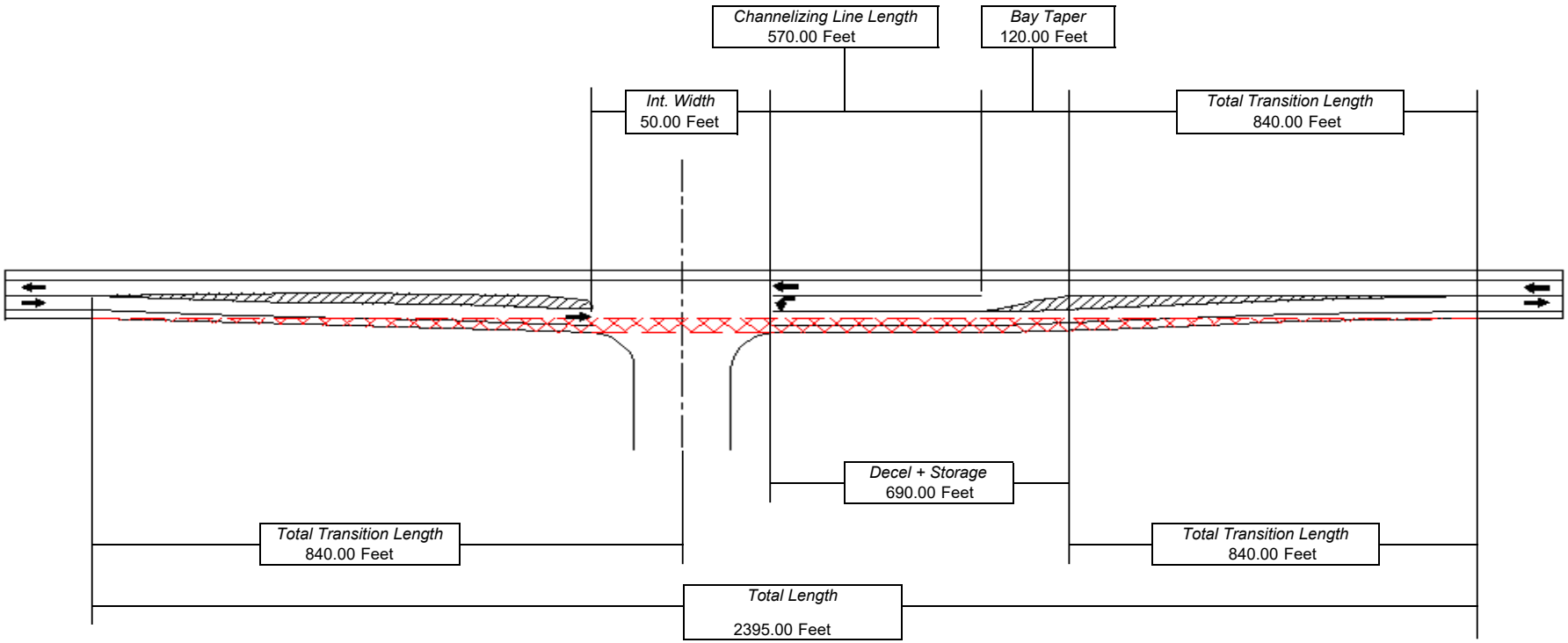
3 Legged Intersection - Widening on One Side for Rural, Semi-Rural and High Speed/Volume Urban Areas

Project Name: **Bar X Ranch Cultivation Project**

Location: **SR 29/Project Driveway**

Design Speed:	70 mph
Turn Pocket Width:	12.0 feet
Design Queue:	3 veh
Decelerate From:	70 mph
Intersection Width: *(Stopline to Stopline)*	50 feet
Bay Taper Length =	120 feet

Stacking Length =	75 feet
Deceleration =	615 feet
Transition =	840 feet
Total Length of Widening =	2395 feet
Area Of Widening=	16740 sf



Left Turn Channelization Dimensions

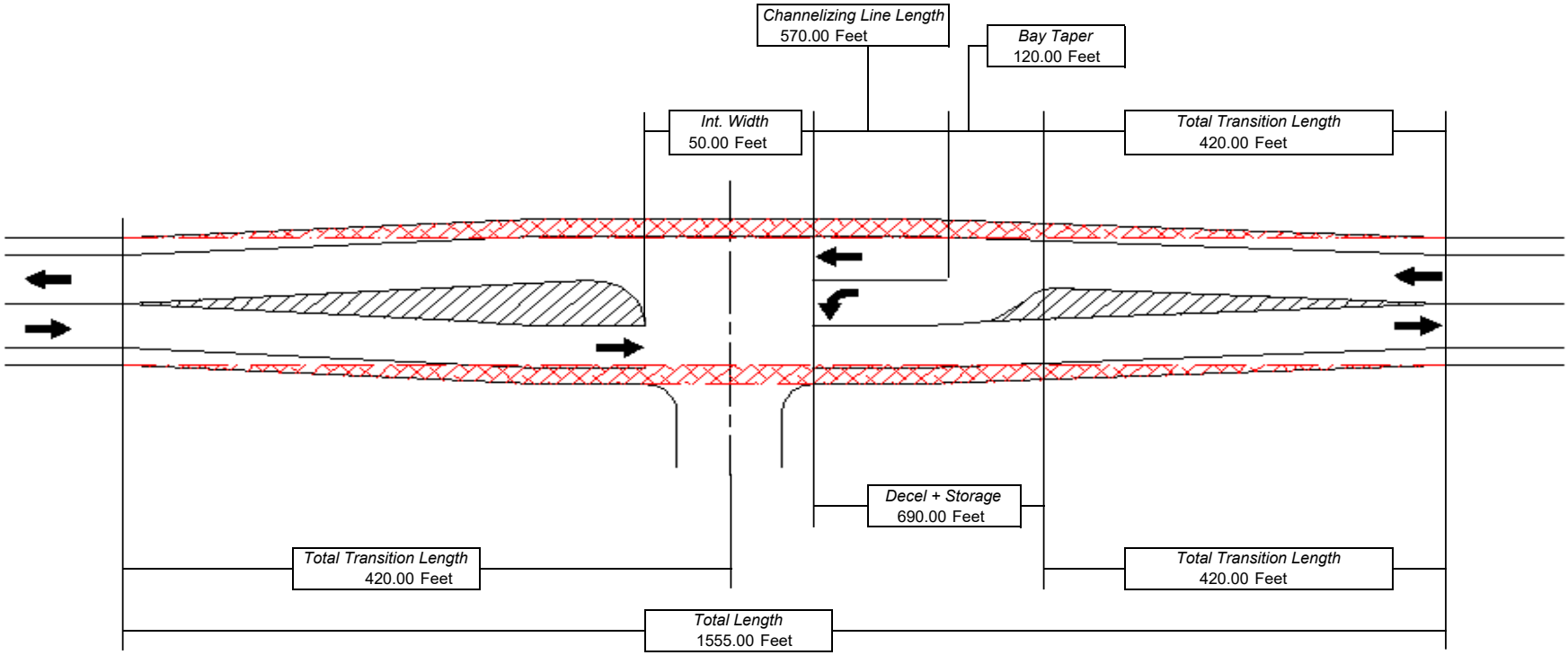
3 Legged Intersection - Widening on Both Sides for Rural, Semi-Rural and High Speed/Volume Urban Areas

Project Name: **Bar X Ranch Cultivation Project**

Location: **SR 29/Project Driveway**

Design Speed:	70 mph
Turn Pocket Width:	12.0 feet
Design Queue:	3 veh
Decelerate From:	70 mph
Intersection Width: *(Stopline to Stopline)*	50 feet
Bay Taper Length =	120 feet

Stacking Length =	75 feet
Deceleration =	615 feet
Transition =	420 feet
Total Length of Widening =	1555 feet
Area Of Widening=	12540 sf



The above calculations are based on the methodologies and criteria contained in Section 405.2 and Figure 405.2A of the Caltrans *Highway Design Manual*.