Appendix F

Strauss Wind 67m Blade Feasibility Assessment

LOGISTICUS
PROJECTS GROUP

Strauss Wind 67m Blade Feasibility Assessment

Performed September 4-8, 2018 by:

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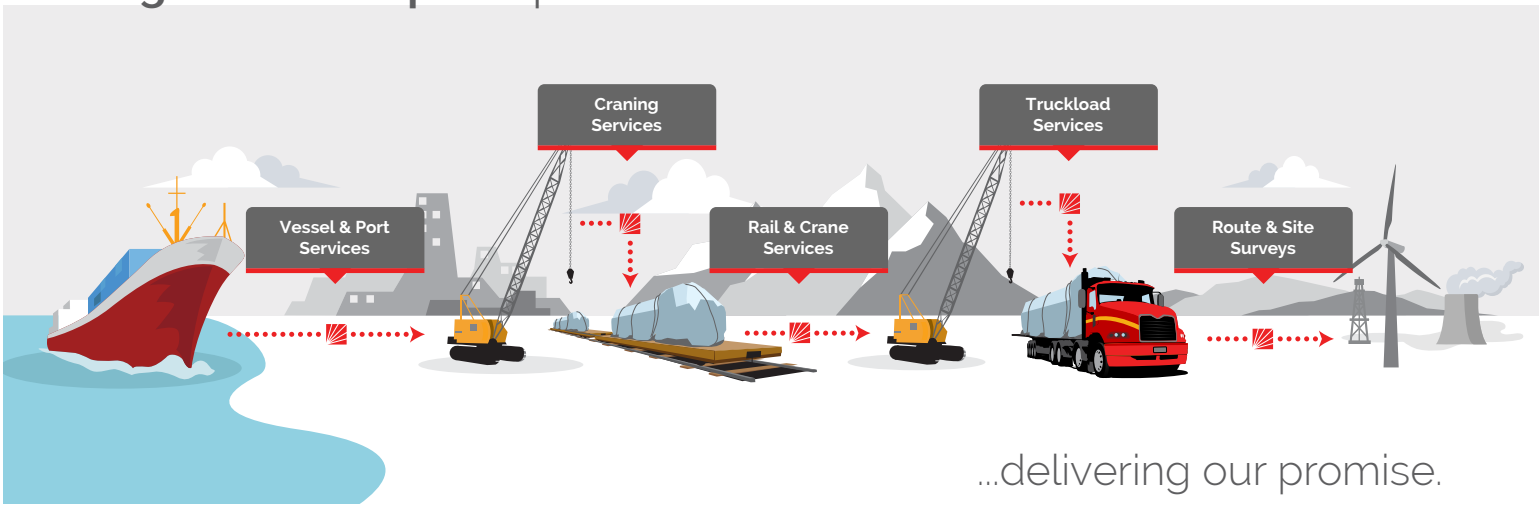
DISCLAIMER: This document is for reference purposes only. All conditions stated within this survey will need to be reverified by transport company before execution of shipment along route described herein. Any road, bridge and/or failure along route that creates damage or delay cost are the responsibility of the shipper. All conditions sited herein are subject to change by controlling agent.

This document is not meant to replace the trucking companies route survey in any way. A secondary audit should be completed 30 days before actual transport to identify any new risk.

Logisticus Group is capable of...



...delivering our promise.

Project Overview

STRAUSS WIND 67M BLADE FEASIBILITY STUDY

Assessment Performed: September 4-8th, 2018
Purpose: GE Renewables has hired Logisticus Group to conduct a transport feasibility assessment for their 137m rotor blade from I-5 at CA-166 to the project site boundary of the Strauss Wind project. The goal of this assessment is to identify risk items along public roads leading up the proposed project site. This document is provided as a reference document only.

Project Name: Strauss Wind
Customer Name: GE
Project Start Date: Q3 2019
Location: Lompoc, CA
GPS Coordinates: 34°34'23.22"N, 120°31'3.08"W
Component Type: 137m Rotor Blade (67m)

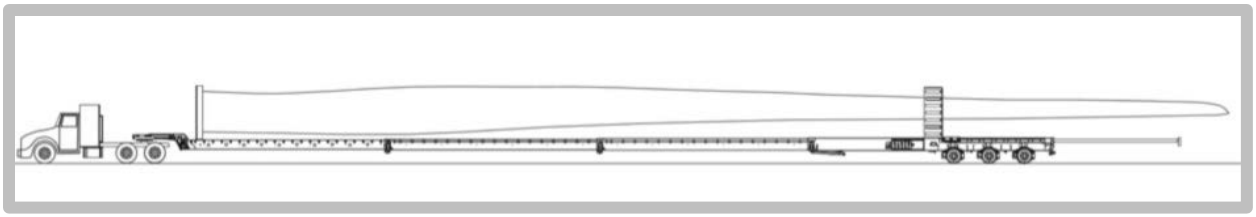
Project Overview continued

DIMENSIONS

GE 137m Rotor Blade			
Weight	Box Length	Box Width	Box Height
17798.96 kg	68.64 m	4.24 m	2.83 m
39240 lbs	225.2 ft	13.9 ft	9.3 ft

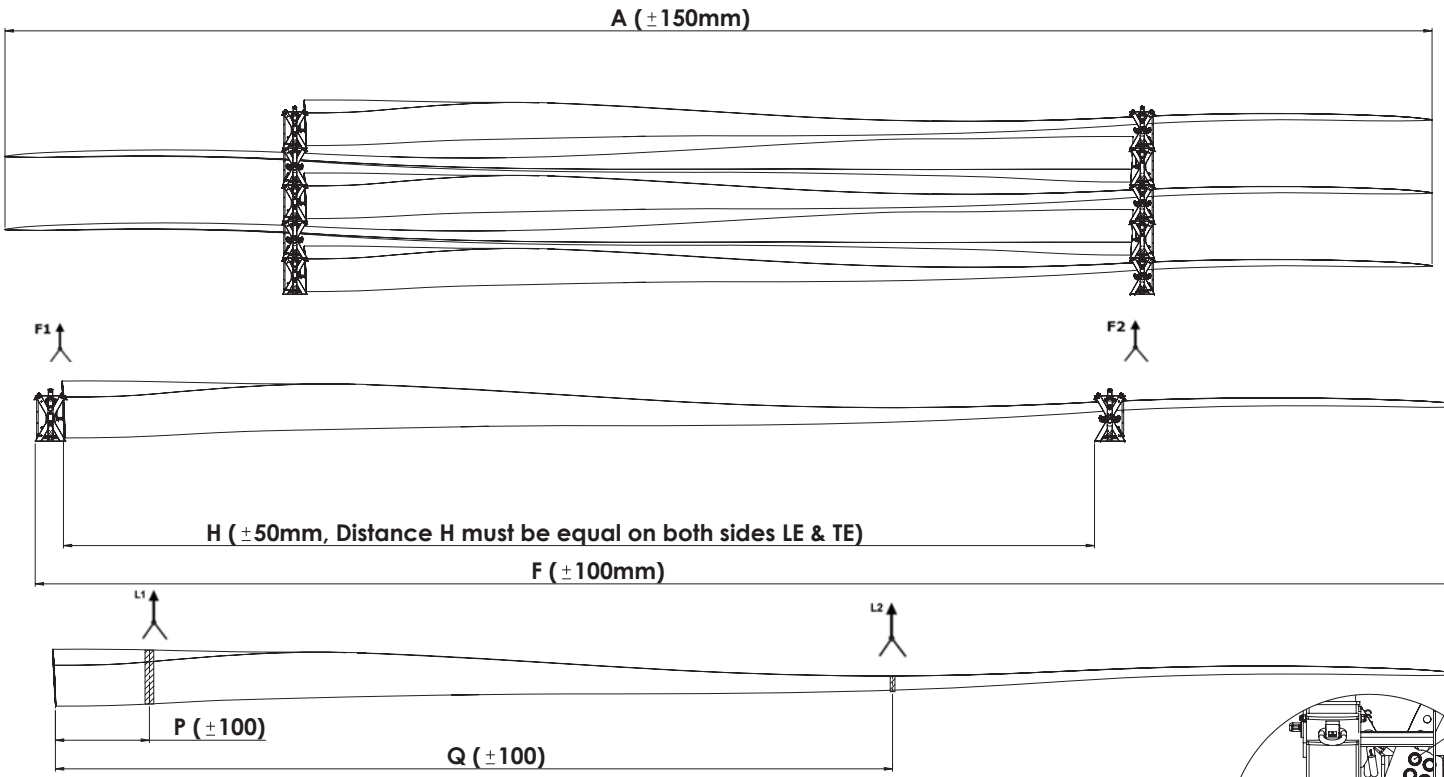
BLADE TRAILER CONFIGURATION:

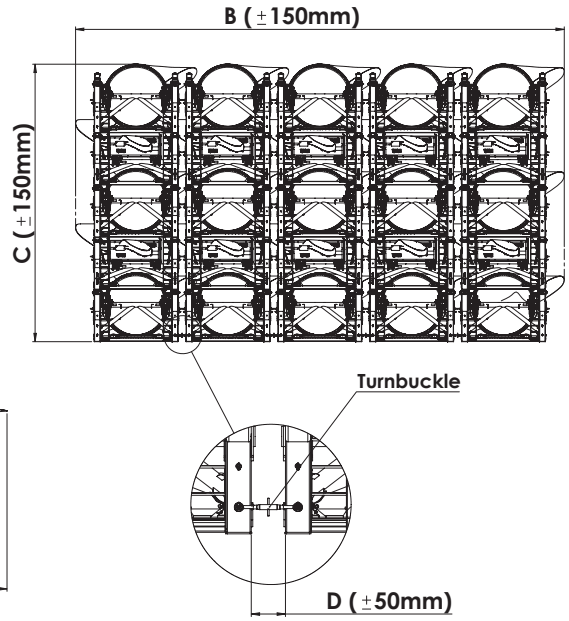
Width – 14 feet
Height – 14.5 feet
Length – 255’ feet
Weight – 100,000 lbs



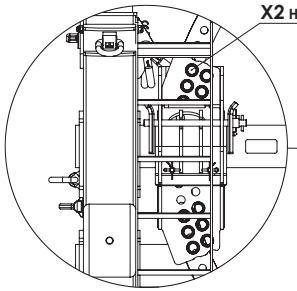
According to GE’s drawing and a previous route study for this project the main change to dimensions will be the length of the blade. The overall trailer dimensions should remain the same or similar as in the aforementioned study if the tip stand remains in the place observed on the drawing on the next page. Increased tip swing will be the primary concern; additional signs, trees, etc. may have to be removed to allow for this. Additionally, planned turn radius improvements may have to be reworked to minimize the effects of this increased tip swing.

ISO A1

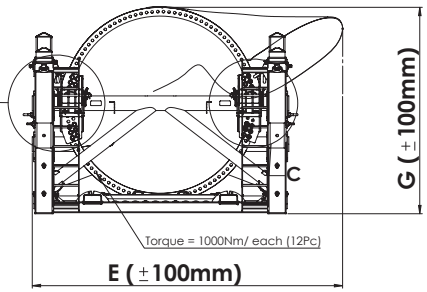




DETAIL A
SCALE 1 : 25



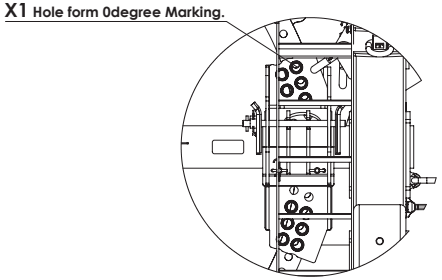
DETAIL B
SCALE 1 : 12



IMPORTANT :

- Blades can be stacked to maximum of 5 layers high for tip to root stacking.
- Number of blades in width must be equal or exceed number of blades in height,to ensure a stable stack As per UM-01398.
- When stacking more than three blades on shore the minimum lashing conditions must be met.
- Mount turnbuckle as per UM-01398 .
- Each side of Root support should be mount with 6 bolts as per UM-01398.
- Refer user manual (UM-01398) for lifting details and lashing plan.
- Minimum width of lifting strap is 450mm
- Print label in A3 size as per MS-00230.

Transport and Storage data (All measured in mm)			
Description	**Annotation**	**67.2P**	**69.3P**
Lifting capacity incl. Root Frame	F1 (kg)	12291	12260
Lifting capacity incl. Tip Frame	F2 (kg)	10048	9595
Box length of blade stack	A	84485	88546
Box width of blade stack	B	20969	20297
Box height of blade stack	C	11650	11734
Distance between two stacks	D	340	340
Box width single blade	E	4242	3906
Box length single blade	F	68646	70677
Box height single blade	G	2830	2914
Distance between root and tip frame (Inner side)	H	49270	49270
L1 Lifting Point Distance	P	2000	2000
L2 Lifting Point Distance	Q	43500	46200
L1 Lifting Capcity without Frames	L1 (Kg)	8785	9186
L2 Lifting Capcity without Frames	L2 (Kg)	8462	7477
Bushing Number is counted Counter Clockwise Form 0° Marking	X1	2	2
	X2	43	40
* For further information on stacking rules, see usermanual UM-01398			

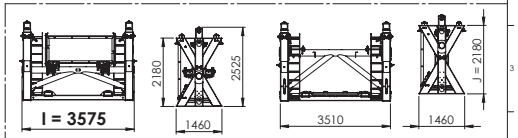


DETAIL C
SCALE 1 : 12

B for any number of stacks x1 = number of storeys: B(x1)=((x1-1)*D) + (2*E) + ((x1-2)*I)

C for any number of storeys
Without spacer frame x2 = number of storyes : C(x2) = ((x2-1)*J) + G

J value as per detail drawing of Root Frame



#055720 Root Frame without Root Support Mass : 1964Kg
#056657 Root Sup BCD 2450 - 2600 : 442Kg
#056660 Root Sup BCD 2300 - 2500 - 2764 : 542Kg
#055719 Tip Frame without tip Cavity Mass : 2429Kg

No Sharp Edges

ISO-E | Change note: New

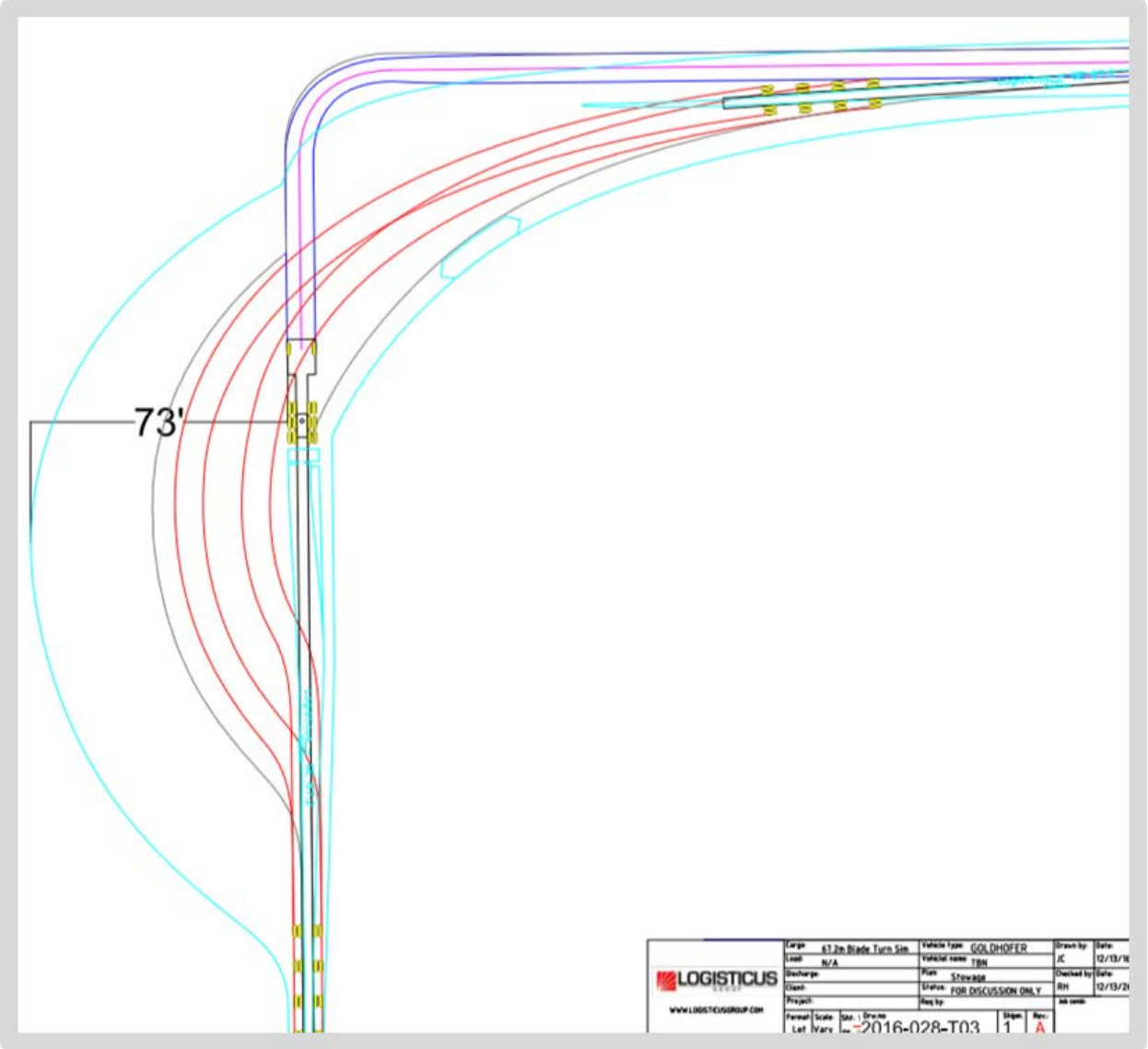
LM WIND POWER

Transport And Handling

I Frame Type - A

Scale:	Released:	EngChange Owner:	EngChange ID.:
1:200	28-Sep-2016 14:26	khaj	49583/A
Dimension:		Weight:	Assy no:
		5090.34 kg	056085
Material:			Document ID / Rev:
Material <not specified>			SW-018252/A2

Project Overview continued



Truck Routes

TRANSPORT STATEGY

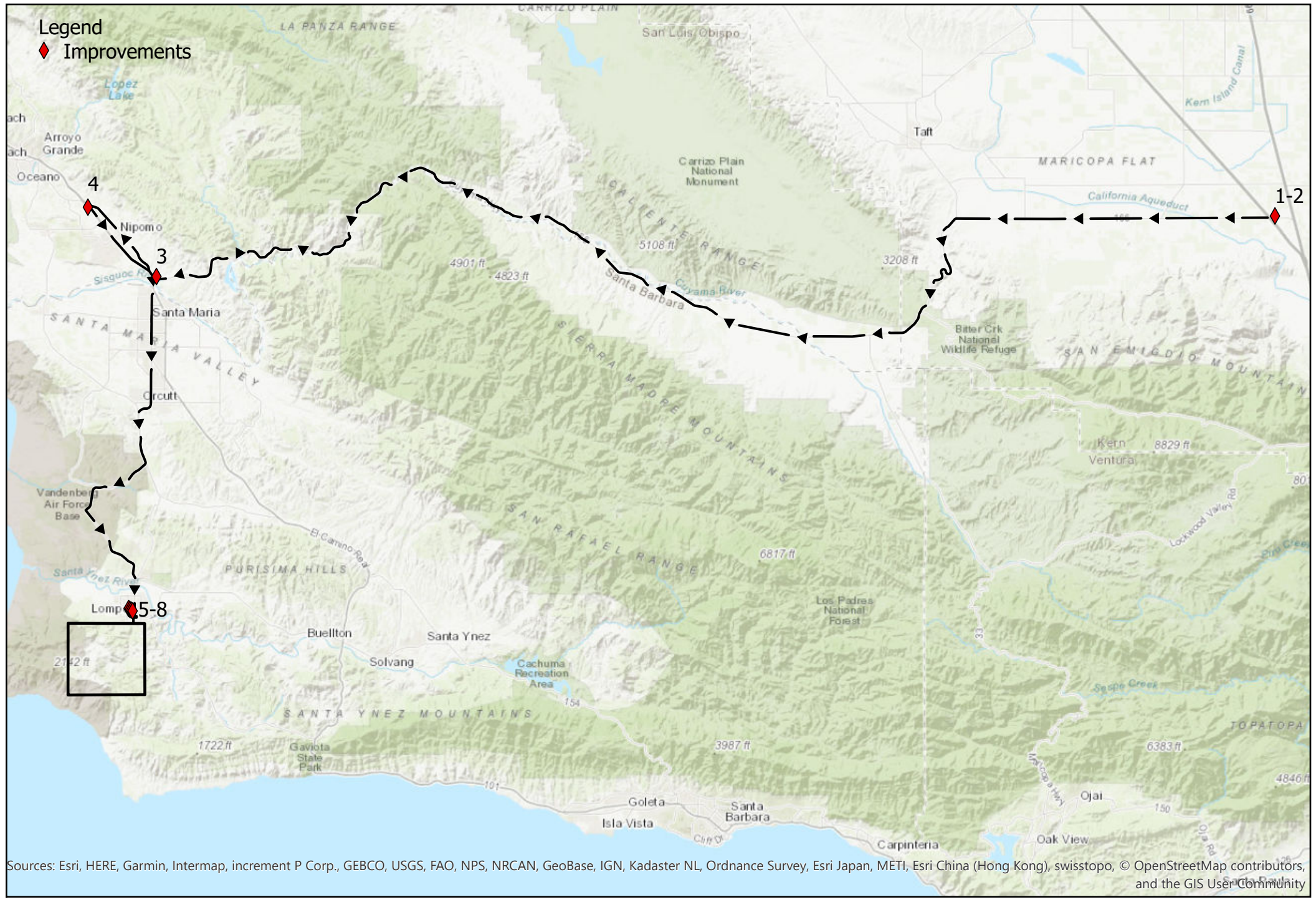
GE 67m blades will be transported over the road to the project site. For this assessment the origin location was the intersection of I-5 and CA-166.

ROUTE ONE (BLADE ONLY)

Source Location: I-5 and CA-166
Approximate Travel Time: 143 miles (one day)
Detailed Route: Start I-5 at CA-166, CA-166 W, South Thompson Ave N, US-101 S, exit onto Business-101/CA-135 S, CA-1/CA-135 S, CA-1 S, left turn at Vandenberg Air Force Base to stay on CA-1 S, CA-246 E, North F Street S, East Cypress Ave W, South I Street S, San Miguelito Road S
Off-site Road Improvements: Yes
Holiday Restrictions: Yes
Police Escorts: Yes
Structures/Bridges: No
DOT Construction: No
Risk Level: **High** (off-site road improvements, blade length, police escorts)

Summary:

Exiting from I-5 to CA-166 from the south will require removing and sleeving signs and a turning radius improvement; I-5 from the north to CA-166 will require removing and sleeving signs and utilizing existing gravel shoulders and medians. CA-166 traverses the Los Pedros National Forest and the mountainous region therein, extreme caution will be required around blind turns and to ensure the blade tip swing does not impact canyon walls. CA-166 to S Thompson Ave and then S Thompson Ave to US-101 is suggested to avoid making improvements on US-101. The first intersection will require utilizing an existing parking area on CA-166 and removing and sleeving signs and graveling the NW corner of the intersection; this will ensure that tip swing does not impact the hillside along the SE portion of the intersection. S Thompson Ave to US-101 entrance ramp will require removing and sleeving signs on NE corner of intersection and a radius improvement and removing a light pole on the SE corner; the trucks will have to utilize an existing gravel shoulder on the US-101 entrance ramp. All intersections between US-101 and Lompoc will not require improvements. Trucks at CA-1 to CA-246 will have to jump the center concrete medians on both CA-1 and CA-246. Removal of signs, light pole and traffic signals will be required in the NE corner to allow for the blades to use the sidewalks on that corner; this is to avoid tip swing impacts on the NW corner. Trucks will have to utilize the center concrete median on CA-246 and the sidewalk/parking lot on the SW corner of CA-246 to N F Street. This will require removing signs, a light pole. A tree on the north side of CA-246 may have to be removed to allow for increased tip swing. Trucks may be able to use an empty lot to increase turn radius at N F Street and Cypress Ave. The east side of N F Street will have to be cleared of tip swing obstructions. Cypress Ave to S I Street will require removal of a bus shelter, signs, light pole, and several small trees. The truck and trailer will have to utilize sidewalks to avoid the tip swing from affecting buildings on the north side of Cypress Ave.



Blade Route from I-5 to Strauss Wind Project

Route_1
Site_Area

0 5 10 20 Miles

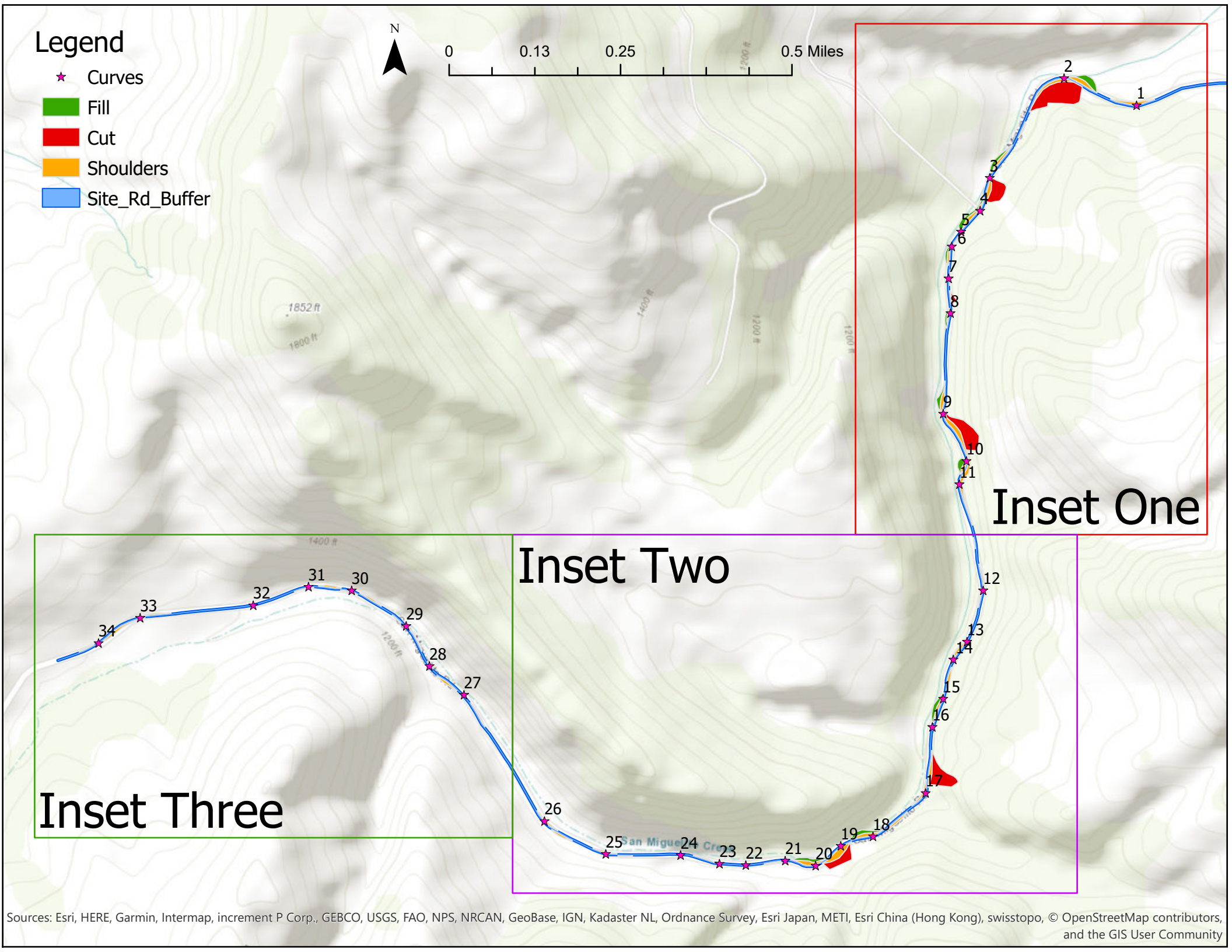
N

Truck Routes continued

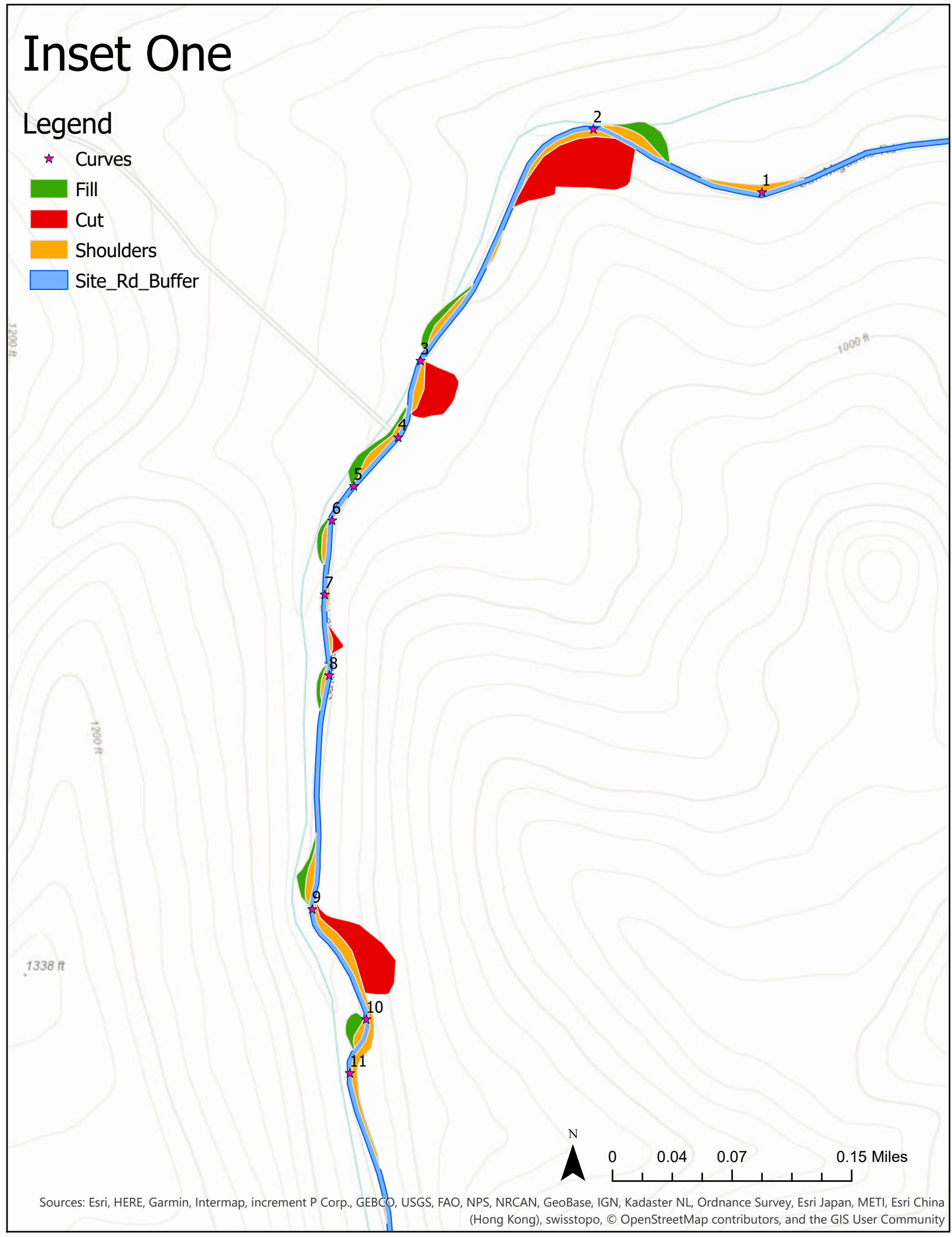
SAN MIGUELITO ROAD

San Miguelito Road is the access road for the Strauss Wind project; this road climbs into the mountains south of Lompoc, CA and will require significant improvements to allow a 67m blade to travel it. Logisticus Group identified 34 spots outside site boundaries that will require some sort of improvement. Plotting identified improvement locations over a developer-provided map of planned improvements shows that many of the concerns along San Miguelito Road will be ameliorated. Many of these improvements will improve the shoulders along the road to allow for a straighter path or cut and/or fill at unnavigable curves. All but **Improvement Area # 32** (map on next page) seem to have been addressed; Logisticus recommends reinforcing and graveling the shoulders at this curve to better allow the large blade to traverse this area.

As it has been noted previously in this report, the trailer wheelbase should be the same as in the previous transportation report for Strauss Wind (depending on final trailer type and transportation provider). The main impact of increasing the blade from 65m to 67m will be an increased tip swing. Logisticus recommends that improvement areas identified should be cleared of trees, brush, and where needed, have hillsides cut back to allow for the additional 11 feet of tip swing that is anticipated for this blade.



Inset One



Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, © OpenStreetMap contributors, and the GIS User Community

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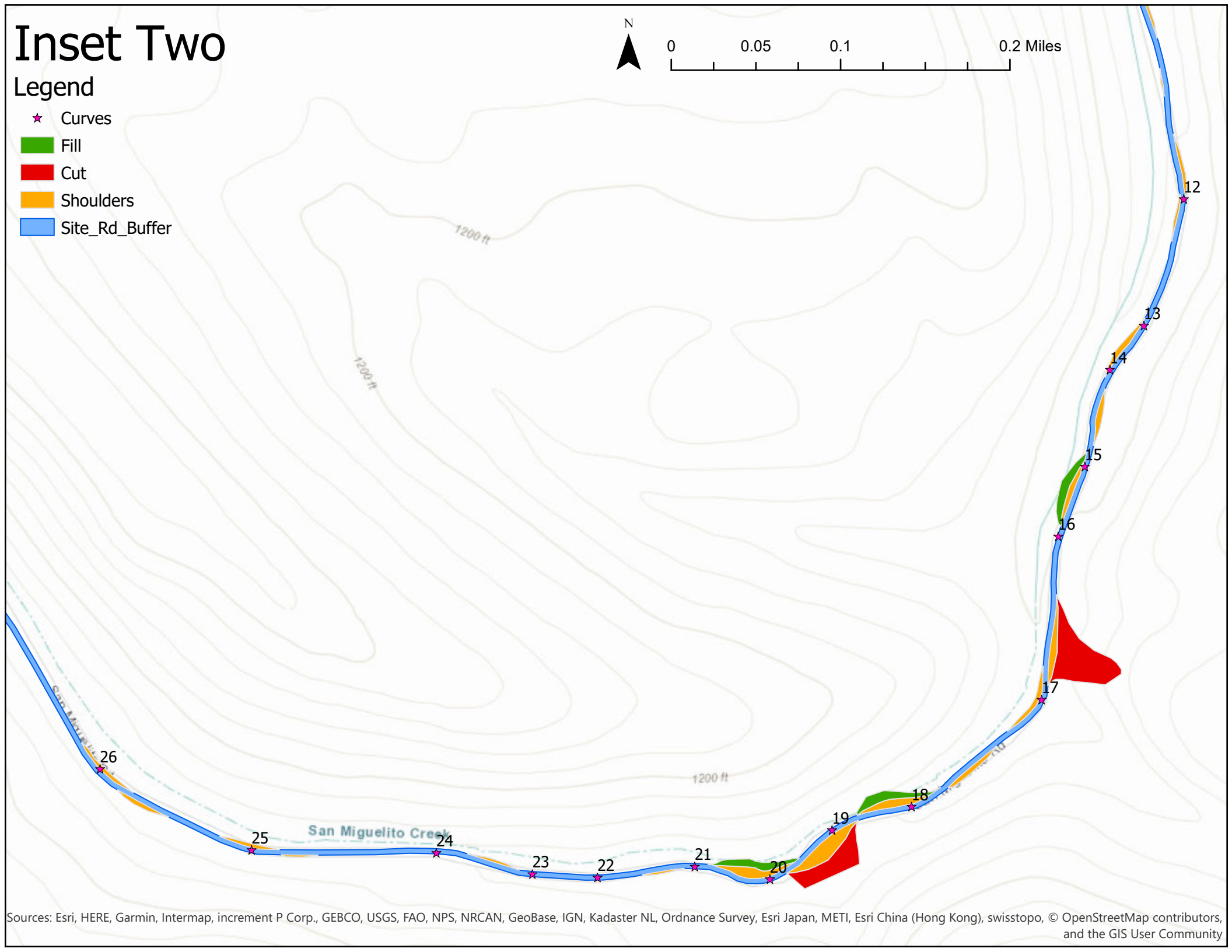

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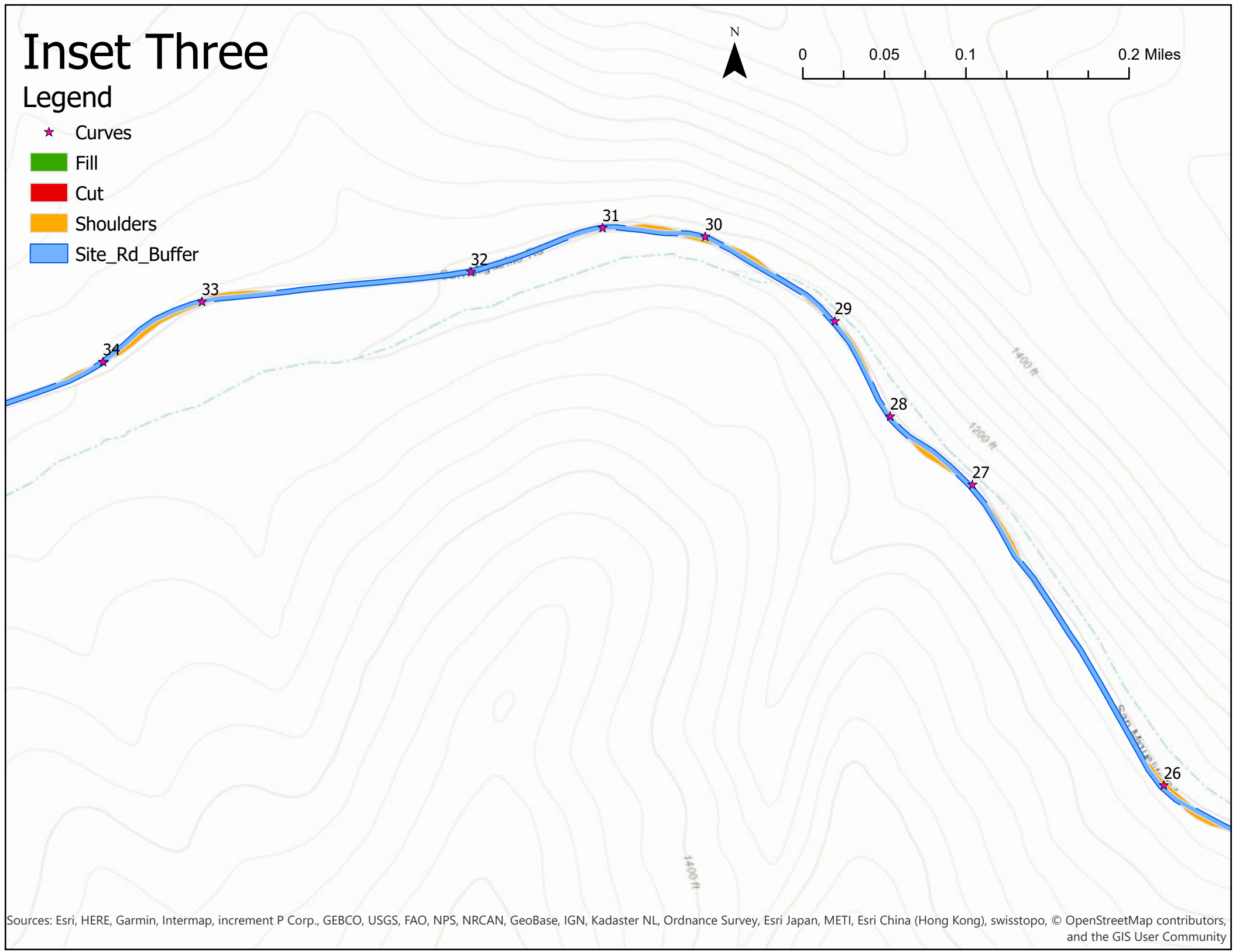

Required Permits

California – Permits are valid for 5 days, Travel is permitted from one-half hour before sunrise and one-half hour after sunset Monday through Friday. Weekend and Night Travel is allowed on a case by case basis depending on dimensions. Divisible Loads Permits are NOT available. Regular permits are simple issue through automated system however Super loads are issued through a Variance Permit Process.

Police (California Highway Patrol) – Blades of this size are considered super loads in California and will require Highway Patrol escorts.

Off-site Road Improvements

I-5 TO SITE AREA

1. I-5 to CA-166 from the south
    a. Requires removing and sleeving signs
    b. Turning radius improvement
2. I-5 from the north to CA-166
    a. Requires removing and sleeving signs
    b. Utilize existing gravel shoulders and medians.
3. CA-166 to S Thompson Ave
    a. Utilize an existing parking area on CA-166
    b. Remove and sleeve signs, NW corner
    c. Gravel the NW corner of the intersection
4. S Thompson Ave to US-101 entrance ramp
    a. Requires removing and sleeving signs on NE corner of intersection
    b. Radius improvement SE corner
    c. Remove light pole on the SE corner
    d. Utilize an existing gravel shoulder on the US-101 entrance ramp
5. CA-1 to CA-246
    a. Jump the center concrete medians on both CA-1 and CA-246
    b. Remove of signs, light pole and traffic signals in NE corner
6. CA-246 to N F Street
    a. Utilize the center concrete median on CA-246
    b. Remove signs, a light pole to use sidewalk/parking lot on the SW corner
    c. Tree on the north side of CA-246 may have to be removed to allow for increased tip swing
7. N F Street and Cypress Ave
    a. Use empty lot in SW corner to increase turn radius
8. Cypress Ave to S I Street
    a. Remove of a bus shelter, signs, light pole, and several small trees, north side of Cyprus Ave.
    b. Utilize sidewalks to avoid the tip swing from affecting buildings on the north side of Cypress Ave

Off-site Road Improvements continued

SAN MIGUELITO ROAD

There are 34 Improvement Areas noted in detail in Appendix II.

Construction

There are no known construction projects planned along the route detailed herein during the estimated time of deliveries. Logisticus recommends following up with Caltrans closer to delivery to determine any planned construction along potential routes.

Summary

Site Status – Planning phase

- Source Locations
  - Unknown
  - This assessment began at the intersection of I-5 and CA-166
- Off-site Improvements
  - Eight intersections will require improvements
  - Depending on final routing, dimensions, and trailer configurations, more improvements are possible
- San Miguelito Road
  - 34 Improvement Areas identified
  - Map provided by developer indicates that most Improvement Areas are going to be addressed
    - One Improvement Area (32) may still need to be addressed
      - Logisticus recommends graveling shoulders to ease transport through this curve.
  - Improvements should consider longer tip swing of 67m blade vs 65m blade
- Overall delivery risk is **High**
  - Large number of improvements
  - Transport through Lompoc, CA
  - CA Highway Patrol escorts
- Logisticus recommends that once all site work is complete, prior to deliveries, to perform a follow up survey to ensure site is ready to receive components.
- Carriers should run all routes prior to deliveries and not replace this document with their own state-required route survey
- Logisticus has the ability to facilitate communications with DOTs and a DOT approved engineering company, if the need arises

Appendix I: Route Breakouts

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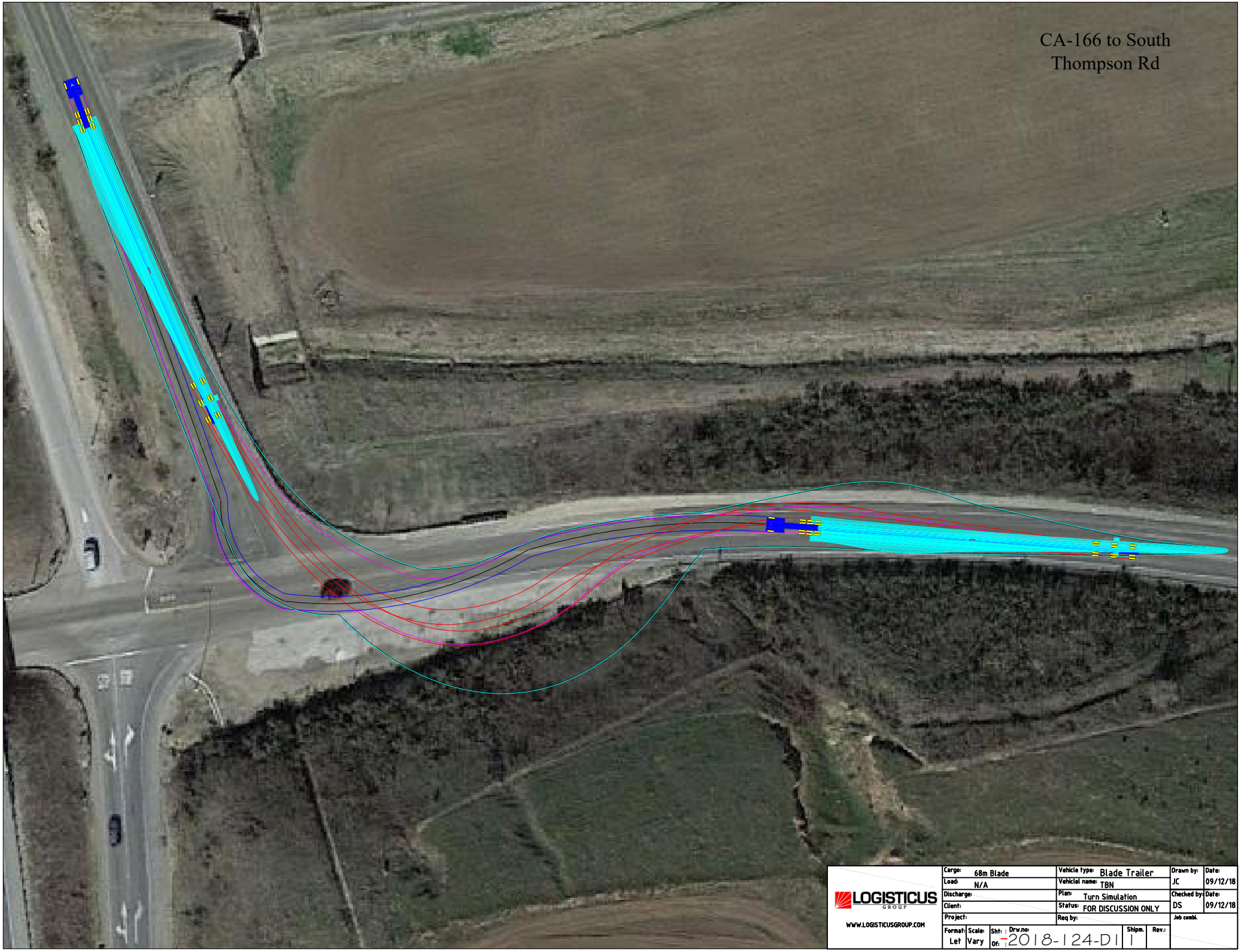
I-5 S to CA-166

I-5 N to CA-166

CA-166 to S Thompson Rd



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Cargo: 68m Blade		Vehicle type: Blade Trailer		Drawn by: JC	Date: 09/12/18
Load: N/A		Vehicle name: TBN			
Discharge:		Plan: Turn Simulation		Checked by: DS	Date: 09/12/18
Client:		Status: FOR DISCUSSION ONLY			
Project:		Req by:		Job combi.	
Format: Let	Scale: Vary	Sht: 1 Of: 1	Drw.no: 2018-124-D1	Shipm. 1	Rev.:

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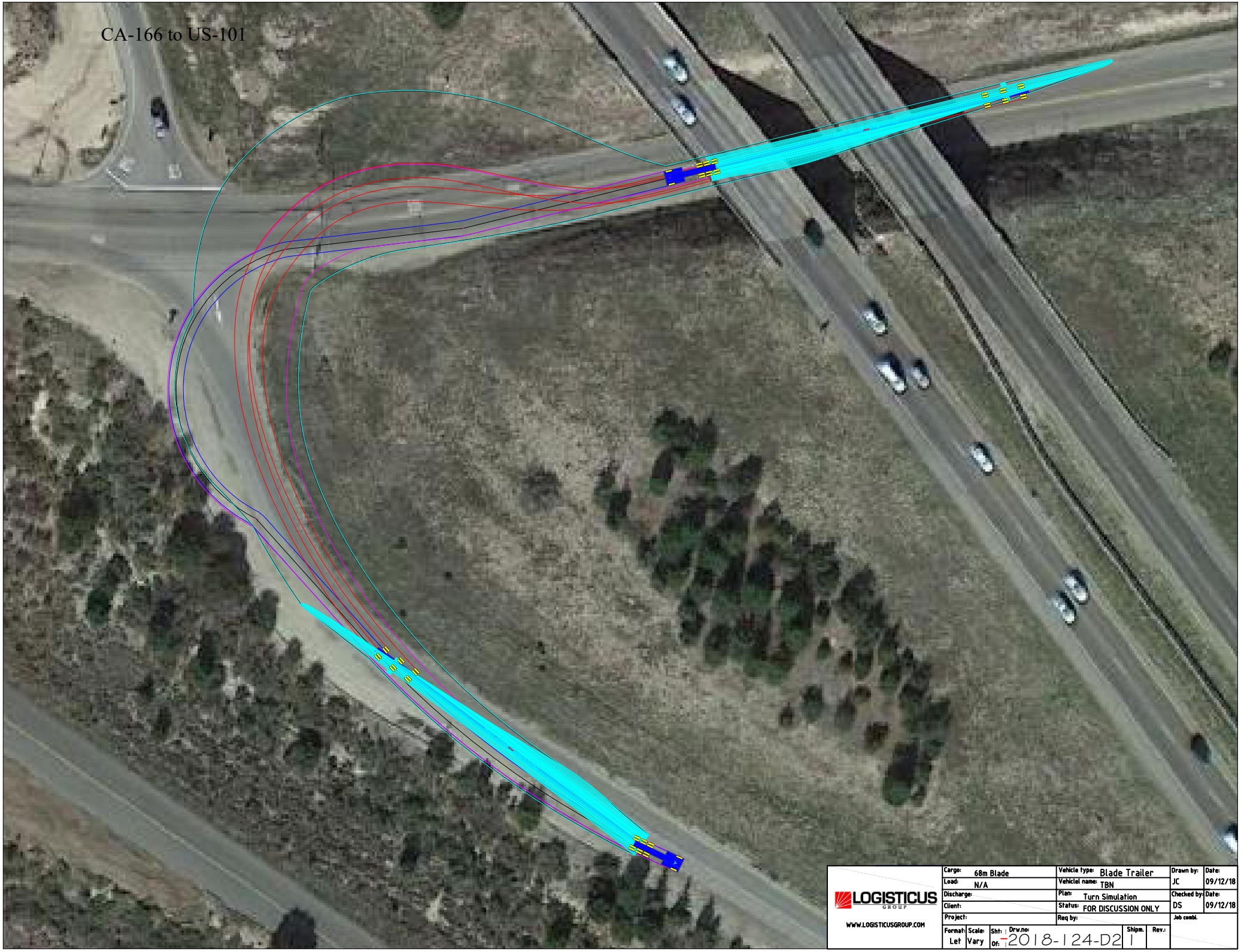
S Thompson Road to US-101

CA-166 to US-101



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Project:		Req by:		Job combi.	
Format: Let	Scale: Vary	Sht: 1 Of: 1	Drw.no: 2018-124-D2	Shipm. 1	Rev.:

CA-1 to CA1 at Vandenberg

CA-1 to CA-246

CA-246 to S F Street

CA-1 to CA-246

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Cargo: 68m Blade	Vehicle type: Blade Trailer	Drawn by: JC	Date: 09/12/18
Load: N/A	Vehicle name: TBN		
Discharge:	Plan: Turn Simulation	Checked by: DS	Date: 09/12/18
Client:	Status: FOR DISCUSSION ONLY		
Project:	Req by:	Job combi.	
Format: Let	Scale: Vary	Sht: 1 Of: 1	Drw.no: 2018-124-D3	Shipm. 1	Rev.:

S F Street to Cypress Ave

Cypress Ave to S I Street

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Cargo: 68m Blade	Vehicle type: Blade Trailer	Drawn by: JC	Date: 09/12/18
Load: N/A	Vehicle name: TBN		
Discharge:	Plan: Turn Simulation	Checked by: DS	Date: 09/12/18
Client:	Status: FOR DISCUSSION ONLY		
Project:	Req by:	Job combi.	
Format: Let	Scale: Vary	Sht: 1 Of: 1	Drw.no: 2018-124-D4	Shipm. 1	Rev.:

Appendix II: San Miguelito Road

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Improvement Area #1

Improvement Area #2

Improvement Area #3

Improvement Area #4

Improvement Area #5

Improvement Area #6

Improvement Area #7

Improvement Area #8

Improvement Area #9

Improvement Area #10

Improvement Area #11

Improvement Area #12

Improvement Area #13

Improvement Area #14

Improvement Area #15

Improvement Area #16

Improvement Area #17

Improvement Area #18

Improvement Area #19

Improvement Area #20

Improvement Area #21

Improvement Area #22

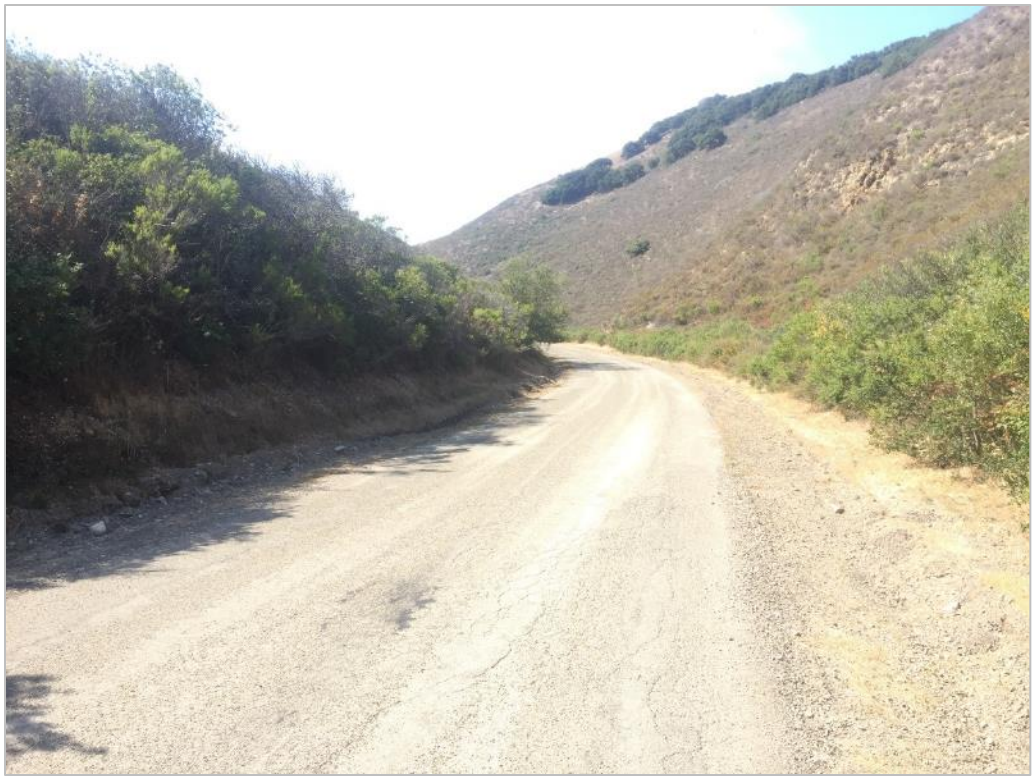
Improvement Area #23

Improvement Area #24

Improvement Area #25

Improvement Area #26

Improvement Area #27



Improvement Area #28

Improvement Area #29

Improvement Area #30

Improvement Area #31

Improvement Area #32

Improvement Area #33

Improvement Area #34

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