SIEMENS Gamesa
RENEWABLE ENERGY

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COMUNI DI BITTI, ORUNE E BUDDUSO'
PROVINCE DI NUORO E SASSARI

PROGETTO DEFINITIVO PARCO EOLICO "GOMORETTA"

Elaborato: EP_CIV_R015	Road Survey Report
Scala : -	
Data : 11 dicembre 2017	

COMMITTENTE :
Siemens Gamesa Renewable Energy Italy S.p.A.

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COORDINAMENTO :
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Rev.00	11/12/2017	BM	NMPEPE	GMERCURIO/NMPEPE	A4 (210x297mm)

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SIEMENS Gamesa
RENEWABLE ENERGY

Specification of requirements

ACCESS REPORT FOR W.F OF GOMORRETTA, (ITALY)

DS991135

Pamplona, 14/11/2017
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CONTROL DE FIRMAS / CONTROL SHEET

Titulo / Title: **ACCESS REPORT FOR W.F. OF GOMORRETTA (ITALY)**

Referencia / Reference: **DS1135**

Autor / Author: ABM

Revisador / Checked: SF

Aprobador / Approved (DPTO. LOGISTICA):

Revisión / Revision:

CONTROL DE REVISIONES / RECORD OF MODIFICATIONS:

Rev.	Día / Date	Autor / Author	Descripción / Description
0	14/11/2017	ABM	Initial report

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1 INTRODUCTION

1.1 Purpose

The aim of this report is to analyse the possible accesses to the Gomorretta wind farm after having done the site visit.

1.2 Background

A visit to the wind farm access road was made on 25th October 2017. The participants were:

Antonio Bruno Mocci, representing ISLA Srl

The promotion of this farm is the responsibility of GESA ITALIA.

The machines destined for these wind farms are 13 x G132 wind turbines with 84 m towers.

1.3.DESCRIPTION OF THE TYPE OF TRANSPORT TO BE USED

When writing this report, the most unfavourable dimensions were considered for transporting the material, and they are as follows:

- Length: blade transport, 69,2 meters.
- Width: nacelle transport, 4.50 meters.
- Height: nacelle most regular used transport, 4.90 meters.

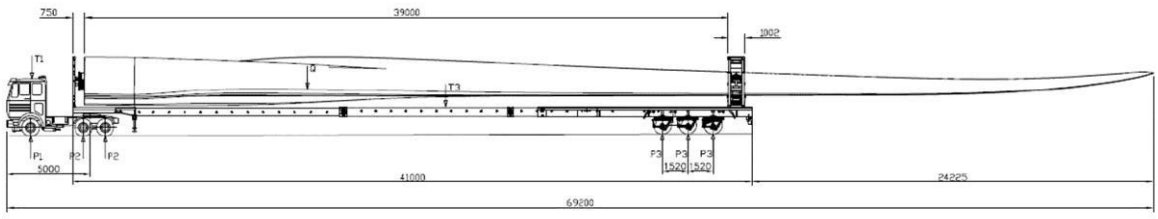


Fig. 1. Blade transport

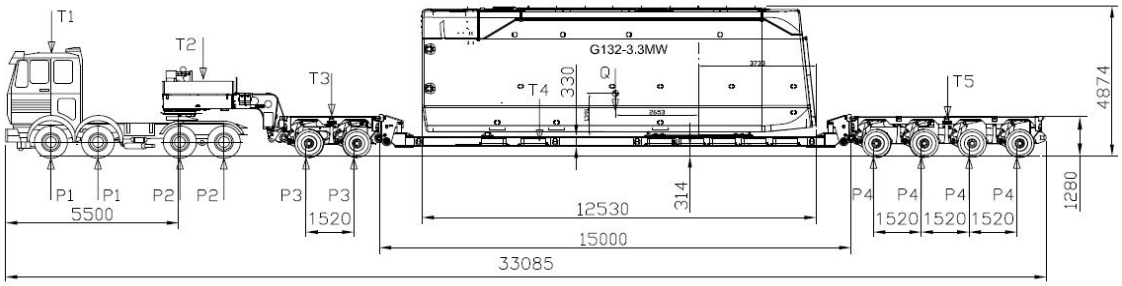


Fig. 2. Nacelle transports

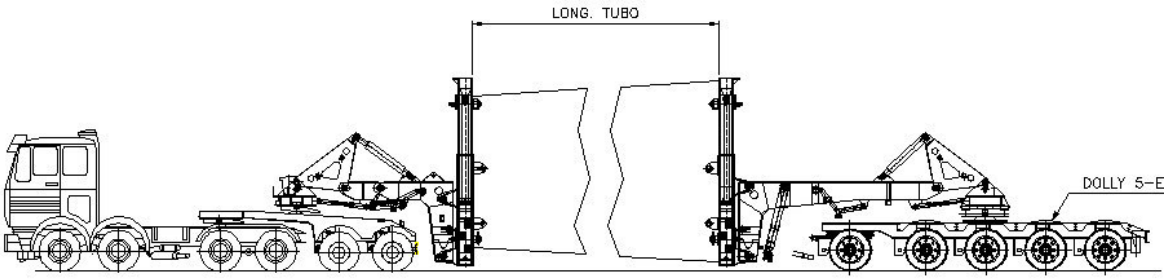


Fig. 3. First tower transports

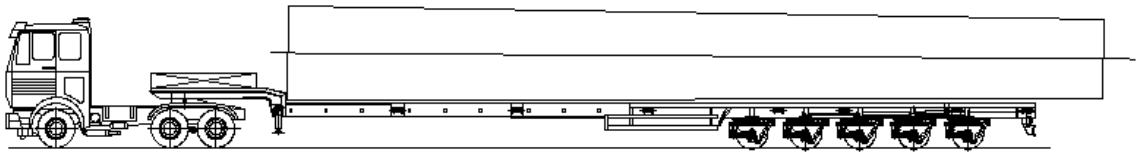


Fig. 4. Tower transports

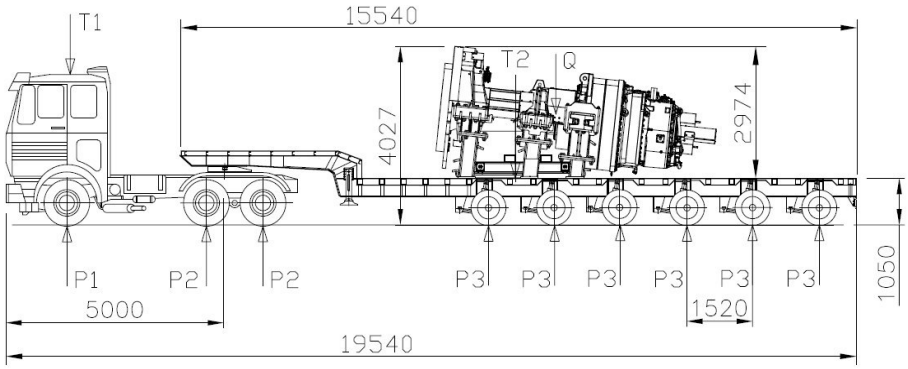


Fig. 5. Gear Box transports

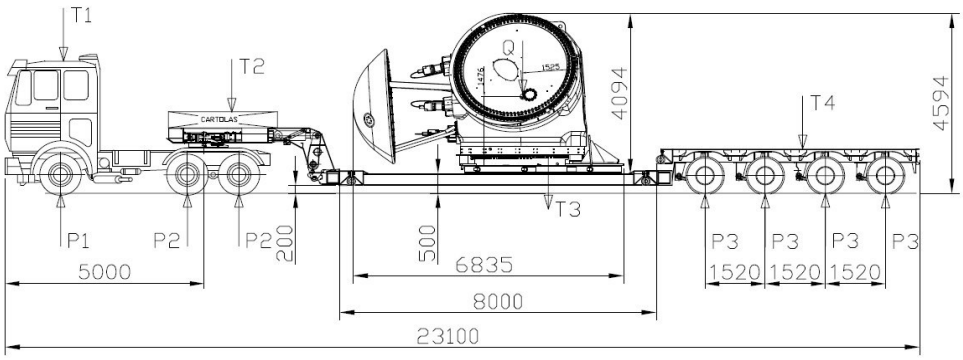


Fig. 6. Hub transports

1.4 Restrictions

The transportation of blades must be done blade by blade.

In addition to the possible restrictions that may come from the highway authorities for passage of the transport vehicles, the site access review was made through roads classified as "A" and national roads closest to the farm.

Further later, when transport permits will be issued, transports route should be re-checked.

1.5 General characteristics of accesses for G132.

Below is a series of general characteristics to be considered for the accesses to the farm.

Bypasses: The lack of bypass roads around some cities and towns is the biggest problem by far for carriage through these areas. While civil engineering works modifications can be used to find solutions for other problematic points, passage in many cases through urban areas and housing zones proves impossible.

Traffic Circles: In many cases, the radius is excessively small, as is the width, which complicates the clearance of transports. However, this problem is easier to resolve than the previous one, given that it would be sufficient to simply remove the signals. Both the inside and the outside of the traffic circle are usually crossed by the trailer, passing over the guardrail areas (see the following point). The passing over in small areas is more critical (depending on the height of the barrier and of the types of

transports and carriage). Passing with steel plates may be a possibility, provided any gradient change is handled with care.

Guardrails and signals: For clearing the beams, normal guardrails should not pose problems, since they are passed over. For the guardrails having a double height, located in some ports, more caution is indeed required and, in some cases, the second guardrail beam will need to be removed (problem for heights above 80cm). For the signals, a male-female mechanical connection can be used for the signal support with a height of less than 60cm. The pilot car itself will remove and re-connect them after the truck has passed.

Bridges: Bridge strength is an essential factor because transport (nacelle as most critical element) and crane crossing can prove to be 12.5t/axle; thus all bridge strengths should be known. This should also be considered for roads with insufficient asphalt spread, since they could break. Providing Gamesa Eólica with the project data for each bridge is indispensable, since a simple visual inspection is not reliable. In case this information is unknown due to old bridges in rural areas lacking documentation, tests must be conducted to ensure resistance. Very critical point.

Roads: The condition of many rural roads is not the most appropriate for special transports. For mountain ports, the constant curves and reverse curves must be taken into account.

1.6 General information from the visit

Measurements: Measuring was done with measuring tape and a GPS. Pictures with a digital camera and various onsite notes were taken. **In order to obtain more precise measurements, detailed topography and computer simulations would need to be conducted, or a test run involving an empty carrier.**

In light of this, small variations may be needed for measurements of the steps proposed in this report not expressly worded as having been analyzed by detailed topography or through a transportation test run. Therefore, SIEMENS GAMESA S.A is not responsible for the costs associated with these variations.

Note: The coordinates attached for each one of the problematic points are U.T.M., and are in the format (Use, X Coordinate, Y Coordinate). This information has been gathered using the Datum WGS84.

2. ACCESS ROAD TO THE GOMORRETTA WIND FARM.

The Gomorretta Wind farm is located in Italy, Sardinia, near the town of Bitti (Nu).

2.1 PROPOSED ROUTE FROM ORISTANO PORT TILL SITE ENTRANCE

The following route is the one that the transport vehicles will follow, depending on transport permits to be issued by the Italian authorities.

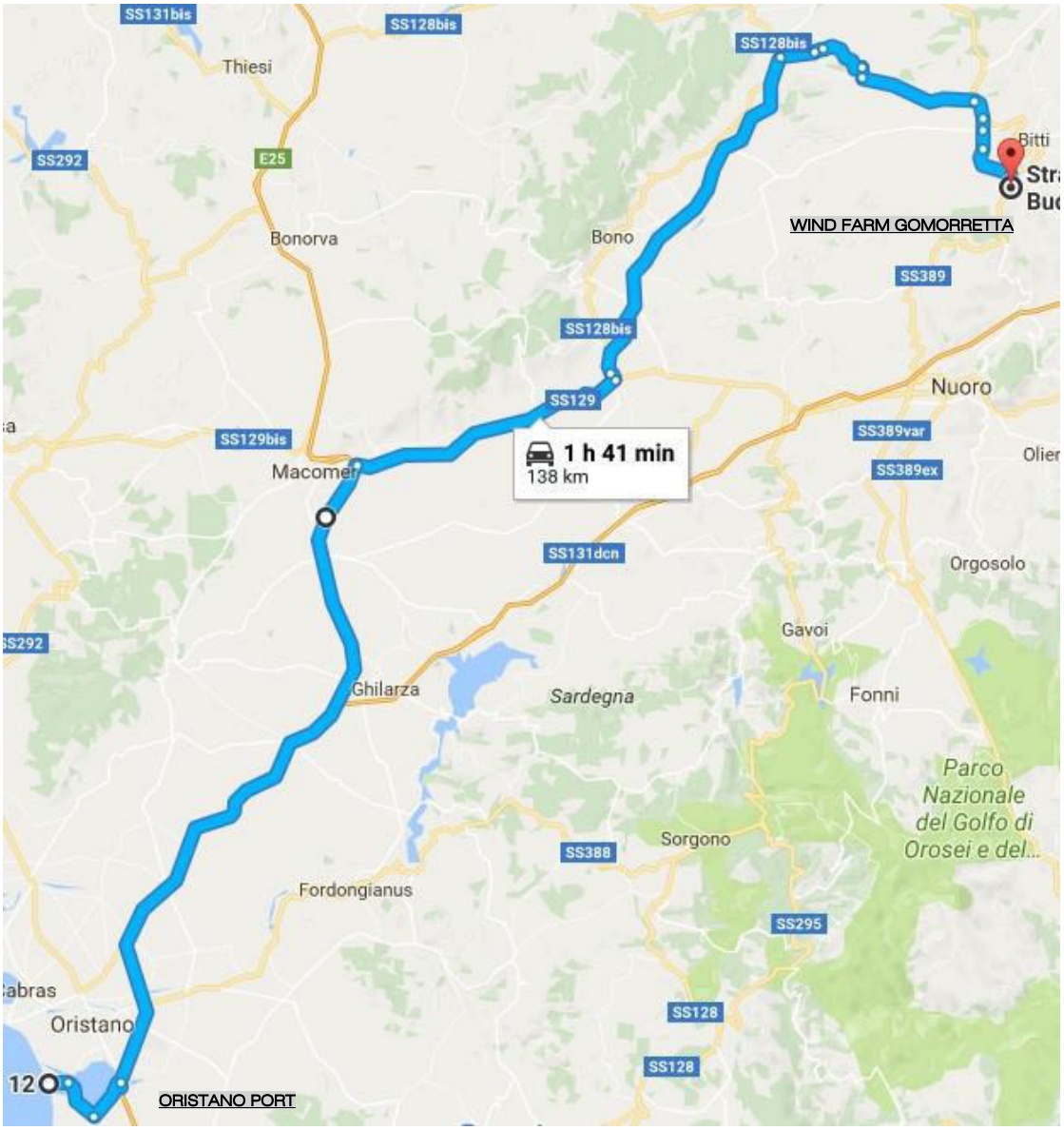


Figure 7. Transport route (blue).

Route description:

Start at Oristano Port

- ✓ Take **Via G. Mariongiu** toward Sassari;
- ✓ Take **Via G. Mariongiu** and turn right and enter on **SP 97**;

  N 39° 52' 04,33" E 08° 34' 10,00"
- ✓ Take **SP 97** and turn left and enter on **SP 49;**

  N 39° 50' 48,57" E 08° 35' 22,86"
- ✓ Take **SP 49** and turn right and enter on **SS131 "SS Carlo Felice" /E25**;

  N 39° 52' 05,06" E 08° 36' 33,41"
- ✓ Take **SS 131/E25** and turn right and enter on **SP 33 "Borone Ottana"** toward Nuoro;

  N 40° 12' 41,79" E 08° 47' 04,40"
- ✓ Continue on **SP 10M;**
- ✓ Take **SP 10M** and take exit Ossidda and enter on **SP 32**;

  N 40° 31' 56,79" E 09° 10' 18,68"
- ✓ Take second exit on roundabout on the **SP 32** and access on **SP 15**;

  N 40° 31' 11,85" E 09° 14' 34,31"
- ✓ Take first exit on roundabout on the **SP 15** and access on **SS 389**;

  N 40° 30' 21,38" E 09° 20' 17,10"
- ✓ Take first exit on roundabout on the **SS 389** and access on **SC without name;**;

  N 40° 29' 40,21" E 09° 20' 44,30"

Site access 1°: N 40° 29' 11" E 09° 20' 43"

Site access 2°: N 40° 29' 40" E 09° 20' 44"

- ✓ ByPass connection **SC without name** on **SS389**;

  A: N 40° 27' 28" E 09° 21' 58" - B: N 40° 27' 25" E 09° 22' 21,04"
- ✓ Take **SS 389** and enter in the Site access;

Site access 3°: N 40° 26' 59" E 09° 22' 09"

Total distance of the route is 140 Km.

ROUTE FROM ORISTANO PORT TO SITE ENTRANCE

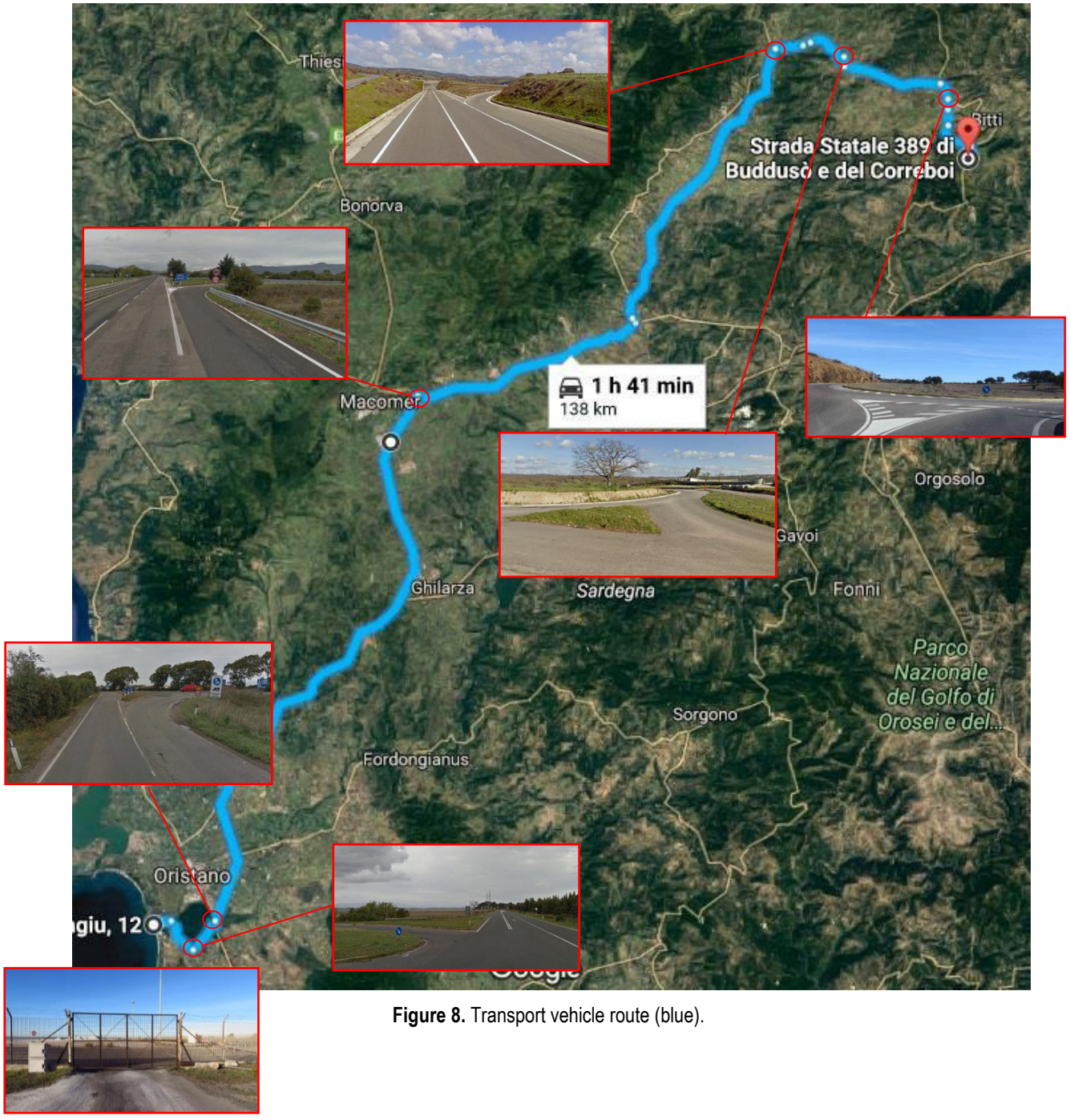
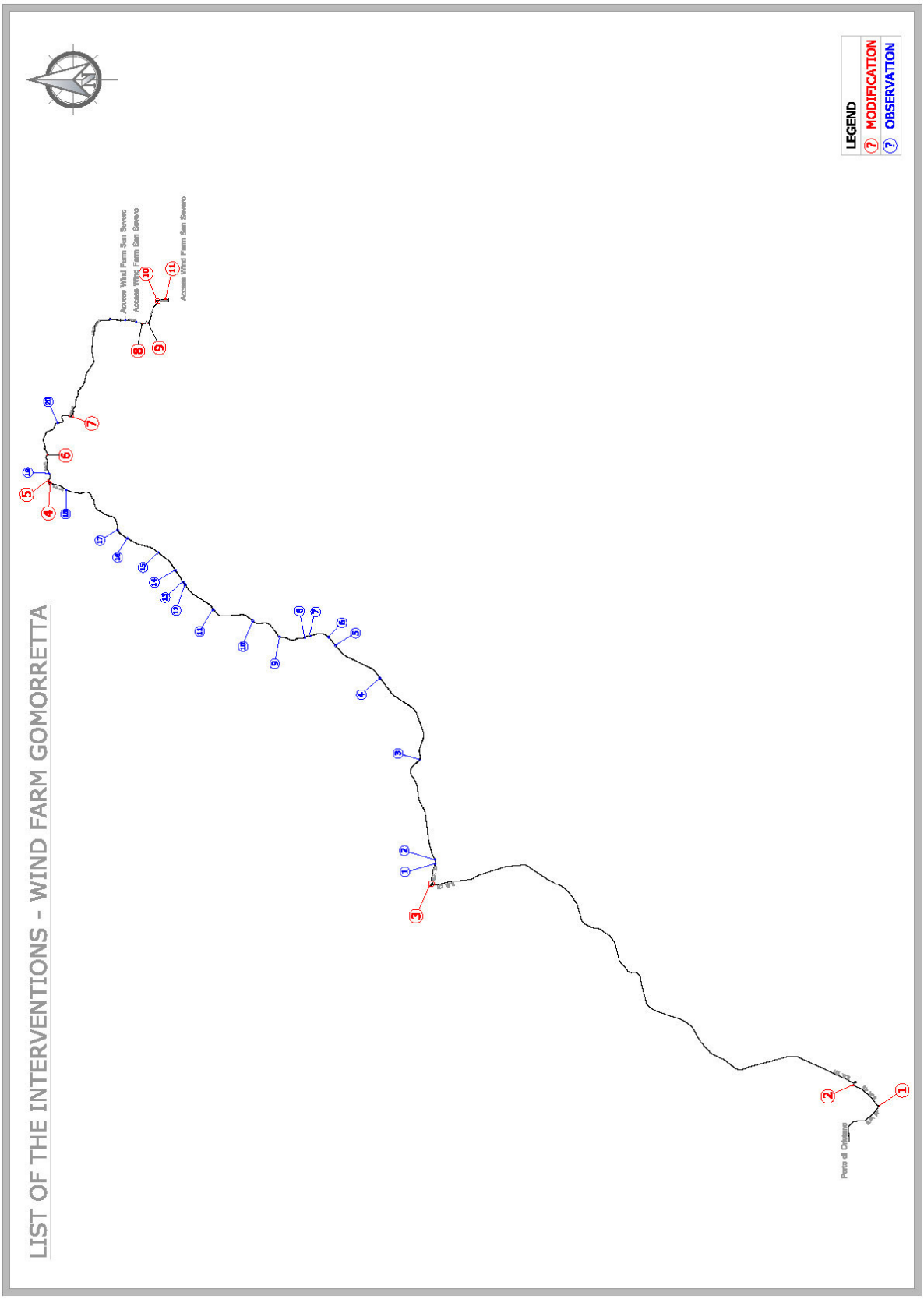
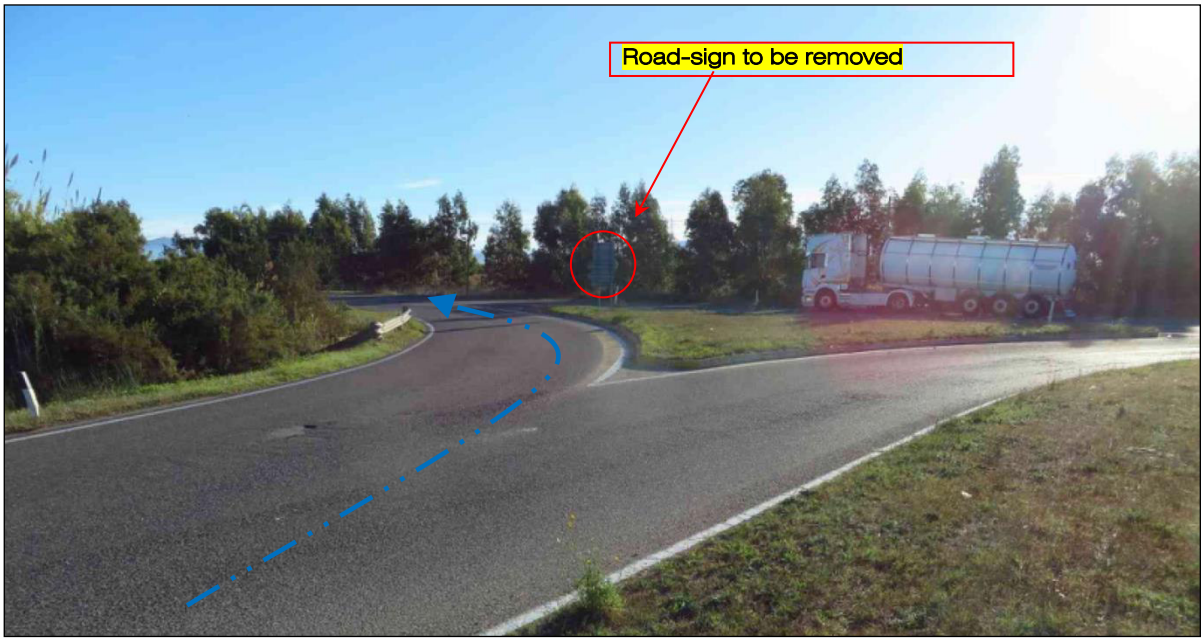


Figure 8. Transport vehicle route (blue).


LEGEND
MODIFICATION
OBSERVATION
LIST OF THE INTERVENTIONS - WIND FARM GOMORRETTA
Access Wind Farm San Severo
Access Wind Farm San Severo
Access Wind Farm San Severo
Porto di Ortona

➢ Modification n. 1

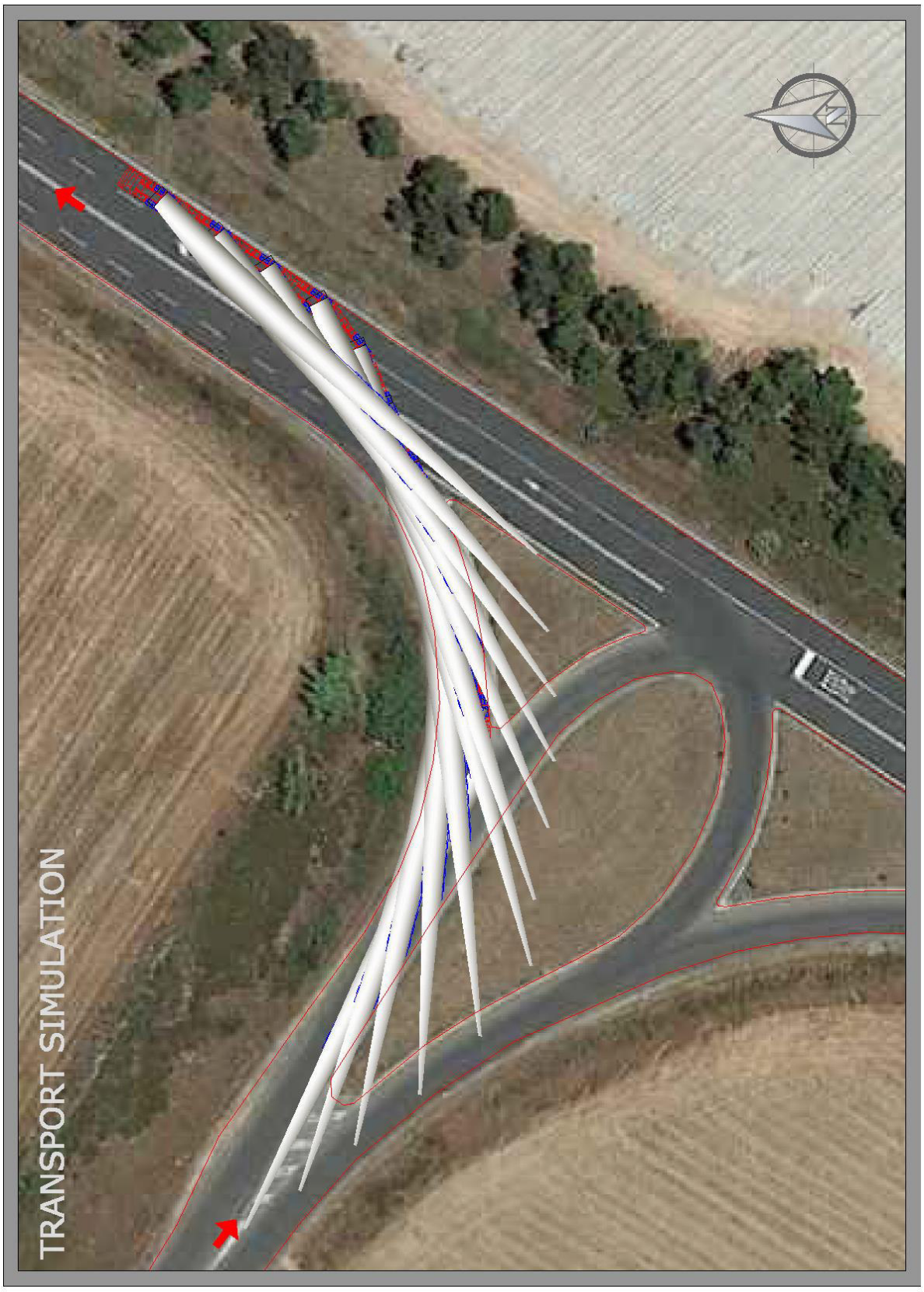


Modification n.1: Connection SP97 on SP49

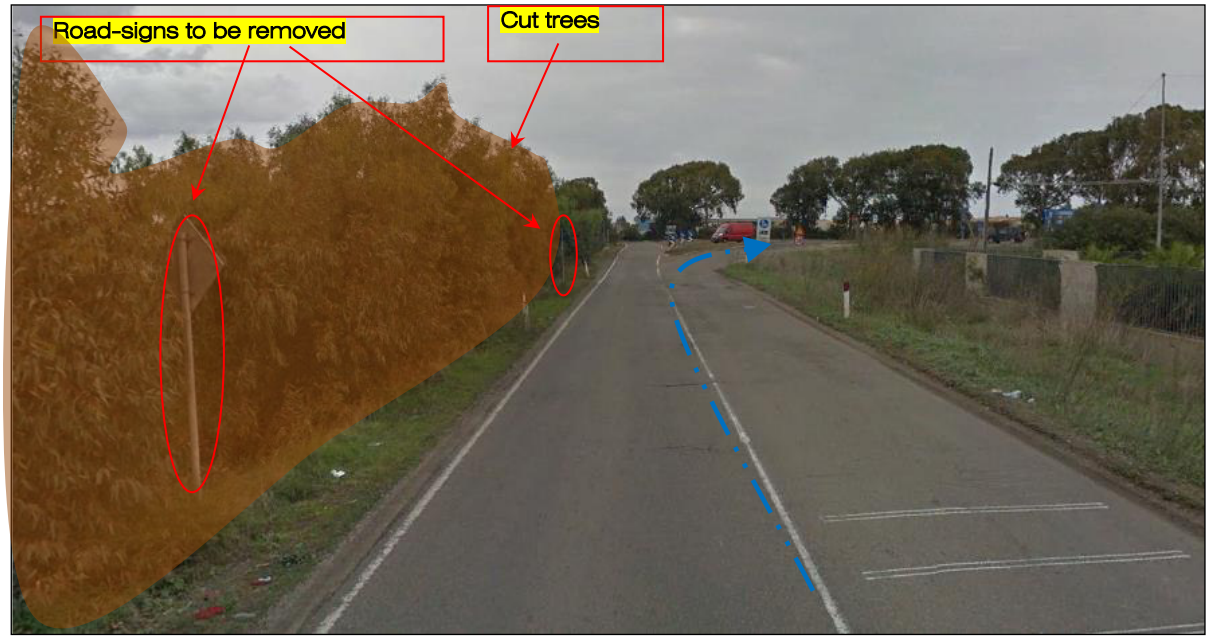
N 39° 50' 48,81" E 08° 35' 22,83"

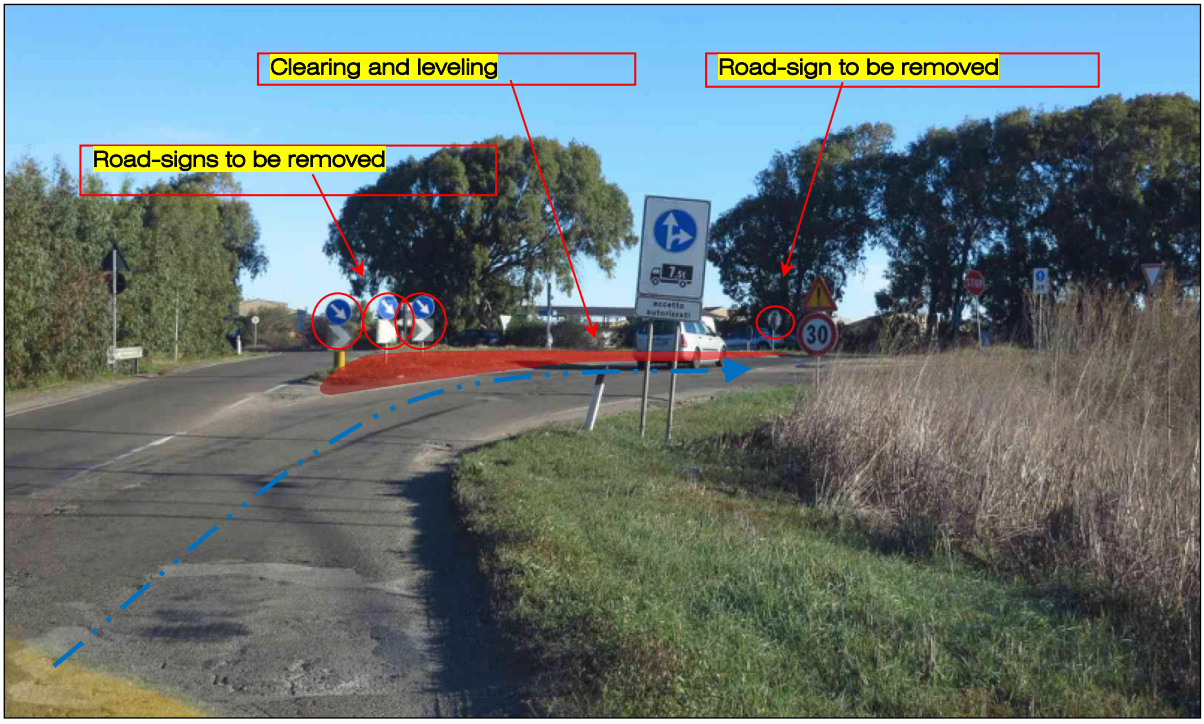
Works to be performed:

Road-sign to be removed.


TRANSPORT SIMULATION

➢ Modification n. 2





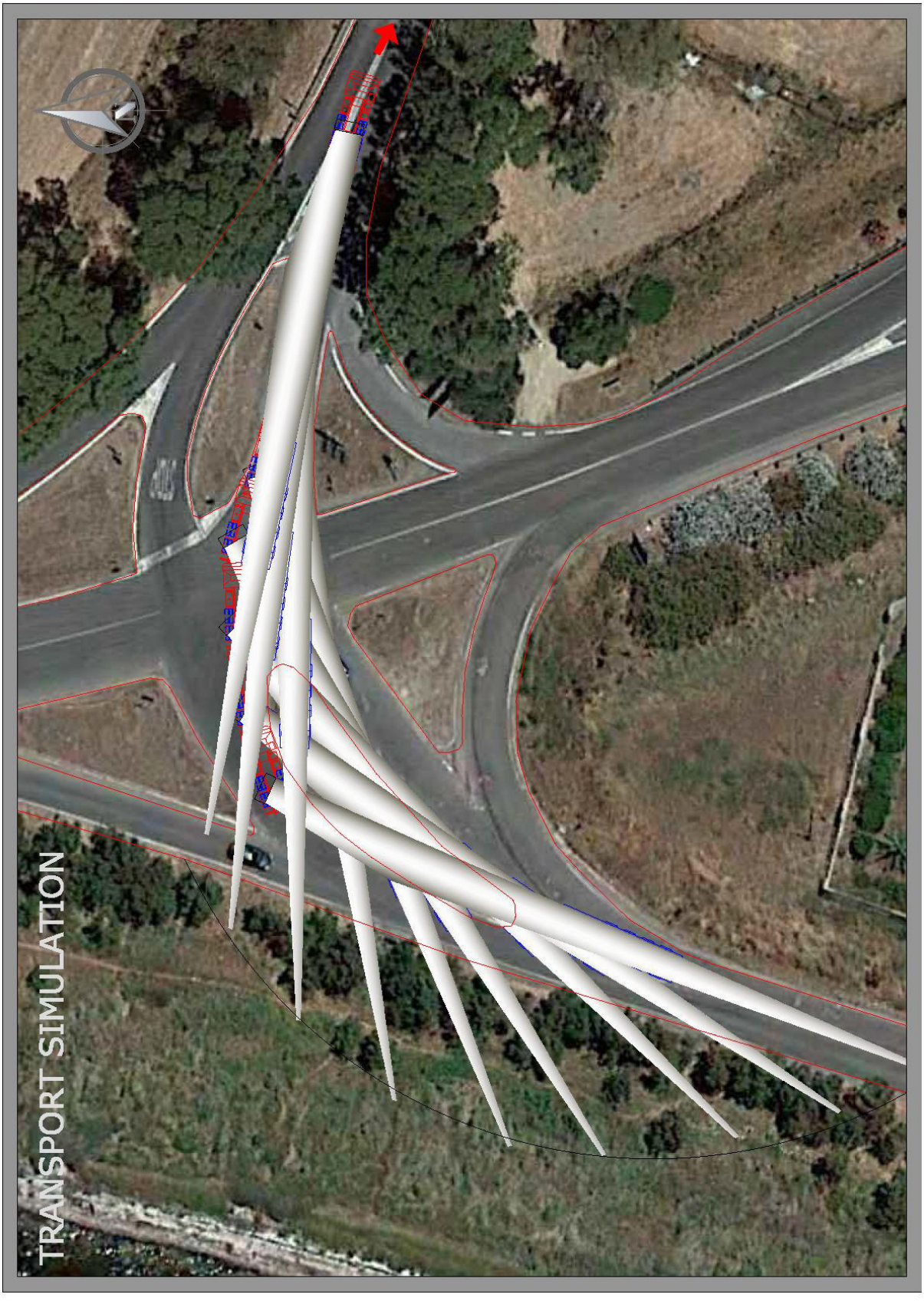
Modification n.2: Connection SP49 on SS131

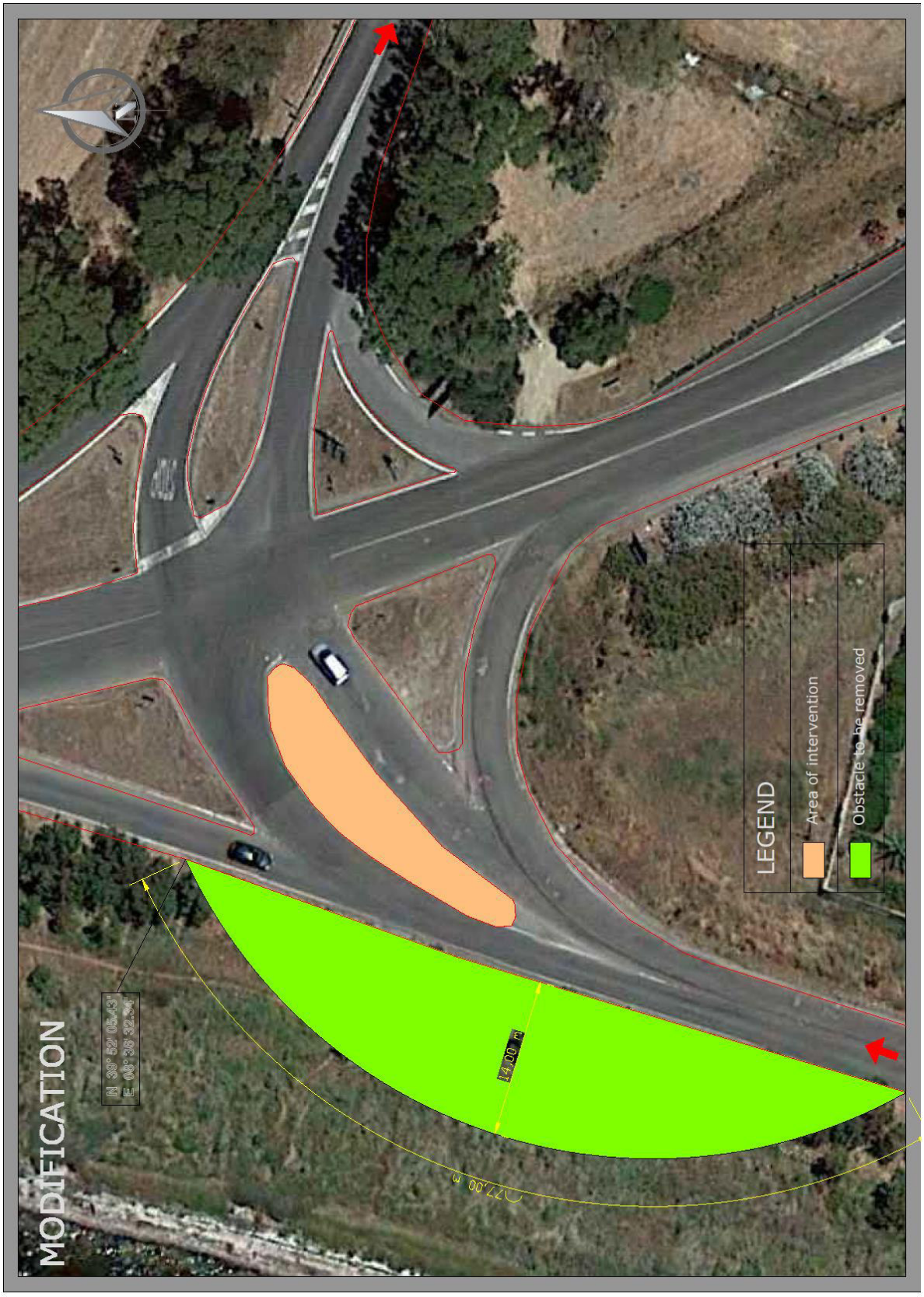
N 39° 52' 05,30" E 08° 36' 33,40"

Works to be performed:

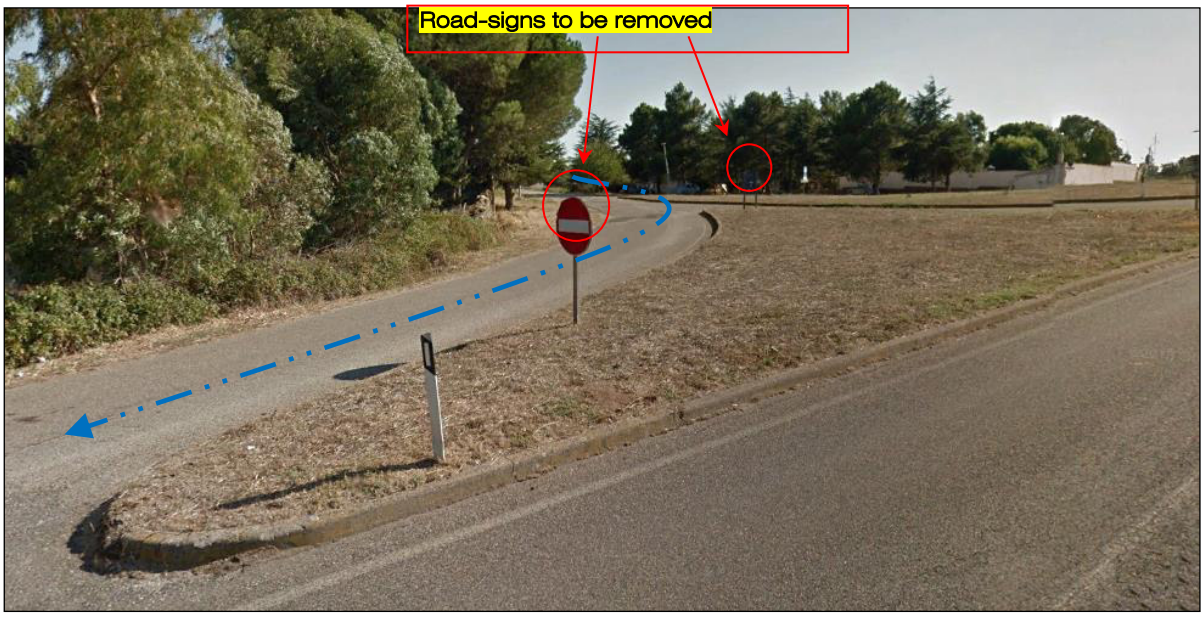
Clearing and leveling;

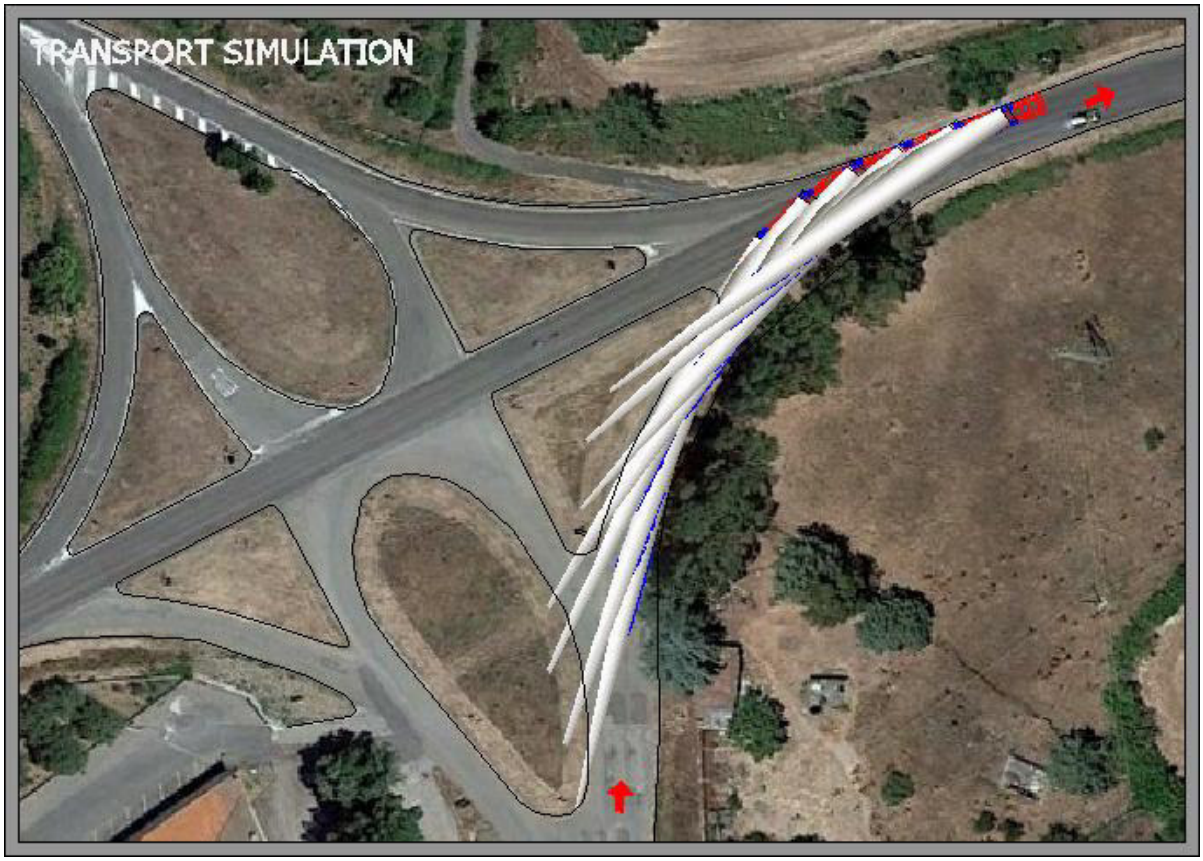
Road-signs to be removed.


TRANSPORT SIMULATION


MODIFICATION
LEGEND
Area of intervention
Obstacle to be removed
14,20 m
77,00 m

➢ Modification n. 3





Modification n. 3: Connection SS131 on SP33

N 40° 12' 38,69" E 08° 47' 13,00"

Works to be performed:

Road-signs to be removed.

➢ Observation n. 1

Observation n. 1: Bridge on SP 33
N 37° 40' 30,90" E 12° 35' 20,31"
Works to be performed: Check carrying capacity of the bridge.

➢ Observation n. 2

Observation n. 2: Bridge on SP 33

N 40° 12' 34,32" E 08° 48' 32,17"

Works to be performed:

Check carrying capacity of the bridge.

➢ Observation n. 3

Observation n. 3: Bridge on SP 33
N 40° 13' 38,32" E 08° 54' 43,83"
Works to be performed: Check carrying capacity of the bridge.

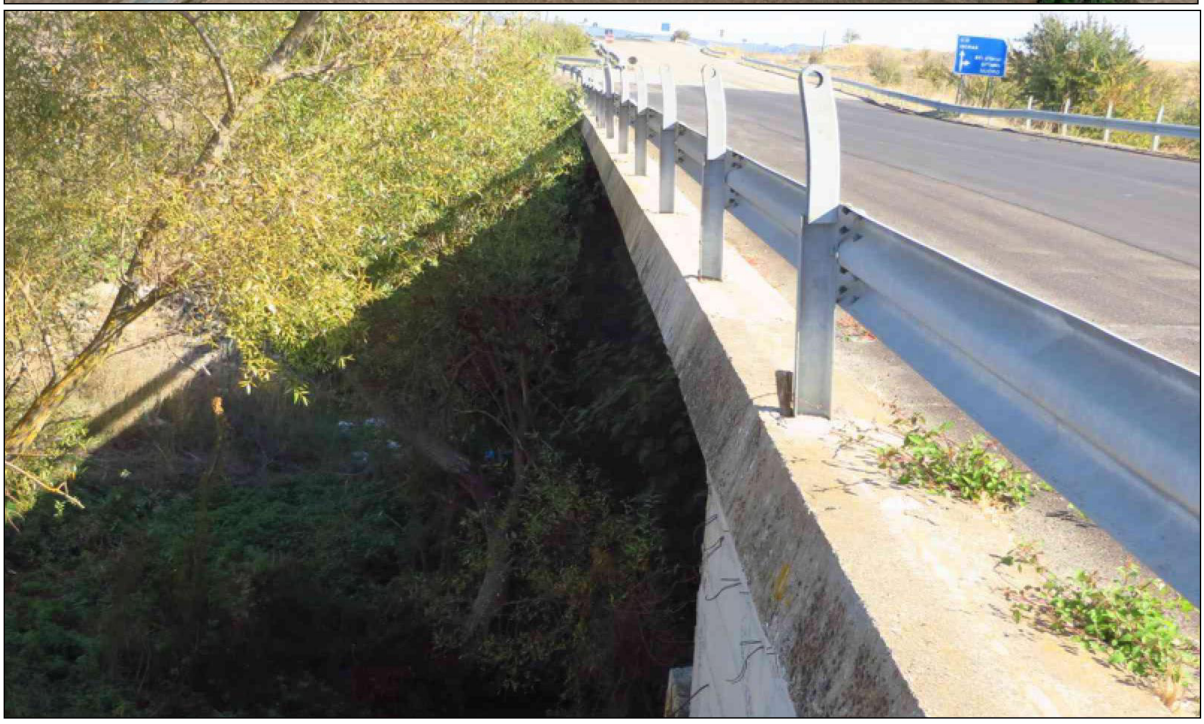
➢ Observation n. 4

Observation n. 4: Bridge on SP 33

N 40° 13' 44,12" E 08° 57' 00,26"

Works to be performed: Check carrying capacity of the bridge.

➢ Observation n. 5

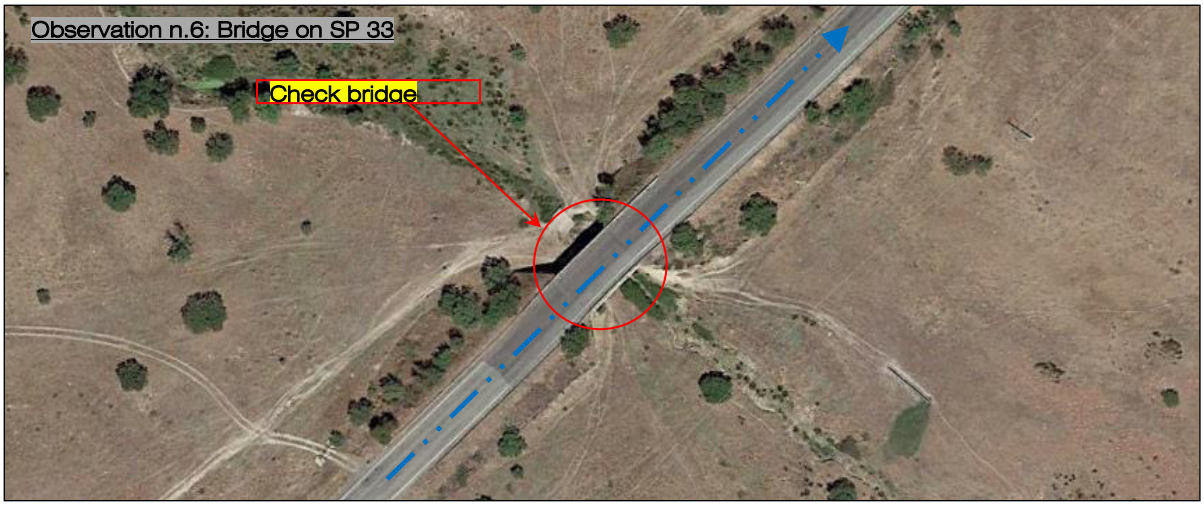


Observation n. 5: Bridge on SP 33

N 40° 15' 43,47" E 08° 59' 32,62"

Works to be performed: Check carrying capacity of the bridge.

➢ Observation n. 6



Observation n. 6: Bridge on SP 33

N 40° 17' 58,47" E 09° 01' 25,75"

Works to be performed:

Check carrying capacity of the bridge.

➢ Observation n. 7

Observation n. 7: Bridge on SP 33

N 40° 18' 19,55" E 09° 01' 55,10"

Works to be performed:

Check carrying capacity of the bridge.

➢ Observation n. 8

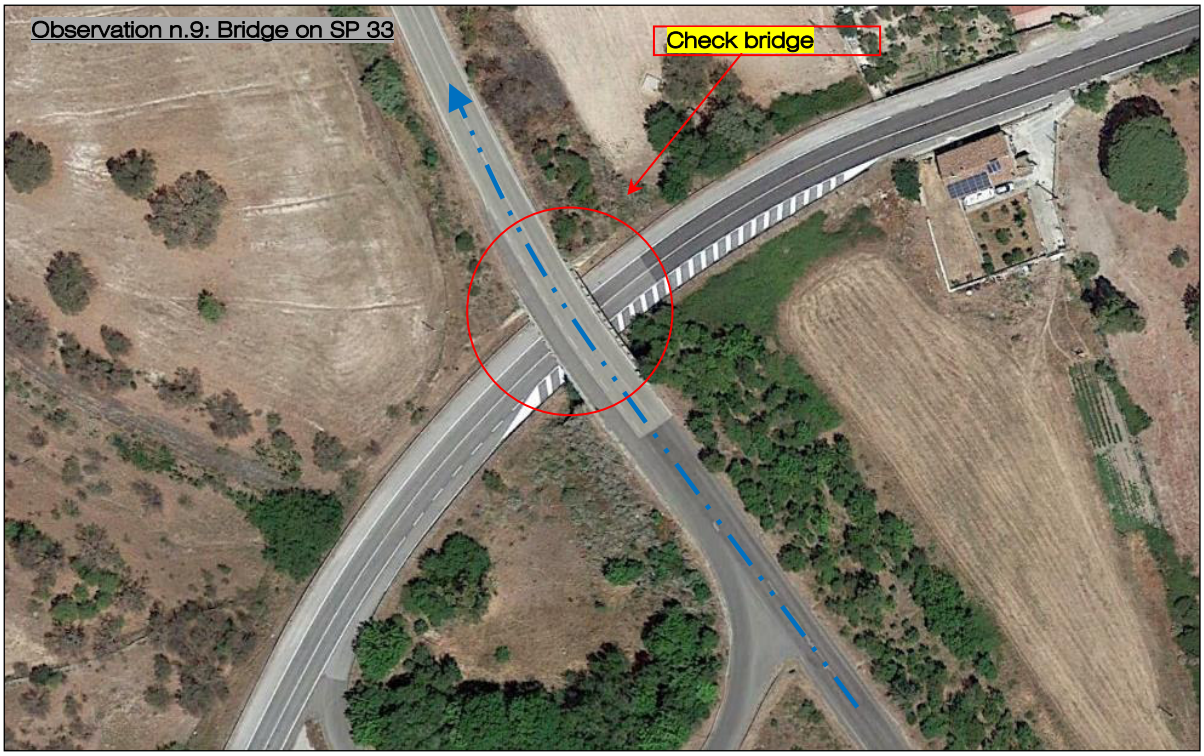
Observation n. 8: Bridge on SP 33

N 40° 18' 19,55" E 09° 01' 55,10"

Works to be performed:

Check carrying capacity of the bridge.

➢ Observation n. 9



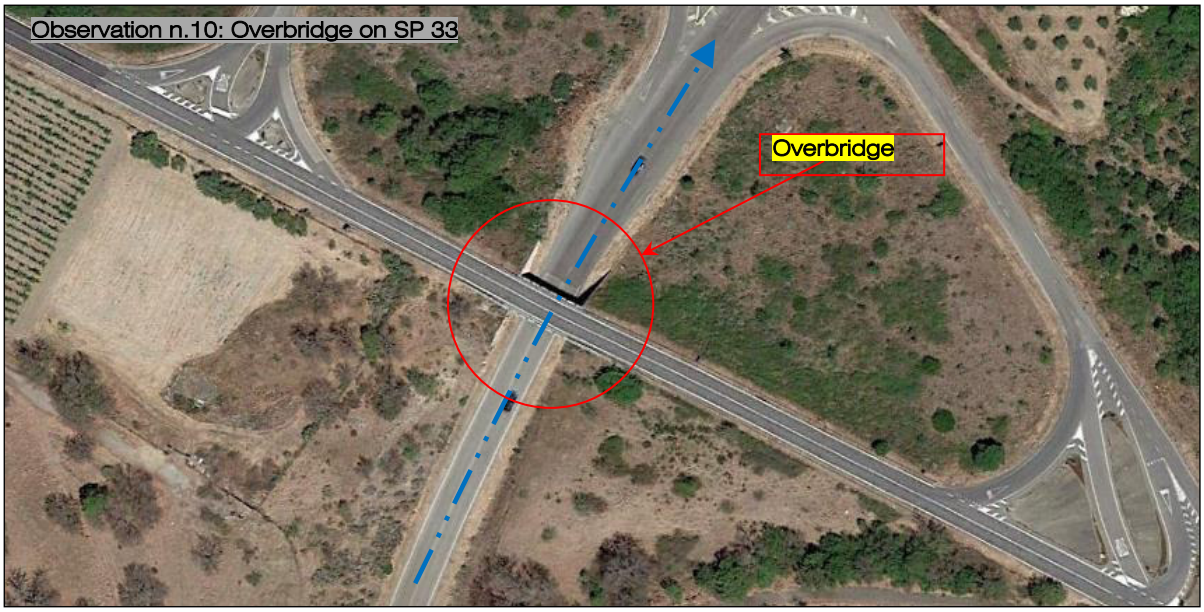
Observation n. 9: Bridge on SP 33

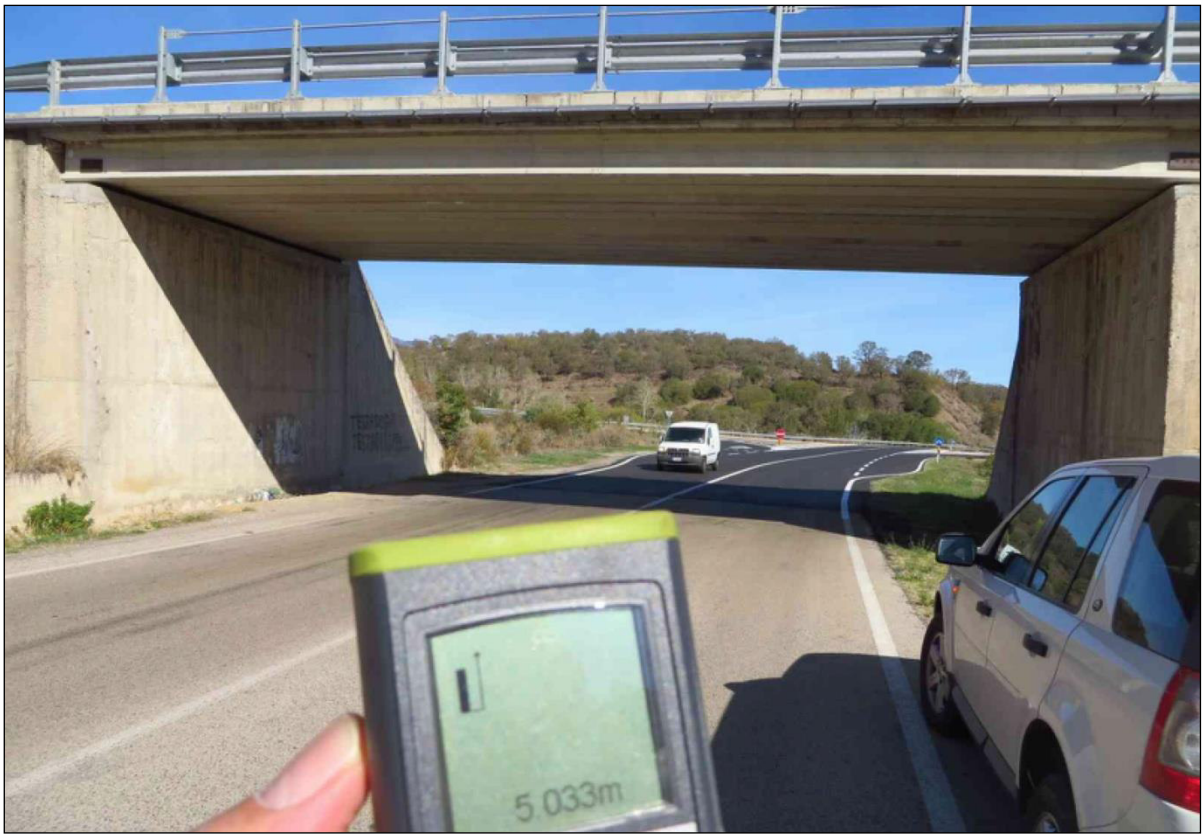
N 40° 19' 28,50" E 09° 01' 48,00"

Works to be performed:

Check carrying capacity of the bridge.

➢ Observation n. 10





Observation n. 10: Overbridge on SP 33

N 40° 20' 39,21" E 09° 01' 44,76"

Note:

Height = 5,033 m.

➢ Observation n. 11

Observation n. 11: Bridge on SP 33

N 40° 21' 58,15" E 09° 02' 36,10"

Works to be performed: Check carrying capacity of the bridge.

➢ Observation n. 12

Observation n. 12: Bridge on SP 33
N 40° 23' 52,05" E 09° 03' 10,54"
Works to be performed: Check carrying capacity of the bridge.

➢ Observation n. 13

Observation n. 13: Overbridge on SP 33

N 40° 25' 17,45" E 09° 04' 36,00"

Note:

Height = 5,453 m.

➢ Observation n. 14

Observation n. 14: Bridge on SP 33

N 40° 25' 22,55" E 09° 04' 43,04"

Works to be performed:

Check carrying capacity of the bridge.

➢ Observation n. 15

Observation n. 15: Bridge on SP 33
N 40° 25' 45,90" E 09° 05' 24,00"
Works to be performed: Check carrying capacity of the bridge.

➢ Observation n. 16

Observation n. 16: Bridge on SP 33

N 40° 26' 40,20" E 09° 06' 28,08"

Works to be performed:

Check carrying capacity of the bridge.

➢ Observation n. 17

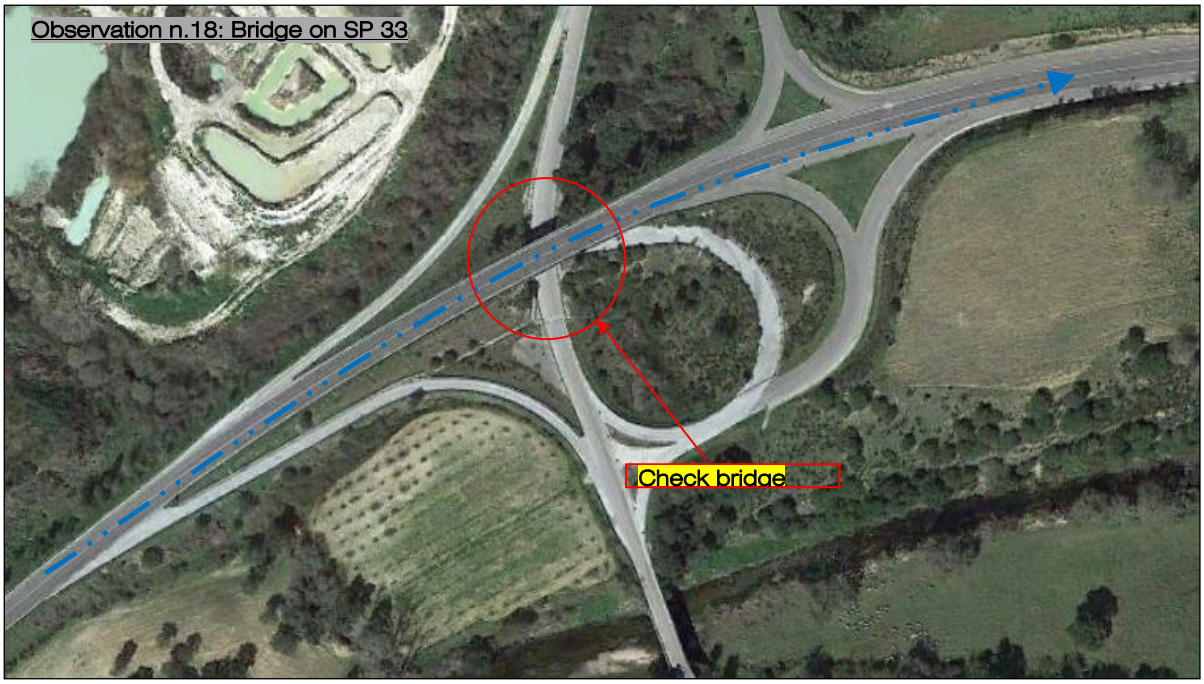
Observation n. 17: Bridge on SP 33

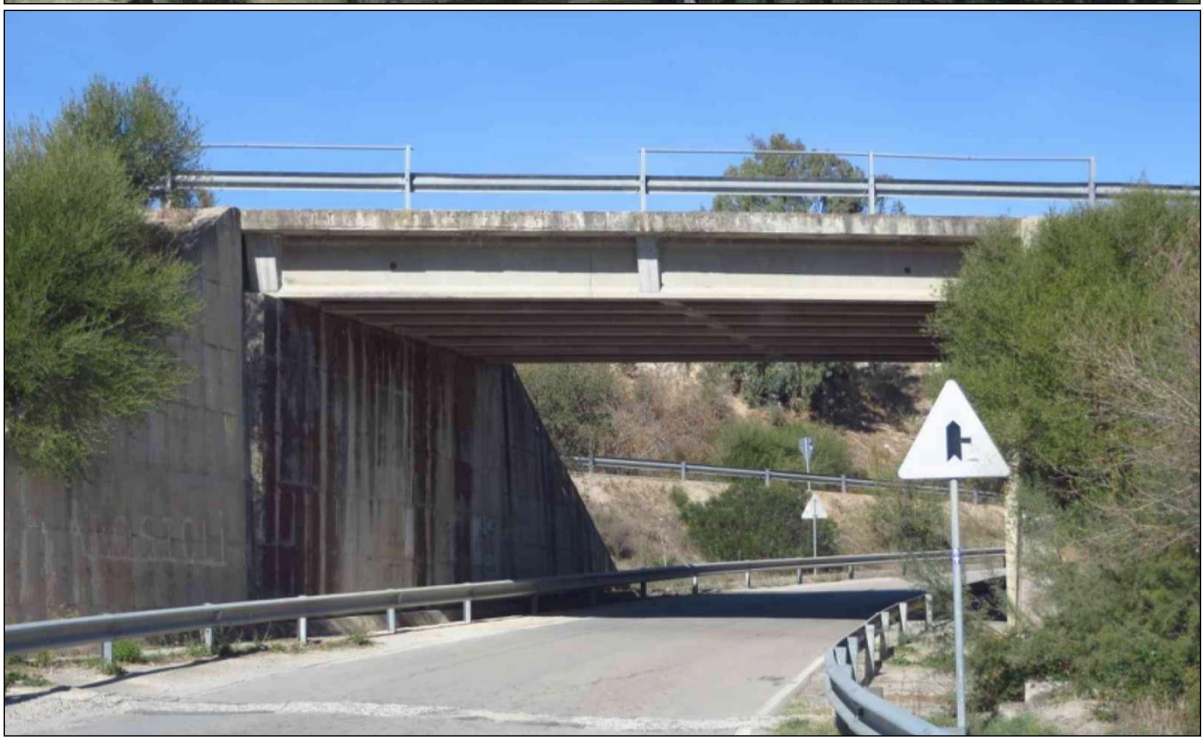
N 40° 28' 06,60" E 09° 07' 10,70"

Works to be performed:

Check carrying capacity of the bridge.

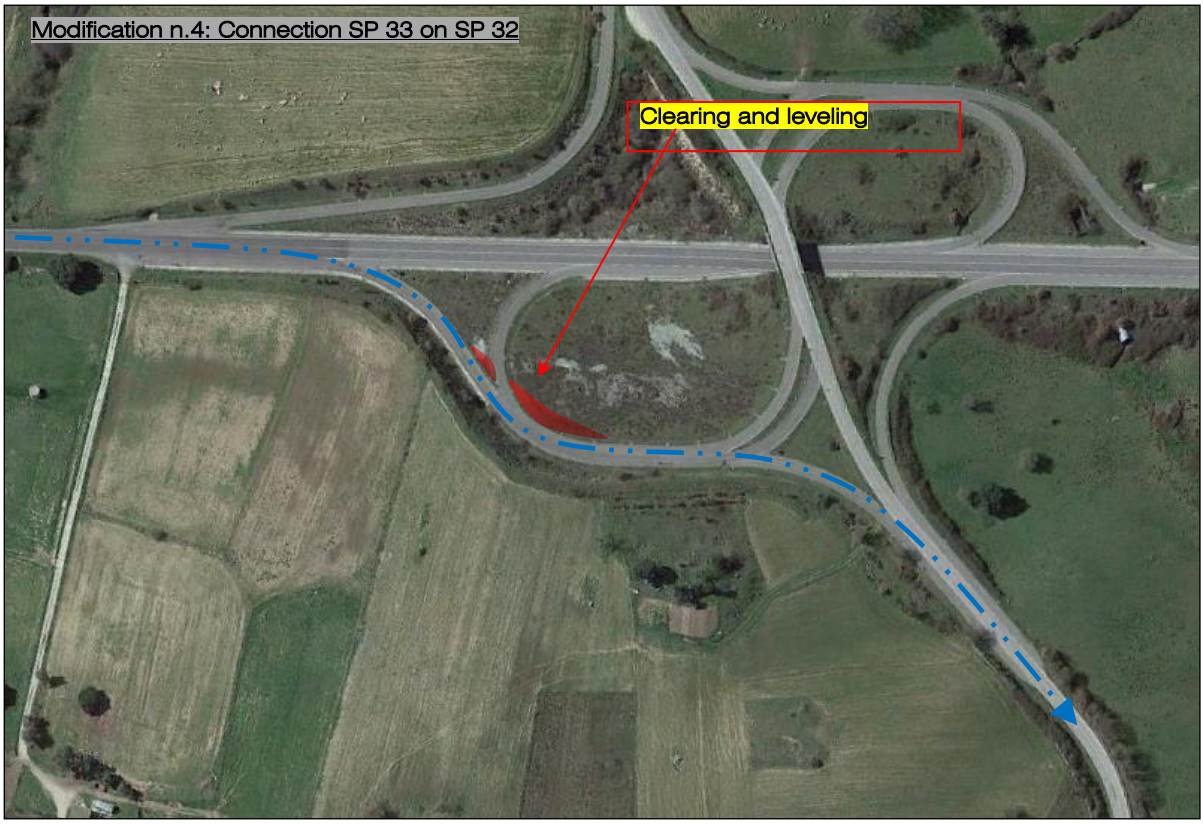
➢ Observation n. 18

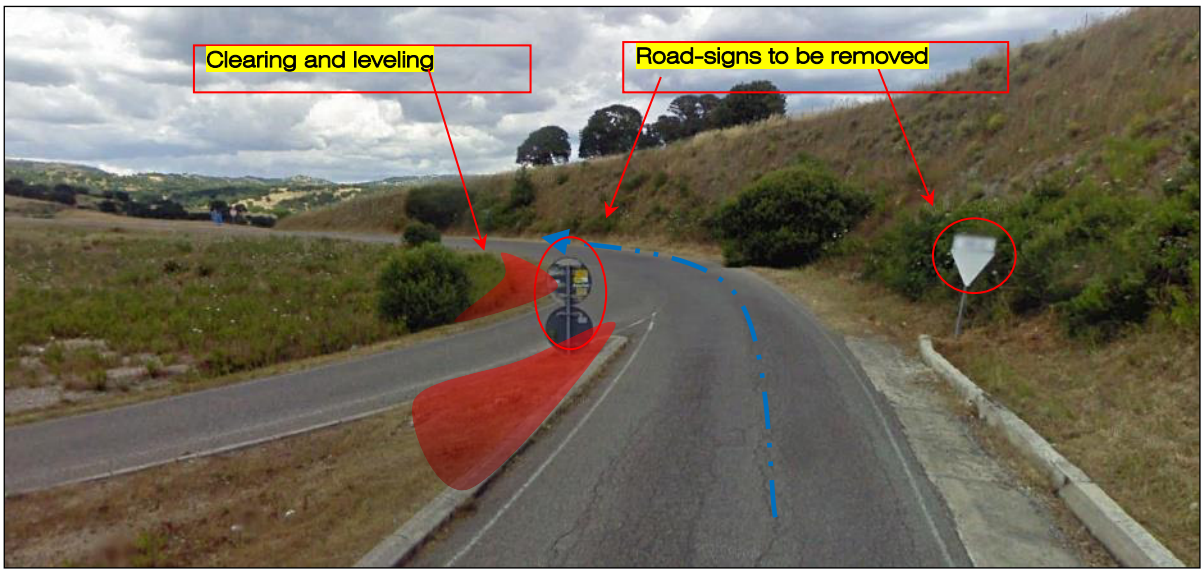




Observation n. 18: Bridge on SP 33
N 40° 28' 38,83" E 09° 07' 41,70"
Works to be performed: Check carrying capacity of the bridge.

➢ Modification n. 4





Modification n. 4: Connection SP 33 on SP 32

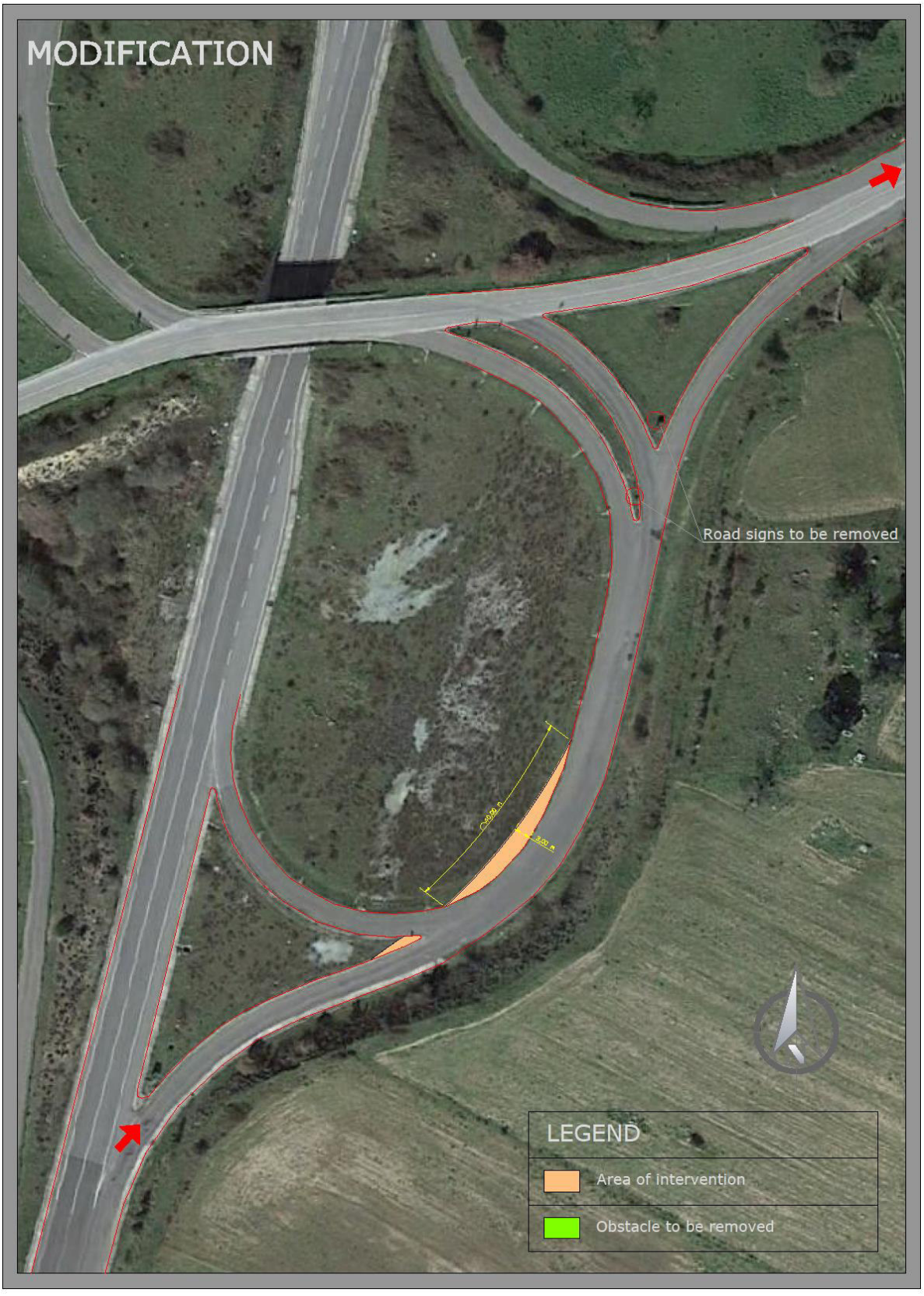
N 40° 31' 56,90" E 09° 10' 18,68"

Works to be performed:

Road-sign to be removed;

Clearing and leveling.


TRANSPORT SIMULATION


MODIFICATION
Road signs to be removed
LEGEND
Area of intervention
Obstacle to be removed

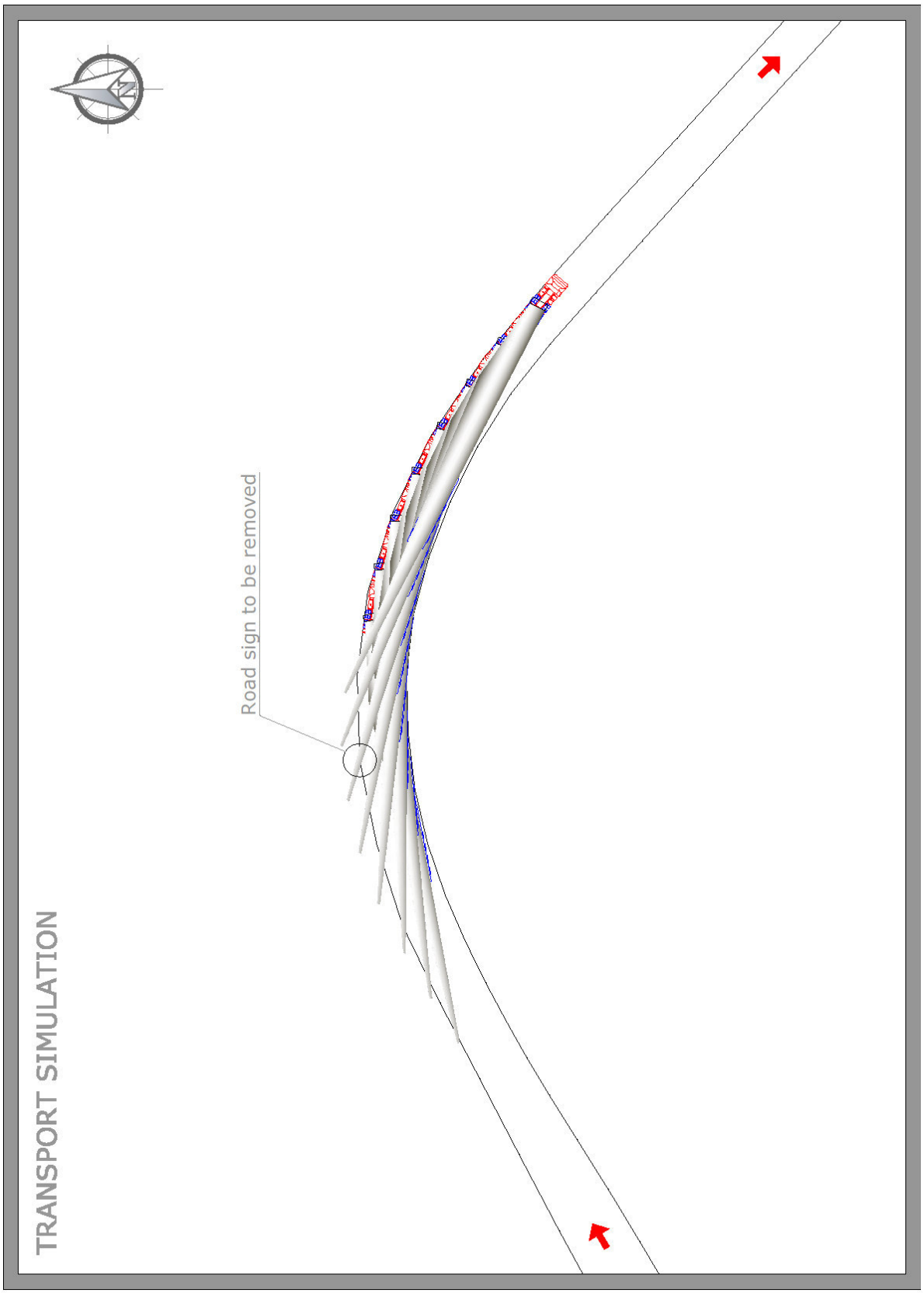
➢ Modification n. 5

Modification n. 5: Left bend on SP 32

N 40° 32' 04,82" E 09° 10' 29,78"

Works to be performed:

Road-sign to be removed.


Road sign to be removed
TRANSPORT SIMULATION

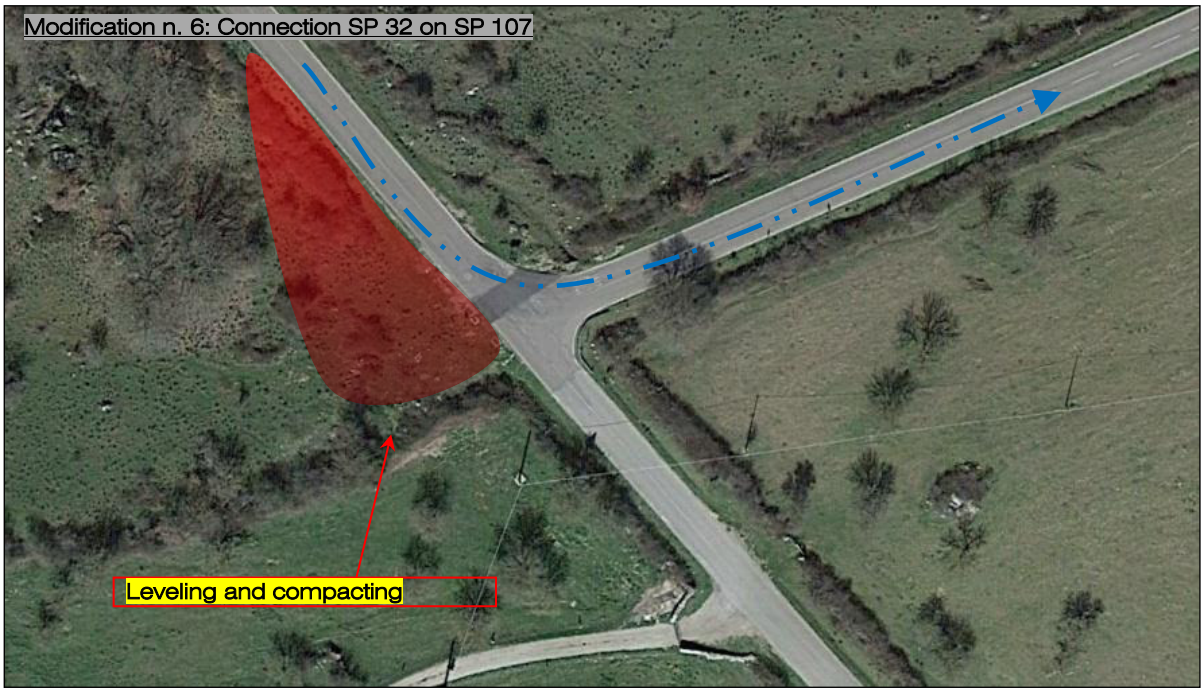
➢ Observation n. 19

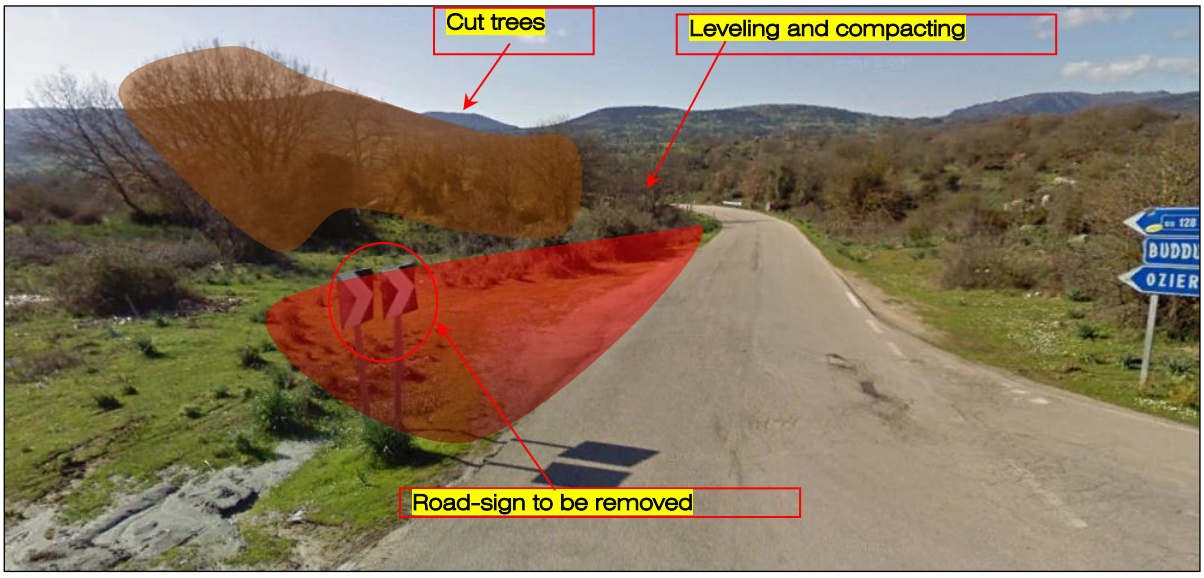
Observation n. 19: Bridge on SP 32

N 40° 32' 03,70" E 09° 10' 55,70"

Works to be performed:Check carrying capacity of the bridge.

➢ Modification n. 6





Modification n. 6: Connection SP 32 on SP 107 without name

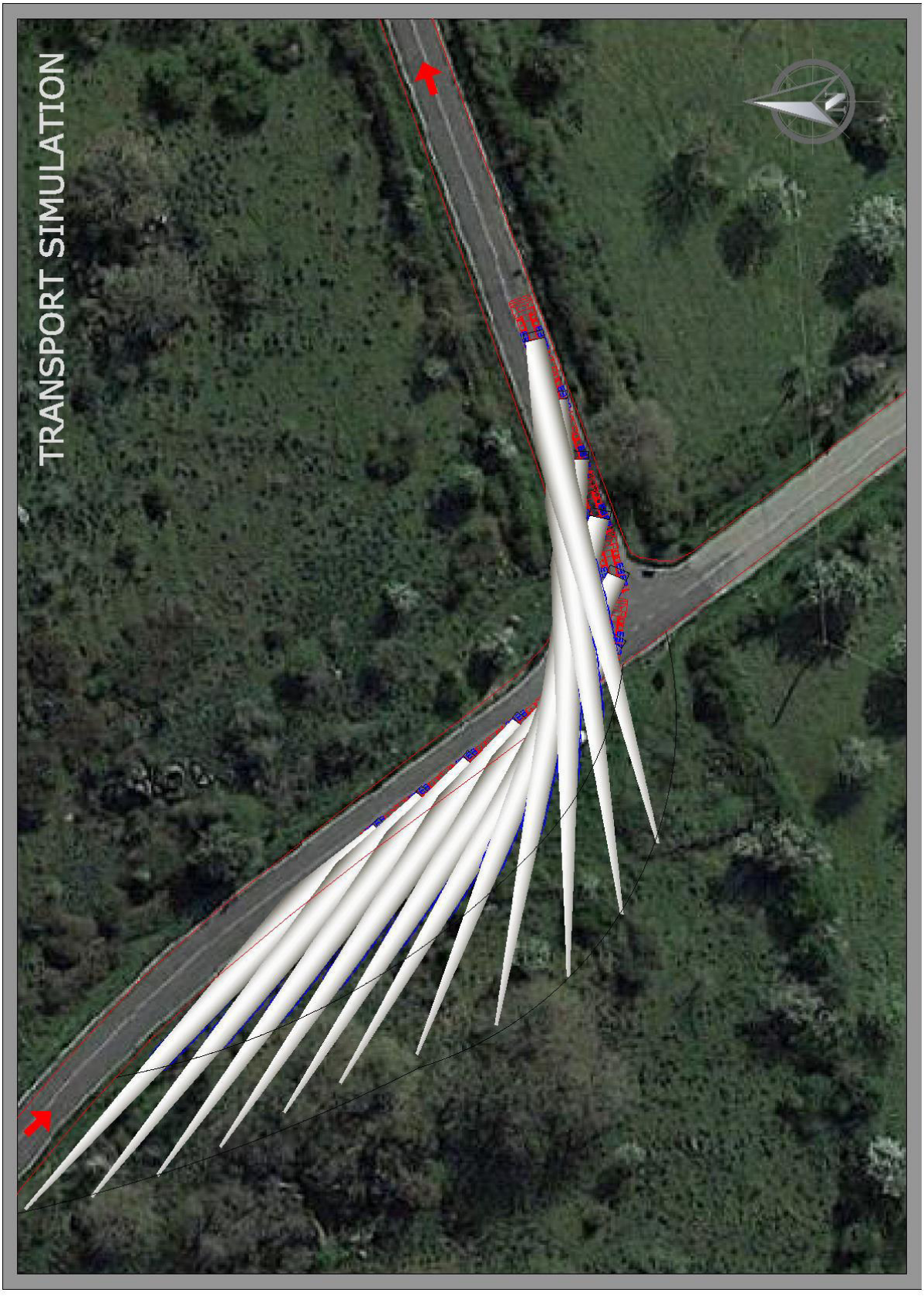
N 40° 32' 12,02" E 09° 12' 04,78"

Works to be performed:

Leveling and compacting the above-mentioned area;

Road-sign to be removed;

Cut trees in external bend.


TRANSPORT SIMULATION


MODIFICATION
LEGEND
Area of intervention
Obstacle to be removed
N 40° 32' 13.57"
E 09° 12' 05.21"
23.50 m
32.50 m
59.30 m
58.65 m

➢ Observation n. 20

Observation n. 20: Bridge on SP 107

N 40° 31' 51,00" E 09° 14' 05,09"

Works to be performed:

Check carrying capacity of the bridge.

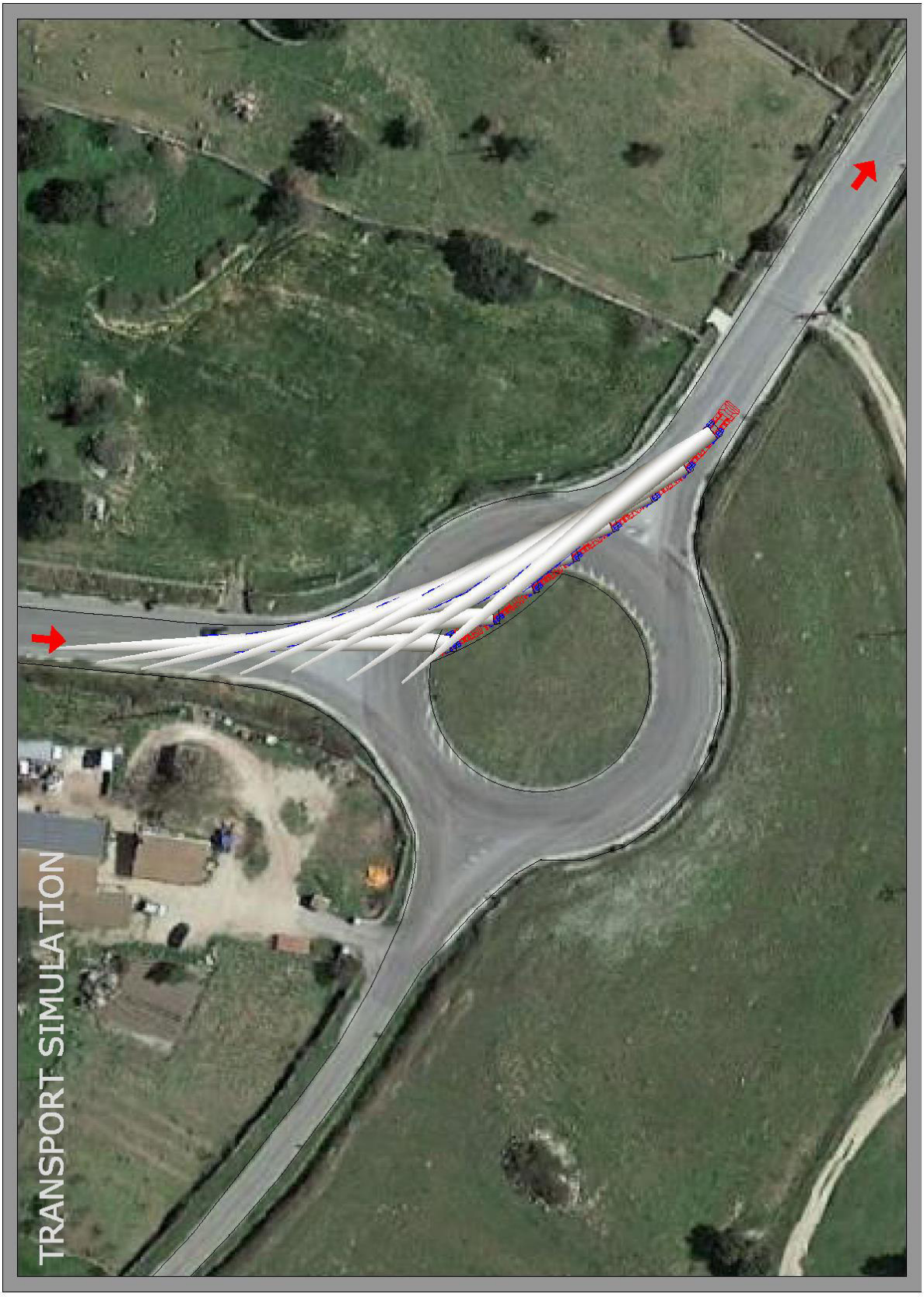
➢ Modification n. 7

Modification n. 7: Roundabout on cross SP 107 - SP 15

N 40° 31' 12,00" E 09° 14' 34,31"

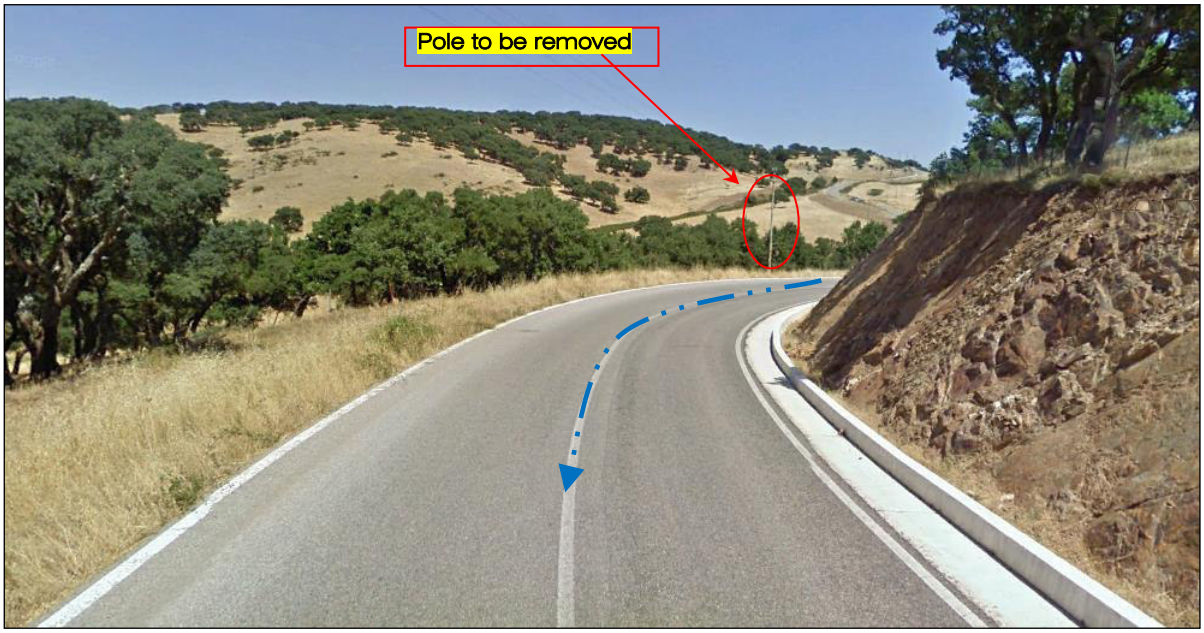
Works to be performed:

Clean and leveling the above mentioned area.

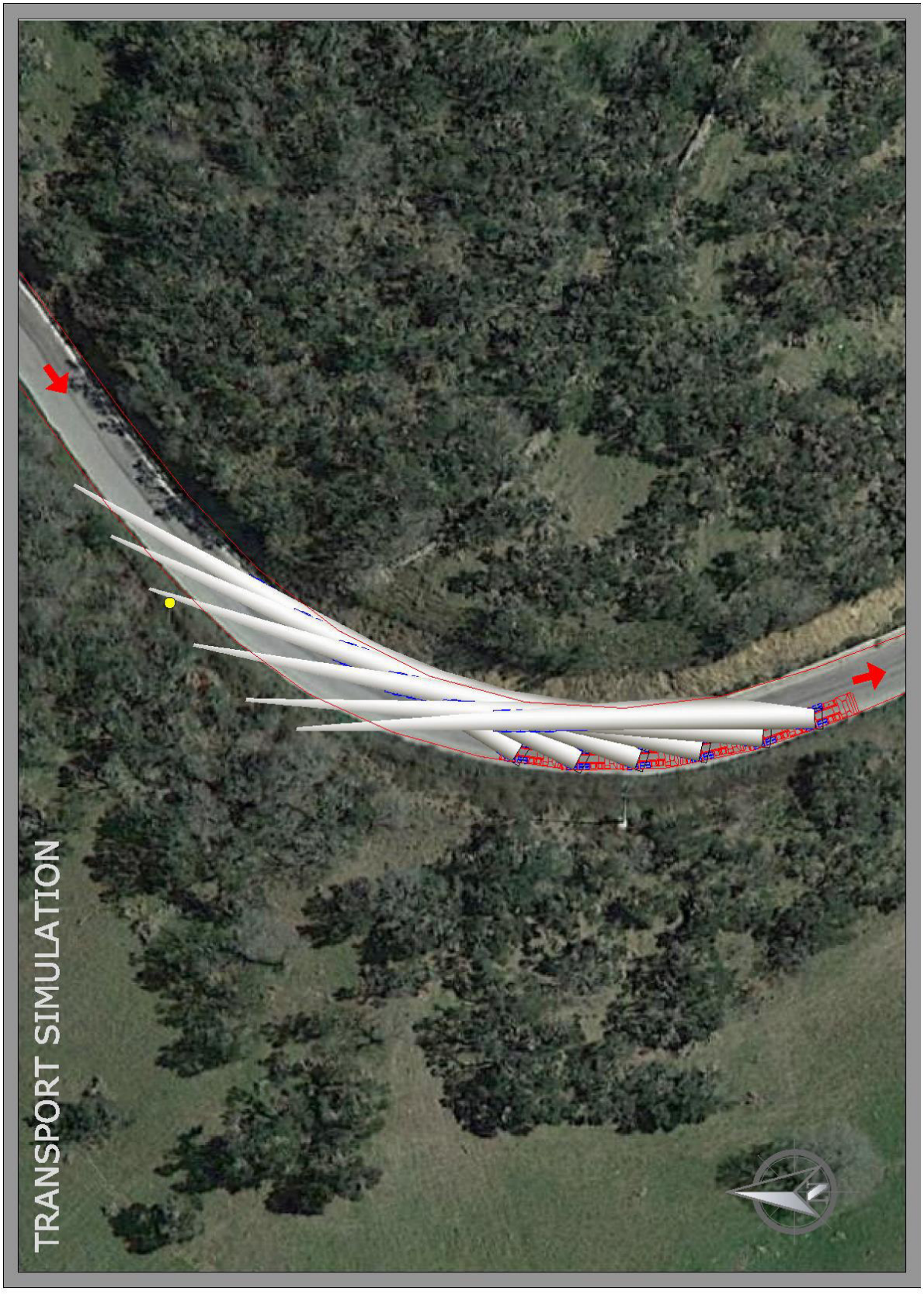

TRANSPORT SIMULATION


MODIFICATION
LEGEND
Area of intervention
Obstacle to be removed

➢ Modification n. 8



Modification n. 8: Left bend on SC without name
N 40° 28' 07,18" E 09° 20' 33,91"
Works to be performed: Pole to be removed.


TRANSPORT SIMULATION

➢ Modification n. 9

Modification n. 9: Left bend on SC without name

N 40° 27' 50,45" E 09° 20' 39,77"

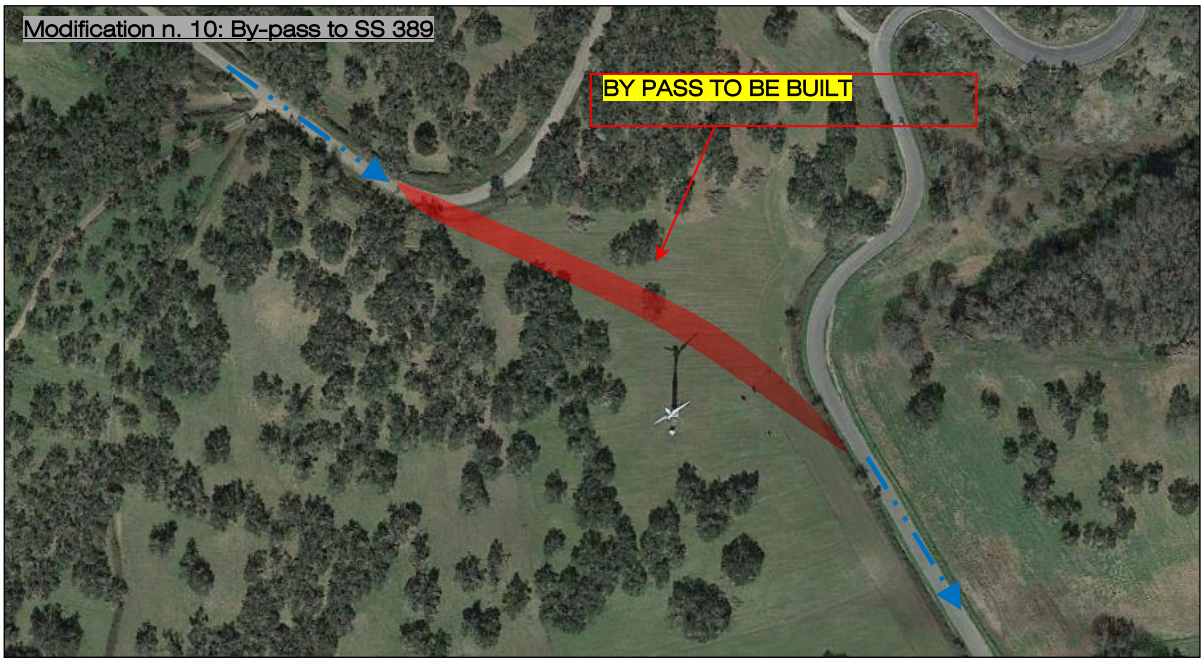
Works to be performed:

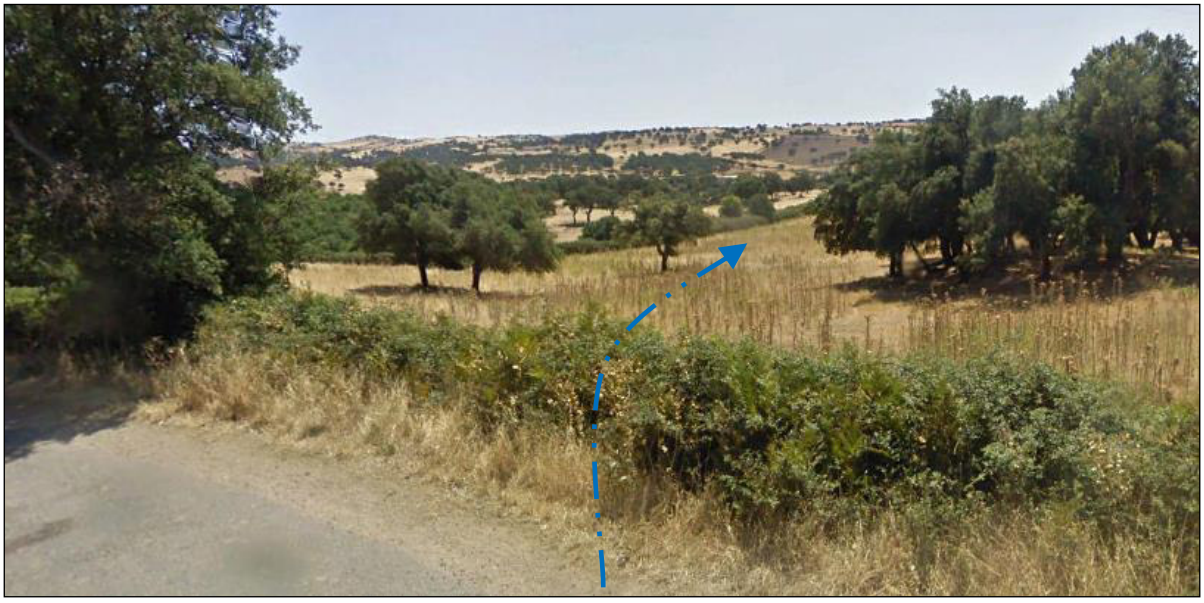
Pole to be removed; Air obstacles to be removed.


TRANSPORT SIMULATION
N


MODIFICATION
49,00 m
13,80 m
34,60 m
N 40° 27' 50.37"
E 09° 20' 39.71"
LEGEND
Area of intervention
Obstacle to be removed

➢ Modification n. 10



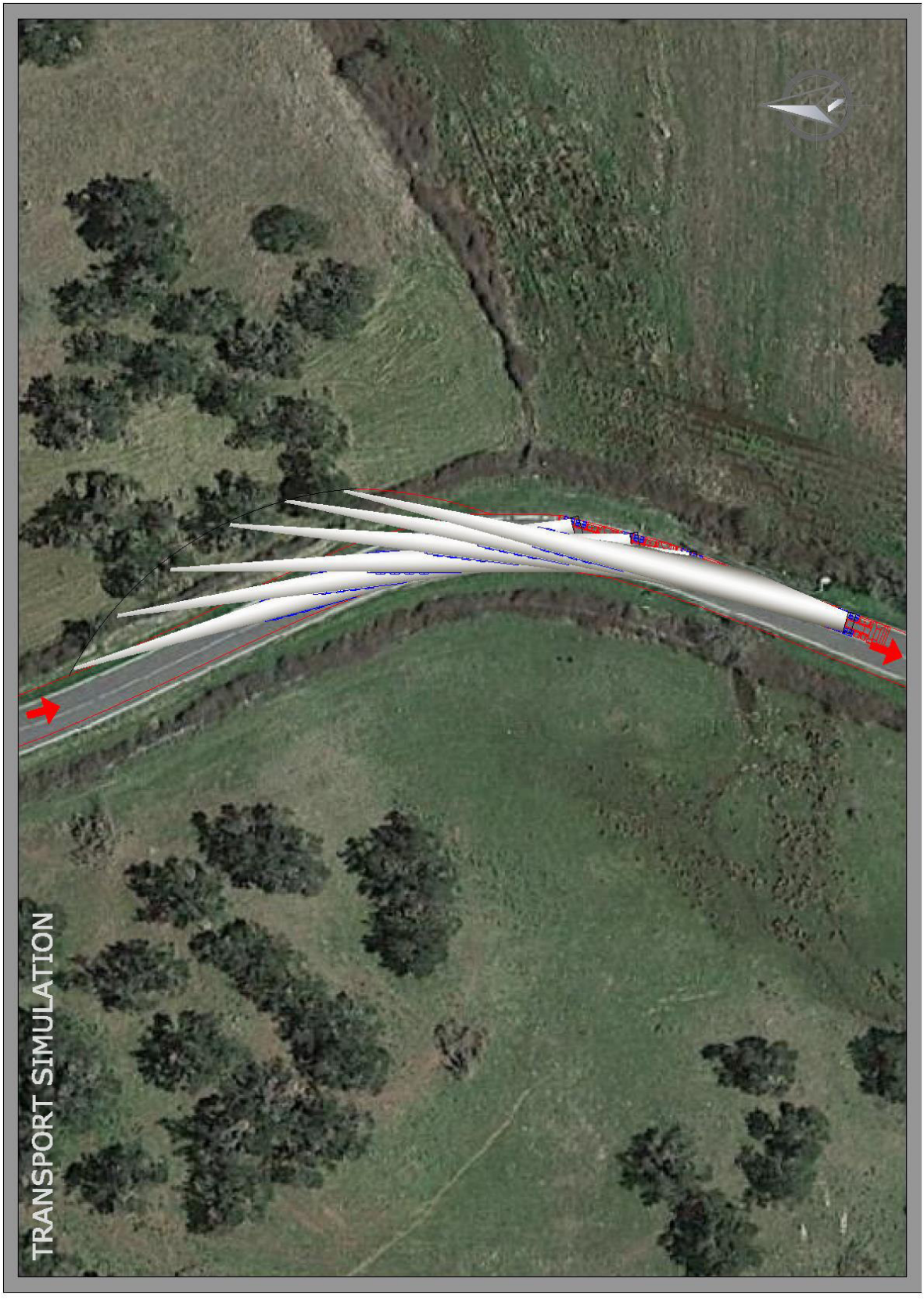


Modification n. 10: By-pass to SS 389
A: N 40° 27' 28" E 9° 21' 58" – B: N 40° 27' 26" E 9° 22' 05"
Works to be performed: By-pass to be built.


MODIFICATION

➢ Modification n. 11

Modification n. 11: Right bend on SS 389
N 40° 27' 06,04" E 09° 22' 13,08"
Works to be performed: Cut trees in external bend.


TRANSPORT SIMULATION


N 40° 27' 46.14"
E 09° 22' 13.08"
17,00 m
44,50 m
LEGEND
Area of intervention
Obstacle to be removed
MODIFICATION

3. CONCLUSIONS:

- The access from "Oristano" port is possible till the site entrance if needed modifications stated on this report are taken into account.
- Above transit simulations, are based upon the possibility to load blades onto truck with blade tip cradle positioned on basement supports to lift the minimum height from ground level to lower blade tip side to 3,5 mtrs. This is necessary to overfly several road signs / fences / obstacles and avoid modifications.
- Even though not specified for each single point, all public access roads have to respect the minimum requirements as per construction specifications.
- The entire road must have a width of at least 5m free from obstacles on both sides and must be leveled, compacted and cleaned to allow the transit of trucks.
- All branches hanging out on roads need to be cut (6mt width for all the height). We suggest that on the first transport our carrier will be supported from client team in case of needs
- Transit of all components subject to the execution of a trial run in order to check the entire route and the modified points in subject.
- In each one of the municipality crossed by exceptional trucks it will be necessary to request prohibition of parking along the way.
- Exceptional transports on all above described routes are subject to issue of permits and approval of all involved road authorities and involved landowners.
- The route presented in this report and the defined modifications required for the feasibility of the same, in order to guarantee the transportation and consequent supply chain of the WTG's elements to the site, is conditioned upon the issuing of the transportation and roads modifications permits by the relevant authorities. To the extent that the relevant authorities impose changes and/or conditions to the presented route and/or modifications which affect the Contractor's ability to comply with the same and/or to comply with the Program, the Buyer shall be liable for all the additional costs incurred as a result of such changes and/or conditions and the Contractor shall be entitled to an adjustment of the Program by adding the additional days necessary to recover the relevant delay.
- If, at the request of a COMPETENT AUTHORITY, the contractor is obliged to perform changes, reinforcements, adjustments and/or upgrades to any bridges in the transportation route; and/or to transport the WTGs along an alternative route in whole or in part not contemplated in the Road Survey Report, and as a result thereof the timely performance of this CONTRACT is delayed or disrupted, then the contractor shall be entitled to an EXTENSION OF TIME; and the BUYER shall reimburse the contractor for the contractor's substantiated cost, if any, incurred as a result thereof.

NEEDED MODIFICATIONS ON THE ACCESS ROUTE						
Item/Point	*Road Type*	*Passages on Bridges*	*Major modifications*	*Medium modifications*	*Small modifications*	*Possible Risk Level*
Modidication 1	Province	-	-	-	X	Low
Modidication 2	National	-	-	X	-	Medium
Modidication 3	Province	-	-	-	X	Low
Observation 1	Province	X	-	-	-	High
Observation 2	Province	X	-	-	-	High
Observation 3	Province	X	-	X	-	High
Observation 4	Province	X	-	-	-	High
Observation 5	Province	X	-	-	-	High
Observation 6	Province	X	-	-	-	High
Observation 7	Province	X	-	-	-	High
Observation 8	Province	X	-	-	-	High
Observation 9	Province	X	-	-	-	High
Observation 10	Province	-	-	-	-	Low
Observation 11	Province	X	-	-	-	High
Observation 12	Province	X	-	-	-	High
Observation 13	Province	-	-	-	-	Low
Observation 14	Province	X	-	-	-	High
Observation 15	Province	X	-	-	-	High
Observation 16	Province	X	-	-	-	High
Observation 17	Province	X	-	-	-	High
Observation 18	Province	X	-	-	-	High
Modidication 4	Province	-	-	-	X	Low
Modidication 5	Province	-	-	-	X	Low
Observation 19	Province	X	-	-	-	High
Modidication 6	Province	-	X	-	-	High
Observation 20	Province	X	-	-	-	High
Modidication 7	Province	-	-	-	X	Low
Modidication 8	Local	-	-	-	X	Low
Modidication 9	Local	-	-	-	X	Low
Modidication 10	Local	-	X	-	-	High
Modidication 11	Local	-	-	X	-	High