

NITREX



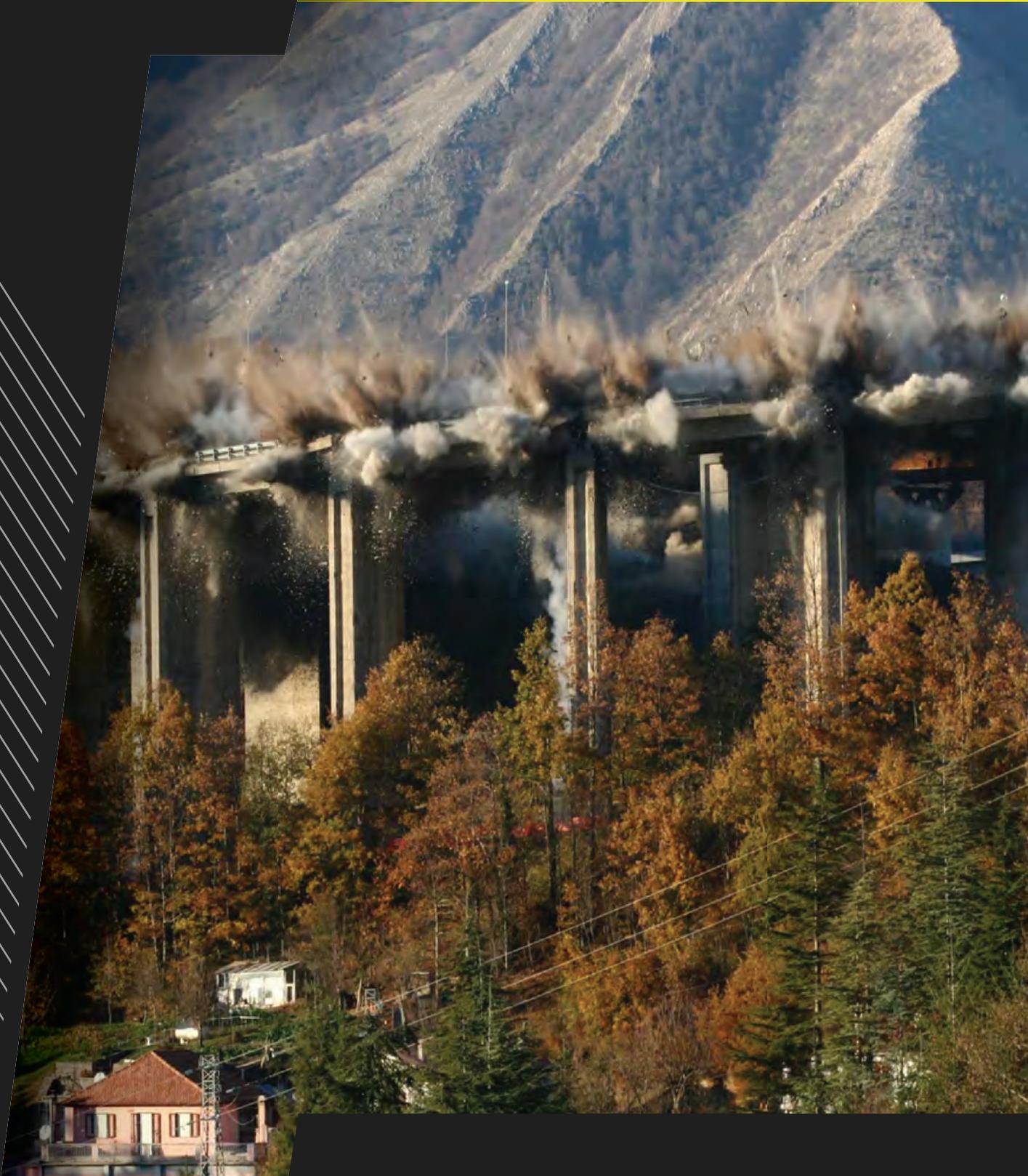
*explosives  
engineering*

2007-2016

# 100 BRIDGES

successfully demolished with explosives in 10 years

**a record we are proud of!**



[www.nitrex-explosives-engineering.com](http://www.nitrex-explosives-engineering.com)

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## ***It was a challenge!***

NITREX has successfully applied state-of-the-art explosives technology and engineering to demolish 100 bridges over the past 10 years. In accomplishing this feat, significant constraints and unique challenges were faced.

On some projects, up to 5 adjoining roads carried live traffic, on others, housing and industrial buildings were located nearby and even below the target bridge. These cases required exact design to leave nearby roads and structures undamaged after blasting.

Some of these bridge demolition projects presented challenges never before faced. In one case, new pylons 57 meters high had already been built within the footprint of the 650 ton, 70 meters high spans that were to be demolished. On another project, the new superstructure was built a handful of centimeters above the old one to be demolished. This approach was adopted so the old bridge could be used as a construction platform while 200-ton cranes assembled the beams of the new bridge. This unique construction method was made possible through properly controlled demolition blasting, decreasing construction costs and time by an order of magnitude.

Many of the projects were made more complex by significant environmental constraints, including locations:

- in national parks
- immediately beneath high voltage power lines
- above oil and gas and water pipelines buried only a few meters below the blast impact zone,
- involving slopes in active landslide mode
- with rivers, water channels, water springs within the work zone, and
- where existing retention walls, sewer facilities, other permanent structures to be retained.

Each of the 100 bridges had varied, distinct characteristics in shape, structure and condition, so it was necessary to produce a targeted blast design for each to ensure success. The blast demolition timeline varied from 1 to a maximum of only 8 weeks. The longer work times applied only to those projects that required several thousands of blast holes, extended preliminary cuts and concrete breakage. This timetables lead to significant overall cost savings, a drastic decrease in environmental impacts, and dramatically lowered the man-hour exposure to the potential for work site accidents, particularly in comparison with standard mechanical demolition techniques which require a much longer work time.

The successful results of these 100 projects provide clear evidence that demolition of bridges with explosives is much safer, quicker and less expensive than the alternative technique of mechanical “deconstruction”, overturning an established preconception.

Pictures and data pertaining to each of the 100 bridge demolition projects follow.

## ***Background***

ANAS, the Italian roads agency, started a significant highway refurbishment and reconstruction project to match the latest European standards resulting in the need to demolish and replace many older bridges.

The highways targeted for improvement generally had been built in the late 1960's and early 1970's. Bridges were constructed of reinforced concrete, with pylons of a maximum height reaching 130 meters. The horizontal span length varied, but was generally 16, 32 or 45 meters, mostly 32 but frequently also of 45, on 4 or 3 post-tensioned beams. Some pylons had longitudinal cantilevers, to cover a spacing up to 80 meters; some other had transverse cantilever to sustain both carriageways; other were built above arches up to 120 m long.

At the time of construction, it was general practice to contract only a few kilometers of highway at a time. As a result, ten of different companies had been involved in the construction of the bridges, working from the designs of the best Italian structural engineers.

Design parameters were targeted to minimize concrete and iron quantities, and to take advantage of the low cost of high qualified manpower at that time. These design considerations produced the iconic highway bridge appearance so recognizable today: pylons with a slim and elegant geometry, many angled surfaces and spans with a minimalist form. The resulting designs also included hollow foundations, even in earthquake-sensitive areas.

Because no official standardization of the construction design was set in place, almost each bridge was built with its own unique shape and structure, according to the best practice and experience developed by each construction company and their trusted engineers and teams.

The ANAS refurbishment and reconstruction projects included total or partial demolition of the bridges on the targeted highways. Where the road layout had to be moved, both spans and pylons were demolished to restore the original environment. Where the road layout didn't change, just the spans were demolished to replace the old obsolescent reinforced concrete superstructure with a new one in COR-TEN steel, weighting about half so much and with better seismic resistance and longer shelf life.

## ***Demolition work***

Demolitions were executed by placing blasting charges within holes in the structure being locally reduced in size.

Static safety factor was always left high because of the lack of live loads on the structures after removal of the service traffic.

Explosives were used to create plastic hinges and to trigger collapse in a given sequence. Explosives were also used to disintegrate the structure in case of steep slopes where the falling span or pylon could slide toward the closest acceptor such as the next pylon to be left in place, a retention wall, or similar, or just slide away down the slope making it impossible to retrieve for crushing and mucking.

## ***Equipment***

Several kinds of equipment were used, depending on the ease of the access.

Drilling was executed mostly with remote controlled hydraulic rigs but also by diamond coring, hand driven electric hammers or pneumatic hammers. Hole diameter of 30 mm was common but on occasion holes up to 60 mm were used, depending on the characteristics of the specific bridge. Hole length varied from 10 cm to 3 m.

Horizontal cuts were executed with a floor saw with a diamond blade. In case of difficult access or for vertical cuts, small hand driven wall-saws and diamond wire saws were used.

Concrete breakage prior to and following blasting was executed with remote controlled excavators, both self-propelled and small-size electric.

In order to access high spots for drilling, blasthole loading or other work items, both telescopic lifters-booms (up to 50 meters reach) and suspended platforms up to 120 m reach, were used. When necessary, personnel accessed the work sites on double-rope and harness safety systems.



TOTALS	Spans (pc.)	Pylons (pc.)	Boreholes (pc.)	Explosives (kg)	Det. Cord (m)	Length of drilling (m)
	<b>724</b>	<b>472</b>	<b>60.000</b>	<b>14.500</b>	<b>155.000</b>	<b>85.000</b>

Nr.	NAME OF THE BRIDGE / VIADUCT	YEAR	CUSTOMER	SPANS	PYLONS	MAX HEIGH PYLONS	ARCH LENGTH	
1	LONTRANO	2007- 2008	<b>CMC RAVENNA S.p.A.</b>	9	8	110		
2	S. ONOFRIO 1			5	4	90		
3	TANAGRO			4	4	42		
4	MURUSELLA			3	2	16		
5	P. PETROSO			2	0			78
6	P. TANAGRO			12	10			50
7	P. MOLINO North	2009- 2010	<b>PIZZAROTTI S.p.A.</b>	8	6		46	
8	P. MOLINO South			8	6		46	
9	P. TANAGRO North			15	13		64	
10	P. TANAGRO South			15	13		64	
11	CERRETA 1 South	2008- 2014	<b>SIS S.C.p.A.</b> (Sacyr S.A., INC srl e Sipal spa)	7	6	14		
12	CERRETA 1 North			7	6	14		
13	MALVO North			5	0	25		
14	MALVO South			5	0	25		
15	SALESE South			6	0	29		
16	SALESE North			8	0	29		
17	PENNARONE 1 North			3	2	35		
18	PENNARONE 1 South			3	2	35		
19	PENNARONE 2 North			4	3	34		
20	PENNARONE 2 South			4	3	34		
21	CALABRIA North			3	2	32		
22	CALABRIA South			3	2	32		
23	STAGNO North			8	7	26		
24	STAGNO South			8	7	26		
25	PALAZZO North			5	4	36		
26	PALAZZO South			5	4	36		
27	NOCE North			4	0	75		
28	NOCE South			4	0	75		
29	DRAGONARA North			2	0	28		
30	DRAGONARA South			2	0	38		
31	CALANCHI 1 North			6	5	13		
32	CALANCHI 2 South			3	2	15		
33	CALANCHI 3 North			12	11	15		
34	CALANCHI 3 South			12	11	15		



Nr.	NAME OF THE BRIDGE / VIADUCT	YEAR	CUSTOMER	SPANS	PYLONS	MAX HEIGH PYLONS
35	CERRETA 2 South	2010- 2014	<b>SIS S.C.p.A.</b> (Sacyr S.A., INC srl e Sipal spa)	8	7	20
36	CERRETA 2 North			9	8	25
37	CALORE North			7	6	13
38	CALORE South			7	6	13
39	CERRITIELLO North			3	2	16
40	CERRITIELLO South			3	2	16
41	ALBANESE North			9	8	38
42	ALBANESE South			9	8	38
43	PECORONE North			24	23	26
44	PECORONE South			24	23	26
45	TORRETTA North			15	14	25
46	TORRETTA South			15	14	25
47	SECCO North			6	5	38
48	SECCO South			6	5	38
49	SAN SALVATORE North			9	8	25
50	SAN SALVATORE South			9	8	25
51	BITONTO North			4	3	16
52	BITONTO South			4	3	16
53	VURRIELLO North			7	6	15
54	VURRIELLO South			7	6	15
55	ROCCA SAN DANIELE	2012	<b>CMC RAVENNA S.p.A.</b>	9	8	42
56	MACERA 1 North	2012- 2014	<b>CARENA COSTRUZIONI S.p.A.</b>	5	0	16
57	MACERA 2 North			9	0	26
58	MACERA 2 South			9	0	26
59	PETRARO North			5	0	20
60	PETRARO South			5	0	20
61	RENA BIANCA 1 North			6	0	12
62	RENA BIANCA 1 South			6	0	12
63	RENA BIANCA 2 North			8	0	18
64	RENA BIANCA 2 South	8	0	18		
65	CABALLA North	2013	<b>TECNIS S.p.A.</b>	5	4	70
66	CABALLA South			5	4	70
67	FRANCO South	2014	<b>ZOLDAN S.r.l.</b>	8	7	25
68	LECARRE 2 North	2014	<b>COLLINI S.p.A.</b>	3	0	30
69	LECARRE 2 North	2015	<b>SCL S.r.l.</b>	5	0	30
70	PANTANO North	2014- 2016	<b>ITALSARC S.C.p.A.</b>	2	1	15



N°	<i>name of the bridge / viaduct</i>	year	customer	Spans	Pylons	<i>max heigh Pylons</i>
71	PANTANO North	2014- 2016	<b>ITALSARC S.C.p.A.</b>	2	1	15
72	CAPOLANZO North			2	1	15
73	CAPOLANZO South			2	1	15
74	FORNO North			3	2	20
75	FORNO South			2	1	20
76	FILOMATO North			3	2	15
77	FILOMATO South			7	6	18
78	MEZZANA North			3	2	10
79	MEZZANA South			3	2	10
80	CARPINETA North			8	7	20
81	CARPINETA South			2	1	15
82	SAN MICHELE South			4	3	35
83	FELICITÀ North			2	1	20
84	FELICITÀ South			3	2	20
85	LA PINETA North			7	6	25
86	LA PINETA South			7	6	25
87	BATTENDIERO 2 North			3	2	20
88	BATTENDIERO 2 South			3	2	20
89	BATTENDIERO 3 North			3	2	15
90	BATTENDIERO 3 South			3	2	15
91	MANCUSO North	6	5	15		
92	MANCUSO South	6	5	15		
93	ITALIA North	16	4	120		
94	ITALIA South	16	0	120		
95	PIETRASTRETTA Est	2014	<b>COLLINI S.p.A.</b>	15	0	50
96	BATTENDIERO 1 North	2016	<b>ITALSARC S.C.p.A.</b>	9	8	70
97	BATTENDIERO 1 South			7	6	70
98	SVINCOLO LAURIA	2012	<b>SIS S.C.p.A.</b> (Sacyr S.A., INC srl e Sipal spa)	50	48	25
99	JANNELLO North	2015-2016	<b>ITALSARC S.C.p.A.</b>	11	0	136
100	JANNELLO South			11	0	136

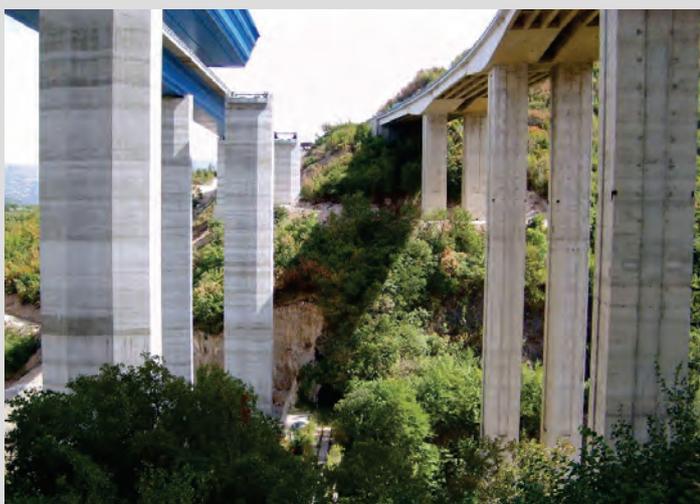


1

Bridge **LONTRANO**Customer: **CMC spa**Site Job: **Auletta (Salerno) Italy – A3 SA-RC Highway**Date: **2007**

Designed by prof. Cestelli Guidi. Built in the 1960's. Maximum height 100 meters. Number 8 pylons with 50 meter cantilever. Nine spans each 32 meters long. Total length of 690 meters. Minimum distance to the nearest structure to be safeguarded (the new Bridge): 4 cm.

2

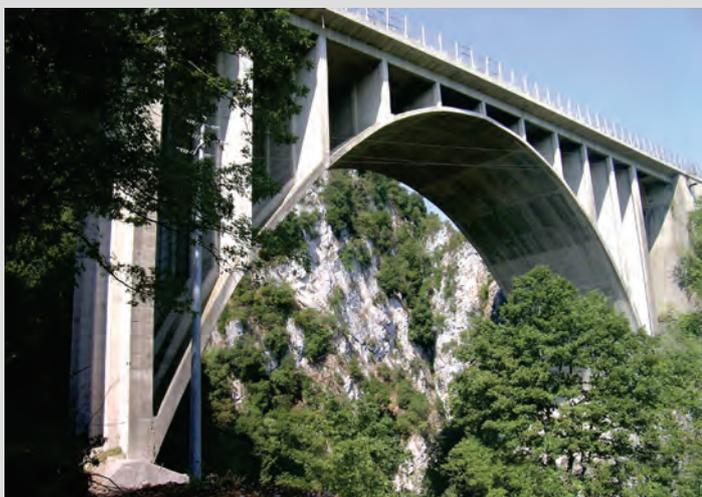
Bridge **SANT'ONOFRIO 1**Customer: **CMC spa**Site Job: **Petina (Salerno) Italy – A3 SA-RC Highway**Date: **2007**

Designed by prof. Cestelli Guidi. Built in the 1960's, maximum height of 120 meters, 4 pylons with 50 meter cantilever, three 32-meter spans, 200 meter length, minimum distance to the nearest structure to be safeguarded (an existing railway viaduct): 15 m.



## Bridge TANAGRO

3



Customer: **CMC spa**

Site Job: **Sicignano, (Salerno), Italy – A3 SA-RC Highway**

Date: **2007 - 2009**

Designed by prof. Giangreco, the arch bridge was built in the 1970's, maximum height of 100 meters, arch span of 80 meters, structure with ribs and thin membrane (thickness from 15 cm to 25 cm), minimum distance from the nearest structure to be safeguarded (railway line): 80 m.

## Bridge MURUSELLA

4



Customer: **CMC spa**

Site Job: **Sicignano, (Salerno), Italy – A3 SA-RC Highway**

Date: **2007**

The MURUSELLA bridge was built in the 1960's. Maximum height of 20 m. 2 piles and three 45 meter spans. Overlaying the nearest structure to be safeguarded: two 1400mm diameter methane gas pipelines (national gas line from Algeria) right 2,5 m the ground surface.



5

Bridge **PETROSO**Customer: **CMC spa**Site Job: **Sicignano, (Salerno), Italy – A3 SA-RC Highway**Date: **2008**

The PETROSO arch bridge was built in the 1970's, Melan system (with iron framed beam embedded in the reinforced concrete) maximum height of 150 meters, arch span of 78 meters, minimum distance from the nearest structure to be safeguarded (the new bridge) - 4 m (above).

6

Bridge **TANAGRO**Customer: **CMC spa**Site Job: **Polla, (Salerno), Italy – A3 SA-RC Highway**Date: **2007**

The Tanagro bridge: 5 spans 32 meter long, with I beams, with 50-meter support pylons.

## Bridges **MOLINO** North and South

7 - 8



Customer: **PIZZAROTTI spa**

Site Job: **Sicignano, (Salerno), Italy – A3 SA-RC Highway**

Date: **2009 - 2010**

The Molino arch bridge: 8 spans 32 meter and 16 meter I beams, with 6 pylons and 46 meter arch to be tilted down.

## Bridges **TANAGRO** North and South

9 - 10



Customer: **PIZZAROTTI spa**

Site Job: **Sicignano, (Salerno), Italy – A3 SA-RC Highway**

Date: **2010**

The Tanagro viaduct with arch bridge: 15 spans, 32 meter and 16 meter I beams, with 13 pylons and 64 meter arch.



11 - 12

Bridges **CERRETA 1** North and SouthCustomer: **SIS scpa**Site Job: **Montesano, (Salerno), Italy – A3 SA-RC Highway, year 2010.**

The Cerretta 1 bridge: 14 spans 32 meter and with 12 pylons at 2cm from the nearby standing bridge.

13 - 14

Bridges **MALVO** North and SouthCustomer: **SIS scpa**Site Job: **Montesano, (Salerno), Italy – A3 SA-RC Highway, years 2008 – 2010.**

The Malvo bridges: 10 spans, 32 meter long and 8 pylons to be safeguarded.

15 - 16

Bridges **SALESE** North and SouthCustomer: **SIS scpa**Site Job: **Montesano, (Salerno), Italy – A3 SA-RC Highway, years 2008 – 2010.**

The Salese bridge: 8 spans 32 meters long and 7 pylons to be safeguarded.



## Bridges PENNARONE 1 North and South

17 - 18



Customer: **SIS scpa**

Site Job: **Lagonegro, (Potenza), Italy – A3 SA-RC Highway, years 2008 – 2010.**

The Penarone 1 bridges: 6 spans 32 meters long and 4 pylons max high 35 meters.

## Bridges PENNARONE 2 North and South

19 - 20



Customer: **SIS scpa**

Site Job: **Lagonegro, (Potenza), Italy – A3 SA-RC Highway, years 2008 – 2010.**

The Penarone 2 bridges: 8 spans 32 meters long, V beams, 6 pylons to be tilted down.

## Bridges CALABRIA North and South

21 - 22



Customer: **SIS scpa**

Site Job: **Lagonegro, (Potenza), Italy – A3 SA-RC Highway, year 2008.**

The Calabria bridges: 6 spans 32 meters long, V beams, and 4 pylons to be tilted down.



23 - 24

Bridges **STAGNO** North and SouthCustomer: **SIS scpa**Site Job: **Lagonegro, (Potenza), Italy – A3 SA-RC Highway, years 2008 – 2010.**

The Stagno bridges: 16 spans 32 meters long, V beams, with 14 pylons to be tilted down.

25 - 26

Bridges **PALAZZO** North and SouthCustomer: **SIS scpa**Site Job: **Lagonegro, (Potenza), Italy – A3 SA-RC Highway, years 2008 – 2011.**

The Palazzo bridges: 10 spans 32 meters long and 8 pylons to be tilted down.

27 - 28

Bridges **NOCE** North and SouthCustomer: **SIS scpa**Site Job: **Lagonegro, (Potenza), Italy – A3 SA-RC Highway, years 2008 – 2011.**

The Noce bridges: 8 spans 32 meters long, V beams, 6 pylons to be safeguarded.

Bridges **DRAGONARA** North and South

29 - 30

Customer: **SIS scpa**Site Job: **Lagonegro, (Potenza), Italy – A3 SA-RC Highway, years 2008 – 2010.**

The Dragonara bridge: 4 spans 32 meters long; 2 pylons to be safeguarded.

Bridge **CALANCHI 1** North

31

Customer: **SIS scpa**Site Job: **Lauria, (Potenza), Italy – A3 SA-RC Highway, years 2008 – 2011.**

The Calanchi 1 bridge: 6 spans 32 meters long, I beams, 5 pylons to be tilted down.

Bridge **CALANCHI 2** South

32

Customer: **SIS scpa**Site Job: **Lauria, (Potenza), Italy – A3 SA-RC Highway, year 2008.**

The Calanchi 2 bridge: 5 spans 32 meters long; 4 pylons to be tilted down.



33 - 34

Bridges **CALANCHI 3** North and SouthCustomer: **SIS scpa**Site Job: **Lauria, (Potenza), Italy – A3 SA-RC Highway, years 2008 – 2011.**

The Calanchi 3 bridge: 24 spans 32 meters long, I beams, 22 pylons to be tilted down.

35 - 36

Bridges **CERRETA 2** North and SouthCustomer: **SIS scpa**Site Job: **Montesano, (Salerno), Italy – A3 SA-RC Highway, year 2010.**

The Cerreta 2 bridges: 17 spans 32 meters long; 15 pylons to be tilted down.

37 - 38

Bridges **CALORE** North and SouthCustomer: **SIS scpa**Site Job: **Casalbuono, (Salerno), Italy – A3 SA-RC Highway, year 2012.**

The Calore bridges: 14 spans 32 meters long, I beams, 12 pylons to be tilted down.



## Bridges CERRITIELLO North and South

39 - 40



Customer: **SIS scpa**

Site Job: **Casalbuono, (Salerno), Italy – A3 SA-RC Highway, year 2012.**

The Cerritiello bridge: 3 spans 32 meters long, I beams, 2 pylons to be tilted down.

## BridgeS ALBANESE 1 North and South

41 - 42



Customer: **SIS scpa**

Site Job: **Casalbuono, (Salerno), Italy – A3 SA-RC Highway. Date: 2012 - 2013**

The ALBANESE bridges: 18 spans 32 meters long, I beams, 16 pylons to be tilted down.

## Bridges PECORONE North and South

43 - 44



Customer: **SIS scpa**

Site Job: **Lauria, (Potenza), Italy – A3 SA-RC Highway. Date: 2013**

The Pecorone bridges: 48 spans 32 meters long, I beams, 46 pylons to be tilted down.



45 - 46

Bridges **TORRETTA** North and SouthCustomer: **SIS scpa**Site Job: **Montesano, (Salerno), Italy – A3 SA-RC Highway. Date: 2010 - 2012**

The TORRETTA bridges: 30 spans 32 meters long, I beams, 28 pylons to be tilted down.

47 - 48

Bridges **SECCO** North and SouthCustomer: **SIS scpa**Site Job: **Lauria, (Potenza), Italy – A3 SA-RC Highway. Date: 2013**

The Secco bridges: 12 spans 32 meters long, I beams, 10 pylons to be tilted down.

Bridges **SAN SALVATORE** North and South

49 - 50

Customer: **SIS scpa**Site Job: **Lagonegro, (Potenza), Italy – A3 SA-RC Highway, year 2014.**

The SAN SALVATORE bridges: 18 spans 32 meters long, I beams, 16 pylons to be tilted down.

Bridges **BITONTO** North and South

51 - 52

Customer: **SIS scpa**Site Job: **Casalbuono, (Salerno), Italy – A3 SA-RC Highway, year 2012.**

The Cerritiello bridge: 3 spans 32 meters long, I beams, 2 pylons to be tilted down.



53 - 54

Bridges **VURRIELLO** North and SouthCustomer: **SIS scpa**Site Job: **Lagonegro, (Potenza), Italy – A3 SA-RC Highway, year 2014.**

The VURRIELLO bridges: 14 spans 32 meters long, I beams, 12 pylons to be tilted down.

55

Bridge **ROCCA SAN DANIELE**Customer: **CMC Ravenna**Site Job: **Favara, (Agrigento), Italy, year 2012**

The Rocca Daniele bridge: 9 spans 32 meters long, I beams, 8 pylons to be tilted down.



## Bridge MACERA 1

56



Customer: **CARENA spa**

Site Job: **Lauria, (Potenza), Italy – A3 SA-RC Highway.**

Year: **2012- 2014.**

The MACERA I bridge: 5 spans 32 meters long, I beams, 4 pylons to be safeguarded.

## Bridges MACERA 2 North and South

57 - 58



Customer: **CARENA spa**

Site Job: **Lauria, (Potenza), Italy – A3 SA-RC Highway.**

Years: **2012- 2014.**

The MACERA II bridges: 18 spans 32 meters long, I beams, 16 pylons to be safeguarded.



59 - 60

Bridges **PETRARO** North and SouthCustomer: **CARENA spa**Site Job: **Lauria, (Potenza), Italy – A3 SA-RC Highway. Date: 2012- 2014**The **PETRARO** bridge: 10 spans 32 meters long, I beams, 8 pylons to be safeguarded.

61 - 62

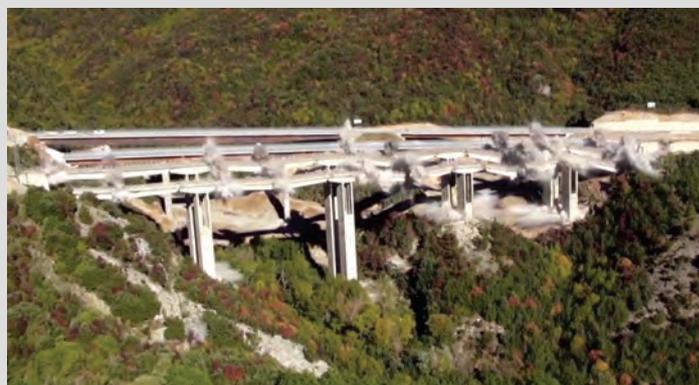
Bridges **RENA BIANCA 1** North and SouthCustomer: **CARENA spa**Site Job: **Lauria, (Potenza), Italy – A3 SA-RC Highway. Date: 2012- 2014**The **MACERA 2** bridges: 18 spans 32 meters long, I beams, 16 pylons to be safeguarded.

63 - 64

Bridges **RENA BIANCA 2** North and SouthCustomer: **CARENA spa**Site Job: **Lauria, (Potenza), Italy – A3 SA-RC Highway. Date: 2012- 2014**The **RENA BIANCA 2** bridge: 16 spans 32 meters long, I beams, 14 pylons to be safeguarded.

Bridges **CABALLA** North and South

65 - 66

Customer: **TECNIS spa**Site Job: **Morano Calabro, (Cosenza), Italy – A3 SA-RC Highway. Date: 2013**

The CABALLA bridges: 10 spans 32 meters long, I beams, 8 pylons to be tilted down.

Bridge **FRANCO** North

67 - 68

Customer: **ZOLDAN S.r.l and SCL s.r.l.**Site Job: **Vietri di Potenza, (Potenza), Italy – A35 SI-PZ Highway. Date: 2014**

The FRANCO bridge: 8 spans 32 meters long, I beams, 7 pylons to be safeguarded.

Bridge **LE CARRE 2** North

69

Customer: **COLLINI S.p.A.**Site Job: **Vietri di Potenza, (Potenza), Italy – A35 SI-PZ Highway. Date: 2014 - 2015**

The LE CARRE II bridges: 8 spans 32 meters long, I beams, 7 pylons to be safeguarded.



70 - 71

Bridges **PANTANO** North and SouthCustomer: **ITALSARC S.C.p.A.**Site Job: **Laino Borgo, (Cosenza), Italy – A3 SA-RC Highway, year 2016.**

The PANTANO bridges: 4 spans 32 meters long, I beams, 2 pylons to be tilted down.

72 - 73

Bridges **CAPOLANZO** North and SouthCustomer: **ITALSARC S.C.p.A.**Site Job: **Laino Borgo, (Cosenza), Italy – A3 SA-RC Highway, year 2016.**

The CAPOLANO bridges: 4 spans 32 meters long, I beams, 2 pylons to be tilted down.

74 - 75

Bridges **FORNO** North and SouthCustomer: **ITALSARC S.C.p.A.**Site Job: **Laino Borgo, (Cosenza), Italy – A3 SA-RC Highway, year 2016.**

The FORNO bridges: 5 spans 32 meters long, I beams, 3 pylons to be tilted down.



## Bridges **FILOMATO** North and South

76 - 77



Customer: **ITALSARC S.C.p.A.**

Site Job: **Laino Castello, (Cosenza), Italy – A3 SA-RC Highway, years 2015 – 2016.**

The FILOMATO bridges: 10 spans 32 meters long, I beams, 8 pylons to be tilted down.

## Bridges **MEZZANA** North and South

78 - 79



Customer: **ITALSARC S.C.p.A.**

Site Job: **Laino Castello, (Cosenza), Italy – A3 SA-RC Highway, years 2014 – 2015.**

The MEZZANA bridges: 6 spans 32 meters long, I beams, 4 pylons to be tilted down.

## Bridges **CARPINETA** North and South

80 - 81



Customer: **ITALSARC S.C.p.A.**

Site Job: **Mormanno, (Cosenza), Italy – A3 SA-RC Highway, years 2015 – 2016.**

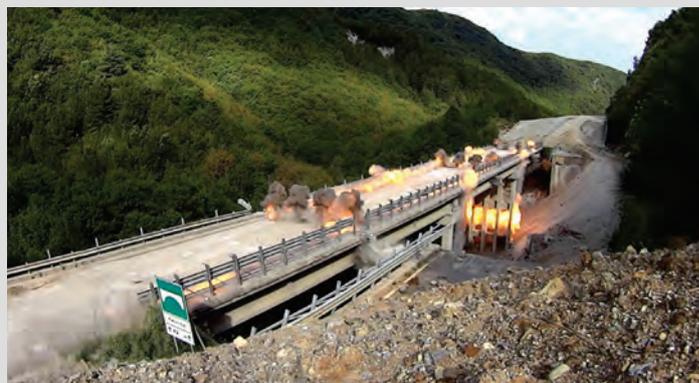
The CARPINETA bridges: 10 spans 32 meters long, I beams, 8 pylons to be tilted down.



82

Bridge **SAN MICHELE**Customer: **ITALSARC S.C.p.A.**Site Job: **Mormanno, (Cosenza), Italy – A3 SA-RC Highway, year 2016.**The **SAN MICHELE** bridge: 4 spans 32 meters long, I beams, 3 pylons to be tilted down.

83 - 84

Bridges **FELICITA' North and South**Customer: **ITALSARC S.C.p.A.**Site Job: **Mormanno, (Cosenza), Italy – A3 SA-RC Highway, year 2016.**The **FELICITÀ** bridges: 5 spans 32 meters long, I beams, 3 pylons to be tilted down.

85 - 86

Bridges **LA PINETA North and South**Customer: **ITALSARC S.C.p.A.**Site Job: **Mormanno, (Cosenza), Italy – A3 SA-RC Highway, year 2016.**The **LA PINETTA** bridges: 14 spans 32 meters long, I beams, 12 pylons to be tilted down.



## Bridges **BATTENDIERO 2** North and South

87 - 88



Customer: **ITALSARC S.C.p.A.**

Site Job: **Mormanno, (Cosenza), Italy – A3 SA-RC Highway, year 2014 – 2015.**

The **BATTENDIERO 2** bridges: 6 spans 32 meters long, I beams, 4 pylons to be tilted down.

## Bridges **BATTENDIERO 3** North and South

89 - 90



Customer: **ITALSARC S.C.p.A.**

Site Job: **Mormanno, (Cosenza), Italy – A3 SA-RC Highway, year 2014 – 2015.**

The **BATTENDIERO 3** bridges: 6 spans 32 meters long, I beams, 4 pylons to be tilted down.

## Bridges **MANCUSO** North and South

91 - 92



Customer: **ITALSARC S.C.p.A.**

Site Job: **Mormanno, (Cosenza), Italy – A3 SA-RC Highway, year 2014 – 2015.**

The **VALLONE MANCUSO** bridges: 12 spans 32 meters long, I beams, 10 pylons to be tilted down.



Customer: ITALSARC S.C.p.A.  
 Site Job: Laino Borgo, (Cosenza), Italy – A3 SA-RC Highway  
 Date: 2015 - 2016

The ITALIA bridges: 32 spans 45 meters long, I beams, 6 pylons to be tilted down.



## Bridge PIETRASTRETTA

95



Customer: COLLINI S.p.A.

Site Job: Vietri di Potenza, (Potenza), Italy – A35 SI-PZ Highway

Date: 2016

The PIETRASTRETTA bridge: 15 spans 45 meters long, I beams, 14 pylons to be safeguarded.

explosives  
engineering

96 - 97

Bridges **BATTENDIERO 1** North and SouthCustomer: **ITALSARC S.C.p.A.**Site Job: **Laino Borgo, (Cosenza), Italy – A3 SA-RC Highway**Date: **2016**The **BATTENDIERO I** bridges: 16 spans 35 meters long, I beams, 14 pylons to be tilted down.



## Svincolo LAURIA

98

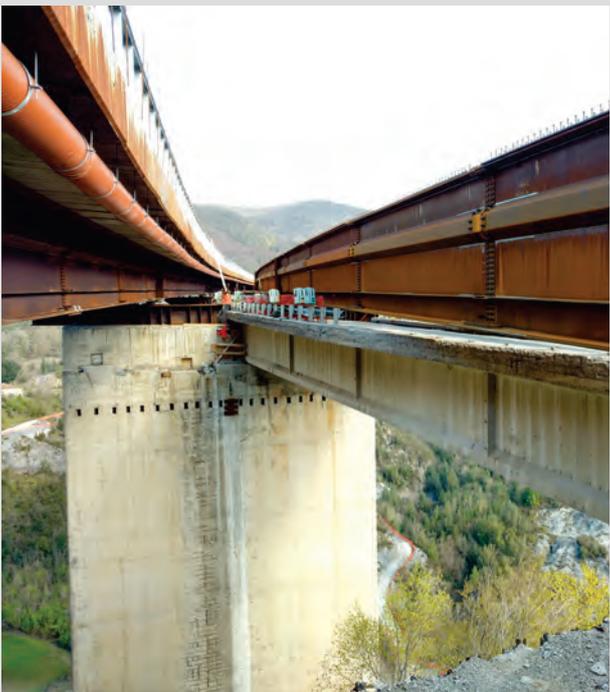
Customer: **SIS scpa**Site Job: **Lauria, (Cosenza), Italy – A3 SA-RC Highway**Date: **2011 - 2012**

The Svincolo Lauria bridge: 50 spans with I beams and 48 pylons to be tilted down.

explosives  
engineering

99 -100

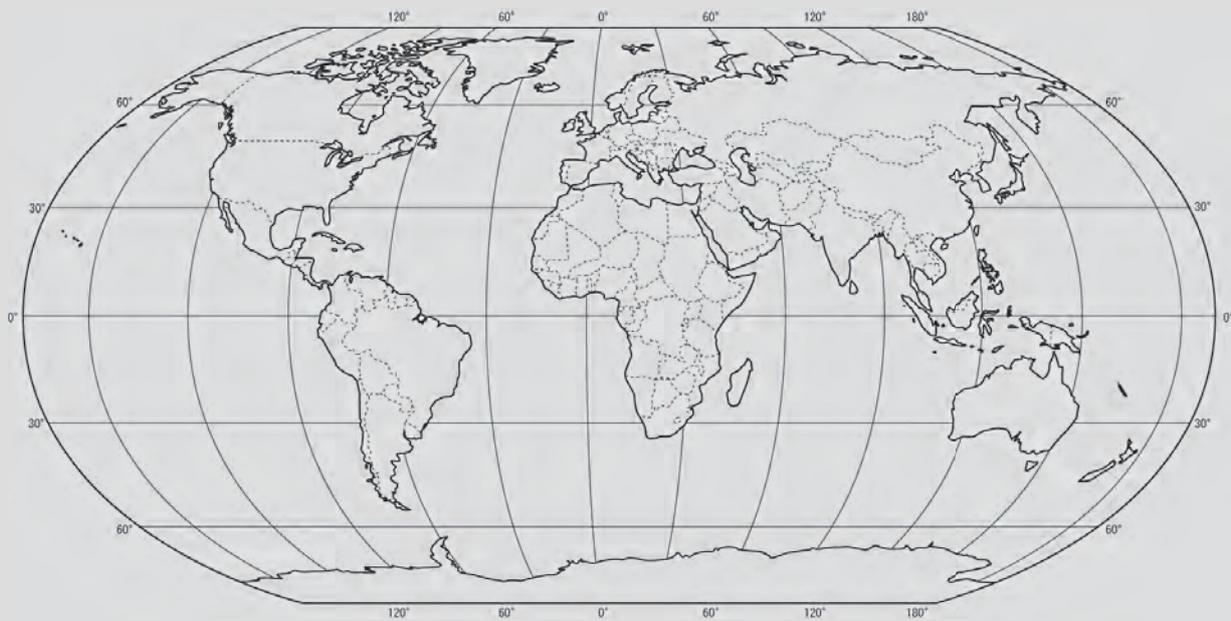
Bridges **JANNELLO** North and SouthCustomer: **ITALSARC S.C.p.A.**Site Job: **Laino Borgo, (Cosenza), Italy – A3 SA-RC Highway**Date: **2014 - 2016**The **JANNELLO** bridges: 22 spans 45 meters long, I beams, 20 pylons to be safeguarded.







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