

# We are Pini Group

DETAIL "D"  
1st Phase: Excavation UR55 gallery  
(1:20)



Considered deformation (Td)	8 cm
Excavation section (Vault)	44.80 m <sup>2</sup>
Excavation section (Invert)	2.73 m <sup>2</sup>
Vault development	18.03 m
Invert development	6.42 m

- (3b) Splicing of radial ribs alternatively to the radial bolts
- (3c) Supplementary rock bolts Ftk=250 kN L = 4.00m
- (3f) Radial fibre glass bolts L = 6.00m, with appropriate
- (4) Lattice girders type "Jörimann 3G-70/20/26" (or eq

	Tunnel face area ≤ 5m		Rearward area	
	Supports	Quantity	Supports	Quantity
Vault	(3a)	24 m <sup>2</sup> /m		
	(3b)	22.5 m <sup>2</sup> /m		
	(3e)	100 m		
	(3f)	21 m <sup>2</sup> /m		
Vault	(1a)	0.90 m <sup>3</sup> /m	(1f)	0.87 m <sup>3</sup> /m
	(1e)	2.65 m <sup>3</sup> /m		
Invert			(1a)	0.34 m <sup>3</sup> /m
			(1e)	1.00 m <sup>3</sup> /m
			(1f)	0.34 m <sup>3</sup> /m
Excavation face	(1c)	2.97 m <sup>3</sup> /m		
Vault	(2)	first layer		
		second layer		

**NOTES:**

1. For construction/deformation tolerances and materials s...  
-Contractual Appendix H.2 - Annex A "Constructive Tole...  
-LHC-LOM1350030090 Underground Structures, Gener...
2. Drawing shows typical rock support that may be adjuste...
3. The quantities indicated for the ribs do not include the w...
4. The invert shall be excavated in the rearward area, in pr...
5. At least six meters before and after the crossing zones, the heaviest support class shall be adopted.
6. The drawings don't take into account the addition of LHC-LOM1350030031
7. The part of the rock support indicated as "A" shall be indicated as "B" can be executed in the rearward area. (
8. The dimensions less than one meter are given in centim...
9. The contractor is responsible for the production of the shall include also the design of the connection between represented in Detail "C"
10. Radial deformation allowance "Td", already considered

**REFERENCE DOCUMENTS:**

- LHC-LOM135003009 - Table of Materials
- LHC-PSW135003010/11 - Fine Lining Segments Layout
- LHC-PSW135233101 - Excavation and rock support -
- LHC-PSW135233102 - Excavation and rock support -
- LHC-PSW135133101 - Excavation and rock support -
- LHC-PSW135133102 - Excavation and rock support -

**UA53.2 First part**

Considered deformation (Td)	8 cm
Excavation section (Vault)	48.45 m <sup>2</sup>
Excavation section (Invert)	1.64 m <sup>2</sup>
Vault development	18.46 m
Invert development	7.07 m

	Tunnel face area ≤ 5m		Rearward area	
	Supports	Quantity	Supports	Quantity
Vault	(3a)	31.4 m <sup>2</sup> /m		
	(3b)	35 m <sup>2</sup> /m		
	(3e)	100 m		
	(3f)	2.71 m <sup>2</sup> /m	(1f)	0.89 m <sup>3</sup> /m
Invert			(1a)	0.37 m <sup>3</sup> /m
			(1e)	1.10 m <sup>3</sup> /m
			(1f)	0.37 m <sup>3</sup> /m
Excavation face	(1c)	3.23 m <sup>3</sup> /m		
Vault	(2)	first layer		
		second layer		

**Agility  
Creativity  
Passion**

Take a look at our **#canyousee** video





self-drilling grouted bolts, Fikz340 kN L=6.00m  
 Plate 100x100x8mm if necessary  
 blocking system  
 (equivalent)

$$\gamma_{zx} = \frac{\tau_{zx}}{G}$$

$$\epsilon_p = \frac{p'}{K}$$

see the following Documents:  
 "Grants"  
 - Table of materials.  
 d to local conditions approved by the Engineer.  
 values of the connections, plates and overlays.  
 principle at the end of excavation phase.  
 despite the encountered geological conditions,  
 al excavation allowance (d), see document  
 executed within 1 excavation round, the part  
 Detail "A")  
 eters.  
 shop drawings of steel ribs. The shop drawings  
 on steel rib in the crown and in the invert, as  
 in the drawing  
 Support class UR55.1  
 Support class UR55.2  
 First Part - Support class UA53.1  
 First Part - Support class UA53.2

**We are a global community of talented individuals specialising in the design and management of complex engineering projects of all sizes.**



$$\begin{bmatrix} \delta\epsilon_a \\ \delta\epsilon_r \end{bmatrix} = \frac{1}{E'} \begin{bmatrix} 1 & -2\nu \\ -\nu & 1-\nu \end{bmatrix} \begin{bmatrix} \delta\sigma'_a \\ \delta\sigma'_r \end{bmatrix}$$

$$\begin{bmatrix} p' \\ q \end{bmatrix} = \begin{bmatrix} 1/3 & 2/3 \\ 1 & -1 \end{bmatrix} \begin{bmatrix} \sigma'_a \\ \sigma'_r \end{bmatrix}$$

$$\begin{bmatrix} \delta\epsilon_p \\ \delta\epsilon_r \end{bmatrix} = \begin{bmatrix} 1 & 2 \\ 2/3 & -2/3 \end{bmatrix} \begin{bmatrix} \delta\epsilon_a \\ \delta\epsilon_r \end{bmatrix}$$

$$\begin{bmatrix} \delta\epsilon_p \\ \delta\epsilon_r \end{bmatrix} = \begin{bmatrix} 1/K' & 0 \\ 0 & -1/(3G) \end{bmatrix} \begin{bmatrix} \delta p' \\ \delta q \end{bmatrix}$$

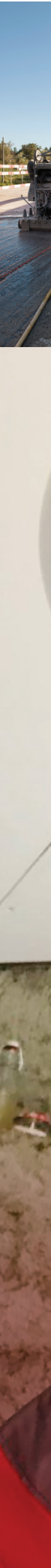
$\begin{Bmatrix} \delta\sigma'_a \\ \delta\sigma'_r \end{Bmatrix}$   
 ISSUE  
 ISSUE FOLLOWING CONTRACTOR'S COMMENTS  
 ISSUE  
 ISSUE

**Our  
multidisciplinary teams  
are made from**

# People

**combining  
local know-how  
with global  
best practice in  
engineering  
across  
five continents**

More on our  
Instagram profile







Our areas of expertise:

- **Infrastructure & Transportation**
- **Urban & Cities**
- **Energy & Environment**
- **Digital & Innovation**





# 70 years of development



**1950**  
Luigi Pini founds in Lugano Studio d'ingegneria Pini

**1995**  
Pini Associati SA the firm becomes a public limited company with shareholders

**2013**  
Development in Switzerland with the acquisition of KBM SA (Sion) and Straub AG (Chur-Baden).  
Rebranding into Pini Swiss Engineers SA

**2014**  
Opening of the Zurich branch in Switzerland.  
Expansion outside national borders with the first branch in Austria (Innsbruck)

**2015**  
Establishment of Pini Italia (Lomazzo)

**2017**  
Establishment of Pini France (Paris)

**2019**  
Establishment of Pini Israel (Modi'in)



**2020**  
Opening of Lausanne branch in Switzerland



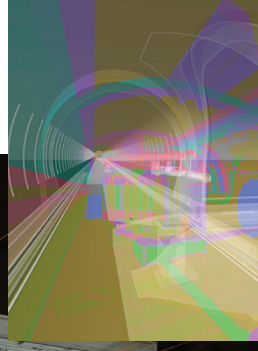
**2021**  
Adoption new "Glocal" strategy.  
Opening Rome, Fribourg, Roveredo branches.  
Acquisition of Anastasi & Partners SA in Locarno



**2022**  
Swiss companies merge into Pini Group SA.  
Acquisition of JLCM in Lisbon (Portugal),  
EBEL in São Paulo (Brazil), SEPI in Trento (Italy),  
INEA in Latina (Italy) and ALP in Visp (Switzerland).  
Opening of St.Moritz, Rapperswil, Turin branches.  
Establishment of Pini Australia in Melbourne,  
Pini Norway in Oslo and Pini Group USA  
in Washington DC.  
Acquisition Geodata

**2023**  
Opening of Aarau branch.  
New Business Unit Latin America.  
New Business Unit Middle East & North Africa.  
Opening of the new Headquarters in Grono,  
Switzerland.

**2024**  
Opening of Basel, Milan, Cairo, Tunis  
and Abu Dhabi branches.







We support **Helvetas**  
and their initiatives  
around the world.  
Learn about our  
partner's projects  
at [helvetas.org](https://helvetas.org)





# Our Glocal


**strategy  
is central to everything  
we do**

We consider our branches as a network of local entrepreneurs,  
able to develop their own network of relationships,  
while strengthening the whole Group.

This is how we combine the local know-how with global best practice,  
to offer a 360° service package to our clients.

We are actively present in:

**Argentina  
Australia  
Austria  
Bolivia  
Brazil  
Chile  
Egypt  
Ecuador  
France  
India  
Israel  
Italy  
Nepal  
Norway  
Perù  
Portugal  
Saudi Arabia  
Switzerland  
Tunisia  
Türkiye  
United Arab Emirates  
USA**

More on our  
 LinkedIn profile











# Key numbers

More than **12000** employees

International footprint in over **50** countries

More than **10000** current projects



CHF





50

branch  
offices

26

mln  
turnover

More than

50000

km  
of tunnel

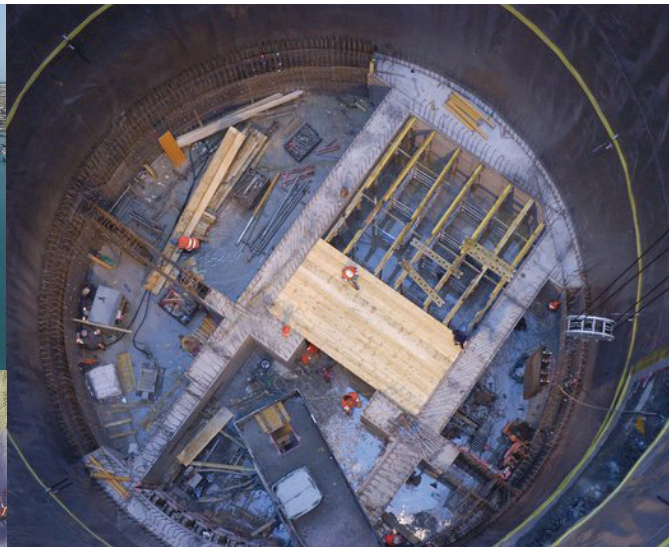


# Our Services

**360°  
Throughout  
the whole lifecycle  
of a project**

Project Management  
Design for public and private clients  
Independent checking engineer  
Site & Construction Management  
Claim and risk Management  
Inspection & Assessment  
Measurement & Survey  
Digital Support



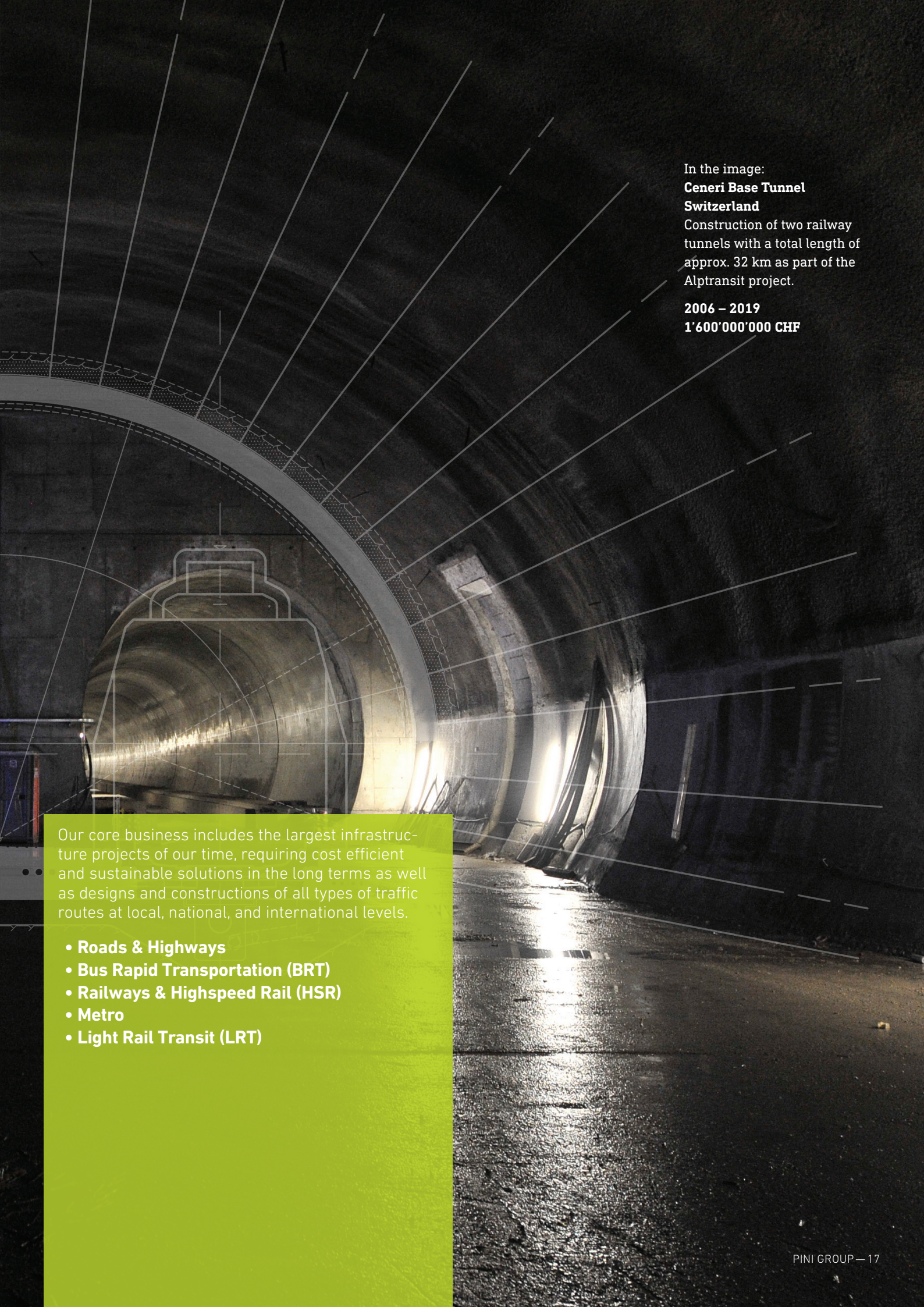




Infrastructure & Transportation

# Our expertise connects people





In the image:  
**Ceneri Base Tunnel**  
**Switzerland**

Construction of two railway tunnels with a total length of approx. 32 km as part of the Alptransit project.

**2006 – 2019**  
**1'600'000'000 CHF**

Our core business includes the largest infrastructure projects of our time, requiring cost efficient and sustainable solutions in the long terms as well as designs and constructions of all types of traffic routes at local, national, and international levels.

- **Roads & Highways**
- **Bus Rapid Transportation (BRT)**
- **Railways & Highspeed Rail (HSR)**
- **Metro**
- **Light Rail Transit (LRT)**



Urban & Cities

# Creating tomorrow's way of life





In the image:  
**Europaallee Zurich**  
**Switzerland**

In a prominent location in the new Europaallee district of Zurich, the building is built of great architectural value and energetically outstanding.

**2012 – 2018**  
**80'000'000 CHF**

We help our clients to adapt to changing realities providing open and reliable partnerships for architects in the implementation of challenging and innovative projects, integrated solutions for buildings and urban areas.

- **Buildings**
- **Airports**
- **Ports**
- **Datacenters**





Energy & Environment

# We empower ideas for a future of sustainable energy





From the feasibility study to implementation, we provide reliable support and advice. Generating, distributing, storing, and consuming energy is becoming increasingly complex. We are partners with our customers in analyzing these challenges and seeking solutions to ensure that their investments are sustainable and ageless.

- **Pump Storage & Hydropower Plants**
- **Energy Transmission & Distribution**
- **Water Distribution & Outflow Systems**
- **Waterways & Water Management**
- **Natural Hazards Assessment & Solutions**

In the image:

**Slotted fishway in  
Champfèr, Switzerland**

The existing fish pass will be decommissioned and replaced with a slotted pass on the opposite bank.

**2016 – 2024  
1'400'000 CHF**




Digital & Innovation

# Looking beyond the horizons of tomorrow

In the image:  
**CERN, HiLumi, LHC Point 5**  
**France/Switzerland**  
The Large Hadron Collider  
Project (LHC) consists of a 27 km  
circular system with eight  
sites positioned around the  
circumference of the tunnel.

**2016 – 2024**  
**65'000'000 € (Point Nr.5)**





We use new technologies and our capacity to identify the trends that shape the future. For our clients. For the next generations. We combine innovation, analytical skills, and digital creativity with our passion to do better.

- **Digital twins & Artificial Intelligence**
- **Building Information Modeling (BIM)**
- **Virtual/Augmented Reality**
- **Metaverse Architecture**
- **Innovative Measurements & Drones**
- **Traffic Planning & Technology**

***#Pini4Innovation** is our Corporate Venture Capital and Innovation Development Fund: the Pini Group's in-house tool that has the agility, expertise and autonomy to invest in innovative start-ups and SMEs in the ACE (Architecture, Construction & Engineering) sector and to support innovative projects.*



# Worldwide experience



**Sotra Link Road Tunnels**, Norway  
**Vestkorridoren E18 Road Tunnel**, Norway  
**Buildings Degnerstrasse**, Germany  
**Grand Paris Express**, France  
**Metro of Toulouse**, France  
**CERN HL-LHC**, France/Switzerland  
**Road Tunnel TSEE 4.0**, France  
**Airport Bâle-Mulhouse**, France/Switzerland  
**TELT Railway Base Tunnel**, France/Italy

**Terminal Port XXI Sines**, Sines  
**Salgueiro Maia Bridge**, Santarém  
**Aveiro Port Feeder Line**, Aveiro  
**Red Line Metro**, Lisbon  
 Portugal

**RFI Fortezza-Ponte Gardena**, Alto Adige  
**BBT Underpass Isarco river**, Alto Adige  
**CEPAV2 HSR Milano-Verona**, Lombardy/Veneto  
**Tram of Padova, Line 3**, Veneto  
**RFI HSR Napoli-Bari**, Campania/Puglia  
**RFI Giampilieri-Fiumefreddo**, Sicily  
**Turin Automatic Metro Line 1 & Depot (GOA4 Automatic Line)**, Piemonte  
 Italy

**South Hartford Conveyance and Storage Tunnel**, Connecticut  
**3RPORT**, Indiana  
**Lower Olentangy OARS Tunnel**, Ohio  
**Parallel Thimble Shoal Tunnel**, Virginia  
**LA Outfall Tunnel**, California  
**Suffolk County Outfall Replacement Project**, New York  
**Chemical and GTL complex project**, Louisiana  
 USA

**Bridge over the Rio Grande**, Costa Rica  
**PSA Marine Terminal**, Panama  
**Via Ferrea**, Bolivia  
**Distribution Lines renovation**, Paraguay  
**Paita Port**, Peru  
**Lima Metro Lines 2 and 4**, Peru  
**Offshore Port**, Colombia  
**Bogotá-Fucha-Tunjuelo Wastewater Interceptor and complementary works**, Colombia  
**E-ELT, Antofagasta**, Chile  
**Santiago-Batuco Railway Line**, Chile  
**HPP Alto Maipo 531MW**, Chile  
**Chuquicamata Mine Access Tunnel**, Chile  
**HPP Coca Codo 1500MW**, Ecuador  
**HPP Villadora & Chontal 365Mw**, Ecuador  
**Matanza-Riachuelo basin Lot 1&3**, Argentina  
**Multi storey depo: Etileno XXI Project**, Mexico  
**Caracas Metro. El Valle-La Rinconada-Line 3**, Venezuela

**Monorail Line 17**, São Paulo  
**São Paulo Metro Extension of Line 5 and Depot**, São Paulo  
**BRT São Luiz**, Maranhão  
**Maringá Road**, Paraná  
**BRT Goiania**, Goiás  
**Salvador Airport**, Bahia  
**Fortaleza Airport**, Ceará  
**Manaus Port**, Amazonase  
 Brazil



**Gubrist Road Tunnel**, Zurich  
**SBB Europaallee Building**, Zurich  
**Interxion Datacenter ZUR 4**, Zurich  
**Campus HES Sion**, Valais  
**Hôpital du Valais**, Valais  
**Susten Road Tunnel N9**, Valais  
**Martigny High-Voltage Underground Link**, Valais  
**Highway Vennes-Chexbres TP3 + TP5**, Vaud  
**Limmern Pumped Storage Plant 1520 MW**, Glarus  
**Drinking Water Plant Riet**, St. Gallen  
 Switzerland

**Ceneri Base Railway Tunnel**, Ticino  
**SBB Refurbishment Railway Tunnels**, Ticino  
**SBB Bellinzona Railway Station**, Ticino  
**Giornico Multi-Service Area and HGVC**, Ticino  
**Highway PoLuMe N2**, Ticino  
**Mendrisio Road Junction N2**, Ticino  
**Second Gotthard Road Tunnel**, Ticino/Uri  
 Switzerland

**Bogdkhan Bypass Railway Tunnels**, Mongolia  
**Friendship Bridge**, China  
**HSR Zhengzhou-Zhoukou-Fuyang Railway (PMC)**, China  
**HSR Beijing-Shenyang Railway (PMC)**, China  
**HSR Shangqiu-Hefei-Hangzhou Railway (PMC)**, China  
**Siddhababa Road Tunnel**, Nepal  
**HPP Bheri Babai Diversion Multipurpose 48MW**, Nepal  
**Metro of Bangalore**, India  
**Delhi Metro. Phase III**, India  
**Mumbai Metro**, India  
**North East Link**, Australia  
**Metro of Sydney**, Australia  
**Snowy 2.0 Hydro**, Australia  
**Forrestfield Airport Link**, Australia  
**Cross River Rail**, Australia  
**Northern Sydney Freight Corridor - Stations**, Australia  
**Eastern Region Line (ERL)**, Singapore  
**New Mutwal and Torrington Storm Water Tunnels of Colombo Metro**, Sri Lanka  
**Metro Interchange node with Volzhskaya Metro Station & Ryazanskaya Transit Oriented Development**, Russia  
**SMART Tunnel - Kuala Lumpur**, Malaysia  
**Theun Hinboun Hydroelectric Project**, Laos

**BBT Railway Base Tunnel**, Austria  
**Sibiu-Pitesti Motorway**, Romania  
**North-South Corridor Highway**, Armenia  
**Road 60 Tunnels**, Israel  
**Shazar Road Caverns**, Israel  
**Purple Line LRT**, Israel  
**Green Line LRT**, Israel  
**Kokhav Hayraden Pumped Storage Power Plant 340MW**, Israel  
**Zarqa College Bridge**, Jordan  
**El-Grou Bridge**, Algeria  
**Rail Line Beni Mansour-Bejaia, Ghourzi-Touggourt**, Algeria  
**Rabigh PP2 Water Intake Structure**, Saudi Arabia  
**Tahliya Underpass and Flyover**, Saudi Arabia  
**Réunion Island Bridge**, France (Overseas)  
**Wharf Gorée Island**, Senegal  
**Dakar Airport**, Senegal  
**New Luanda Airport**, Angola  
**Istanbul Metro, different lines**, Türkiye  
**HPP Julius Nyerere 2100 MW**, Tanzania  
**Bar-Boliare Highway**, Montenegro  
**Main Eastern and Western Tubes of Alborz Tunnel**, Iran  
**Thessaloniki Submerged Tunnel**, Greece  
**Gibraltar strait crossing**, Gibraltar



# A team ready for the challenge

## Group Management



**Andrea Galli**

Group Chief Executive Officer  
Head of Business Unit Latin America



**Davide Merlini**

Group Chief Technical Officer



**Cristina Pagani**

Head of Business Unit  
Switzerland & Austria



**Andrea Polli**

Head of Business Unit  
Italy



**Roberto Schürch**

Head of Business Unit  
International



**Aymen Cheikh Mhamed**

CBD0 - Head of Business Unit  
Middle East, North Africa and Asia





## Business Units


Switzerland & Austria	Italy	International	LATAM	MENAA
<b>Market Area North</b> Zurich Rapperswil-Jona Aarau Basel	<b>Lomazzo</b>	<b>Europe</b>	<b>Perù</b> Lima	<b>Middle East</b>
<b>Market Area East</b> St. Moritz Chur Ilanz	<b>Milan</b>	<b>Norway</b> Bergen Oslo	<b>Chile</b> Las Condes Santiago	<b>United Arab Emirates</b> Abu Dhabi Dubai
<b>Market Area South</b> Lugano Roveredo Locarno Visp	<b>Rome</b>	<b>France</b> Chambéry Paris	<b>Argentina</b> Buenos Aires	<b>Saudi Arabia</b> Riyadh
<b>Market Area West</b> Sion Lausanne Fribourg	<b>Trento</b>	<b>Israel</b> Modi'in	<b>Ecuador</b> Quito	<b>North Africa</b>
<b>Construction Management</b> Austria Switzerland	<b>Turin</b>	<b>Portugal</b> Lisbon	<b>Bolivia</b> La Paz	<b>Tunisia</b> Tunis
<b>Austria</b> Innsbruck	<b>Latina</b>	<b>North America</b>	<b>Brazil</b> São Paulo	<b>Egypt</b> Cairo
	<b>Brescia</b>	<b>USA</b> Washington DC		<b>Asia</b>
	<b>Construction Management</b>	<b>Oceania</b>		<b>India</b> New Delhi
		<b>Australia</b> Melbourne Sydney		<b>Nepal</b> Kathmandu
				<b>Türkiye</b> Ankara Istanbul

## Group Services

<b>Finance</b>	<b>Human Resources</b>	<b>Information Technology</b>	<b>Innovation</b>	<b>Marketing &amp; Communication</b>	<b>Strategy &amp; Business Development</b>	<b>Sales</b>	<b>Quality</b>
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



# Keep in touch

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EXCAVATION PROFILE UR55 2  
L = 6.00 m

	Project level
	Excavation level

$$G = \frac{E}{2(1+\nu)}$$

$$K = \frac{E}{3(1-2\nu)}$$

POSITION OF THE  
LATTICE GIRDERS

$$\gamma_{xy} = \frac{\tau_{xy}}{G}$$

$$\gamma_{yz} = \frac{\tau_{yz}}{G}$$

$$\gamma_{zx} = \frac{\tau_{zx}}{G}$$

Effective excavation line  
(including Td)

