Building an Underground in Rome

Paola Adinolfi – Technical Supervisor - Line C

London – 27 March 2012

The role of 'Roma Metropolitane srl'

Roma Metropolitane works on behalf of the Municipality of Rome to carry out all functions associated with the construction, enlargement, extension and modernization of Metro Lines in the City of Rome, as well as all other interventions concerning public transport to be implemented in the City and associated or complementary works.

Roma Metropolitane is an independent subdivision of the Municipality of Rome which, as the owner of the entire share capital, directs and coordinates the **Company's activities:**

- Execute the **design of works, plants and systems**
- Execute the duties and functions of **Sole Project Manager and of Works Direction, using its own personnel in possession of the qualifications** specified by law
- Execute the duties of Technical and Administrative **Supervisor**
- Execute the function of **Compulsory Purchase Authority**
- Execute the activities of **Contracting Authority and the functions of Tender Procedure Manager**
- Draw up the **tender documentation and all associated and prescribed** proceedings
- Draw up and stipulate **contracts with the winning bidders of the tenders** conducted
- Draw up all proceedings and documents necessary for the execution, prosecution and completion of the works, proceeding on behalf of the Municipality of Rome with the application of penalties, with the resolution and extension if necessary of the contract, and with any other activity associated with the **prompt, correct and complete execution of the works**
- Manage, in accordance with the instructions formulated by the respective departments of the Municipality of Rome, **disputes** arising from the contracted works, services or supplies.

ROMA METROPOLITANE

- Building an Underground in Rome
- Development program of existing metro network
- Project financing for the development of the metro system

BUILDING AN UNDERGROUND IN ROME
Archaeological problems during Metro construction

ROMA METROPOLITANE

BUILDING AN UNDERGROUND IN ROME
Archaeological problems during Metro construction

ARCHAEOLOGICAL EXCAVATIONS – LINE C
Piazza Venezia

ARCHAEOLOGICAL EXCAVATIONS – LINE C
Piazza Venezia

ROMA METROPOLITANE

Piazza Madonna di Loreto

ROMA METROPOLITANE

Piazza Madonna di Loreto

ROMA METROPOLITANE

Piazza Madonna di Loreto
Ricostruzione dell'Atheneum

ROMA METROPOLITANE

Via Sforza Cesarini

Via Sforza Cesarini

ROMA METROPOLITANE

Via Sora

Via Cesare Battisti

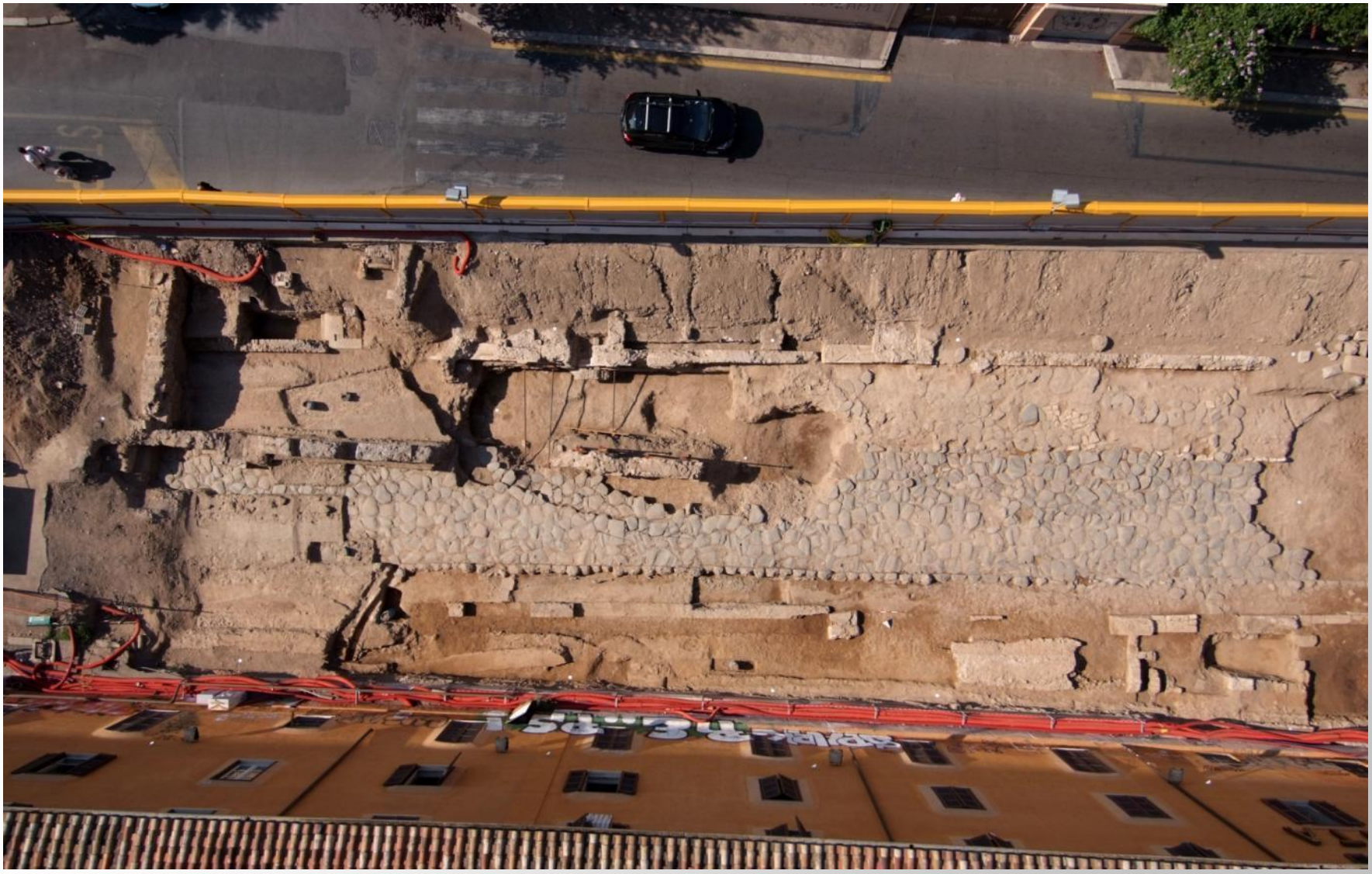
Via Sannio – Porta Asinaria

ROMA METROPOLITANE

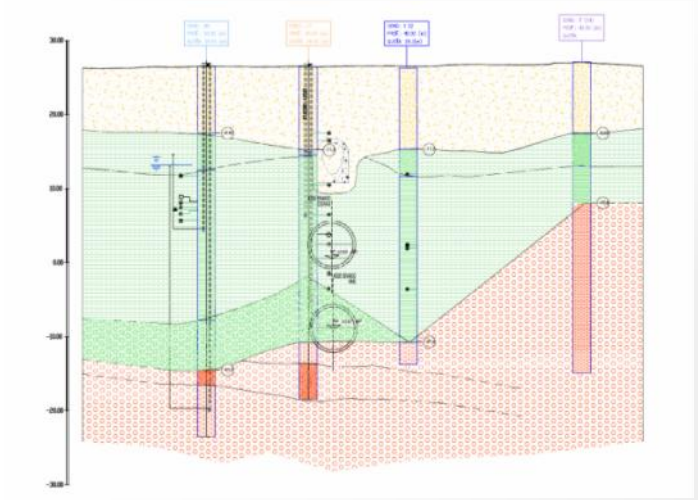
Largo Brindisi

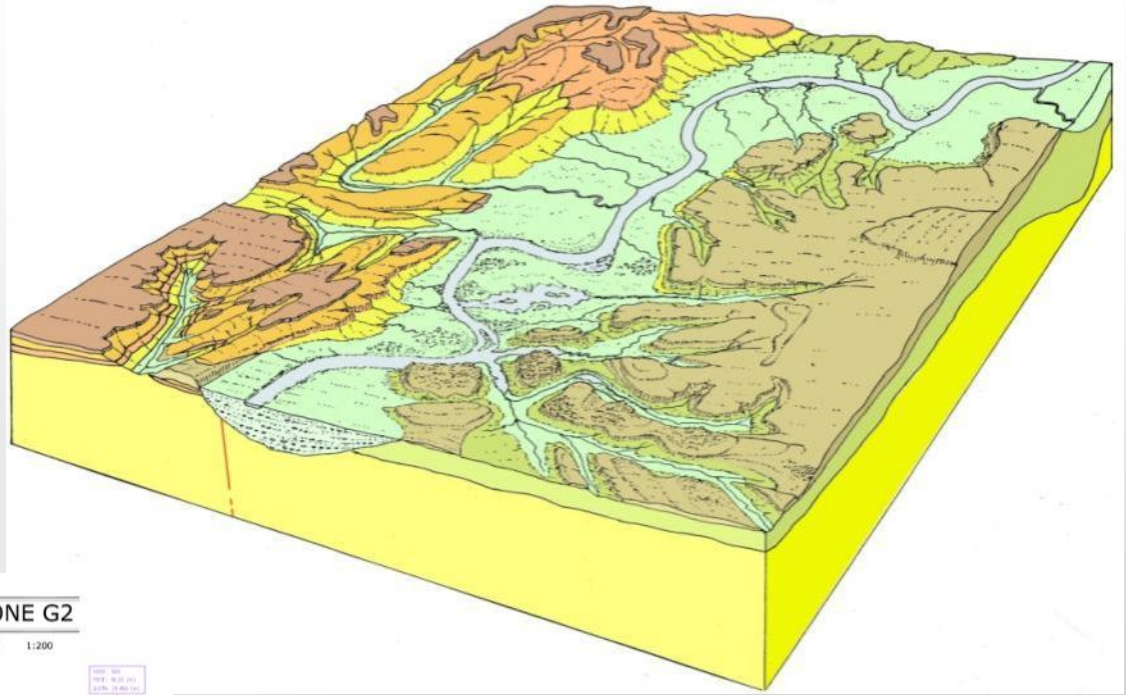
Pozzo 4.2 – Via Casilina Vecchia

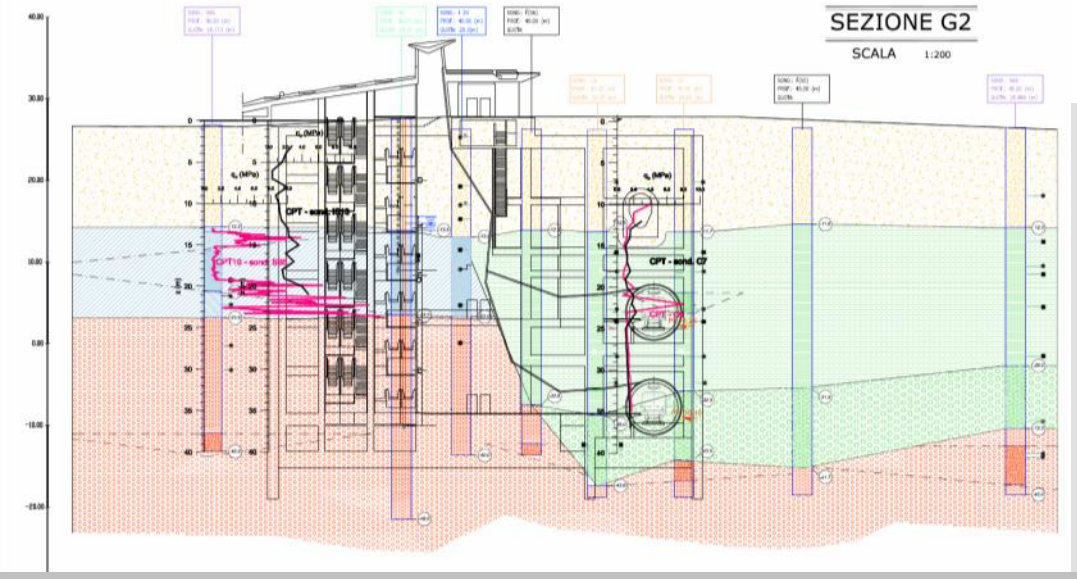
Pozzo 4.2 – Via Casilina Vecchia

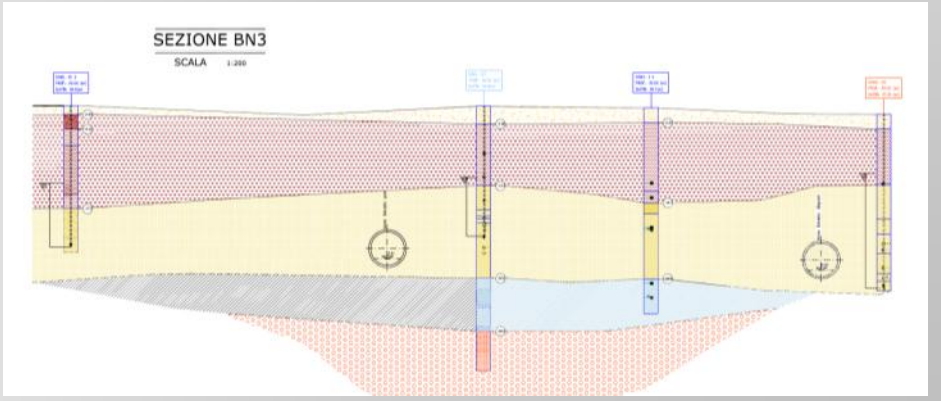


BUILDING AN UNDERGROUND IN ROME
Geological and hydrogeological problems during Metro construction



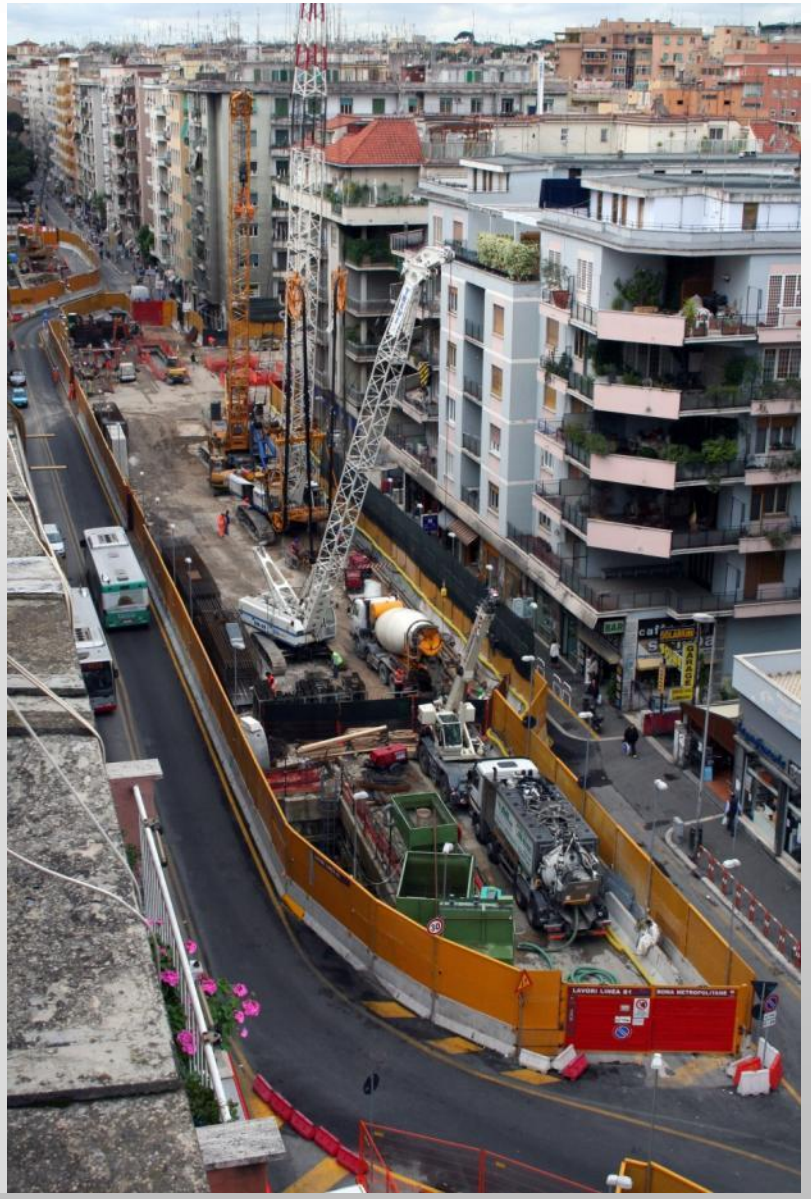






BUILDING AN UNDERGROUND IN ROME
Densely populated areas

Line B1 – Libia station



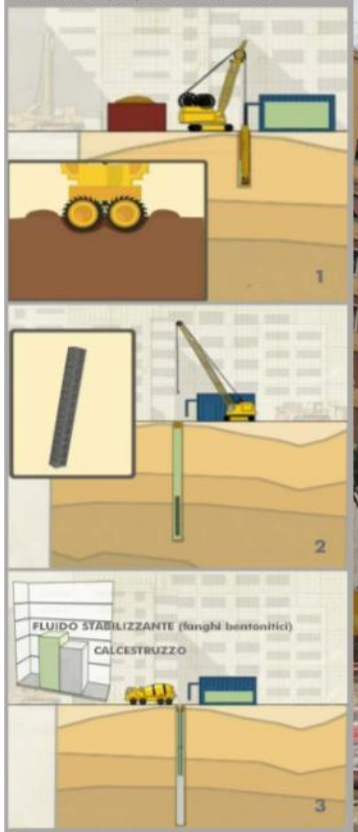
Line C – S. Giovanni station

ROMA METROPOLITANE

Line C – Lodi station

Executive technologies – trench cutter

1. Idrofresa - prospetto laterale e frontale



2. Schema delle fasi principali: 1) scavo con fluido stabilizzante; 2) posa armatura; 3) getto con risalita fluido stabilizzante

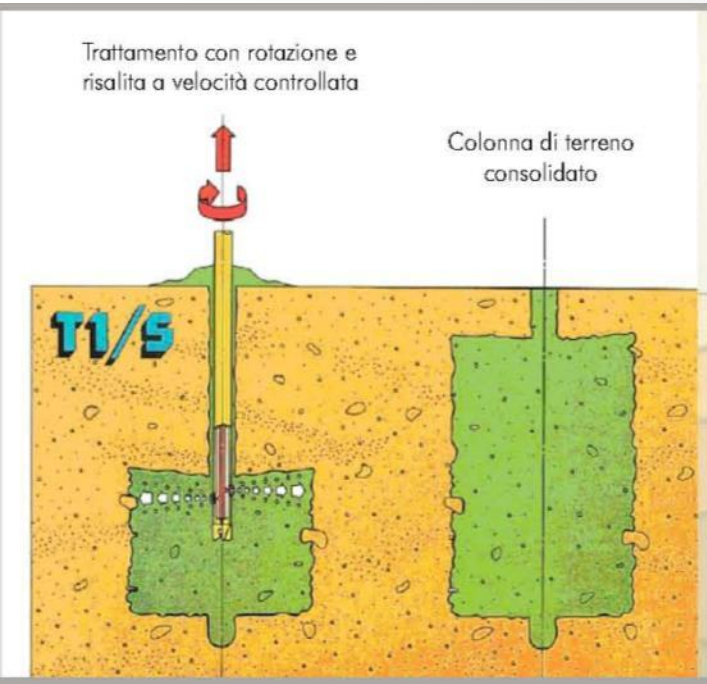
3. Idrofresa in fase di scavo alla stazione Annibaliano

4 - 5. Particolari dell'attrezzatura di scavo dell'idrofresa - ruote fresanti dotate di picchi e coltelli

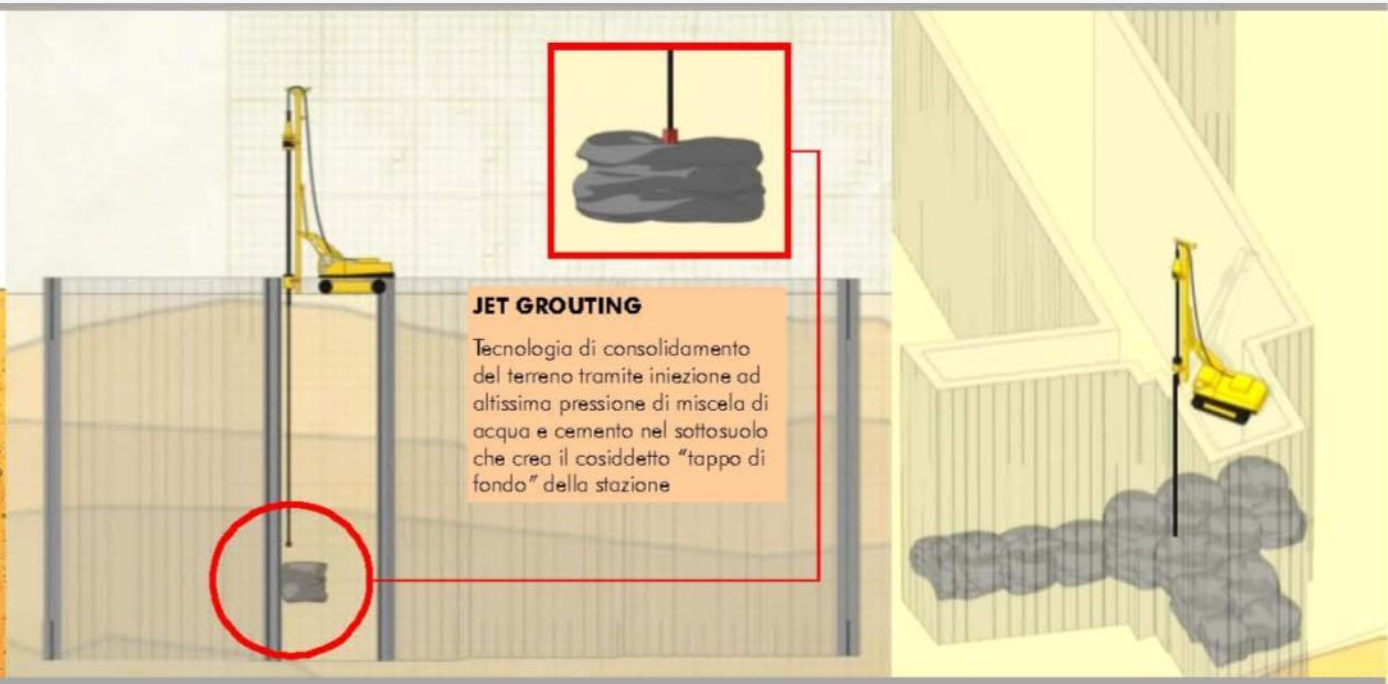
6 - 7. Particolari dell'attrezzatura di scavo della macchina, inserita tra i cordoli guida, in fase di escavazione

8 - 9. Dissabbiatore e vasche di recupero

Executive technologies – jet-grouting



1. Fase di iniezione con la tecnica T1-S



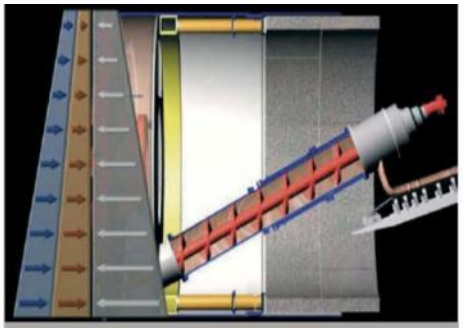
2-3. Schema in sezione e tridimensionale di una stazione durante il trattamento di jet grouting

Executive technologies – jet-grouting

6. Area di lavoro

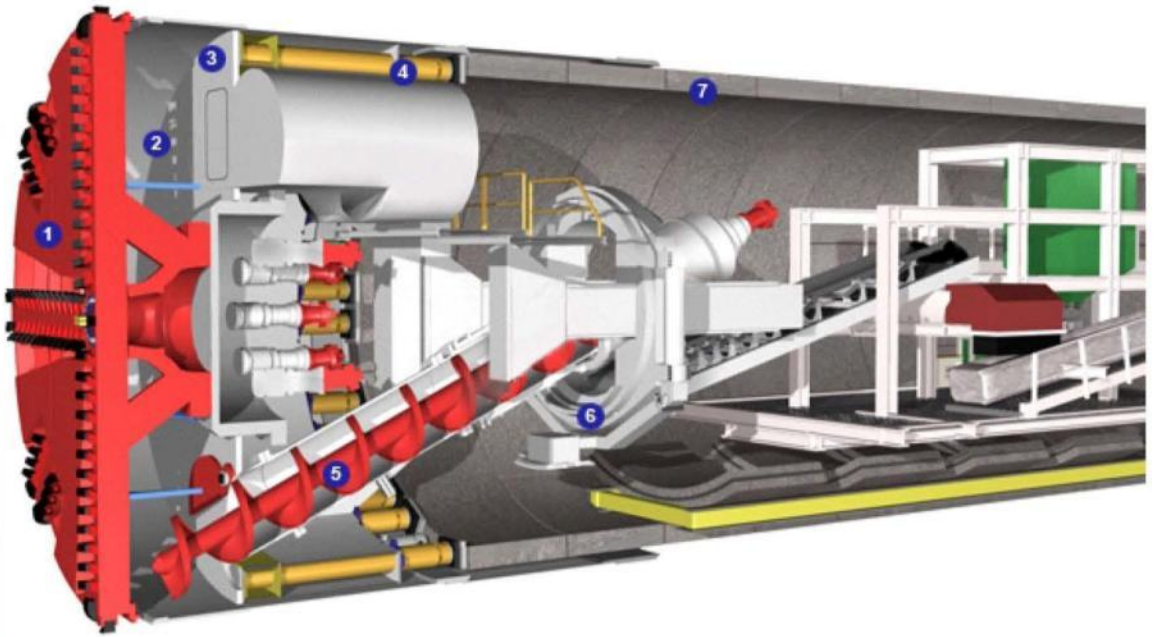
7-8-9. Area di confezionamento della miscela di iniezione

Executive technologies – TBM – EPB type



1. Schema funzionamento TBM tipo EPB

2. Testa di scavo della TBM S 387 e S 388;



3. Schema di sezione longitudinale di una TBM EPB: 1.testa di scavo; 2.camera stagna di scavo; 3.camera iperbarica; 4.cilindri di spinta; 5.coclea; 6.erettore; 7.anello in cemento armato prefabbricato (fonte: www.herrenknecth.com)

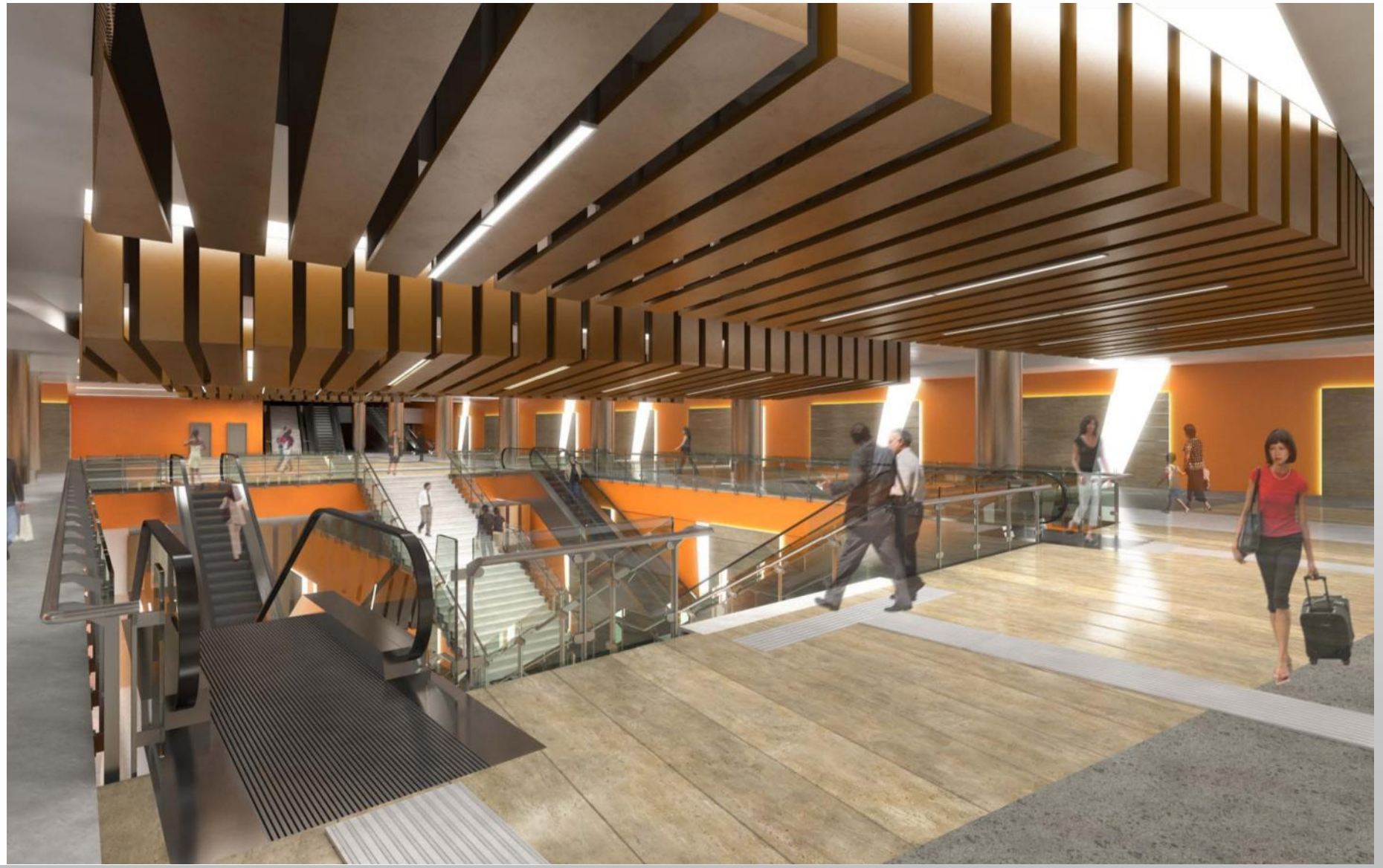
4. Anello in c.a. prefabbricato posato a terra in cantiere

5. Concio trapezoidale di tipo universale

6. Schema di anello a 7 conci: 6+1 di chiave

ROMA METROPOLITANE

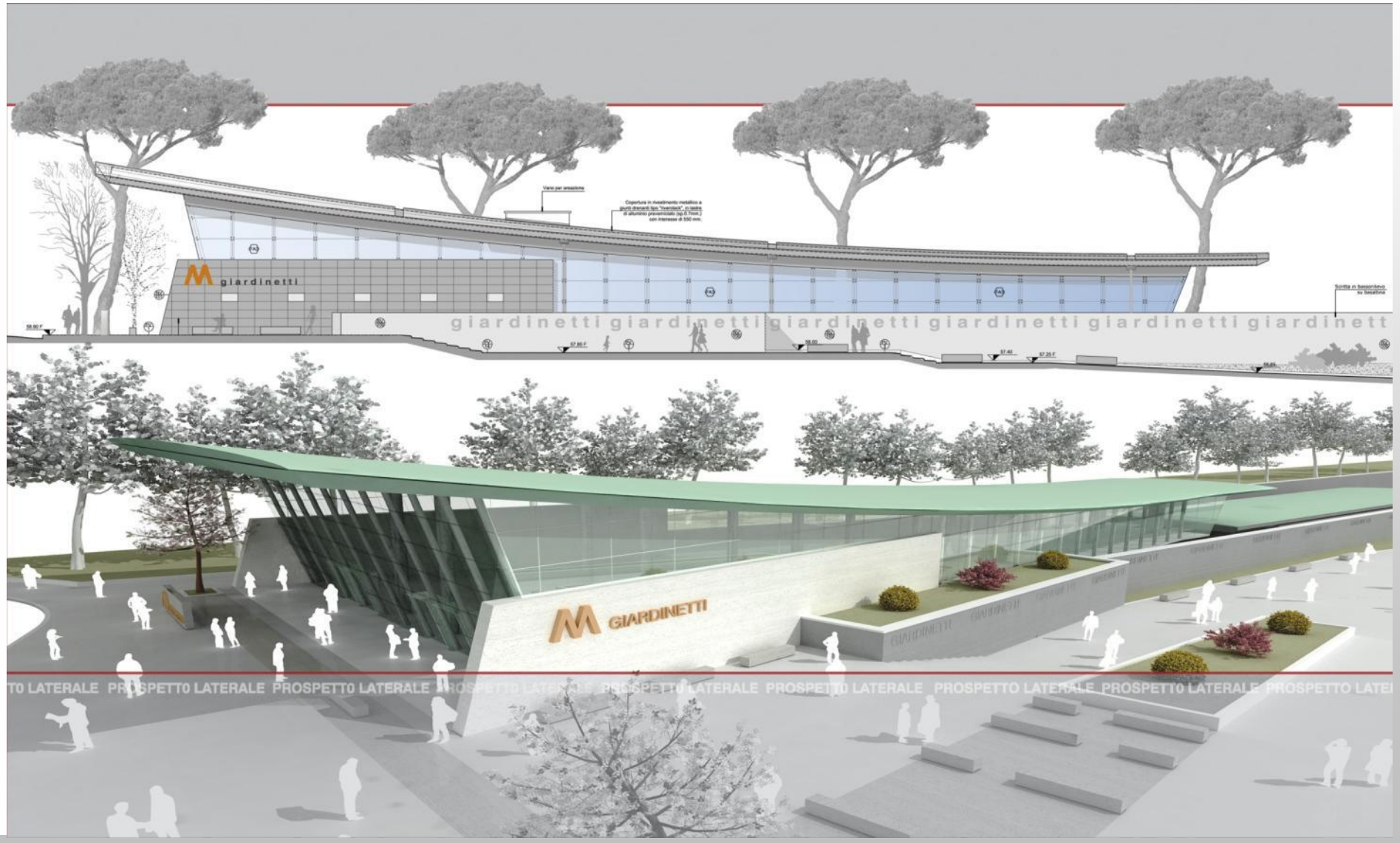
Line C – Tratta T3 – Fori Imperiali Station



Line C – Tratta T3 – Fori Imperiali Station

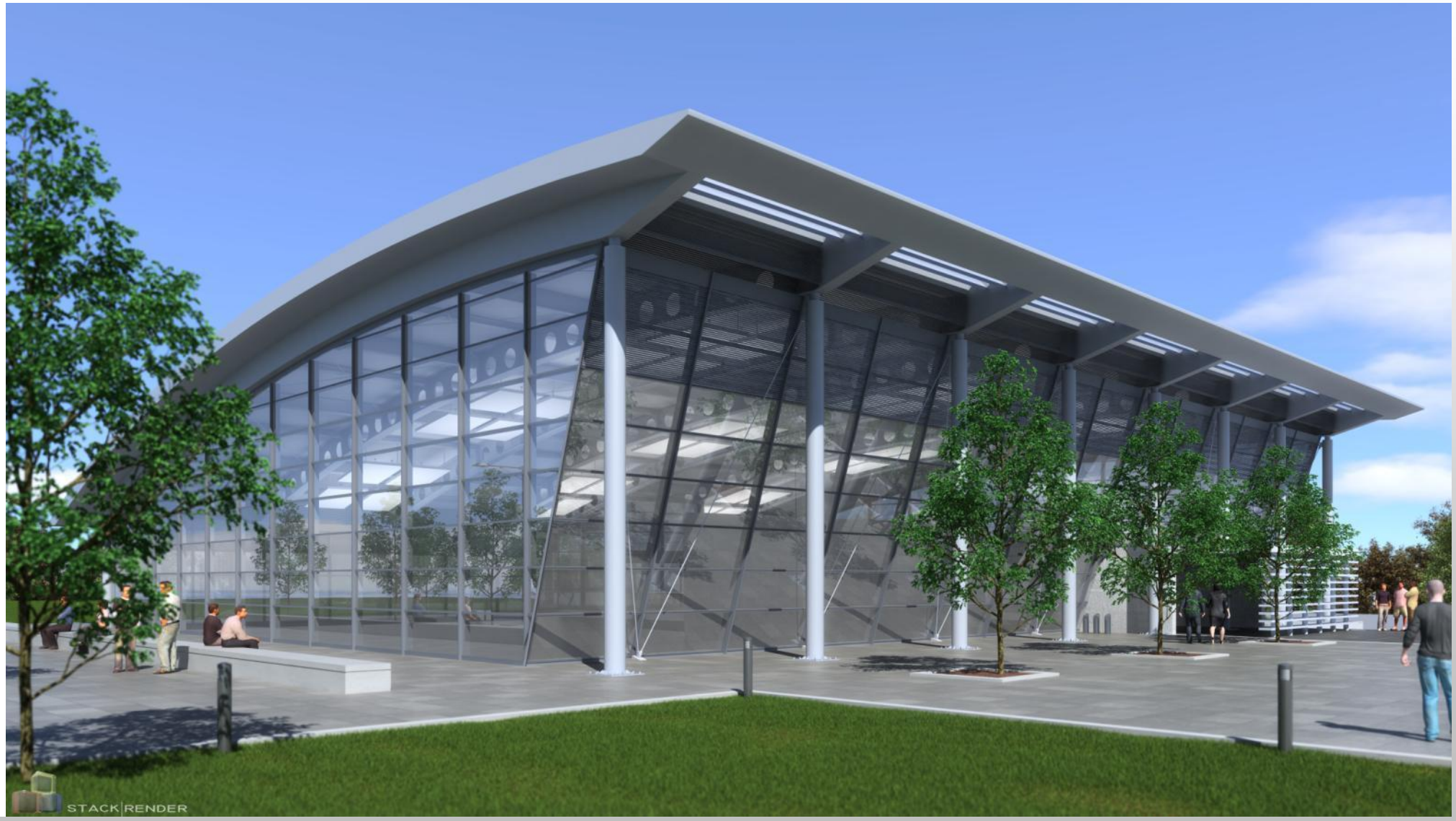
Line C – lift - view at street level

Line C – Tratta T6 – Giardinetti Station



Line C – Tratta T6 – Giardinetti Station

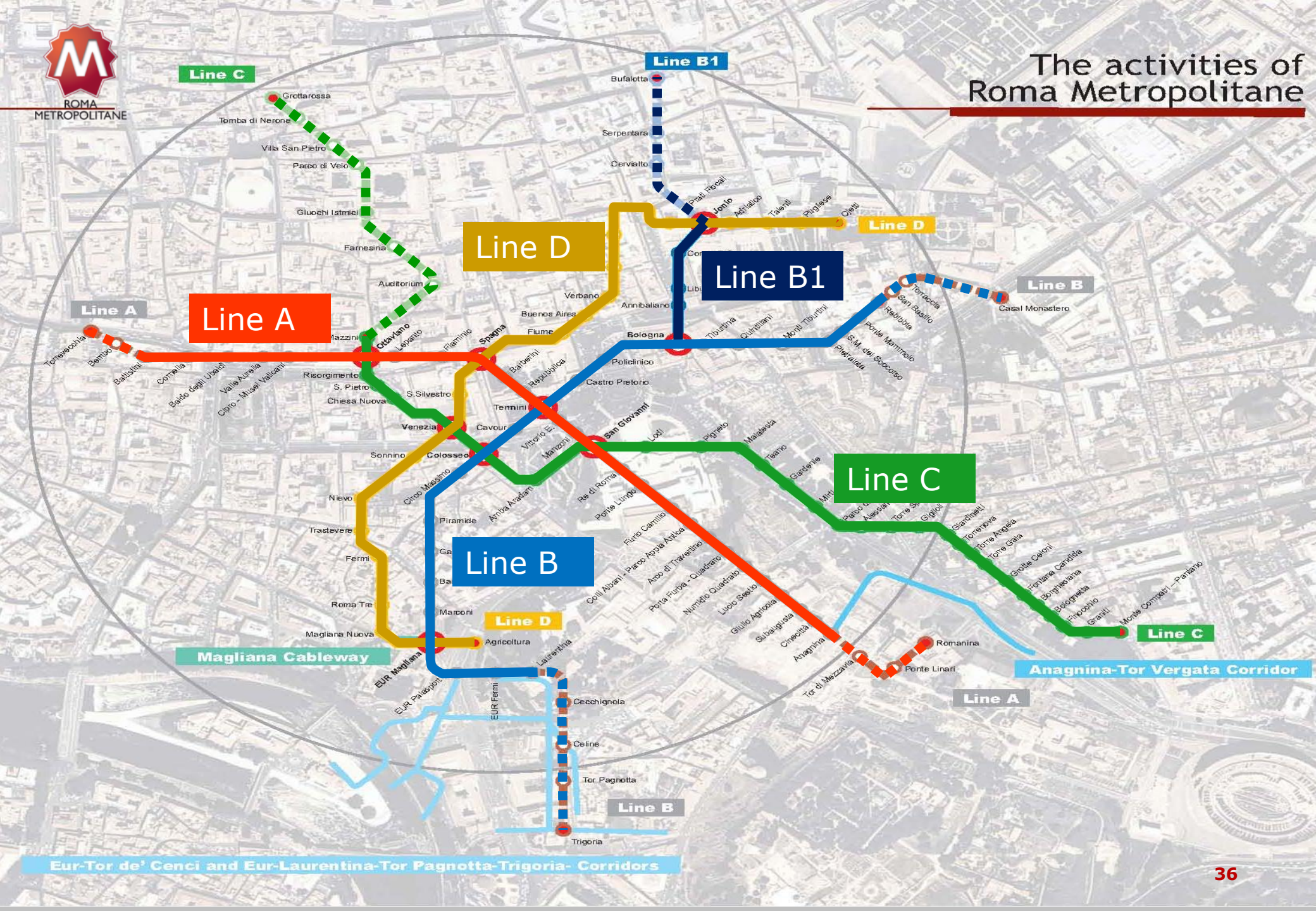
Line C – Tratta T5 – Teano Station



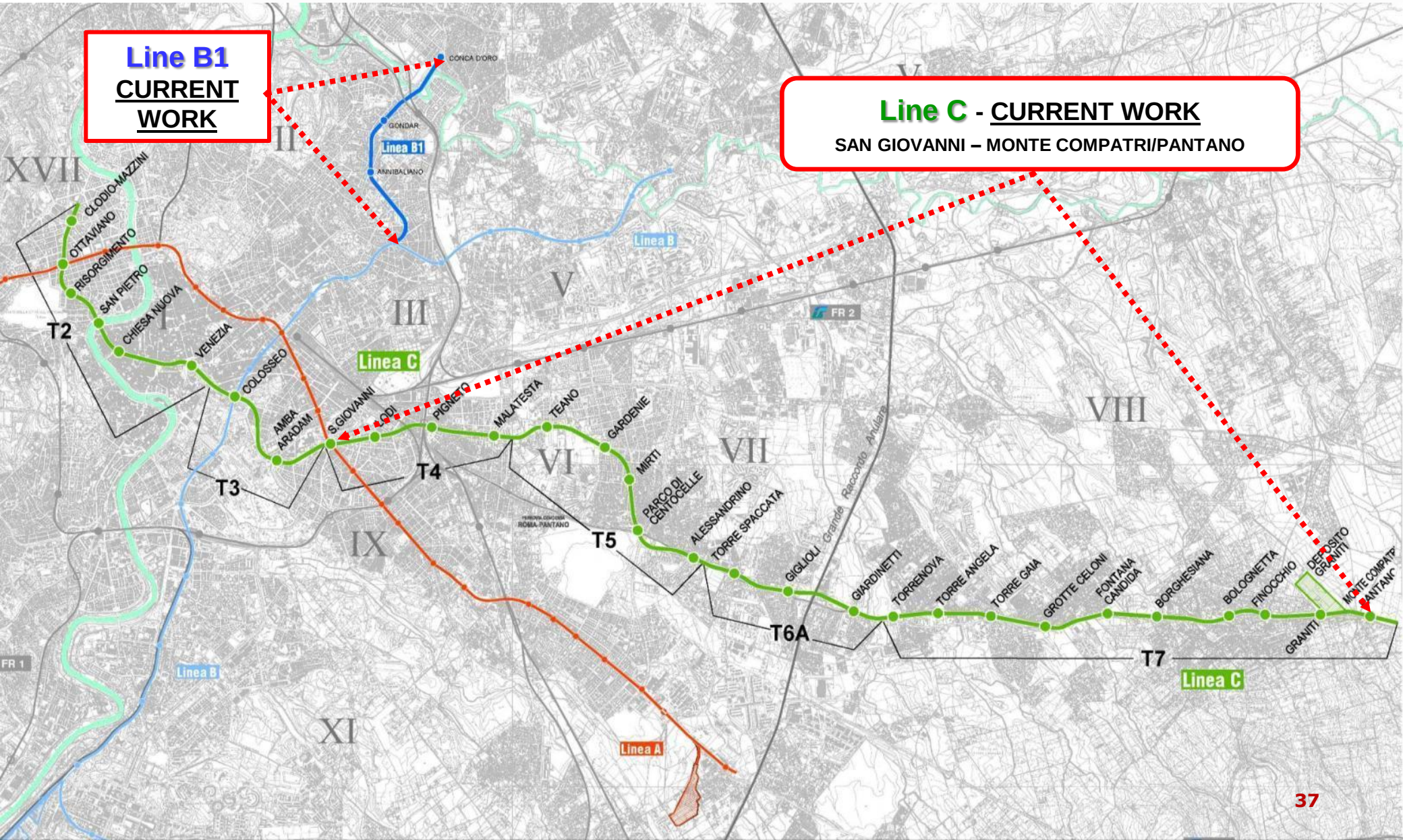
Line C – Tratta T5 – Teano Station

Line C – Tratta T7 – Monte Compatri - Pantano Station

The activities of Roma Metropolitane



Work in progress



Metro Lines development program in Rome

	current	2015	2020
Development (km)	**36,5**	**69,3**	**96,9**
Stations (Stations inside the Historic Town)	**49** (15)	**72** (19)	**100** (29)
Residents coverage	**350.000**	**500.000**	**850.000**
Workers coverage	**290.000**	**360.000**	**610.000**
Supplied demand (transfers/day)	**780.000**	**850.000**	**1.700.000**

Total investment Euro 10.000.000.000

PROJECT FINANCING FOR THE DEVELOPMENT OF THE NEW METRO LINE

The Administration of Roma Capitale has opted to use **project financing** for the other sections of the Metro System scheduled for construction, starting from the extensions of A and B line and of the ones under construction, B1 and C.

Roma Metropolitane makes use of specific tender procedures to acquire technical/financial proposals from the market to award Concessions to private Contractors.

The Concession holders can assume the task of the following activities:

- the construction of the Lines
- the management of the services and systems in the stations and at the interchange nodes
- the management of the railway operations and of the train signaling and circulation for transport system that are independent from the existing network

Patterns of project finance for new Metro Lines

*In the case of the realization of a public transport system in urban area, with a private contribution to finance the works, there are **three possible patterns**, depending on what the private partner shall build and operate.*

type A - Building and operating a complete and independent new infrastructure

type B - Building an extension of an existing Line and managing the hubs

type C - Revamping and extending an existing Line

Notable operations of land valorization can be connected to any of these patterns

Patterns of project finance for new Metro Lines

type A - Building and managing a complete and independent new infrastructure

This solution is the most suitable one for a totally new and independent Metro Line. It is the clearest pattern from the point of view of the transfer of the management risks, because it avoids any confusion in the allocation of responsibility when a disservice occurs.

This is the case of **Line D**, as the Concessionaire will conduct preliminary investigation, develop the project, build the Line, operate the rail system and manage the service of the stations and hubs for a 20-year concession period. Its also the case of **Line C**, where General Contractor proposed a financial contribution to the construction of the last section of the Line and also the operating of the entire Line vis-a-vis an "availability charge" during the operating. This proposal is under examination by Rome Municipality.

type B - Building an extension of an existing Line and managing the hubs

The private partner, in the stations and hubs, provides the maintenance and the surveillance of structures and plants, and can also provide the welcome services, beside carrying out subsidiary commercial activities or other services.

Instead the management of the transport service, including the purchase and the maintenance of the rolling stock, remains to the previous handler.

This is the case of the extension of Line B, B1, A.

type C - Revamping and extending an existing Line

The construction of an extension of an existing Line involves a remarkable investment for revamping and modernization of the existing Line.

In such a case the Public Administration would entrust to the Concessionaire the total responsibility of the operating of the transport service. It would not be advisable for Public Administration to leave the operating to someone different from the Concessionaire of the revamping works, because the responsibilities of disservices could weave.

This is the pattern for the revamping of the existing lines, A and B.

The allocation of risks in public-private partnerships

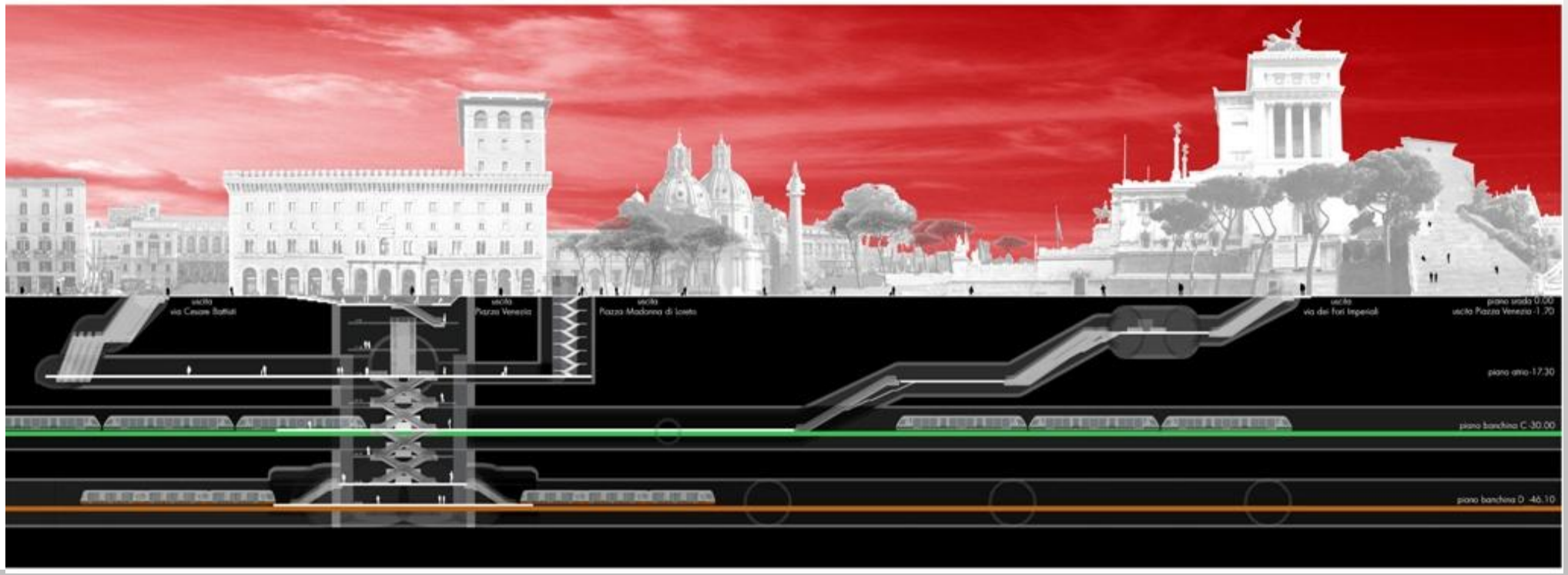
In 2005 Eurostat recommended that the public-private partnerships must respect both the following conditions:

1. **The private partner bears the 'construction risk':** guarantee of compliance with envisaged timeschedule and costs over the implementation phase. The archaelogical risk remains charged to the Municipality.
2. The private partner bears at least one of either '**availability**' or '**demand**' risk

In Rome we are going to build underground in high intensity populated areas. So, demand is unchanged as the fare is fix and very low. Without choice and very low price, people will continue in every case to use the Metro. On the other hand Public Administration is interested to increase the number of people who use infrastructure. The option adopted **in Rome** is that **the private partner bears the 'availability' risk**.. So the **proceeds** and related **demand risk** remain charged to the Administration, which will continue to manage the system of fare proceeds.

The allocation of risks in public-private partnerships

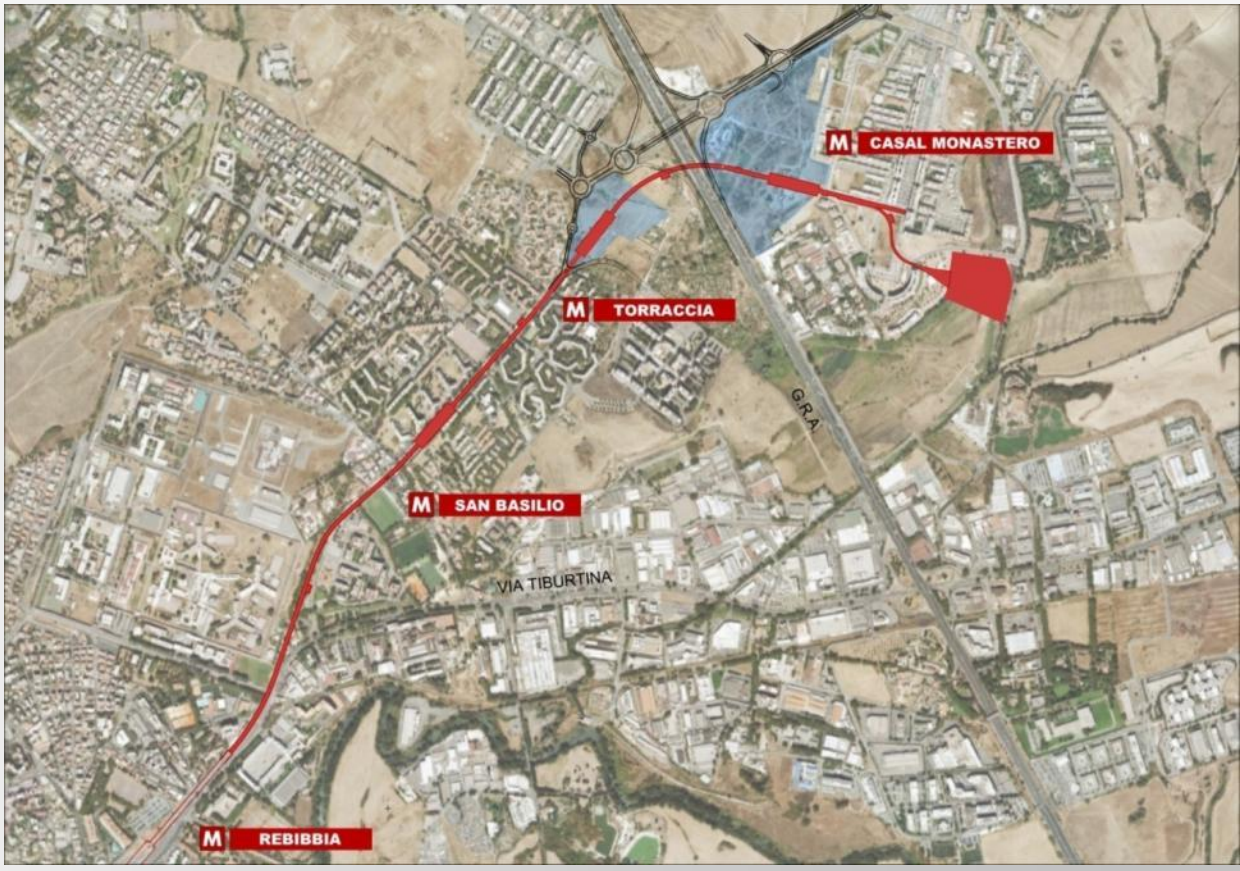
This is the option that will lead the Concessionaire to adopt the most efficient behavior in the operating of the service.
In fact its profit will depend on the achievement of the standard of service established by the conceding Administration



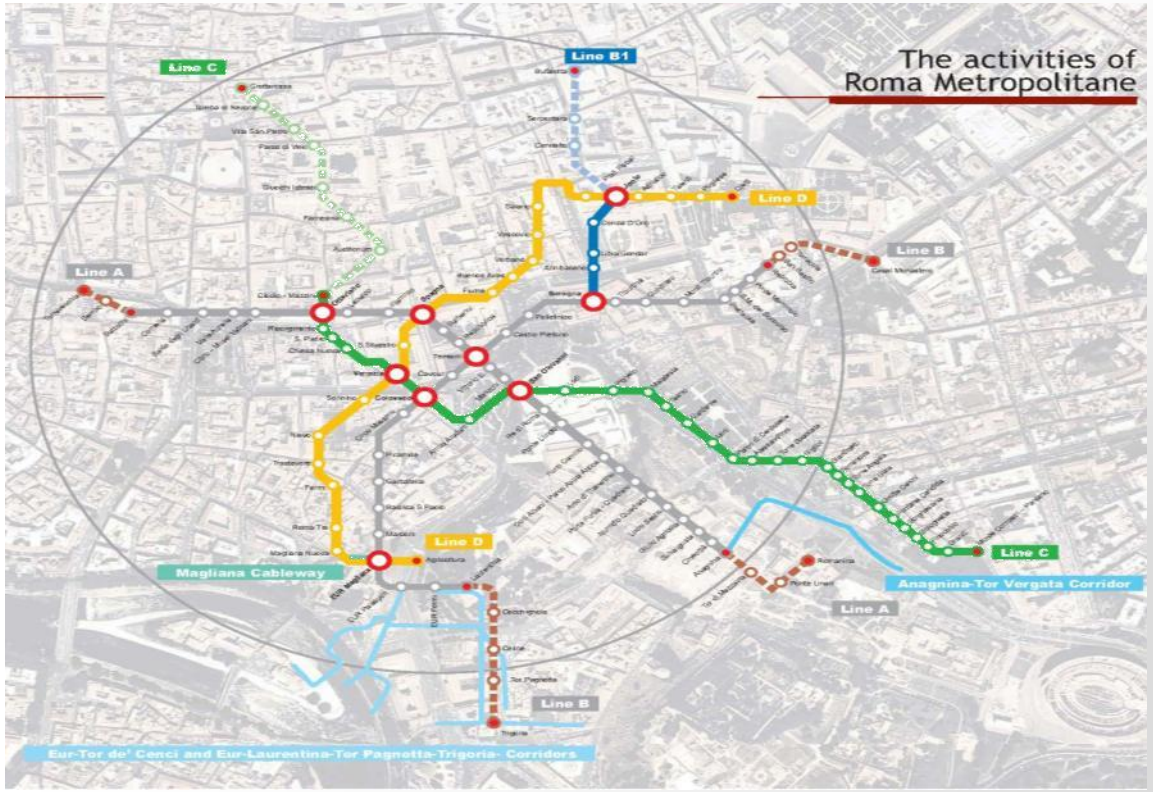
Valorisation projects of territory

Finally the construction of the new transport system (or the enhancing of the existing one), improving accessibility of the territory and increasing the value of lands and buildings interested by, could render notable operation of land valorization sustainable, using the instruments "di *variante*" permitted by the City General Plan (i.e. changing of the Land Use Plan).

This way to proceed has been challenged by local committees which make an opposition to this relevant change of land use.



final remarks



Despite the difficulties of Public Funding, the Development Program will be continued and concluded only whether the on-going procedures of project financing will prove to be valid and will be completed.

Overall we are confident of the good results of the different financing patterns above described but we also know that the real response will be given from the market in the next years.

ROMA METROPOLITANE

ROMA CAPITALE

Thank you for your kind attention

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