

Maximization of Gross Value Added for RB Rail AS International Passenger Stations

EXECUTIVE SUMMARY



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1. INTRODUCTION

1.1 PROJECT SCOPE AND STUDY AREA

The overall goal of this project is to confirm that the planning process of the RB Rail AS international stations is informed by international best practices, so confirming that the potential for generating economic, social, and commercial value is maximized. Furthermore, a specific objective of this study is to develop a critical analysis and provide sound policy recommendations on maximization of Gross Value Added (GVA) for the seven RB Rail AS international passenger stations. This study therefore considers commercial, socio-economic, environmental, and mobility-related aspects of international passenger railway stations.

The study area for international best practice study includes mostly stations within the European Union, however, some stations outside the EU were also considered. For the critical analysis and detailed recommendations, this report focused on the Baltic nations where the seven RB Rail AS International passenger stations are being planned or currently in development.

1.2 ORGANISATION OF THE REPORT

Following the introduction, this report is organized in the following main sections:

- Literature Review of catalytic impacts generated from modern international railway passenger stations;
- Benchmarking analysis of international best practices related to planning, design, and operation of international railway stations;
- Critical discussion of the results from the benchmarking analysis and summary of lessons learned;
- Critical analysis of development plans for the RB Rail AS International passenger stations;
- Policy recommendations;

During the project, two stakeholder workshops were held. The main outcome discussions were considered under the key recommendations for the RB Rail AS international railway stations.

A summary of these workshops can be found under Annex III.



2. REVIEW GVA STEMMING FROM MODERN RAILWAY PASSENGER STATIONS

Throughout history, railway stations have mainly served as single or limited land uses, primarily facilitating rail and passenger traffic. However, in recent years, a more holistic approach to the development of railway stations and their surroundings has gained momentum due to their potential of generating and capturing economic value. Such value is understood as the delivery of socio-economic and environmental benefits. These effects can be seen at commercial and housing developments, that with their mix of land uses, effectively attract employers, workers, shoppers, and other types of customers. The literature review implemented for the present study focused on the identification of main catalytic impacts related to modern railway passenger stations, as well as on how station planning, and design could be leveraged to integrate them with their immediate surrounding areas and beyond.

2.1 STATION CONCEPT AND CLASSIFICATION

In order to establish or improve the attractiveness of a railway station, it is important to define how a station will be operated in terms of governance and spatial interaction. The operation models are also connected to the city concept, landscape and territory availability, potential functionality, surroundings, and future developments. In some cases, historical aspects play an important role. Two models are identified: "Introverted Station Model" and "Open Station Model". A station based on an introverted model will have less interaction between different spaces (the surroundings and the city itself), meaning mono- functionality within the station, as well as having less interaction or cooperation between different stakeholders. Such a railway station is basically an isolated object within a city that has less connections between people and important economic activities. An open station model

works in the opposite way, providing greater interaction between spaces, people, and different potential users and uses. Stations with an open concept are easily integrated in the urban surroundings. In addition to providing a railway station, these stations also act as transport hubs for different modes of transport, as a business / commercial center, and as a town square by exploring various aspects of placemaking.

2.2 CHOOSING A STATION LOCATION

Generally, cities have common challenges due to high population density, economic and historical activities, high volumes of road traffic, and various pollution issues. This is an important reason why the literature review suggests placing stations in urban core areas, where the maximum benefit is achieved for the public and for the railway system itself. One of the most important aspects of locating a future railway station is to integrate planning of the station in city urban planning strategies. For instance, utilizing a Transit Oriented Development (TOD) approach, including Land Value Capture (LVC), could aid in the holistic planning process of a station itself, but could also be integrated into a wider urban planning strategy. This could be done as a strategic project in the development of a metropolitan-wide development plan, as a sustainable urban mobility plan (SUMP), or as a small area plan or specific land use plan.

2.3 URBAN INTEGRATION AND INTEGRATION WITH SURROUNDING AREAS

Urban integration ensures that a railway station serves its transport and commercial functions while smoothly integrating into the surrounding urban land uses and functions, and could include the following aspects:

Modal integration: effective connection between railway, road, and urban mobility modes as well as integration with land use planning. The benefits of a multi-modal urban transport system and proper construction of transferring points could harmonize passenger flow at a railway station area.

Economic activity generation: promote economic growth and spur development in neighbouring areas. Railway stations could contribute to the improvement of the regional economy by offering mobility and access for the labor force, and by providing accessible employment options, shopping, and housing opportunities. Stations also have an important potential for Land Value Capture (LVC) that could support to cover the project capital investment costs/ operational costs or provide additional sources for municipal finance.

Urban regeneration: A modern railway station development contributes not only to the urban regeneration of less vibrant parts of a city but could also spur new investment and attract residents and employers in highly active urban centers.

Regional and international railway service integration: Taking into consideration the integration aspects of railway stations, it is extremely important to address international and interregional train services. This is important in the view of a sustainability-oriented mobility strategy where high-speed rail services are functionally integrated with air-travel and other (e.g. private car) modes of transport are used for medium-long journeys.

2.4 STATION DESIGN

According to the literature review, at the early stages of a station planning and design, considerations should be given for identifying user needs and preferences.

The reviewed literature suggests that during the design phase, stations should not only be understood as a passenger or freight node, but as destinations by themselves: meeting places where people could congregate, shop, and carry out everyday life activities. International railway stations should be designed to allocate various facilities like shopping areas, retail services, food stores and other relevant commercial spaces.

The literature also highlights that although passenger safety and operational efficiency should be at the forefront of the design and implementation of any railway station, user needs should be critically considered during the design process. The literature review also shows that it is important to engage all the different stakeholders during the early planning stages.

A relevant consideration for a railway station stakeholder list should include at least government authorities, users, operators, real estate agents, retail/commercial/trading groups, contractors, and other commercial players.



3. INTERNATIONAL EXPERIENCES TO MAXIMIZATION OF GVA

3.1 SELECTING BENCHMARKING

This section presents an overview of international best practices in the development of international railway stations.

Several interviews and workshops have been implemented with RB local stakeholders to identify valuable aspects of developing international railway stations. The retrieved information helped in selecting a list of international best cases comparable to the seven planned RB Rail AS stations for the benchmarking analysis of the best practices for maximizing the GVA stemming from international railway stations.

All the selected cases were analysed with respect to multi-functionality and urban mobility connections, availability of commercial opportunities and stations (internal) space usage, goods and services offered at the station and surroundings, connectivity and accessibility. The blue box on the right side provides the list of the 24 stations reviewed as best benchmarking cases. Appendix I illustrates the detailed overview of each station.

1. Leipzig Central Railway Station (DE)
2. Liège- Guillemins Railway Station (BE)
3. Amsterdam Central Station (NL)
4. Utrecht Central Station (NL)
5. Berlin Central Station (DE)
6. Frankfurt (Main) Hauptbahnhof (DE)
7. Vienna Main Station (AT)
8. Copenhagen Central Station (DK)
9. Helsinki Central Railway Station (FN)
10. Pasila Railway Station, Helsinki (FN)
11. St. Pancras International, London (UK)
12. Copenhagen Airport Station (DK)
13. Malmö Central Station (SE)
14. Oslo Airport Station (NR)
15. Aarhus Central Station (DN)
16. Amsterdam Amstel Station (NL)
17. Rotterdam Central (NL)
18. Nørreport station (NL)
19. Beijing West Railway Station (CN)
20. Zaragoza-Delicias Railway Station (ES)
21. Naples-Afragola station (IT)
22. Bordeaux Saint-Jean (FR)
23. Canary Wharf Railway Station (UK)
24. Køge Nord (DK)



3.2 ASSESSMENT OF BENCHMARKING CASES

Before preparing lessons learned from identified best practices and assessing their comparability and suitability to the RB Rail AS railway stations, the consultant reviewed each of the 24 international cases against five categories:

Architecture & land use. Important elements such as station design and its architectural functionality were reviewed. The architectural assessment covered an in-depth review of station scale, spatial qualities, quality of the exterior spaces and historical/ modern architectural solutions, as it pertains to a specific city or metropolitan areas, including their planning and concept development.

Commercial use. Station-wide analysis of current commercial use describing commercial and functional aspects that contribute to GVA maximization. These aspects are: urban structure, real estate, land-use efficiency, agglomeration benefits, commercial content.

Functionality. Specific focus of a railway station being a part of a city, its urban life. Any station elements, their planning and connections are reviewed against integration with the existing urban environment and its role in the regeneration of urban areas.

Operation. A detailed overview was performed for chosen lessons learned including how the railway station operation (including financing) is planned, organized, and managed in cooperation with different public and private stakeholders.

Mobility. Under this category, connectivity between railway stations and other public transport was analysed. This included metro, light rail, and bus services. Furthermore, the analysis also reviewed railway station accessibility by other modes of transport, including pedestrian connections and facilities, bicycle infrastructure and parking, Electric Vehicle (EV) charging infrastructure for various transport modes, car sharing facilities, availability of taxi services, and relevant arrangements.



3.3 LESSONS LEARNED

CATEGORY 1: ARCHITECTURE. URBAN & SOCIAL PLACEMAKING

The relation between international railway stations and the inner-city fabric has been increasingly oriented to a complex and multi-functional approach. In many cases, urban regeneration is directly related to redevelopments of railway station areas. Modern railway stations often require redefining and reshaping of the building and its interaction with the surrounding environment to satisfy the needs of society and utilizing technology to optimize their use and aesthetics.

The railway stations chosen for the benchmarking analysis are characterized by outstanding synergies between station and city fabric, based on the concept of stations as transport nodes and places/destinations.

Key findings from identified lessons learned:

- The station as an integrated element of the urban system;
- The station as an open and active urban space that encourages developments in front of the central entrances (open public areas) and incentivizes diverse usage;
- Both stations and adjacent urban areas must accept a continuous synchronization and agile adaptation with respect to reciprocal changes;
- Attached public areas such as green spaces add value to both the station and the services it provides;
- The station, especially if located in peripheral areas, has the potential to host urban micro- institutions (some small finance companies) for broader functionality and social placemaking;

CATEGORY 2: LAND-USE

The accelerated commercialization of government-owned land areas around the stations has enabled the generation of economic and social value, in many cases, in the form of holistic multi-purpose use development. Such developments have resulted, in most cases, in the realization of important GVA for the locations and increased their attractiveness. Within this context, the successful experiences related to the TOD approach in urban planning suggest a multicentred urban structure with sub-centers that include most of what people need in their daily lives, easily accessible by walking or biking.

Land use should focus on supporting critical mass and needed intensity especially in terms of housing, commercial services, and workplaces to become attractive for both citizens and investors. The immediate surroundings of the stations gather the highest pedestrian volumes, making them optimal locations for retail. High potential exists also for office and accommodation clusters. All of these should be utilized with maximum volume while taking care of a thorough market analysis that must support this potential.

Key findings from identified lessons learned:

- The surroundings of stations have high land value and are successfully utilized through high volumes of mixed development in order to maximize GVA;
- Diversifying land uses around stations gives the opportunity not only to generate value through the increase in land prices and in the desire to live, work, and shop in the area,

but also (for public entities and station owners and operators) to capture such value through land value taxation and developer-paid infrastructure development (new/improved sidewalks or bike infrastructure);

- Land-use mixing enables faster completion of the area development, as the market take-up requirement for a single real estate market sector decreases.
- Retail has an important potential in the immediate proximity of the station which should be maximized by strategic positioning on the busiest natural pedestrian routes.
- Railway platforms and tracks in some cases divide the urban districts blocking their connections/ integrations. To better use the available land, railway platforms and tracks, are placed underground when feasible.
- Low- value land uses have their role in urban structure, but these should be developed in a sensible and efficient way to enable the best possible GVA.

CATEGORY 3: COMMERCIAL USE

Railway stations analysed significantly differ by commercial concept and service structure. Each station includes basic services such as ticket sales, kiosks, and cafes, but even shopping mall concepts can be successfully implemented resulting in an increase of the station's role as a retail area. A central location next to the railway station, public transportation, and natural pedestrian flows will create a possibility for new major retail and other commercial development. Railway stations close to the city center and in developing sub-centers have such transformative potential. Railway stations themselves, have mostly small-scale retail and other services for passing passengers. A more diverse range of retail services can be combined with an adjacent shopping center with a wide range of specialty stores, restaurants, grocery stores, and commercial

services. The scope of the actual retail space in different stations will vary depending on the real estate market conditions, commercial competition, and city planning objectives. According to the analysis, railway stations next to airports are usually only extensions of the terminal building and do not have that much potential for development of retail opportunities.

During the benchmark analysis, the Consultant has used the following typology to classify each analysed station regarding related commercial concept and service structure:

- **TYPE 1** Minimal basic services; typically includes ticket sales, kiosk, café, etc.;
- **TYPE 2** Diverse basic services including groceries and related activities;
- **TYPE 3** Minor retail center scale with basic services, added singular special retail, and minor destination role;
- **TYPE 4** Shopping mall scale; includes clustered special retail with destination role;

Key findings from identified lessons learned:

- Railway passengers create a natural customer base for convenience stores, restaurants, and other take-away services;
- Great accessibility and central location in the city can expand the customer base from local to regional;
- Underdeveloped (unbuilt) areas next to a railway station could be used as an attractive location for major commercial developments;
- Commercial development around railway stations can create an anchor point that expands the busiest retail areas and strengthens the service structure of the whole city center;
- Areas attached to railway station can be used as a location for allocating regional shopping centers complemented by offices, hotels, and apartments. In this case, greater attention should be paid to city development plans and the existing competitive situation.

CATEGORY 4: FUNCTIONALITY

The integrated functionalities of modern railway stations focus on combining mobility services with retail and public services. The common benefits that connect those functions are clearly seen in their central location, architectural significance, long opening times, and crossing customer streams. The modern railway multifunctional building typology carries important social responsibility and acts, at the same time, as a public living space. Stations are no longer dedicated to one specific customer group, i.e., travelers, but it is enabled for travelers as well as shoppers, bypassers, and local residents. Today, everybody meets under the common umbrella of the station roof. As a consequence, new spatial concepts (physical and functional) must optimize the balance between “traffic node” and “meeting place”. This spatial adaptation from a classical railway terminal to a building that hosts a mini city in itself is challenging and not always possible. Our chosen “Best Station” and the related “Lesson learned” show examples for this transition process of an historical station and a new-build complex on top of existing railway platforms.

Key findings from identified lessons learned:

- Functional, flexible spaces and construction solutions that allow for future changes.
- Generous spaces that showcase internal daylight to support user and customer convenience.
- Short distances and clear wayfinding allow for a smooth and safe interchange.
- Commercial functionality cannot compromise transit circulation qualities.
- Densely packed diverse functional mix to attract different customer groups.

CATEGORY 5: MOBILITY

This category has been analysed with respect to the benefits identified under the TOD

approach and focuses on urban mobility complementary (feeders) support to railway, including requirements to reorganize the traditional railway service and station operation into a modern hub. TOD approach also aims to include mobility integration and access to national, regional, and international passenger railway destinations. Moreover, a modern hub in the TOD approach perspective serves different categories of users depending on its size (large, medium, and small) and role within the urban area (central, transfer, urban and suburban transportation complementary).

CATEGORY 6: STATION OPERATION

Railway passenger mobility services have a great impact on economic growth and social well-being. Passenger service plays an important role in dense inter-city corridors, and as part of well-integrated regional passenger transport systems in densely populated areas. Any railway service has key physical elements (components) for its operation: the infrastructure (the permanent way, tracks, stations, freight facilities, viaducts, tunnels, etc.) and the rolling stock (the locomotives, passenger coaches, freight cars, etc.). Moreover, the operation of railway stations is based on a complex management approach which includes not only general management, but also rail operation & its operational integration with other transport services, sales and commercial management, stakeholder cooperation & management, financing station development or improvements, facility management and life-cycle asset management, among others.

Key findings from identified lessons learned:

- Railway stations are often operated by the same company that provides railway mobility services. Such arrangement provides benefits in terms of providing a holistic railway service organization, efficient reporting system, and data collection. Furthermore, this model of operation also

provides benefits in terms of the existence of in-house management, including departments such as commercial, operations, and customer service.

- Stations could be constructed and managed by private sector real estate owners, if the commercial entity attached to a station is wide enough to generate revenues that can repay the costs. This model offers clear benefits as the station operational costs can be partly covered by commercial activities allocated at a railway station, where possible building right sale profits could be used for core business (i.e., railway infrastructure development) and the efficient construction and market-led content is assured.
- Large-scale commercial entities require dedicated commercial management which differs from standard railway station management. The main difference is the marketing and branding process that is required to manage the risks deriving from an unpredictable retail market and, if relevant, number of leasable premises. Moreover, it is important to clearly identify agreements on responsibilities between private owners and a railway infrastructure administrator.

- Structure station management and services have to be based on the level of traffic, and typology of buildings and facilities in place.
- Railway station optimization can be combined with the results of the station analysis regarding the use of its area, as well as financial support for concepts / lease agreements.
- Developing mobility services based on the customer needs.

The table below summarizes the identified best cases and lessons learned per categories described above and per potential station locations. Annex II describes these lessons learned in more detail.

Categories	A - Central	B – Airport Station	C- Sub-central
1. Architecture "Lessons learned"	Amsterdam Central station "Inter-dependencies"	Canary Wharf station "Hybrid Density"	Helsinki Pasila station "Contextual bridging"
2. Land-use "Lessons learned"	Aarhus Central station "Clever positioning"	Utrecht Central station "Airport cities"	Helsinki Pasila station "Amplifying and complementing"
3. Commercial "Lessons learned"	Aarhus Central station "Commercial anchor point"	Copenhagen Airport Station "Limited retail"	Helsinki Pasila station "Local and regional services"
4. Functional "Lessons learned"	Berlin Central station "Generous Flexibility"	Copenhagen Airport Station "Multi-layered integration"	Copenhagen Nørreport "Smart Switch"
5. Operational "Lessons learned"	Berlin Central station "One- hands solution" "Efficient cooperation form to finance railway service"	Copenhagen Airport Station "High operational efficiency"	Køge Nord station "Early private- public collaboration"
6. Mobility "Lessons learned"	Vienna Central station "High integration and full mobility"	Oslo Airport station "Archiving sustainable mobility"	Amsterdam Amstel station "Transfer hub between suburban and central city "

4. RECOMMENDATIONS FOR MAXIMIZATION OF GVA BASED ON THE LESSONS LEARNED

One of the key findings from the benchmarking analysis of best practices is that international railway stations must not be seen as isolated and independent elements of the urban system but rather as a part of an integrated city development strategy, considering various elements and modes of urban transportation, business and commercial developments, land availability and spatial planning, future urban developments, and other relevant strategies.

In this respect, international best practices offer many examples. For instance, modern or historical architecture design, can make a station become a touristic attraction.

To guarantee universal accessibility and improve station safety, complementary planning, and layouts for bicycle traffic (introducing paths and traffic lights at the railway station building), as well a pedestrian plan and access to railway platforms within a railway station building are introduced. In fact, an efficient organization and development of a railway station can bring important mobility-related benefits to urban residents.

As part of universal accessibility-oriented planning, it is important to guarantee safety and security, having a crucial role in passenger railway station GVA maximization. Planning and improving these characteristics will make a railway station not only attractive to passengers, but also could be economically efficient for railway operations (for example, due to cost saving of any accidents, or more efficient operational planning which will be integrated with urban transportation).

Developing commercial and renting services at a railway station could generate additional revenue for the railway station operator and attract visitors so allowing the development of

the station as a social and urban node, giving nearby residents a comfortable place for daily shopping and meeting points. The benchmarking analysis shows that modern railway stations (which usually have an operational model where railway operators own the station and ancillary infrastructures, or stations which are operating on Public Private Partnership set-up) could provide working spaces, shared offices, and conference areas and services, which might especially be attractive for international business travelers and self-employed users. Establishing such a concept for a passenger railway station, modern technological start-ups or large corporations, who could be main users of a rental service, through their marketing and communications could contribute to a station's visibility and its urban importance.

Moreover, the latest trend in developing logistics services for private users show a positive catalytic effect. Logistic services in this case mainly consist in allocating delivering boxes (a parcel lock, e-commercial parcels) directly at platforms or within the railway station, where travelers and non-travelers can have free access to pick up their packages any time they want. For railway station operators, income (which could be generated from space rental, giving access to parking areas, leasing smart boxes, or directly involving a railway parcel delivery service for small regional and private deliveries) is generated through a cooperation with large delivery companies, such as DHL, Green Pin, UPS etc.

The best example of establishing such a service is Deutsche Bahn in Berlin, who are developing a comprehensive strategy to shift more traffic to rail and develop smart mobility offering logistics solutions for urban areas or within the railway station. Such services are presented by logistic last mile connections for small package deliverables at a railway station using cargo bikes, also for delivering post to logistics points allocated within the railway building,

etc. Moreover, DB offers such a service as a regional delivering.

Another recurring theme in international best practices involves the aspect of funding and financing. The first important aspect is understanding the difference between these two terms and understanding the contributions from all levels of government to ensuring regular funding streams are set not only for the construction of the station, but also for the operation and maintenance (if the operational model envisions a public entity).

Below, there is a figure which illustrates the difference between funding and finance and offers an indication of the type of sources for each.

Based on the benchmarking analysis, there are several recommendations to be considered for the maximization of GVA stemming from modern international railway stations.

These recommendations come from the analysis of the international best practices that have been identified.

To give a summary of the important catalytic effects to consider with regard to planning, development, and operation of modern railway stations, findings and recommendations from the international experiences including theoretical and practical applications are discussed in the table below.

FUNDING		FINANCING	
TYPE	SOURCE	TYPE	SOURCE
Government revenues	• General taxes	Public finance	• Multilateral development banks
	• Intragovernmental transfers		• Bilateral development institutions
User revenues	• Farebox revenues		• Public or municipal debt
Commercial revenues	• Advertising		• Tax exemptions
	• Leasing of commercial spaces		• Government-backed securities
	• Naming rights	Private finance	• Banks
LVC revenues	• Merchandising		• Equity investors
	• Development based		• Capital markets
Other revenues	• Tax based		• Equipment suppliers
	• User charges		
	• Dedicated sales or payroll taxes		

Note: LVC = land value capture.

SOURCES OF FUNDING AND FINANCING FOR URBAN RAIL PROJECTS
(SOURCE WORLD BANK GROUP 2018)

CATEGORY 1: ARCHITECTURE

Summary: Maximize international railway stations GVA requires to diversify the services and the functionalities provided by the station while increasing its spatial relationship to the context in which the stations are developed.

Key recommendations:

- Contextual insertion - the observation undertaken during the benchmarking process led to the conclusion that a best practice station takes into consideration a holistic approach to value creation. This is seen both in how spaces are designed and organized within the station and in how the spatial concept of the station is inserted in a larger context.
- Intersectional densification - the service provision of stations does not have to limit itself to the passenger use, rather it ought to frame opportunities of interaction between different users and interest groups. By catering to a wider audience, the spaces of the station can develop beyond their primary mobility functions into spaces that provide a variety of public functions.
- Design for convenience and attractiveness for all types of users – stations should not only be designed as transport operational facilities, but they should also provide convenience for everyday life as well as critical services that make it easy for passengers to be attracted to it. Designing a station to be convenient and attractive should also include a comprehensive approach to allure potential customers who may use the station or live around it.
- Design for inclusion - it is important that station design include considerations for a diverse range of people and how they interact in the public space including Passengers with Reduced Mobility (PRM). Examples include: planning and design for example: barrier free/ step, free entrances and/ or “unassisted” accesses, braille and tactile wayfinding and textured surfaces, number and location of elevators to be connected to the platforms and within commercial areas, design of crossings which lead to the station, design of boarding and alighting areas, and others.

CATEGORY 2: LAND- USE

Summary: Land-use efficiency and diversity around the station plays the biggest role in maximizing GVA and there are several good examples on how the station surroundings have been developed to maximize the huge potential that these best accessible locations have. Clever positioning of different uses enables the mixing to function as intended and provide the social and economic benefits for everyday urban life and successful investments. Both center and sub-center locations have usually very good potential for fully mixed structure, but airport surrounding differ clearly having still good potential for some high-value land uses like offices, hotels, and convention centers.

Key recommendations:

- Develop efficient land-use to maximize the GVA potential that highly accessible railway station areas feature.
- Incentivize mixed uses, especially retail, offices, hotels, and housing, to enable vital urban structure that attracts both residents and investors, and to accelerate the completion of the developments.

- Avoid too complex land-use mixes within quarters to limit risks of losing the feasibility.
- Place retail areas with potential high customer volumes on the busiest natural pedestrian routes.
- When needed, use clustered retail as an anchor point to expand the busiest commercial zone and to unite the two different sides of the railway.
- Consider the possibility to move tracks underground, and if feasible, introduce land-use on the tracks to unify the city structure and to utilize the high value of emerging land.
- Develop current low-value but necessary land uses into more efficient forms to improve land-availability;
- Study the possibility to develop airport station surroundings especially with offices, hotels, and exhibition centers as well as sports and other arenas that require high levels of accessibility.
- Perform a thorough market analysis to find optimal volumes of new building stock for different uses.

CATEGORY 3: COMMERCIAL USE

Summary: Railway passenger flows create a natural customer base for retail and while stations provide services for citizens living nearby, great accessibility also creates the potential for expanding the customer base to regional. In the right market environment, a station's retail concept can be increased from basic services to even shopping mall scale, and by doing this the station's role changes to a significant retail hot spot.

Key recommendations:

- Use underdeveloped (unbuilt) areas next to a railway station as a location for major commercial developments.
- Study the retail market potential and connect retail areas to the station in order to utilize the natural pedestrian flows retail needs.
- Create attractive pedestrian routes that combine different urban areas around the station and lead them to and through the commercial areas.
- Widen the customer base catchment area from local to regional with wider shopping centers or other clustered retail form;
- Retail has limited potential in airport stations but introduce other commercial uses like hotels or offices. Take into consideration that the scope of the actual retail and other premises in different stations will vary depending on the real estate market situation, commercial competition and city planning objectives. Lean on market analysis.

CATEGORY 4: FUNCTIONALITY **Summary:** The best practice analysed are characterized, from a functional perspective, by a seamless approach to programme integration. They incorporate features that allow smooth traffic flow, but also an easy- switch between modes, services and their digital and physical interfaces.

Key recommendations:

- Program integration – a functional station should aim to maximize the diversity of functions to expand its functional quality beyond the mobility function. A dense mix of commercial, workplace, public, transport is desirable to produce multi-functionality paired with agile adaptation possibilities.
- Easy-switch –switching between transport modes and services, as well as the digital and physical interfaces facilitating these movements, improve the functionality of the station while correlating directly with an increase in GVA.
- Permeability – unconstrained routes for different customers and travelers to transmit and access the station area. Special attention must be given to creating barrier free entrances and passageways as well as natural connection points to neighbouring functions
- Short distances and clear wayfinding - all sequences of spaces and transition zones must be developed to minimize walking distance and maximize visual connection between key functions like platforms, entrances, halls, transit zones. The wayfinding concept should include local orientation points and daylight for stress free passenger and customer flow.

CATEGORY 5: MOBILITY **Summary:** Improving and providing increased mobility starts in the planning process and requires including potential users and other important stakeholder into the planning design and development of the station. Promoting sustainable transportation (walking, biking, public transport and shared mobility) and having a seamless connection between transportation and public spaces is a key feature of modern railway stations.

Key recommendations:

- Integrate station planning and design with land use and mobility planning.
- Promote NMT, introducing parking and integration with city bicycle path use and developing pedestrian zones.
- Catalysing sustainability and resilience, where MaaS and shared transit have a considerable role to provide sustainable mobility.
- Allocating new sharing mobility service, which could provide flexible use concepts and cost-integration with railway services.
- Develop optimal parking facilities based on the area needs, offering charging stations for various vehicles and needs.
- Develop reliable and efficient digitalization platforms for services.

CATEGORY 6: OPERATIONAL

- Creating social mobility (diverse groups of people) at or around the railway station.
- Connecting to redevelopment in a city.
- Considering TOD as a part of a railway mobility strategy to allow shaping and assessing urban development around a railway station;
- Develop functional integration with other modes, including both private and public modes, for both short and longer distance journeys (e.g. air-rail integration);

Summary: Station operators that clearly understand the operation of the transport side of the station, as well as the retail and other land uses near the station, possess an advantage not only at exploiting the services that could be provided to customers and passers-by. The scale of the station and its passenger volumes have clear impact on what kind of administrative solution can be used from an operational perspective. In large-scale solutions, the station building can be combined with, and some of the operational costs can be covered by, an adjacent commercial entity.

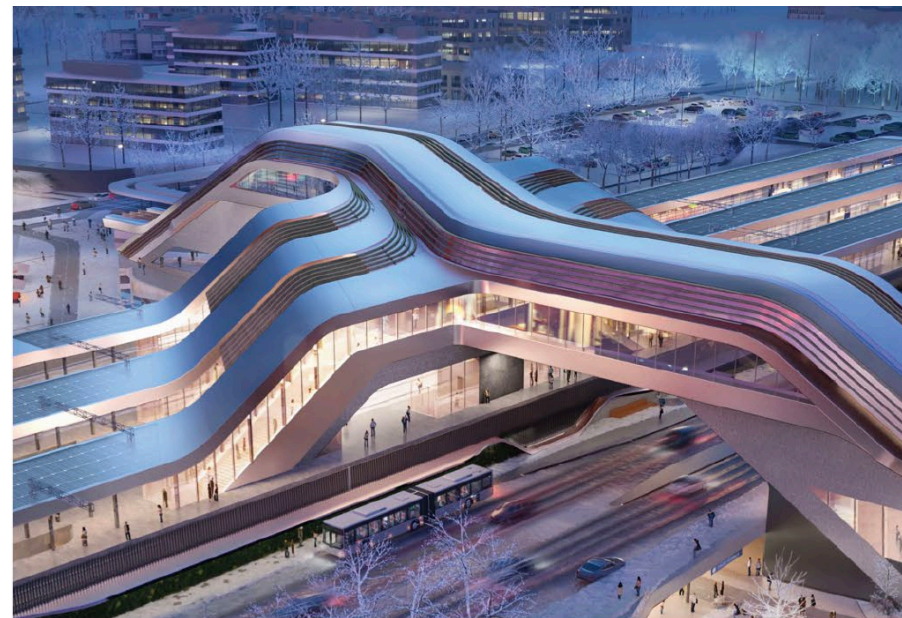
Key recommendations:

- A railway station operator and manager should exploit the full potential from connecting logistic and urban mobility services. It will also help an operation to assign relevant stakeholders and bring them together;
- There are important incentives for operators to be able to have some level of control in planning and development of conceptual design, infrastructure and real estate development in and around the stations;
- It is important to understand the potential to develop Business Improvement Clusters that could implement plans and develop improvements in the case of different operators for retail and other land uses inside and outside the stations.
- It is important to have an institutional transport authority that performs planning functions such as physical and fare integration, funding, intermodal transport planning, and other functions at the network level.
- Institutional weaknesses can be a barrier to the effective operation of the railway station. It is recommended to strengthen institutional capacity.
- Developing administrative structures that enable the railway station to integrate with the planning and operational functions of the metropolitan transport authority
- Provide adequate training and maintain a pool of professionals who are knowledgeable on both transport operation and infrastructure investments

5. CRITICAL ANALYSIS OF RAIL BALTICA INTERNATIONAL PASSENGER RAILWAY STATIONS

5.1 ÜLEMISTE INTERNATIONAL RAILWAY PASSENGER TERMINAL

5.1.1 ARCHITECTURE AND URBAN FORM



RB ÜLEMISTE TERMINAL (SOURCE: ZHA)

Tallinn Ülemiste district is located south-east of the city centre. Large areas have been commercially developed on and around the former Dvigatel factory site. The zone between the future RB international passenger railway terminal and the Airport of Tallinn is an essential part of an ongoing urban redevelopment, called "Ülemiste City". Its strategically well chosen location,

between the airport and the city centre, enable wide opportunities regarding seamless urban mobility and commercial functionality gathered around the modern RB Ülemiste international terminal. The future transportation hub will provide additional catchment area strength and an anchor point for the future development of the district and beyond. The terminal will serve international

TALLINN, Estonia

RB Ülemiste Terminal

448 770 (Tallinn pop. 2021)

~3000 (PAX p. day)

Bus, Tram, Car, Bike, (Airport 500 m)

Access to airport - 500 m, Terminal on bridge with integrated underpass

6 Platforms (2x local trains, 4 x HSR trains)

Basic diverse commercial services ~500m2 (total building 3950 m2)

night trains being an important junction connecting Baltic States with central Europe, as well as being an urban connector between Tallinn city centre and Ülemiste district and therefore boost potentials for further business developments and a mix of recreational and residential zones. Moreover, the station has a direct and fast connection to Finland over FinEst link- 30 min.

CONCLUSION ON KEY IMPROVEMENTS:

- Rail Baltica Ülemiste international passenger terminal has a great potential to be a boosting supplement to the future urban development of the area
- A modern mobility hub that actively instigates public, urban and commercial territory adjacent to the northern and southern entrance
- Commercial activity inside the station shall focus primarily on the traveller's needs. The main retail activity and the "Destination-Character" should establish around the public squares and the important axis towards the airport
"Destination-Character": in terms of positive placemaking and creating a commercially memorable location that attracts wide range of customers .
- Existing shopping centres to be converted and redeveloped to actively interplay with the station squares
- Increasing the visual presence of the terminal by connecting it to a tall building (f.ex.the proposed ZHA's high-rise next to European square)
- Activate and promote a dense network of traverse links that connect the urban fabric also in station adjacent areas
- Strengthening and streamlining the terminal's internal spatial use by further defining the role of the main underpass and the terminal bridge
- The main underpass has a major potential to develop into a more central and responsible part of the terminal (tailored functional provisions and improved views and natural daylight)
- To develop the terminal bridge into a flexible business objective that could attract supplementary customers beside HSR traveller's rather than being primarily a waiting and circulation zone bridging both sides of the city
- Highlighting one focus area where customers can naturally meet and orient themselves to counterbalance the continuous circulation flow
- To consider a small volume e-commerce parcel station located at the terminal underpass creates a natural addition to the retail program (f.ex. at southern end near the air-rail room)
- Further investigating bike-pedestrian collision to enhance smooth traffic flow
- Improving seamless mobility paired with customer comfort through the provision of air-rail facilities and its full integration will strengthen functionality level of the terminal



LOCATION WITHIN CITY



FUTURE VISION LAKE SIDE



FUTURE EUROPEAN SQUARE



Tallinn Airport

Suur-Sõjamäe

Peterburi tee



RB ÜLEMISTE TERMINAL (SOURCE: ZHA)

Ülemiste station design concept focuses on the development of the station as a formal bridge and underpass across the tracks. These gestures establish new relationships and challenges for the areas directly north and south of the sta-

tion. The main entrances are highly visible and well integrated into the urban areas north and south of the station. Pedestrian and bicycle traffic easily flow into the station from both directions.

URBAN SURROUNDING (SOURCE: PROJECT CONSORTIUM)



URBAN ANALYSIS

The following points refer to the numbered areas indicated on the maps.

1 RAIL BALITICA ÜLEMISTE TERMINAL

The terminal acts as a vigorous catalyst and connector of the developments north and south of the rail tracks.

2 NORTH-EAST AREAS

Currently housing and railyard area with clear potentials to be converted to higher-density developments and green belt towards the tracks.

3 ÜLEMISTE CITY DEVELOPMENT

The current business park is strategically located between the Airport and Ülemiste station allowing it to play a key role in the development of the area. There are strong opportunities for densification and the strengthening the public spaces between the station and Ülemiste City.

4 EUROPEAN SQUARE, RAIL - AIRPORT URBAN AXIS

The development of the future European square must create a vibrant axis between the station and Tallinn Airport. Currently there are plans (Esplan) to extend the existing Shopping Center with focus on a attractive street life towards European square.

5 WATERFRONT

The increasing multifunctional densification of the area with improved multi-modal access brings an opportunity for an urban waterfront development as an attractor and public space backbone.

6 & 7 ADJACENT SHOPPING CENTRES

The location of both shopping centres give the great opportunity to reorient their layout towards the new urban public areas and customer flow generated by the HSR terminal. Streetlevel activity along the customer routes are crucial.

8 NORTHERN STATION SQUARE

The layout of the northern square leads passengers from the street to the underpass and terminal bridge. Apart from using the vegetation as a buffer to the nearby traffic, the square creates a smooth connection between the city and the station. The current street layout enables limited opportunities for public life and provides priority for cars over pedestrians and cyclists.

9 SOUTHERN STATION SQUARE - EUROPEAN SQUARE

Due to significant level changes between the street and the underpass, the southern square is conceived as a series of ramps and terraces creating a promenade between the terminal and the European square. Terrain characteristics creates challenges for efficient public and commercial usage.

10 SUUR-SÕJAMÄE AND RAILROADTRACK

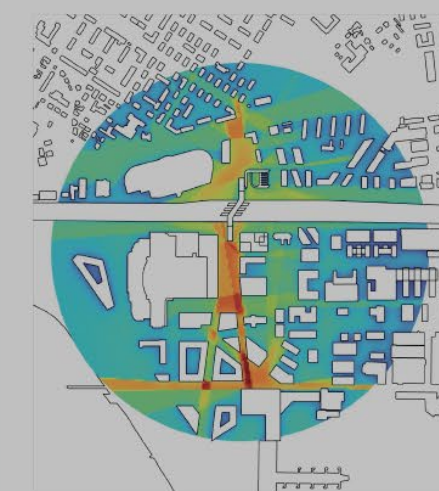
The road works as the backbone between Ülemiste City and the station. The series of services it provides has a direct consequence in the activation of the street. Its beneficial to promote a dense network of traverse links that connect the urban fabric either side with each other.

11 BOLD VISUAL PRESENCE

Well composed high-rise structures in proximity to the station can create strong visual synergies for the terminal and the surrounding.

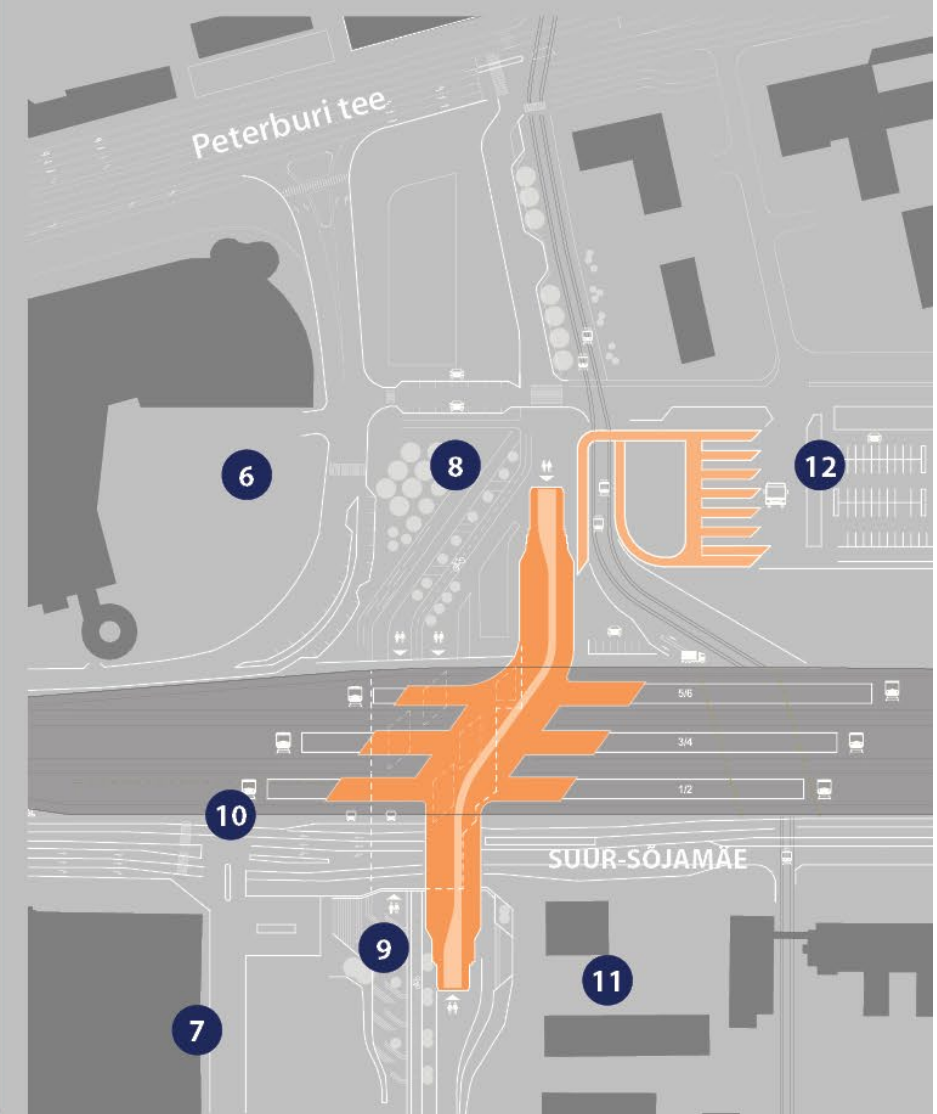
12 PT TERMINAL AND PARKING FACILITIES

The area directly north of the station has been conceived focusing on a direct approach to multi-modality and flexibility. The spatial proposal to focus on this interface can be considered successful in the way it seamlessly allow customers to switch between different modes within an urban framework. The possibility of expansion and introduction of other programmes allow this area to respond to future uses.



URBAN PERFORMANCE LEVEL - ORIENTABILITY AND VIEWS (SOURCE: PROJECT CONSORTIUM)

The urban performance study has shown that the current layout allows for excellent orientability, views and connections towards the terminal. The design allows for an excellent level of orientability which motivates pedestrian connections between Rail and Air. Further increased customer comfort will be achieved through air/rail baggage handling.



5.1.2 FUNCTIONALITY

Level 3:

short summary of room program "terminalbridge":

- tickets
- waiting lounge
- VIP lounge
- F&B areas

Level 2:

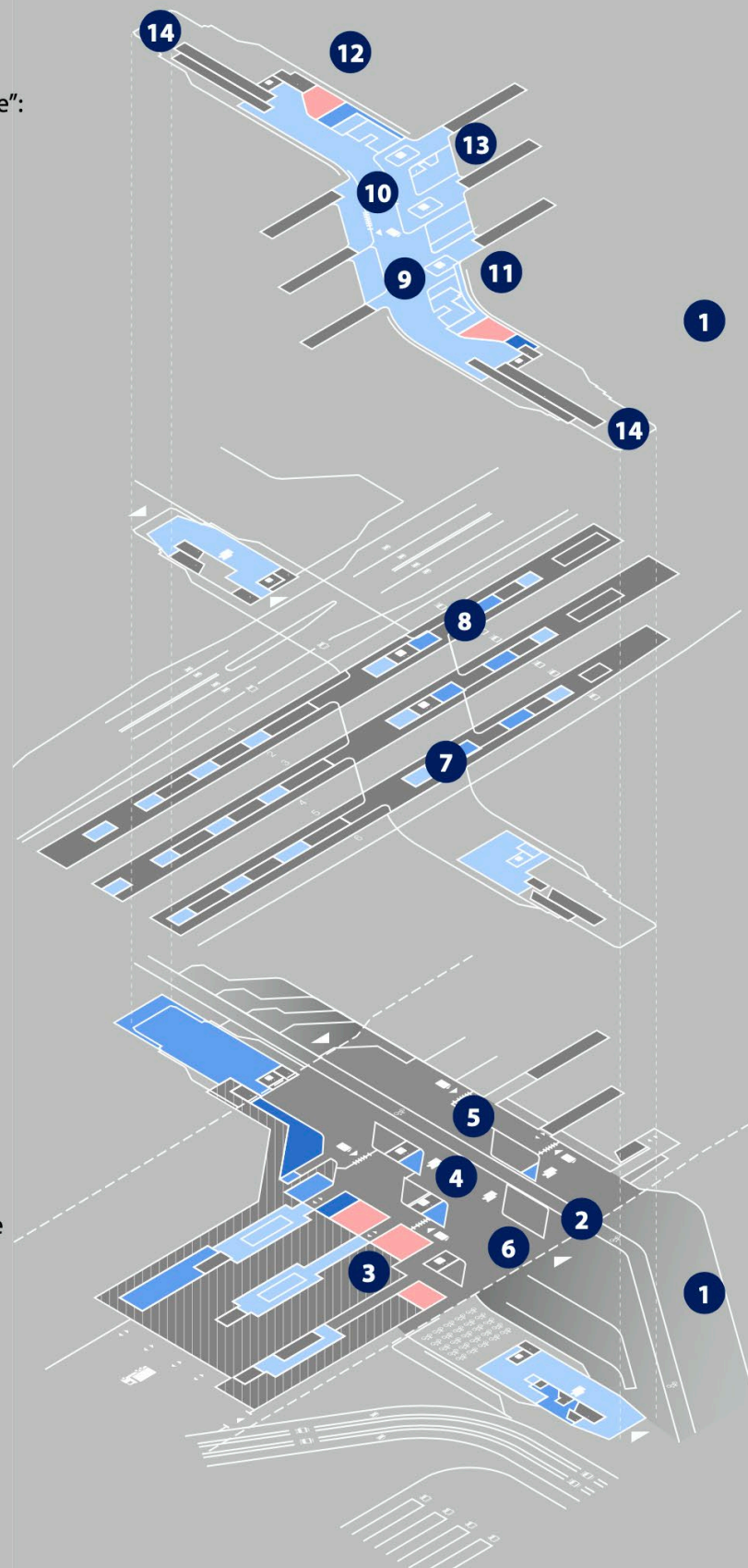
short summary of room program:

- platforms
- circulation
- access to bridge/L01
- BOH (luggage drop-off, storage, etc)

Level 1:

short summary of room program "underpass":

- circulation
- tickets
- access to bridge
- kiosks/shops
- luggage room
- bus station ticket office



3D DIAGRAMATIC MARK-UP
(SOURCE: ZHA + PROJECT CONSORTIUM)

1 EQUAL HIERARCHY CREATES CHALLENGES FOR WAYFINDING.

The terminal concept is articulated into two spatial gestures, the creation of a bridge and that of an underpass. While the bridge ironically signals the terminal as a connecting element in the city, the underpass houses the customer services, retail, circulation, and technical spaces while providing direct access to the platforms. The lack of hierarchy between defining what is the main space from an architectural and programmatic perspective could lead to challenges for wayfinding and user orientation.

2 BIKE-PEDESTRIAN CONFLICTS IN THE UNDERPASS CREATED BY SPATIAL DESIGN AND PROGRAMMING

The underpass has an efficient layout focusing on the maximization of flow and technical functions. The direct bicycle link through the station has been prioritized combined with the fragmentary placement of retail, ticket points and elevators; these can create bike-pedestrian collisions and an unclear circulation within the underpass.

3 BLOCKED VIEWS - ESCALATORS AND STAIRS NOT DIRECTLY VISIBLE.

Some escalators and stairs to the platforms are recessed behind other zones with different programs. This gesture can possibly create wayfinding and accessibility challenges since they are not directly visible from the main space.

4 HIDDEN, SMALL AND FRAGMENTED RETAIL

Retail has been placed in a fragmentary manner to flank the main axis of circulation of the station. Prioritizing the circulation axis creates a fluid approach to the station, the fragmentary placement of retail makes its concept rigid without full opportunity for flexible use in the future.

5 LONG TUNNEL (Underpass) CREATES POOR NATURAL LIGHTING

6 LACK OF CLEAR MEETING SPACE / QUIET ZONE WITHIN THE STATION

7 CHALLENGING VERTICAL CIRCULATION (ELEVATORS)

The positioning of the elevators within the enclosed volumes can create circulation and accessibility challenges to door positioning.

8 OPPORTUNITY FOR AUTOMATED SMALL SCALE ON-PLATFORM RETAIL SERVICE POINTS

9 RISK FOR MONOFUNCTIONALITY

The peripheral and sparse programmatic distribution at L03 can lead to a monofunctional space. Due to its apparent generous luminosity and space, further retail possibilities and concepts could be exploited in its layout arrangement.

10 CORRIDOR FLOW WITH BARRIERS AND LIMITED ACCESS AREAS

The limited access through barriers creates a corridor like movement for all passengers but also post-barrier accessibility issues.

11 COMPRESSED PLATFORM ACCESS

Many of the access points to the platforms have been compressed in between other circulation areas. This move can result in wayfinding and circulation challenges depending on passenger capacities.

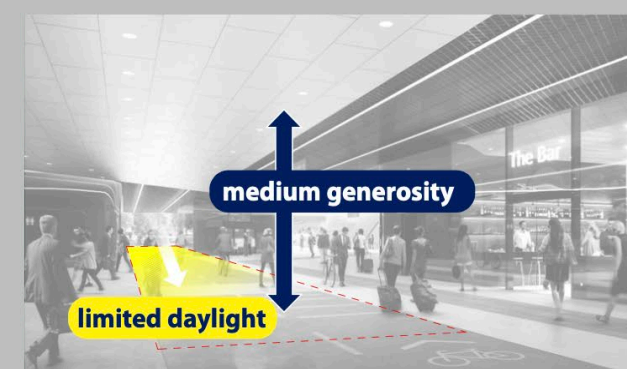
12 DECENTRAL LOCATION OF RETAIL AND HIDDEN FROM WAITING AREAS

The peripheral placement of the retail areas push it into the entrance to the station rather than catering for the waiting areas and contributing to a more diverse programme arrangement within the station area.

13 PLACEMENT OF TICKET-OFFICE / MISSED COMMERCIAL OPPORTUNITY

The placement of the retail areas is focused on the entrance zones rather than catering more centrally. There is an opportunity for a more diverse programme arrangement within the bridge area to attract passers-by.

14 LACK OF VISUAL CONNECTION TOWARDS URBAN LANDMARKS ON ACCESS POINTS



5.1.3 LAND-USE

Assessment of the existing and planned land-use diversity

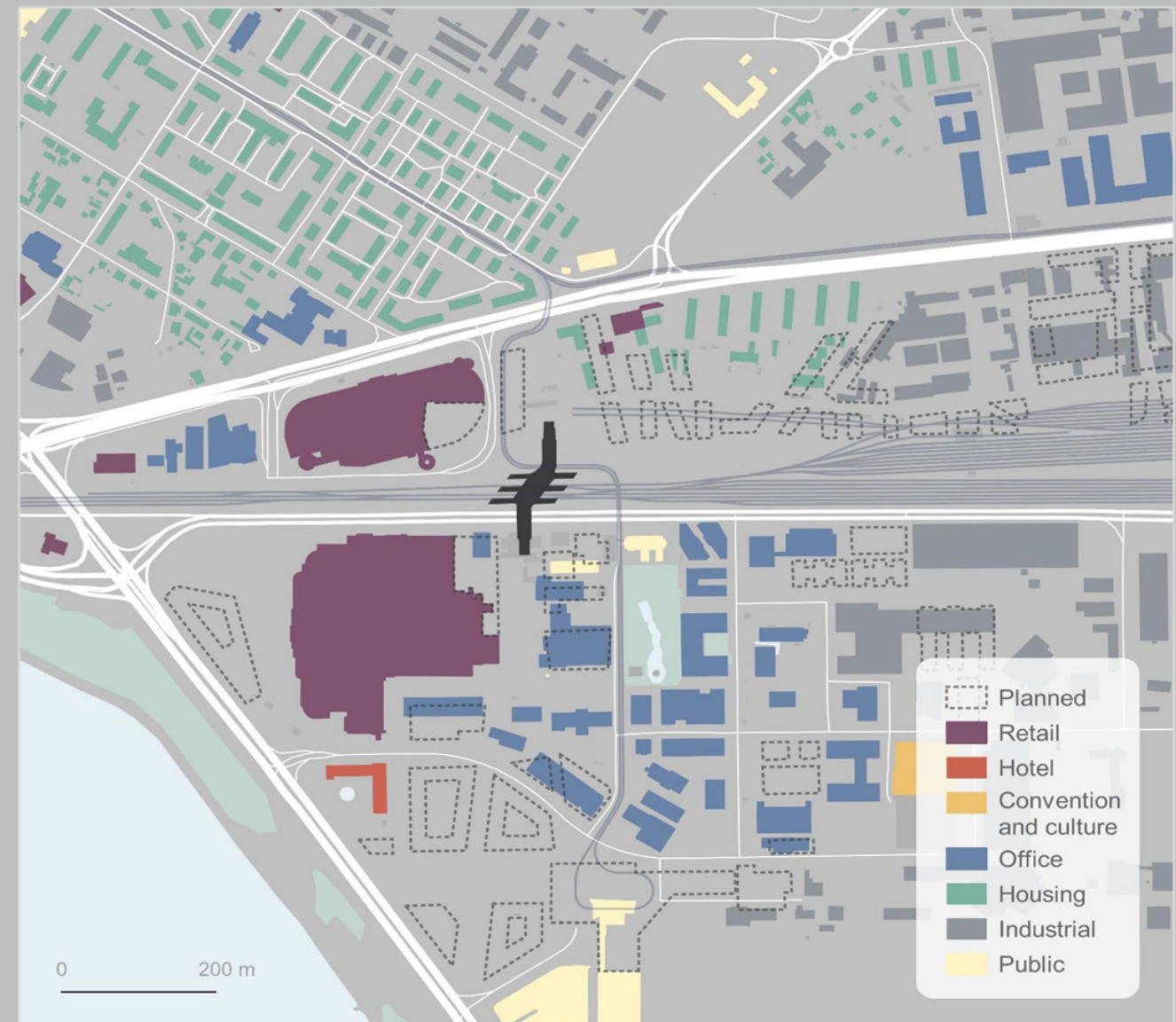
Currently the south side of the terminal area is dominated by the airport services, offices and industrial areas. Large shopping centre Ülemiste (92,000 m²) with cross-neighborhood wide catchment area provides full spectrum of commercial services. Also, some hotels have been completed to provide fast and easy-access accommodation for airport passengers. On the northside diversity increases. Dense housing areas reach toward the Tallinn city centre while office and industrial areas dominate the east part. Another, T1 Shopping Center (66,500 m²) adds a high amount of retail premises to the area.

Improved international and domestic railway connection increases interest toward the area both from business and living point of view. Several plans were already prepared to utilize the hidden value. Existing plans suggest the south side to be developed denser with a higher quality, and to increase office domination over industrial use. Housing is not introduced to area, and airport closeness together with current status arguments for this solution. The north side suggests to have significant amount of added dense housing (more information at the map).

Main assessment outcomes:

- The existing plans show good and realistic level of ambition to fully utilize the GVA potential deriving from improved railway access and urban development. On the north side densification should be done in the immediate surroundings of the terminal to create urban environment highly valued area. Part of it the T1 shopping centre needs to rethinking to form a natural and attractive side for the busy public space. High number of dense housing quarters is advisable to be promoted further to the east from the terminal. By developing low-value industrial use to housing and other higher-quality uses big part of added value potential of the developing rail connection can be realized.
- On the south side, plans of developing the area from industrial use to high-quality office dominated area is advisable and natural continuance for development completed during last years to provide even more business possibilities for growing international traffic. In an ideal scenario, the east part of the airport side should be developed to housing-based use, so providing more balanced and higher valued results. However, the airport noise and the airport operational needs, such as logistics and possible expansion plans, reduces both the feasibility and the attractiveness of this idea. Nevertheless, the more mixed and denser urban structure is developed, the higher the resulting value and attractiveness will be. Offices, accommodation services, meeting- and conference activities and possibly schools, educational premises and other public services could find their place in the airport city.
- On both sides of the terminal in the core area, the busiest streets should include street level retail in order to provide quick purchasing and destination type of services that increase overall vibrancy. Retail is covered with more detail in next section. The terminal itself forms a building of which main function is track crossing and landmark. It does not form dense built form but rather an expensive landmark. This can be questioned, and bigger mass could be developed, either on the tracks or to the sides. Retail content is limited by nearby malls, but other urban uses would be possible.

CURRENT LAND-USE DIVERSITY AND PLANNED NEW DEVELOPMENT AROUND ÜLEMISTE TERMINAL (SOURCE: PROJECT CONSORTIUM)



CONCLUSIONS ON KEY IMPROVEMENTS:

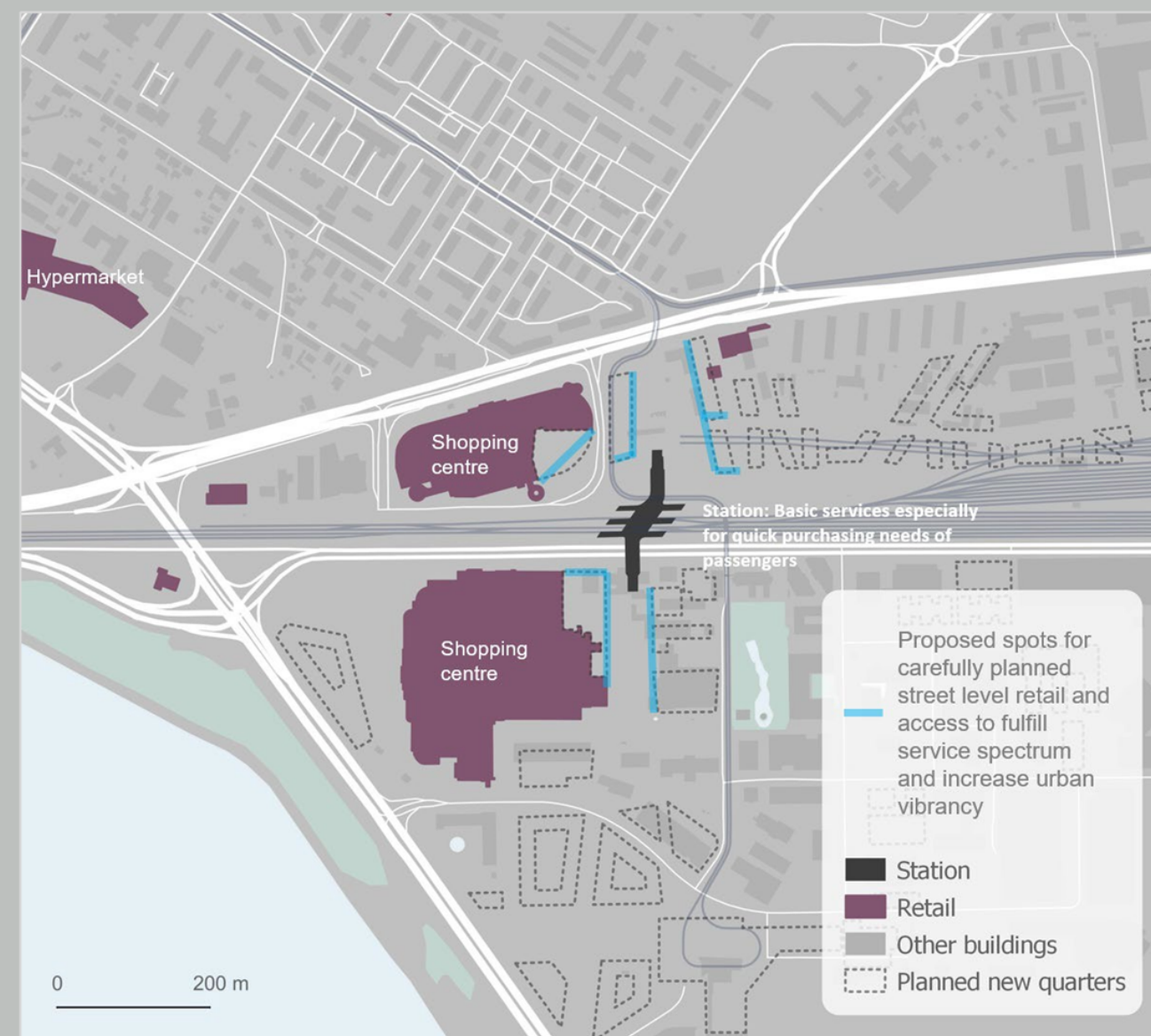
- The real estate market is looking healthy and market info supports locally relatively high possible added volumes for each category. Only retail has clear limitations as currently the area has surplus shopping centre premises.
- The plans of developing the airport side from industrial use to high-quality office dominated areas is advisable and natural continuance for development completed during last years to maximize added value deriving from Rail Baltica connections. In most extreme urban regeneration scenario, the east part of the airport side would be developed to housing-based use providing more balanced and valued end result, but the realism it is still questionable. The airport noise together with airport related needs for industrial use like logistics might lower both feasibility and attractiveness of this idea.
- International railway terminal adds potential for business, but also for housing, and the north side has clear potential to shift to more population-dense, mixed-use neighborhood that leans on current excellent retail service spectrum and improving public transportation connections. The plans to shift the current industrial areas to housing-based quarters should be supported in order to gain maximum added value. Careful architectural design of public spaces

5.1.4 COMMERCIAL DEVELOPMENT

Retail symbiosis

Two wide shopping centres are located next to the terminal and fulfill most of the retail potential in the surrounding area. They provide wide service spectrum of commercial services for district inhabitants and workers, but also for wider catchment area. Still, even stronger development of local services are needed for quick purchasing and unique destinations that also increase urban vibrancy in the area. The number of added retail to be included in street level and terminal premises is very limited.

The terminal will condense pedestrian flows both from track-crossings and train traffic flows combining them under the terminal. Thus, the terminal shopping centres natural spots for basic quick purchasing services to be developed in sensible volumes.



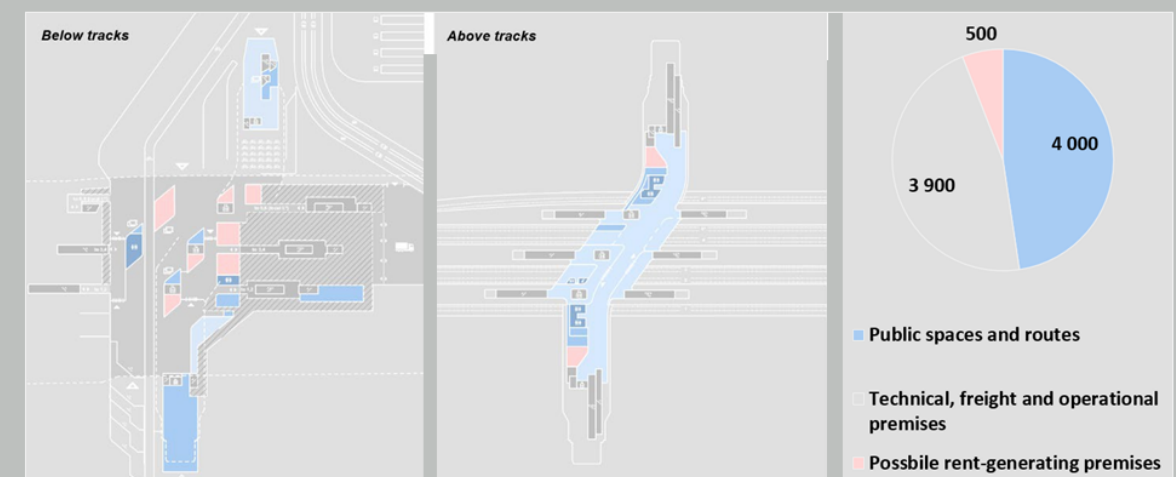
RETAILS AROUND ÜLEMISTE TERMINAL (SOURCE: PROJECT CONSORTIUM)

Commercial concept and functionality

Ülemiste terminal's commercial concept includes diverse basic services in which most of the premises are placed within the terminal underpass. Also, the bridge consists of two premises. The structure divides the pedestrian flows into two different sections, under- and overpass, which raises several concerns as follows.

- In general, the solution seems ineffective regarding construction economics; is there needs for both type of crossings? Do they have clear roles?
- The solution divides the pedestrian flows to under- and overpass which decrease the maximum potential of each retail space. This could lead to quiet and problematic situation to more calm side, in this case most probably the overpass.
- It also leads to very low share of commercial premises as retail does not have potential for wider width (look areal symbiosis) and other rent-generating uses have not been included.
- Low share of rent-generation could be questioned. Could the terminal take a bigger role in urban fabric and are there other uses in order to maximize its value?

In overall, the positioning of the retail spaces is good and utilizes well the highest pedestrian flows in a natural way. The underpass is expected to gather higher number of flows and thus the emphasis there is justifiable. The size is functional for establishing quick purchasing services, kiosks, cafes etc. Also, the volume of premises in total is realistic and takes into consideration already existing large retail stock.



TERMINAL'S FUNCTIONAL LAYOUTS AND SPACE TYPE DISTRIBUTION (SOURCE: PROJECT CONSORTIUM)

CONCLUSIONS ON KEY IMPROVEMENTS:

- The current large shopping centers fulfill most of the retail premise potential in the area. Additional commercial services are required to complement the current retail supply. Main target group of the new services are residents, employees and passengers.
- The terminal's retail content could be mostly quick purchasing shops and services. The current terminal plan with 500 sqm of commercial spaces seems to be sufficient. In the buildings designed next to the terminal, street-level restaurants and other activities serving the area's residents, employees and train passengers, complement the overall offer and form an active urban space.
- Connecting existing shopping centers with the railway terminal over pedestrian flows (especially the backyard and loading area of T1) is extremely important to form functional and attractive urban setting.
- Rent-generating spaces have very low share of the terminal building of which main function is routing to and across the terminal together with landmark role. Could the terminal take even bigger role in urban fabric and form true mixed-use entity to maximize the value of the terminal itself? This could include offices, accommodations and many other public uses.

5.1.5 MOBILITY



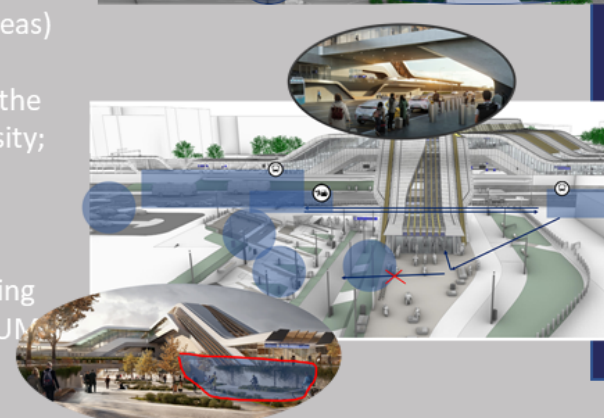
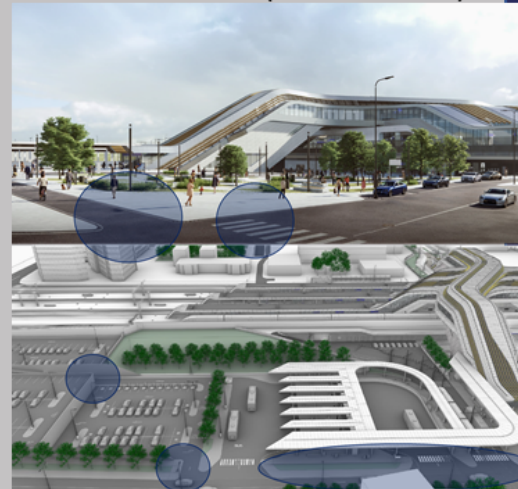
OVERVIEW OF THE TERMINAL LOCATION (SOURCE: PROJECT CONSORTIUM)

The Ülemiste railway terminal plays an important role in providing quality urban and suburban rail connections, and will also play a key role in the development of a multimodal transport hub with a direct access to the airport. The station's existing design materials show potentials for improving connectivity to public transport, safer access for cyclists, and a potential to develop a concept for a better PRM accessibility and older visitors. Due to its proximity to the airport, the terminal will create a direct "air-rail" connection that will be organized without any interaction with the terminal visitors and cycling traffic.

OPPORTUNITIES FOR ÜLEMISTE TERMINAL

- The critical analysis implemented by the consultant under this section follows the vision of "a **people centred station with allocated transportation hub**, which provides sustainable multimodal transport solutions". This means the recommendations for a mobility sector were developed in a line with a future multimodal terminal, which meets functions of an efficient connector between multimodal transportation, commercial and other urban activities. The future terminal could envision the concept of a "smart business city".
- The terminal has a great opportunity to create prioritised and direct NMT connectivity at and around the terminal. Moreover, all surrounded living districts (partly central areas) to be connected by this transport mode;
- Create additional value from connecting the station with the Ülemiste lake & developing housing and commercial density;
- Strong development of air- rail services with integrated ticketing, baggage handling and e-commerce distribution options;
- Creating sustainable mobility hub providing mobility sharing offers which support the implementation of the Tallinn SUM 2035;

PROPOSED IMPROVEMENTS FOR BICYCLE AND PEDESTRIAN CONNECTIVITY (SOURCE: ZAHA HADID)



KEY STATION MOBILITY AND ACCESSIBILITY IMPROVEMENTS:

- Bus & tram stations should be furnished with digital operational information screens, including information on transfers. The terminal must be barrier free for all groups;
- The bus station in the north should bring together all intercity routes. The arrival & departure times from/to main directions (e.g. to Tartu, Narva, Pärnu) to be harmonised with rail;
- Remove all physical barriers at the southern part of the RB terminal. For any urgent assistance call boxes at public places or at platforms to be installed.
- Establish taxi stops providing required information: price, ride roles and support centre;
- Establish signs for K+R and Ridepooling stations;
- Introducing integrated ticketing offers for "rail and bus";
- Car parking at the north side of the RB terminal should not be extended. The focus of this area is to establish strong bus (regional) services;
- Introducing bicycle routes leading the Ülemiste lake and the green zone, as well as to the living area (Sõjamäe, Sikupilli, and direction central city districts);
- Extending bicycle connectivity which will be integrated with the Tallinn SUMP network 2035;
- Improving bicycle lane design making it more visible for pedestrians. This is to avoid high conflicts between pedestrian and bicycles traffic within the underpass and walking zones;
- Bicycle parking with charging options, as well as better bicycle lanes organisation could be established within and around the railway terminal area. At the north part under the walking bridge these facilities could be allocated. A simple bicycle parking racks could be installed at the Ülemiste street (at north);
- Introducing pedestrian priorities at and around the Ülemiste terminal;
- Introducing additional pedestrian crossings over the Ülemiste and Suur- Sojamäe streets;
- Improve pedestrian and bicycle accessibility at south part of the terminal by redesigning the wall. Creation of full NMT accessibility between the southeast and southwest of the terminal;
- The north part of the railway terminal could allocate a smart mobility hub, including carsharing and bikesharing services, close to the railway building entrance (potentially in the proposed car parking on the northwest side of the terminal next to the bus station);
- Allocate micromobility sharing services (bicycles and e-scooters). These systems should be station - based, allocated on both the north and south sides and propose charging options;
- The European Square is a strong connector between the Tallinn Airport and the terminal for introducing a "Air-to-Rail" service, which must be weather protected between two buildings;
- Developing e- commerce services, which could also be integrated with air transportation. For establishing this service the railway terminal should organise logistics (packing, transporting parcels) and parcel distribution zones;

5.2 PÄRNU INTERNATIONAL PASSENGER RAILWAY STATION

5.2.1 ARCHITECTURE AND URBAN FORM



RB Pärnu Station (SOURCE: PLUSS ARCHITECTS)

The future international passenger railway station is located 3 km south-east of the city centre in Pärnu's Mai district. The area plays a role as an urban binder zone between two of the nature areas: the Baltic coastal greenland zone and the Pärnu River.

Today the urban structure is dominated by retail and industrial premises in the north and residential/educational buildings in the south. The potential for placing the station in that exact location derives from site character and its relation to transportation networks. The

- Pärnu, Estonia
- RB Pärnu Station
- 39 620 (Pärnu pop. 2021)
- ~3000 (Passenger p. day)
- Bus, Tram, Car, Bike, Watertaxi (future?)
- Station on bridge with with integrated underpass, new construction
- 4 Platforms
- Limited commercial services
F&B, Kiosk, Bike rental ~ 150 m2
(total building 2000 m2)

site merges nature qualities of the meandering river with mobility aspects (road / train networks) as well as commercial opportunities alongside Papiniidu street. The location is easy to reach by car, bus and bicycle.



LOCATION WITHIN CITY



CURRENT SITUATION



FUTURE VISION (PLUS ARCHITECTS)

CONCLUSION ON KEY IMPROVEMENTS:

- Promoting an activation of urban and commercial territories around the station, and creating a balanced level of urban integration on the green riverside and same time on the urban city side ;
- Papiniidu area can benefit from supplementary customers through strengthening the interrelation between the station and the streetside retail.
- Achieving the best possible link between city and station through developing one strong welcoming, iconic, and prominent urban square that is enriched with a combined transportation/ retail premise ;
- Riverside development will be boosted by the direct vicinity of the station and enrich the traveller's arrival experience. Using the essential quality of nature and the possible access to water traffic has the opportunity to enable the manifestation of a tourist destination;
- Taking full advantage of the strategic location, its excellent visibility and preserving it also during future densification developments will guarantee the iconic landmark and identity of the place;
- Visually joining tall building structures at the junction Papiniidu/Liivi tee to the RB station strengthens the landmark effect and forms an impressive entrance to Pärnu;
- Efficient functional overall design is closely connected to natural wayfinding. Part of it is guaranteed through highly visible, prioritized, and strategical entrance locations and a compact circulation scheme. Investigating opportunities for further optimisation to achieve higher level of compactness.
- A critical verification of the total walking distance from entrance points to platform destination is suggested;
- RB Pärnu station has been designed with focus on achieving one central orientation space located at a natural intersection of the incoming passenger route. Travel information and retail opportunities are paired in spot of highest liveliness and spatial quality. Further increasing the benefit of that key vibrant space by clarifying and grouping of zones with similar functionality (for example merging kiosk and café areas) is beneficial;



RB Pärnu Station (SOURCE: PLUSS ARCHITECTS)

RB Pärnu station incorporates a formal bridge and underpass across the tracks and the adjacent Liivi tee. Its powerful design idea aligns the main station volume - an elevated "station tube" - parallel on top of the platforms. It aims for an iconic appearance.

The architectural expression provides an immediate recognition of the site. The station body continuous as a canopy to cover the entire 350 of platform area. A large window and balcony towards north create the interior highlight of the space.

URBAN SURROUNDING (SOURCE: PROJECT CONSORTIUM)



URBAN ANALYSIS

The following points refer to the numbered areas indicated on the maps.

1 STATION AS AN URBAN BINDER:

The bridging station building with supplementary glazed galleries can establish a new relationship for the areas located east and west of the railtracks. The elevated station tube distributes passenger flow to and from the platforms, caters the base for additional business opportunities and urban relationships.

2 STATION AS LANDMARK:

RB Pärnu station shall be highly visible for the incoming and bypassing traffic and serve as a gate and landmark for Pärnu City. In the future the entire adjacent developments should be composed associated to the station in order to establish an even stronger architectural statement. Tall existing buildings such as the existing Sillakeskus office mid-rise points should be visually integrated and new ones added to form a well-composed ensemble.

3 PAPINIIDU COMMERCIAL DISTRICT AS KEY ELEMENT:

The area alongside Papiniidu street is mix of retail, warehouses, petrol stations, parking lots and a busy 4 lane street. In the future it has the potential to become an important link between the RB Station and the innercity. Commercial densification and features of a city boulevard (including trees, bike and pedestrian areas, less traffic, tailored retail) are envisioned by the Consultant.

4 STATION SUPPORT BY A COMMERCIAL SITE AND PROMINENT WESTERN FORECOURT (K-rauta area):

Part of the passengers will enter and leave the station from the city side. The Consultant sees the chance to establish a more prominent urban square that is enriched with a combined transportation and retail premises. The architectural design of that ensemble will have major impact

on the customer satisfaction and vibrancy of the station.

5 RIVERSIDE PARK AND DEVELOPMENT AROUND EASTERN FORECOURT:

The presence of the nature between Pärnu river and the station has a positive impact on the station identity. It is suggested to minimize parking in favour to recreational and touristic activities. Supplementary commercial functions can enhance destination and attraction values. It's a great chance to introduce Pärnu's touristic values to traveller. A well-balanced land-use development with nature, sports, restaurants would take advantage from bus, train and potential water connections.

6 ENTRANCE HIERARCHY:

The design suggests 5 entrances towards the station. Two of them lead exclusively to the elevated tube and the three others enter to underground passages. The Consultant has observed functional challenges with the decentralized circulation scheme in that specific peripheral environment. A more compact circulation principle would enable more condensed, lively entrance situation and easier wayfinding.

7 ADDED VALUES THROUGH RIVER VICINITY:

Pärnu river provides a true potential for both for recreation, tourism and transportation possibilities. Sport boating, leisure and river ferries can be an additional link to Pärnu city.

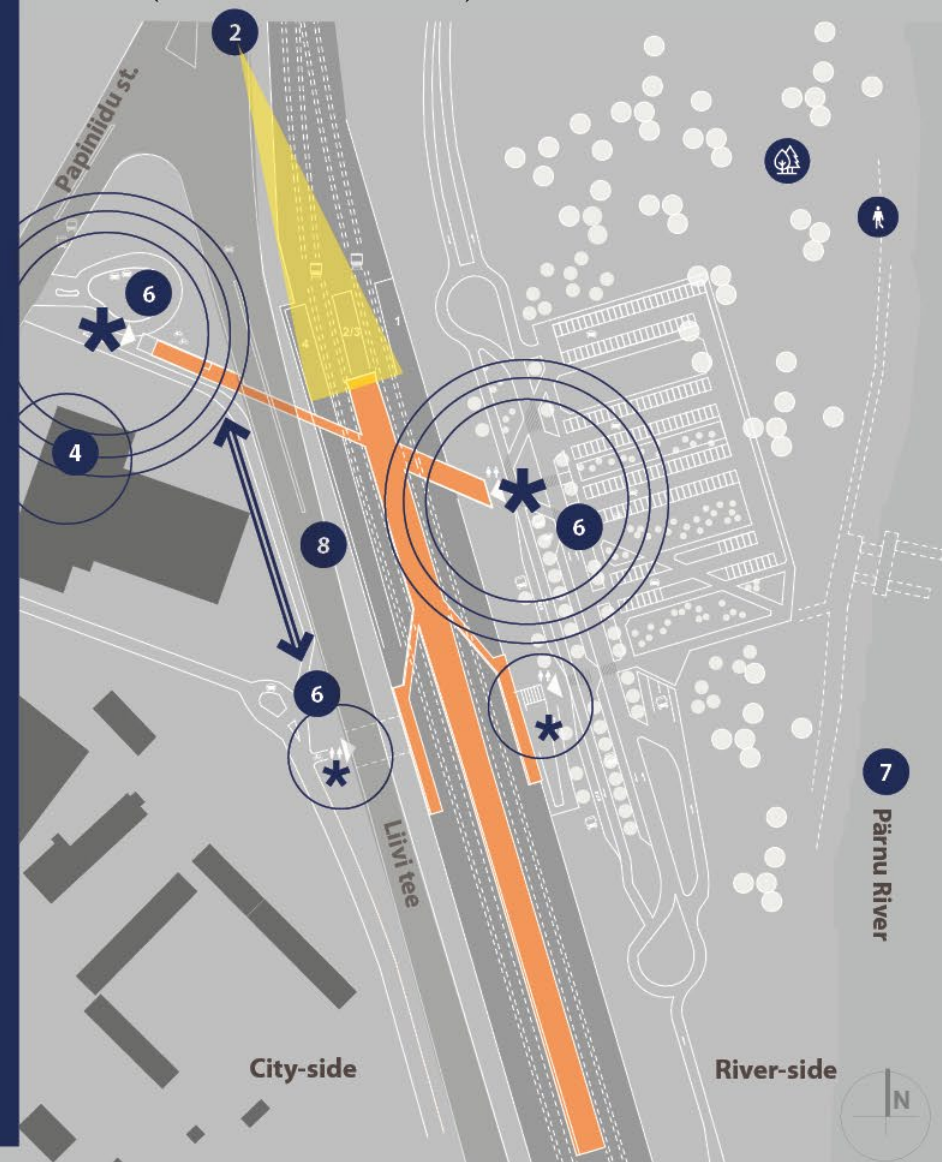
8 LIIVI TEE PROXIMITY: Traffic density and related noise level will have an impact on the station and their urban entrance areas. Sound reducing elements that do not block views to and from the station increase user comfort for the waiting and arriving passengers.

The area east from the railway line is currently a forest and a river-bank. On the opposite side of the station the wide Liivi Street and a low-rise retail /industrial area creates the transition towards Pärnu city. The railway passenger station itself can be entered from both sides of the train track and Liivi tee and

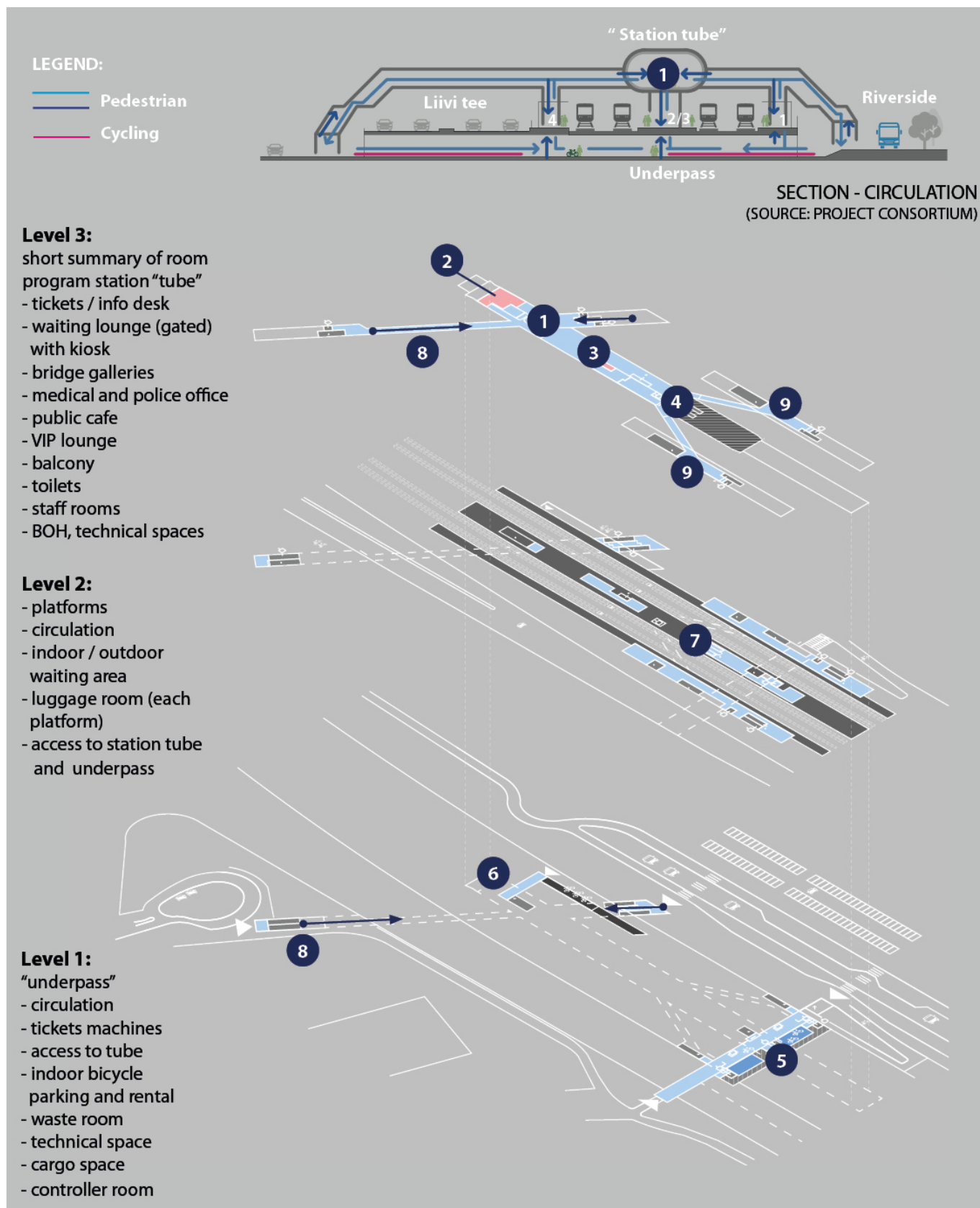
is supposed to serve as an urban connector to improve accessibility.

A critical analysis of the site exposes various opportunities and challenges that relate mostly to the contextual relation of the station entrances and the general orientation of the building.

SITE PLAN (SOURCE: PROJECT CONSORTIUM)



5.2.2 FUNCTIONALITY



1 SPATIAL ORGANISATION AROUND A CENTRAL MEETING POINT:

Both main entrances lead the traveller to one central point with good orientation, information and ticket sale provision located in the elevated station body. Naturally this route will be primarily used by departure traffic. The layout shows that arrival passengers might prefer the direct route from the platform via the underpass. This path will not directly connect to the cityside bus stops neither it would direct flow through the stations commercial zone. Improving natural wayfinding is suggested.

2 CAFE with attractive views towards the river:

The northern end of the station tube is designed to be the area with the highest level of attraction. A relatively small cafe serves customers in this quiet zone protected from busy internal traffic area. Only this zone is accessible for guest without train tickets. The spatial character of the cafe has the potential of becoming an attractive DESTINATION for supplementary customers.

3 WAITING ZONE The waiting zone is separated by ticket gates from the common and cafe area. An additional small kiosk serves the train passengers. A more compact, combined retail concept with shared staff and common service areas would increase flexibility and efficient space usage. The central waiting zone is not serving passengers

entering via the underpass and could appear insufficiently used.

4 BRANCHING POINT: At the southern end of the station tube elevators and escalators lead to the platforms. Especially the outermost platforms require relatively long walking distances and requires clear wayfinding signs. The consultant counts 240 m distance from the central ticket sale/info point towards the platform access point. Investigating a more compact and efficient spatial layout - to improve convenient pedestrian performance - is beneficial.

5 UNDERPASS SOUTH:

The station offers an underpass that connects both sides of the train tracks to all platforms. It has been designed for efficient space use, clear wayfinding and allows pedestrians, cyclists crossing through the tracks. The connection to the urban surrounding - far away from the main entrance of the station - creates challenges for an efficient site organization.

6 UNDERPASS NORTH: At the northern end of the station only the two innermost platforms are connected to an additional underpass accessible from the river side. This system might cause confusion for wayfinding and lacks traversability towards the cityside.

7 PLATFORM LAYOUT

The access points to the upper and lower levels are grouped together into

lobbies, which are clearly seen from the main platform areas. This makes access points easy to find, although the distance between stairs, escalators and elevators will require signage to assist wayfinding. Only the innermost platforms are located directly underneath the station tube and provide indoor waiting areas with evenly spread vertical access points. The Consultant assumes that these 2 platforms are preferred for HSR travellers.

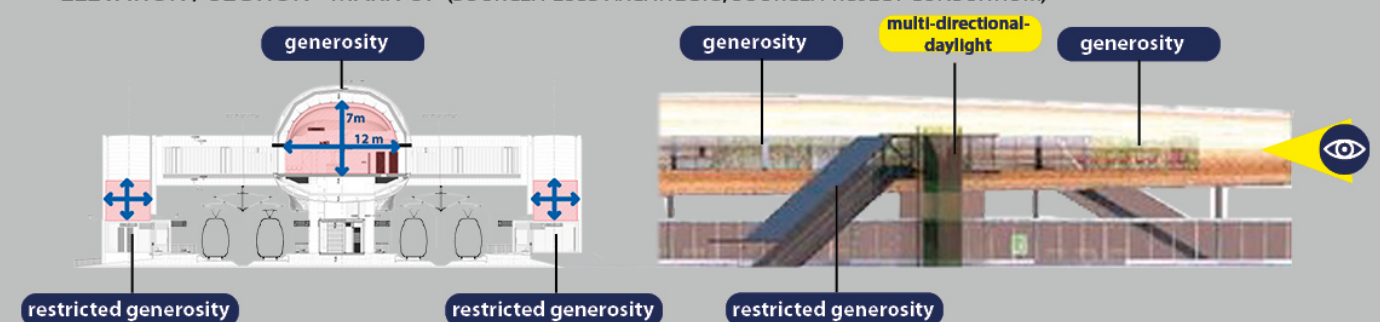
8 MAIN ENTRANCE TO STATION BODY (TUBE)

The main access to the station tube faces long walking distances especially from the cityside and leads exclusively to the elevated station body and not to the platform area. Additional internal transfer with relatively long walking distances will add walking distance to the customer journey. Shortening customer routes and increasing compactness would improve usability.

9 LARGE AREAS OF GLAZED WALKWAYS WITH RESTRICTED GENEROSITY AND LIMITED SPATIAL QUALITIES

The Consultant notes challenges and a critical impact on interior look and feel due to the large areas of glazed walkways. The narrow cross section and significant length of the walkways will affect customer experience and also dominate the exterior outlook. Further design development of these areas will improve the overall design.

ELEVATION / SECTION - MARK-UP (SOURCE: PLUSS ARCHITECTS, SOURCE: PROJECT CONSORTIUM)



5.2.3 LAND-USE

Assessment of the existing and planned land-use diversity

Areas between the future rail tracks and the river are unbuilt park areas and the accessibility is challenging. There are some plans to utilize these areas with small scale real estate developments shown in the map. Plots adjacent to the station on westside are mostly big box retailing with large areas for a street level parking. Most of the customers arrive here by car. Also, plenty of industrial low-density buildings are in the area. The largest building in the area is shopping centre Kaubamajakas (23,000 m², renovated in 2014) which is the most popular shopping destination in the whole Pärnu area with hypermarket and several specialty stores. See more about the current and planned land-use on the map below.

Consultant made the following main notes:

- Pärnu is located between large capital cities (Tallinn and Riga) and the connections by rail could potentially reduce travelling time. Therefore, the Rail Baltica station area in Pärnu and the whole city can benefit greatly from this new improved accessibility. Areas next to the railway station has potentials to develop into more urban area with especially housing and office quarters. Some of the current retail and industrial areas could be developed to more sophisticated retails and service properties and even to a new high density urban city part.
- Still, recent years have shown a decline in inhabitants. Pärnu is a small city, and the growth potential is limited even though the situation can change with the push of Rail Baltica. But by developing public transport connections from the rest of the urban area to the station, it may be possible to restore the region to a growth trajectory.
- The consultant sees good high-value land-use potential on both sides of the tracks. First, the west side should be developed toward urban quarter and boulevard toward the city center. This improving area could provide attractive locations for local companies and hotels and welcomes the passengers in high quality matters.
- The east side will have improved accessibility, waterfront and open green views that could have potential for developing dense of high-quality housing, offices and hotels. Especially in case that west side does not develop to more urban form.

CONCLUSIONS ON KEY IMPROVEMENTS:

- The real estate market is inactive, and development is singular by its nature. The improved domestic and international accessibility increase the potential for city growth which must be enabled in urban planning;
- International railway station adds potential for high-value land-use potential on both sides of the tracks. The westside needs more difficult change from modest big-box retail structure to more urban area while the east side offers greenfield land to be developed. Both sides can provide attractive locations for local companies and hotels in the future, not forgetting high quality housing on waterfronts
- Further studies on sensible scale of development must be carefully prepared to support further planning in case of Pärnu.



CURRENT LAND-USE DIVERSITY AND PLANNED NEW DEVELOPMENT AROUND PÄRNU STATION
(SOURCE: PROJECT CONSORTIUM)

5.2.4 COMMERCIAL DEVELOPMENT

Retail symbiosis

The largest shopping centre of Pärnu is located just few hundred meters from the future station building. There are also two large grocery stores in the area and extensive supply of specialty stores and restaurants. They provide wide service spectrum of commercial services for large number of inhabitants and workers located in the area but also for wider catchment area. In the station only very limited number of new services is needed and only to serve the passengers.

Current big box retail building right next to the station could be developed into more efficient quarter including especially offices and hotels. In this case, a small amount of new retail space could be located to the street level. The potential for new retailing to the east side of the station is rather low.



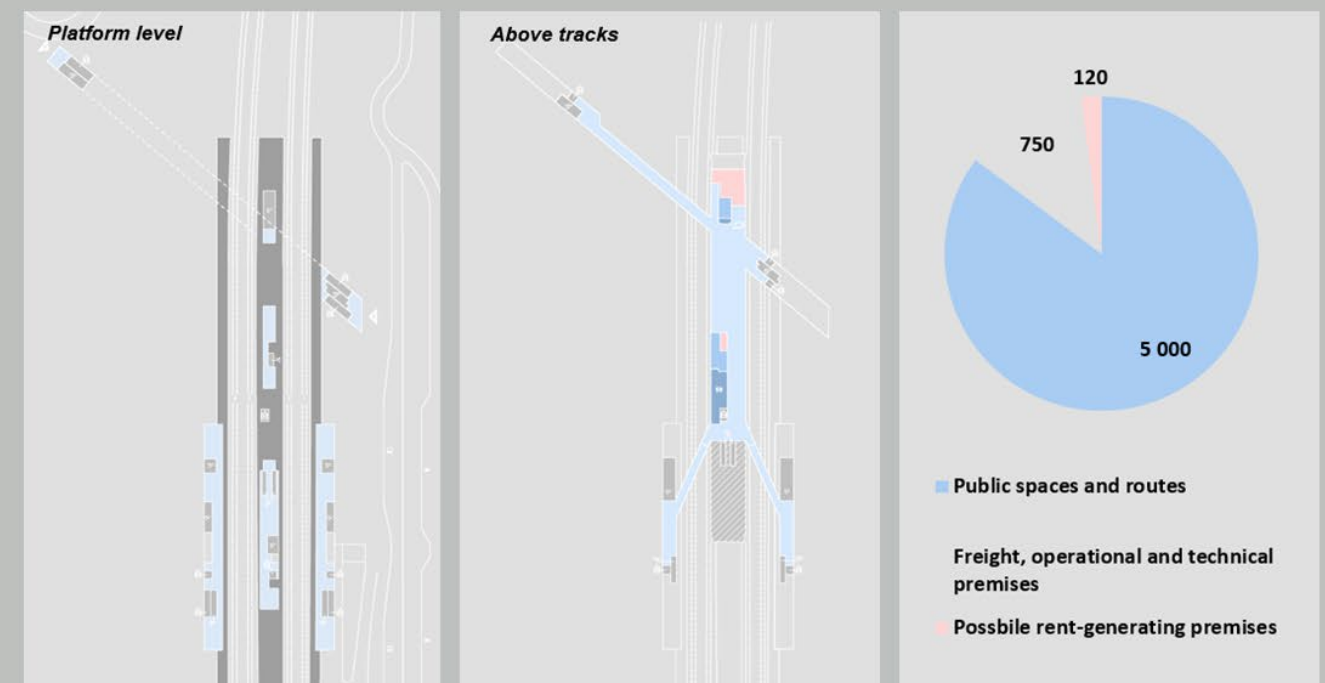
RETAIL AROUND PÄRNU STATION (SOURCE: PROJECT CONSORTIUM)

Commercial concept and functionality

The station commercial space is limited to 120 sqm of possible rent-generating premises. However, that should be enough to serve the passengers by providing them basic café-, take-away foods and allocation of kiosk premises. The positioning of the station utilizes well the highest pedestrian flows in a natural way. More extensive range of retail services and restaurants could be found from the current shopping centre nearby.

The review of the current design raises following questions from a commercial perspective:

- The overall efficiency is very low because of huge number of public spaces and routes. It seems that the design could be improved to more efficient form without critical functional losses.
- The access to the station separates the pedestrian flows in multiple spots. Centralization and connection to possible new urban quarter at least on the westside could be further examined.



STATION'S FUNCTIONAL LAYOUTS AND SPACE TYPE DISTRIBUTION (SOURCE: PROJECT CONSORTIUM)

CONCLUSIONS ON KEY IMPROVEMENTS:

- The largest shopping centre of Pärnu just next to the station and it limits the station retail potential and only very limited number of new services is needed to serve the passengers. The current plan takes this into consideration well.
- The station building form raise questions on efficiency. Could it be developed to compact and centralized form without losing any functionalities?
- The current big box retail building right next to the station, could be developed into more efficient quarter including especially offices and hotels. In this case, a small amount of new retail space could be located to the street level.

5.2.5 MOBILITY

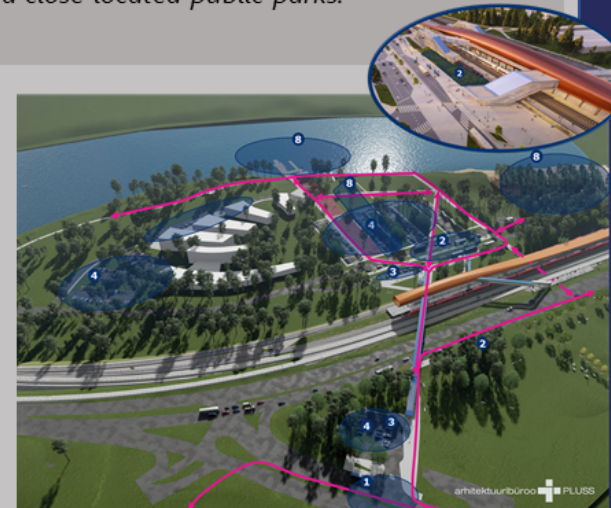


OVERVIEW OF THE STATION LOCATION (SOURCE: PROJECT CONSORTIUM)

Pärnu is the economically important city in Estonia. Number of surrounding living areas and villages (Loode Pärnu, Papsaare, Sauga, Tammiste, Paikuse, etc.) make Pärnu an important economic center with highly developed industrial zones, including the port area and the airport. The city is also known as a national and international touristic destination for hiking routes and water sports. The planned Pärnu railway station is partly a green field, locates 3 km south-east of the city centre. The surrounding area is mainly characterised by a small industrial side, with some shops for technical and building materials. The location has a great access to water and close located public parks.

OPPORTUNITIES FOR PÄRNU STATION

- Following analysed city development plans, under this section the consultant considered the Pärnu city climate change programme 2035 and therefore, proposed the future concept of Pärnu station called “Sustainable island” with a strong focus on a railway services, sustainable PT and mobility offers, their integration with tourist’s attraction services, commercial activities;
- A great attention should be given on developing a strong connection from rail to city central and living districts (by PT and bicycles). The station must be integrated into the urban city life;
- The Pärnu station building and services must combine not only international best practices lessons learned, local needs, but also existing rich national resources to provide services for both business and leisure;
- Pärnu station area should create great NMT accessibility and attractive for cyclists routes;
- Consolidate and “right size” automobile parking;



PROPOSED IMPROVEMENTS FOR A BICYCLE AND PEDESTRIAN CONNECTIVITY (SOURCE: ARHITEKTORIBÜRO+PLUSS. PROJECT CONSORTIUM)

KEY STATION MOBILITY AND ACCESSIBILITY IMPROVEMENTS:

- Pärnu should be a unique sustainable hub for commuters, business visitors & tourists;
- Integrate the station into a city urban life and create synergy effects form a vital new urban environment where sustainable and equitable transport services to be offered;
- Connect Pärnu station with the Pärnu airport. Since at this stage the passenger traffic at the airport is quite low (1000 visitors per year) it is recommended to assign a direct bus connection driving though the city regional bus station and the center;
- Connect the railway station with the existing urban bus routes which run at the Tallinn-Pärnu- Ikli street. All regional, national and potentially some international bus routes to be allocated at the Jöakäärü street in front of the station building entrance;
- Station and surrounds accessibility to be improved with barrier free concept (for all passenger groups). Install call boxes at public places or at platforms for any assistance.
- Introducing charging systems for e- bus vehicles. Identify a quick charging zones;
- Improve a taxi stands design by marking them clearly organised with special signs;
- Reduce car parking zone: remove the parking zone in front of the station entrance and create instead an open public walking place, which could be used for public events;
- Introduce regulated pedestrian crossings at the Papiniidu street which lead to PT stops;
- Introduce a proper bicycle access at the pedestrian railway station bridge;
- Integrate the existing Pärnu bicycle network with the future railway station area. Introduce new bicycle connections which lead to the green area - Pärnu Rannaniidu LKA. This will be attractive directions for residents and tourists;
- Allocate carsharing (could be potentially a zone at the official car parking zone) and bike sharing (close to the station building entrance) at the east station side;
- Developed a strong touristic concept at the railway station: create seasonal services of water transport, develop public beach zone at the southeast from the station building;
- The station should propose a high level of hospitality and offer fast and safe pedestrian access to hotels located southeast of the railway building entrance;
- Since Pärnu will have a fast connections to the Tallinn Ülemiste terminal (about 45 min.) and in an hour to the Riga Airport station, it is recommended to establish air- rail services. Potentially this service could be valuable for business travellers, as well as for international tourists. Luggage transfer between to be done by rail;
- It is recommended to establish urban logistic services (smart parcel boxes, and some packaging services) located directly at platforms or within central building zones;

5.3 RIGA CENTRAL INTERNATIONAL PASSENGER RAILWAY STATION



RB RIGA CENTRAL (SOURCE: PLH)

Rail Baltica HSR train line will have an international station in the centre of Riga. The station is located in the south-eastern part of Riga and a part of the redevelopment of the existing Riga Central station. Its strategic placement between the Central Market area and the Old City brings an opportunity for it to be an instrument for the develop-

ment of the area and the improved connections across the tracks. The station's project started in 2016 by the Danish architecture studio PLH; it takes into consideration the design of the station and its immediate urban connections. A series of projects and efforts from the municipality will see the emergence of improved and additional

- RIGA, Latvia
- RB Riga Central
- ~ 1,070,000 (Metro, 2021)
- ~7000 (Passenger p. day)
- Bus, Car, Bike
- Elevated train station with integrated underpass, new construction
- 8 Platforms /14x tracks (10x 1520mm tracks and 4x Rail Baltica 1435mm tracks)
- Diversed commercial services (dedicated retail passage)

connections across the tracks, and embankment, improving therefore the flow between neighbourhoods.

FUTURE RAIL-BIKE BRIDGE



FUTURE STATION SQUARE



FUTURE SOUTHERN SQUARE



RB RIGA CENTRAL (SOURCE: GOOGLE EARTH)

CONCLUSION ON KEY IMPROVEMENTS:

- Rail Baltica Riga Central should become a modern mobility hub, allowing an interaction of multiple services in the station, especially in the upper station area.
- The strategic presence in its local context can further be explored by the complementary introduction of specific programmes that act as a destination at the station.
- The new station presents a generous grade level passage connecting seamlessly both side of tracks and takes full advantage of the present terrain relations.
 - Ensure the activation of public areas surrounding the station;
 - Investigate potentials for complementary programmes to the area;
 - Activate and promote a dense network of traverse links;
 - Aiming for an Integrated urban planning process for the area to mitigate the existence of protected buildings and allow for maximum socio-economic benefit from the station's implementation;
- Architectural strength and dominance of the new terminal integrates successfully in the current urban context and at the same time a modern identity is expressed. However, a balance is recommended between architectural gesture and spatial compactness for maximum GVA at the station.
- The station presents a clear articulation of space, providing both a generous developed retail area connecting at grade level both sides of the station and an expansive upper floor station area.
- Concourse bridge:
 - The introduction of special functional provisions that act as attractors for supplementary customers and passengers to actively use concourse bridge;
 - The quality of waiting in the upper floor can be further enhanced by the establishment of dedicated F&B areas, this move can enhance passenger experience;
 - Mitigating the large continuous concourse space and its monofunctionality to a "destination" rather than a predominant waiting lounge;
 - Improving the visual connection from the existing station hall towards the new concourse level to increase the attractive force;
- Retail underpass:
 - Advanced upgrades to spatial qualities of the underpass enable an enriched retail experience (this can be achieved by introducing architectural elements that provide natural daylight and increasing views and openness throughout the passageway).

5.3.1 ARCHITECTURE AND URBAN FORM



RB RIGA CENTRAL (SOURCE: PLH)

The efforts to establish new connections across the tracks will see the development of several improvement projects. Most notably at the station and the establishment of a direct accessible route and space between the Central Market and Old City areas. These improved connections will kickstart new

development opportunities for the central area previously disrupted by the introduction of the railway line. New development plans for the embankment are also expected on the National Library side, reinforcing the route across the rail bridge.

URBAN SURROUNDING (SOURCE: PROJECT CONSORTIUM)



URBAN ANALYSIS

The following points refer to the numbered areas indicated on the maps.

1 RB RIGA CENTRAL BECOMES A CATALYST OF DEVELOPMENT AND CONNECTING FEATURE FOR THE AREA.

2 UNDERPASS AS MAIN CONNECTION NODE BETWEEN THE STATION AND CITY

It can be an active connection between both sides of the tracks while providing ample service and retail points. An added bus station, can improve the station interchange potential and the activity levels in this passage.

3 NORTH OF STATION SQUARE IS A BINDING ELEMENT BETWEEN THE STATION AND THE CITY CENTRE

The Station square is conceived as an active urban square facing the central neighborhoods of Riga and the Old Town. The proposed design of the square will prioritize pedestrian and bicycle traffic. Green elements, temporary and permanent pavilions as well as cafe and restaurant extensions to the outside will activate the square and improve the experience of passengers when accessing the station. It also exposes a full potential for becoming a seamless multi-modal integrator.

4 SOUTH OF STATION CONNECTION BRINGS DEVELOPMENT POTENTIAL TO THE AREA

The station's southern square establishes a direct link to the Central Market area, as new development occurs, an increasing influx of passenger is expected from this side of the station. The focus on pedestrian and bicycle transport on Gogola street will drastically improve the experience at the square. The southern square is different in character from the northern square as it is less programmed, it is spatially compressed, and its urban form derives from the surrounding blocks. A great

opportunity for public or commercial functions can be seen in the opposite square side Ministry building which has the functional possibility to enhance street level vibrancy. The vertical circulation addition paired with the green program will further activate the square and make it into an attractive destination in the area.

5 OLD CITY: the proximity and pedestrian accessibility to the Old City are essential aspect of the many projects stitching across the tracks.

6 EMBANKMENT CENTRE-MARKET CAN BECOME AN ATTRACTIVE FEATURE AND CONNECTING ELEMENT.

7 IMPROVED CONNECTION ACROSS THE RIVER CAN BRING DEVELOPMENT OPPORTUNITIES TO THE SOUTH-WESTERN EMBANKMENT.

8 PARK - CITY CANAL CONNECTION BRING LEISURE OPPORTUNITY AND IMPROVED LEISURE EXPERIENCE. The City Canal of Riga provides a pleasant promenade and connection route to different points around the Old Town.

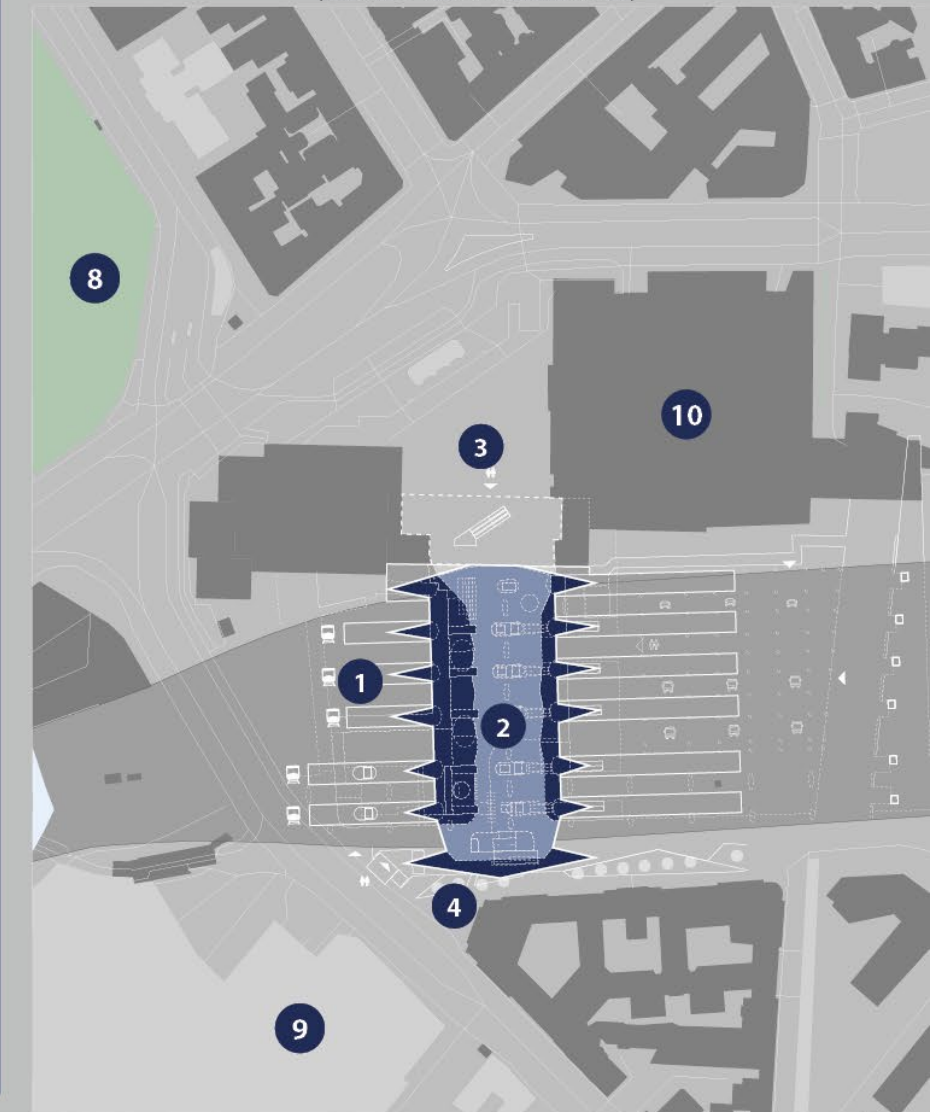
9 CENTRAL MARKET AND STATION CONNECTION CAN BECOME CATALYST FOR MIXED-USE DEVELOPMENTS IN THE AREA.

10 ORIGO (SHOPPING+OFFICE) PROXIMITY BRINGS OPPORTUNITY FOR PASSENGER-CUSTOMER INTEGRATION

SCHEMATIC SECTION OF THE STATION (SOURCE: PROJECT CONSORTIUM)



URBAN SURROUNDINGS (SOURCE: PROJECT CONSORTIUM)



5.3.2 FUNCTIONALITY

Level 3:

short summary of room program "concourse bridge":

- circulation area
- waiting area
- dedicated HS area
- toilets
- retail (2 units)
- access to platforms

Level 2:

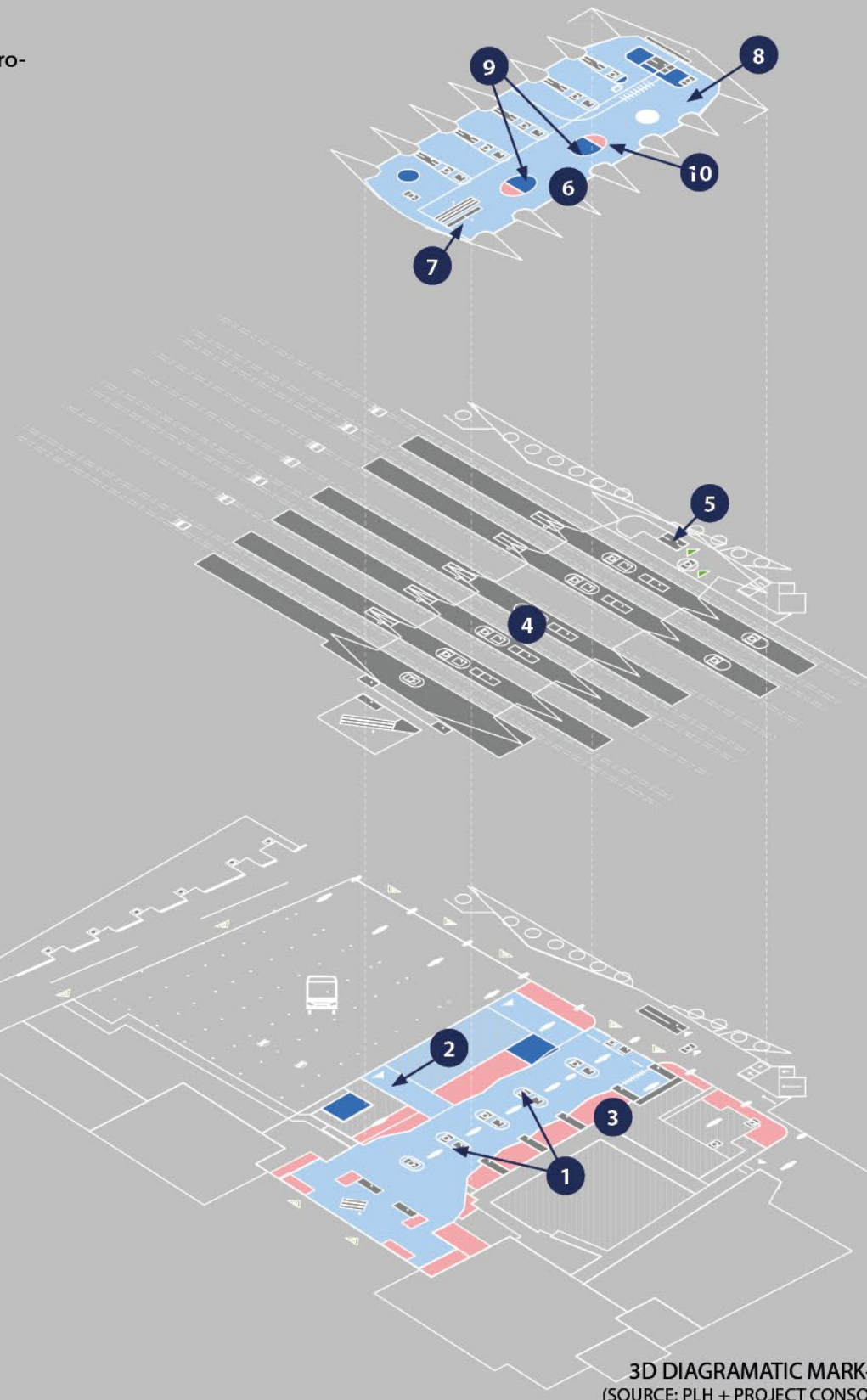
short summary of room program "platform":

- platforms
- waiting areas

Level 1:

short summary of room program "underpass":

- circulation
- retail (developed)
- access to platforms
- access to bus terminal



3D DIAGRAMATIC MARK-UP
(SOURCE: PLH + PROJECT CONSORTIUM)

1 VERTICAL CIRCULATION MIGHT CREATE SPATIAL DIVISION IN THE UNDERPASS

The vertical circulation for platforms added in the middle of the underpass might lead to spatial and visibility divisions. While it might be not possible to move the circulation, formal considerations can be made to reduce its size.

2 CHALLENGES FOR WAYFINDING IN BUS STATION ACCESS BETWEEN RETAIL

The void left underneath the tracks could be smartly used as a bus station with very integrated connection with the train and the services provided by the station. The generous connection provided by the access route can be enhanced and become active spaces with the further introduction of retail and F&B points alongside the route across towards the underpass.

3 GENEROUS RETAIL - OPPORTUNITY OF COMPLIMENTARITY

Not only does the generous retail in the underpass creates the condition for a full diversity of service and retail provision, but also it provides an opportunity of complementarity of the services and retail present in the immediate areas both sides of the tracks.

4 OPPORTUNITY FOR AUTOMATED SMALL SCALE ON-PLATFORM SERVICE POINT

At each platform there's the opportunity of introducing automated small scale service points for both changing and waiting passengers. This improves passenger experience by widening the service opportunity.

5 PROMINENT VERTICAL CIRCULATION

The prominent vertical circulation, the major access route to the upper station hall puts in evidence the large change in level between the two floors. An interesting architectural gesture is necessary for it to be used effectively.

6 RISK FOR MONOFUNCTIONALITY

The vast space of L-03 created a monofunctional space without many variety of retail and services. The consultant recommends investigating more retail, services or other program that can act as a destination and activator of the space. Not only will it activate the space, but also passenger experience will be enhanced in the waiting area.

7 PUNCTUAL URBAN CONNECTION WITHOUT PROGRAMMATIC RELATIONSHIP

The access to the upper levels is done through peripheral urban connections without programmatic relationship within the space. The vertical connection, therefore, could be enhanced architecturally in order to

improve wayfinding at the station.

8 INACTIVE MONOFUNCTIONAL CORNER

The spatial and access analysis revealed an unprogrammed corner where the HSR barriers are located. The introduction of a more varied program or an architectural gesture with improved vertical circulation could enhance the experience of the space as well as help passenger wayfinding potential.

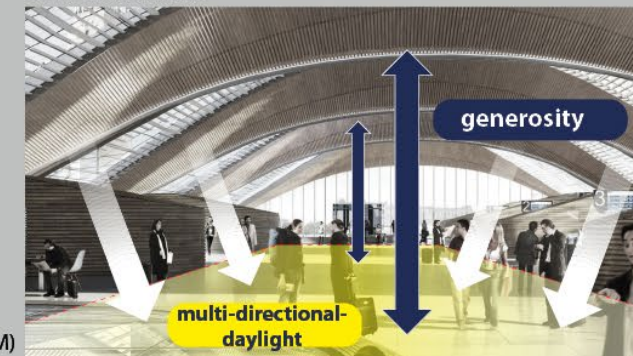
9 COMPRESSED SERVICES

While the distribution of toilets is reasonable, their volumetric separation from other programmes can bring a clearer spatial concept for the space while bringing more opportunities for how retail can better be integrated into the area.

10 DECENTRAL LOCATION OF RETAIL AND HIDDEN FROM WAITING AREAS

The two small retail points analyzed don't unfold the full potential of the waiting hall. The consultant suggests a revision of retail distribution and design in this area, perhaps with a more centralized retail concept and waiting area so a more integrated service is given to the customer while providing better return per m2 for the investment on the station.

CONCOURSE HALL



UNDERPASS



5.3.3 LAND -USE

Assessment of the existing and planned land-use diversity

Directly to the north of the train station is the center of Riga and to the west is the old town. These areas are densely built up and the densest workplace and hotel hub in the entire region. There are a lot of retail space on the street level.

Right next to the railway station on the north side is one of the largest shopping centres in Riga as well as department store Stockmann and multiplex cinema. On top of the shopping centre there is plenty of office space and next to it a large hotel-hostel complex. The north side of the station has only limited potential for new real estate development projects.

South side of the station has more potential for regeneration. It's the area for the biggest outdoor and indoor market in Riga and very popular shopping destination for the locals and tourists. Also a bus station is located there. There are several inefficiently built or unbuilt plots that has major development potential. Current land-use diversity around Riga station can be seen on the map.

Consultant made the following main notes:

- Riga central station is already the busiest hub for local transportation in the area with local train and bus stations. Number of passengers is going to increase significantly when Rail Baltica connection will bring more international and local passengers and connects the RIX airport to the central station. This will increase the interest toward the station area, and it will have potential to even more significant role in the commercial real estate markets as well as significant amount of added housing.
- The further development will focus on southside with careful touch to protect the cultural heritage. A careful planning process is needed to provide the best solution for the area as a whole putting together all the potential that single plots hold. The southeast industrial areas seem to have the biggest potential for modern attractive urban mixed-use districts.
- The new station building will have an important role of connecting north and south. Current extensive range of grocery stores, specialty stores restaurants, cafes and other commercial services will serve the growing number of passengers. Still, the station could take some additional retailing, restaurants and services to the new station building especially for the quick purchasing needs of the passing passengers.

CONCLUSIONS ON KEY IMPROVEMENTS:

- The real estate market is showing relatively high vacancies but high development activity at the same time indicating strong demand for modern stock with better locations. The estimate is that modern commercial and housing development has high potential in large-scale.
- Most of the potential on the northside of the station has been utilized already but the southside offers interesting potential. The protection of cultural heritage will affect the development and requires a holistic planning process to form a clear picture of the best potentials. This will also enable the plot owners to have a clear picture of the potential and fasten the development.
- Both commercial- and housing-led mixed-use districts is estimated to have high potential on southside, especially on currently undeveloped industrial-type of areas.



CURRENT LAND-USE DIVERSITY AND PLANNED NEW DEVELOPMENT AROUND RIGA CENTRAL STATION
(SOURCE: PROJECT CONSORTIUM)

5.3.4 COMMERCIAL DEVELOPMENT

Retail symbiosis

The current train station is part of the large shopping centre Origo. The new Rail Baltica station can be connected to the old station and shopping centre and function as an extension. It's also possible to locate new shops, restaurants, cafes and other commercial services to the new station. Some new business premises could be located also to the southside of the station as a part of the whole Riga travel centre complex.

The shopping destinations in the station area have a regional catchment area but some local services are also needed for quick purchasing. Some of the outdoor market areas on the south side of the station may be developed into modern office buildings that have brick-and-mortar shops in the street level.



RETAIL AROUND RIGA CENTRAL STATION (SOURCE: PROJECT CONSORTIUM)

Commercial concept and functionality

Riga station's commercial concept includes diverse basic services in which most of the premises are placed within the station underpass. The bridge works mostly as a high-quality waiting area for the passengers. The structure seems to create rather quiet but huge waiting hall to the top floor. The following notions and concerns arise:

- As an entity the solution seems ineffective regarding construction economics; is there a clear need for the top floor with relatively poor commercial potential?
- The station has an important role in connecting north and south and the plan achieves this goal very well. In addition, the retail planned along this busy underpass utilizes the quick purchasing potential in excellent way.
- For the top floor it's rather difficult to find natural rent-generating use to improve the entity's overall economy. Still, some clear destination activities such as co-working concepts, cultural uses or sports could be further studied to the space.

The proposal seems excellent, if the lacking role of the top floor is excluded, and the positioning of the retail spaces in the underpass utilizes well the highest pedestrian flows in natural way.

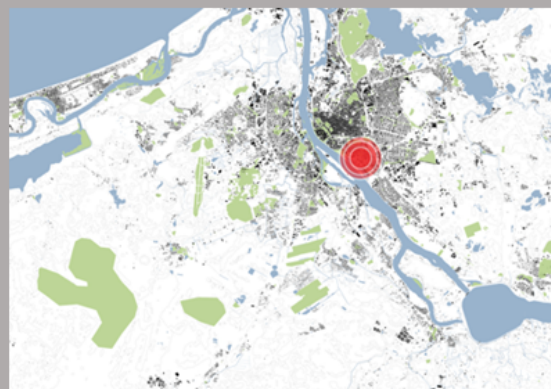


STATION'S FUNCTIONAL LAYOUTS AND SPACE TYPE DISTRIBUTION (SOURCE: PROJECT CONSORTIUM)

CONCLUSIONS ON KEY IMPROVEMENTS:

- The current large shopping centers serve a very wide regional catchment area while also providing a very large range of services to residents, employees and train passengers. They fulfill most of the retail premise potential in the area.
- Additional service spectrum is needed for quick purchasing needs of large number of pedestrians using the station for crossing and reaching the tracks.
- The current station proposal with approximately 2 000 sqm of small retail premises seems good volume and utilizes the potential well. In overall, the underpass seems to create attractive and well-functioning connection between north and south districts.
- On the other hand, when considering the proposed top floor, the entity would have very low share of rent-generating spaces as the top floor is left mainly for passenger waiting hall. This solution seems questionable and more efficient solution could be examined. Another way of improving the GVA would be an examination of potential clear destination activities to be placed on the second floor. For example, co-working, culture or sports might have potential, but still, the micro-location is challenging.

5.3.5 MOBILITY



OVERVIEW OF THE STATION LOCATION
(SOURCE: PROJECT CONSORTIUM)

The Central station offers strong urban transportation and the direct connections to the RIX (10 km by cars and 13km by train, 30 min. by bus) airport. Currently the existing traffic at the station creates pedestrian unfriendly environment and gives the impression of a chaotic transport organization. The future reconstructed railway station, as well as its reorganised surroundings should guarantee first of all NMT priorities with allocated numbers of green zones and open public spaces for social interactions. Residents could get open access to the Daugava river and to the Zakusala island. Such a mix of a district concept will enhance the railway station attractiveness. Reorganisation of the railway station area obviously should provide a strong connectivity to the old city and the market area. All barriers to be removed and the pedestrian friendly zones could be created.

OPPORTUNITIES FOR RIGA CENTRAL STATION

- New organised HS connections to suburban, regional, national/ international destinations, will guarantee fast passenger travels to and from north and central European countries. This will obviously have a positive impact on passenger traffic flow and city visitors;
- Station is a catalyst that activates economic and social activity considering the cultural and historical heritage of its immediate environment;
- The station has a great opportunity to redesign the whole area providing a high access for NMT. Development of a small area plan & circulation plan to be considered;
- The future concept to include a high and seamless integration between rail, bus, tram;



VISUALIZATION OF SOUTHERN STATION ENTRANCE
(SOURCE: COWI)

VISUALISATION 2050 OF THE FUTURE OPEN SPACE IN FRONT OF THE RAILWAY STATION (SOURCE: GEHL)

KEY STATION MOBILITY AND ACCESSIBILITY IMPROVEMENTS:

- The station should provide to visitors strong connectivity to public transport and bicycles to the old city, the free port of Riga and to important education organisations (University of Latvia, Institute of Mathematics and Computer Science, etc.);
- The railway station area should be the place of stitching the neighbourhoods. The embankment wall should be removed to provide strong pedestrian and bicycle accesses from the Old town to the market area, as well as to the bus station;
- Updating a city transport model that considers priorities for pedestrian/bicycle flows;
- Public transportation should strongly be connected to rail. The tram station must have a quick and direct access to the railway station entrance;
- Bus & tram stations to be properly organized: shelter, digital waiting time information, comfortable seating zones, garbage bins. Provide sufficient information to passengers on the PT network, main interchange points and touristic stops, tariffs;
- Urban and intercity bus routes and operational times to be integrated with railway services. Direct pedestrian and bicycle connectivity between stations to be prioritised;
- Station and surrounds accessibility to be improved with a barrier free concept. For any urgent assistance call boxes at public places or at platforms to be installed.
- Establishing where possible physical separated from pedestrians and cars (where possible) cycle lanes which will connect the station with central and living districts;
- A new bicycle route and pedestrian access from the old city to the Torņakalns district over the Daugava Bridge to be introduced;
- Underground car parking (with charging options) incl. PRM and family zones should propose a sufficient and fast connections for all travellers groups to the railway;
- Potentially construction of a bicycle parking house with additional service like bicycle repair, charging. At the Marijas and Rainis Boulevard bike parking could allocate racks;
- Introduce a mobility hub for bike and e- scooters sharing. This service could be also used by students (as a last mile) who are arriving at railway;
- Establish air- rail services to the RIX station. The future offer should include baggage handlings and potential flight check in services. This is to be potentially located underground between platforms and parking zones;
- Since the central station is located in the old town and provide strong commuter connections, it is recommended to establish urban logistic services: smart parcel boxes could be located directly at platforms or at central entrances of the building;

5.4 RIGA AIRPORT INTERNATIONAL PASSENGER RAILWAY STATION

5.4.1 ARCHITECTURE AND URBAN FORM



RB RIGA INTERNATIONAL AIRPORT (PROSIV)

Rail Baltica Riga International Airport station is directly aligned with the new expansion plans for Riga International Airport and located approximately 10km away from Riga city centre.

The station aims to establish a connection both to the airport and its landside developments, through its dedicated airport links

to Riga Central as well as international trains. The direct connection to the airport further enhances the potential of multi-modality focusing on air-rail integration as well as freight due to the proximity of an expanding warehouse and business in the area through the Airport City development.

The strategic placement of Riga Airport Station allows it to operate as a catalyst for the development of the airport, the adjacent area and establishing new connection opportunities for the region and beyond. Not only will the estab-

- RIGA, Latvia
- RB Riga Airport
- 1,070,000 (Metropolitan, 2021)
- ~? (Passenger p. day)
- Airport, Bus, Car, Bike
- Elevated train station new construction
- 2 Platforms (2x main tracks, 1 x dead-end track)
- Limited commercial services ~ 3x 65m2 (possibility to add additional kiosks)

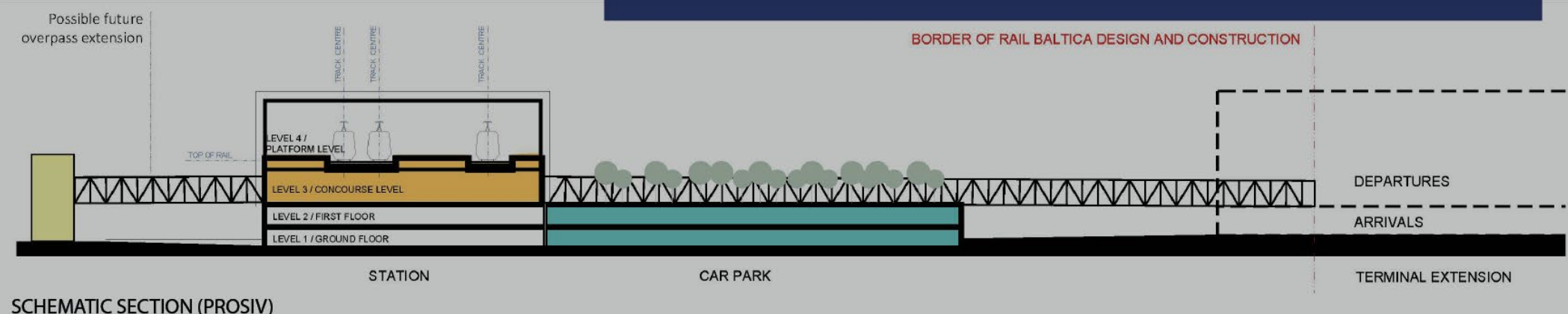
lishment of Rail Baltica's Riga International Airport station bring a smooth and direct connection to the airport terminal, but also it will bring new opportunities to rethink how an airport station can be a local mobility integrator. Furthermore, the development of the station will be useful for further densification of the site with new programme opportunities.

CONCLUSION ON KEY IMPROVEMENTS:

- The Rail Baltica RIX station can benefit from its location to adapt its services and spatial strategies according to the further development of the area
- The potential development of its land side presents a great opportunity for the station to assert itself as the main transport mode for the area.
- The strategic placement of the station allows it develop a high-level contextual integration with specific coordination of additional services and commercial land-side development as part of Airport City.
- Architecturally the station has an efficient yet pragmatic approach to design, blending an architectural vision that brings generosity to the spaces with an efficient circulation.
- Consider high-level contextual integration, avoiding barriers for future expansion.
- The station is organized in three levels with suspended tracks, a bridge connecting to the airport and an underpass linking both sides of the tracks. Limited retail is present to cater for airport passengers.
 - Within the station further retail expansion can be considered. The promenade, at the ground level, can be activated through the introduction of retail and services;
 - The station should further respond to the development of the local area, especially in responding to the Airport City development.
 - Improving the programme diversity and services at ground level can improve passenger experience;
 - Explore tailored provisions that act as attractor for supplementary customers;
 - Strengthen a central meeting and arrival point at the station through a strong commercial and spatial presence;



LOCATION WITHIN CITY





AIRPORT AND PLANNED STATION (SOURCE: PROSIV)

RIX station is organized on three levels. The lowest level ensures access to the station for passengers coming from the surrounding areas, where points of vertical circulation are provided for concourse level access. The concourse level accommodates both public areas with connections to the air-

port, and a paid area with waiting areas and platform access. At the back of the station, and segregated from passenger flow, baggage efficiently moves from the trains to the airport. This happens through dedicated freight elevators and clearly defined transport routes.

URBAN SURROUNDING (SOURCE: PROJECT CONSORTIUM)



URBAN ANALYSIS

Riga International Airport Station's design focuses on the stacking of floors that interface to different conditions of the site. The design displays a generous approach to space at all levels, bringing distinct qualities and connections. The clear vertical circulation paired with the multi-directional connections established by the station, bring it to become paramount in the redevelopment of the local area. The following points refer to the numbered areas indicated on the maps.

1 RIGA INTERNATIONAL AIRPORT - RIX

The direct connection to the airport expansion consolidates the main axis of synergy between airport and station where most passenger flow and activity is expected. The axial alignment of the station with RIX's new terminal makes it a convenient extension of the same. Furthermore, the direct link to the airport serves as access to the carpark, creating an extra potential of connectivity at the site.

2 GRADE LEVEL ACCESS (WEST SIDE)

Toward the west side a prominent connection is established at grade level with the station. This connection should not only provide generous access to the airport building, but also to a bus station and carparks. If designed carefully, this interstitial space between station, airport and carpark has the potential of becoming an interesting heart, connecting the different programs and transport modes present at the site. a planned bus station was in discussion for the east side of the station, however consolidating alternative transports on the west side will facilitate interchanges between transport modes and airport access.

3 GRADE LEVEL ACCESS (EAST SIDE)

Toward the east side the main architectural gesture is signaling the entrance at grade level. This area design should consider the further development of the area and how to prioritize local pedestrian and bike access to the station, reinforcing its local connection and primary transport option for the area. in connection to the east-west access

route at grade level, different transport interchanges should be present and activate the grade level axis between station, airport and greenfield.

4 CARPARK

The station's proximity and direct link to a multi-level carpark brings an easy exchange between car-rail and air. Combined with the bus terminal at the ground floor, the station becomes an easy switch between different transport modes. Therefore, the park and ride approach to the design goes beyond the private vehicle/rail combination.

5 OPEN CARPARK

The area dedicated to an open car park toward the west side of the station can be densified into a multi-level carpark with extra retail or green spaces.

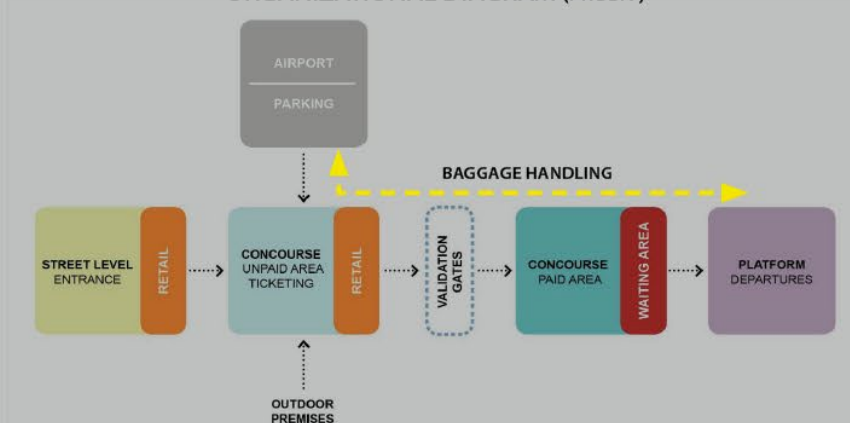
6 HOSPITALITY

the area immediate eastward from the station could be dedicated to hospitality services so there's a strong link between airport, rail, and the further developments at the site.

7 LOCAL DEVELOPMENT

The vast area eastward from the airport present great development potential with the station implementation. The successful development of the site can bring opportunities for land-side retail development as well as more program diversity. Eastward of the station a vast greenfield area can be developed into an array of programs integrated by the proximity of the station and airport, such as commercial, office, manufacturing and logistics. The development of a land-side Airport City can therefore boost potentials for the area and its proximity to Riga.

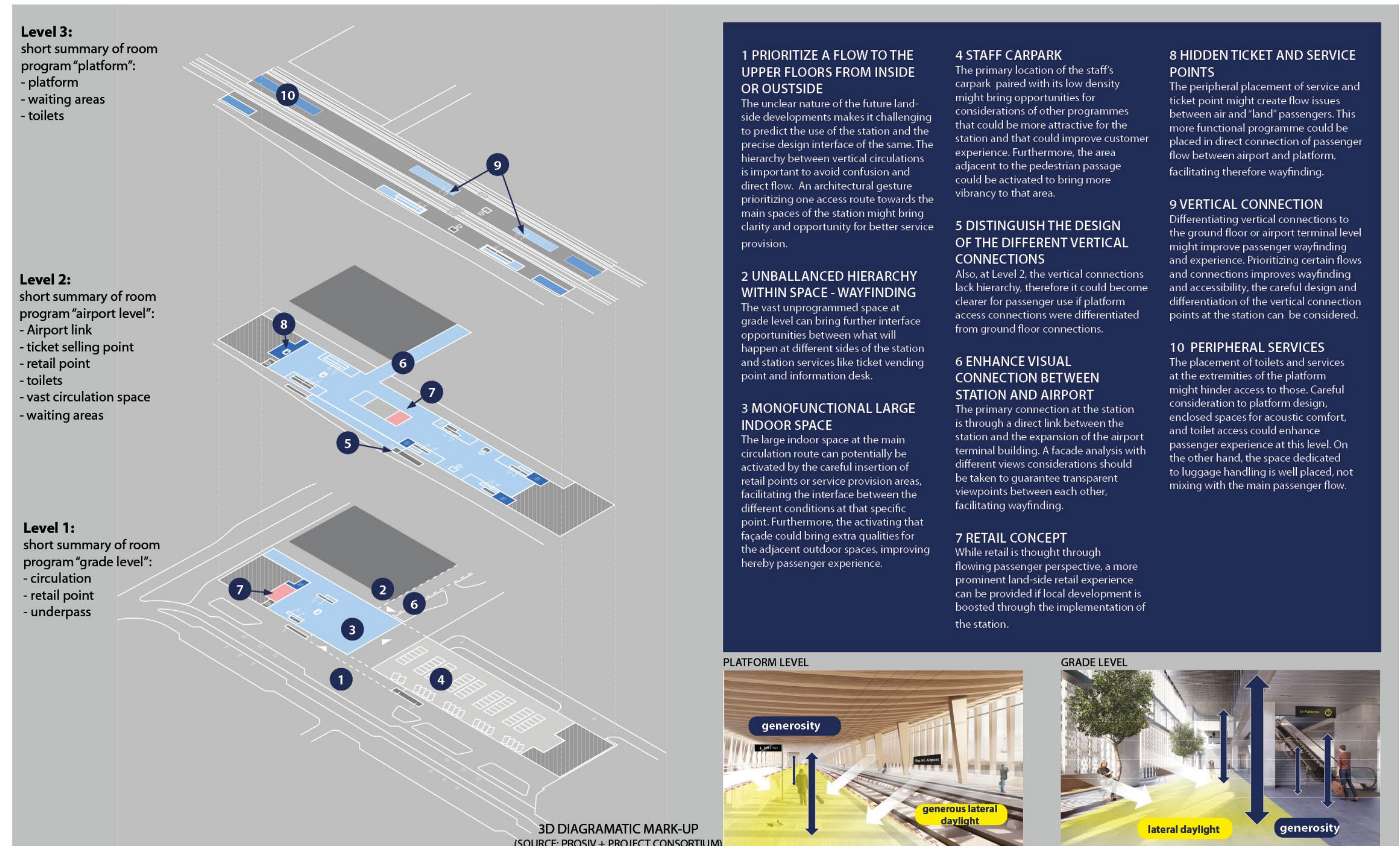
ORGANIZATIONAL DIAGRAM (PROSIV)



URBAN SURROUNDINGS (SOURCE: PROJECT CONSORTIUM)



5.4.2 FUNCTIONALITY

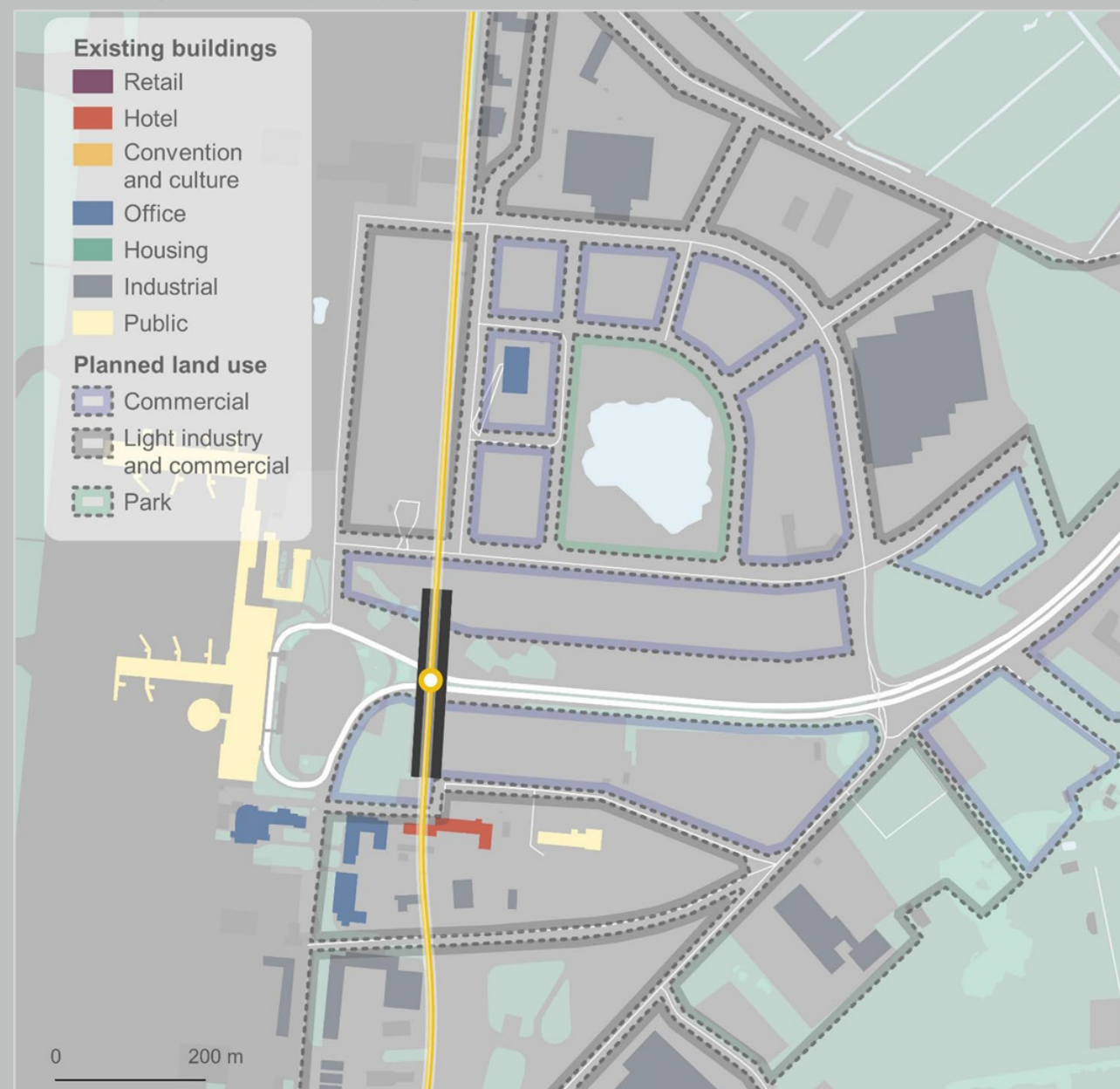


5.4.3 LAND USE

Assessment of the existing plans and land-use diversity

Currently there are a few office buildings, one hotel and several logistical/ industrial buildings next to the future airport station. The surrounding area is dominated by wide parking zone and unbuilt plots around the small lake. There is also one unfinished office construction site that has been there for years.

There is a vision to create a new airport city next to the new railway station around the lake. This area very close to the terminal is particularly inviting for new offices and hotels. Ground level parking areas will be replaced with parking houses at least in areas adjacent to the train station to create more possibilities for new efficiently built development projects.



CURRENT LAND-USE DIVERSITY AND PLANNED NEW DEVELOPMENT AROUND RIGA AIRPORT
(SOURCE: PROJECT CONSORTIUM)

Consultant made the following main notes:

- Airport area is mostly not suitable for housing or functions that are not allowed to be in the noise pollution area of the airport. Therefore, the amount of potential retailing and commercial services is also limited to those who serve people for work purposes in the area. Most of the services created for air-passengers, including some small commercial activities (kiosks, restaurants) will be located close to the RIX station building.
- Airport areas should have a high accessibility. The locations around the station could also be used for expo and convention centres and sports and multipurpose arenas. The prepared vision and general plan for the area shows great level of ambition in order to utilize the potential for emerging airport city. The proposed locations for new effective developments seem to have good qualities regarding accessibility by plane, train or car and landscaping possibilities.

CONCLUSIONS ON KEY IMPROVEMENTS:

- The real estate market is showing relatively high vacancies in Riga but high development activity at the same time indicating strong demand for modern stock with better locations. The estimate is that airport city has potential to create totally new type of commercial sub-market to Riga.
- The prepared vision and master plan for the area show good level of ambition in order to maximize the GVA deriving from improving connection, and the target should be office-led content together with accommodation and possible convention and sport centers. Also concert halls, entertainment centres, schools and universities, aviation museum, logistics centres and hospitals could be studied further considering the Airport City strategy.

5.4.4 COMMERCIAL DEVELOPMENT

Retail symbiosis

Currently there are around 20 shops, restaurants or relevant commercial services in the public zone (landside) of the airport. The airport train station is located separately and connected to the terminal building by a pedestrian bridge. There is a possibility to locate some grab-and-go services to the train station, but mostly current services at the airport will be sufficient also in the future.

The airport city concept naturally emphasises commercial content and inhabitant number will be low. Therefore, the amount of potential retailing and commercial services is limited.

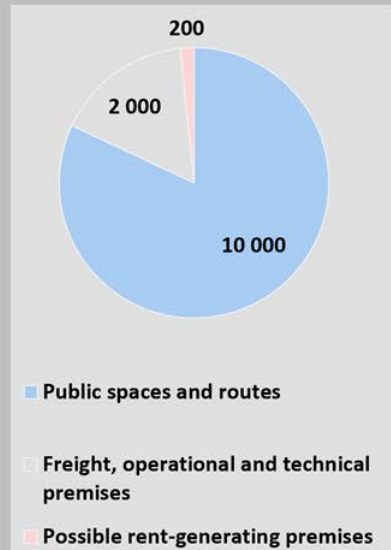


PLANNED COMMERCIAL DEVELOPMENT AROUND RIGA AIRPORT STATION (SOURCE: PROJECT CONSORTIUM)

Commercial concept and functionality

A commercial concept of Riga airport station includes minimal basic services in which the premises are mostly located in the land-connecting floor. The structure is well working considers the low potential for added retail premises.

- In general, the solution seems logical and utilizes the little potential what the station has in terms of retail.
- The services should be for quick purchasing needs for passengers.
- The concept and the content should be further developed together with the airport's landside premises in order to form a well working entity.

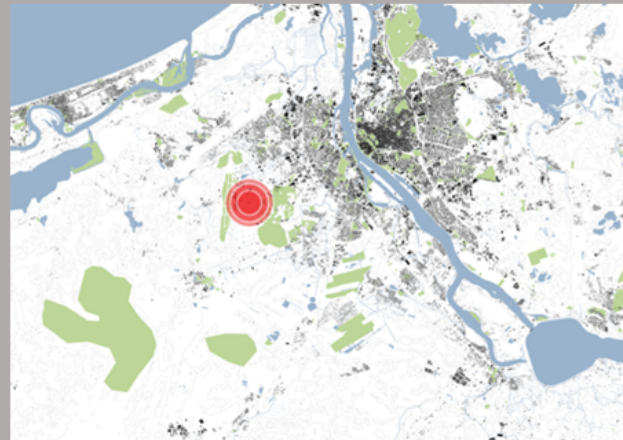


STATION'S FUNCTIONAL LAYOUTS AND SPACE TYPE DISTRIBUTION (SOURCE: PROJECT CONSORTIUM)

CONCLUSIONS ON KEY IMPROVEMENTS:

- The airport surrounding as well as the airports landside have very limited potential for large scale retail. Services for quick purchasing needs have good potential and these are utilized in good way in the proposal.
- The airport city new land-use have the biggest potential in office and accommodation uses together with convention and sport centers as well as public services such as schools, universities or hospitals.

5.4.5 MOBILITY

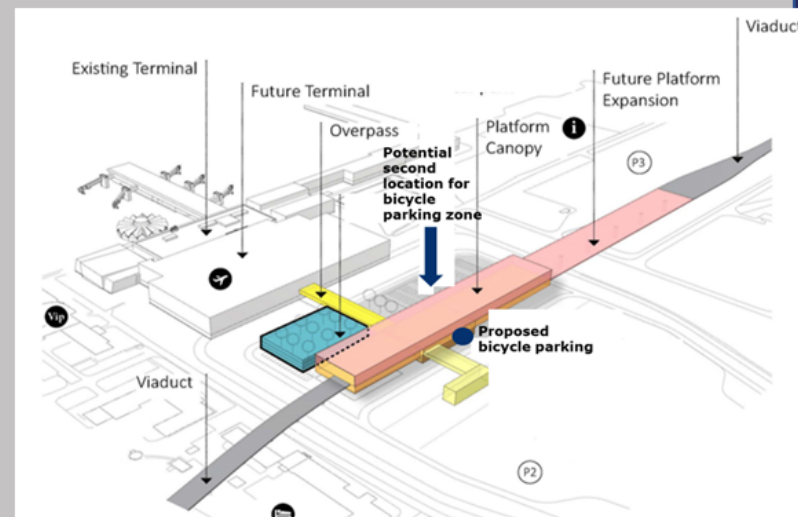


OVERVIEW OF THE STATION LOCATION (SOURCE: PROJECT CONSORTIUM)

The future railway station at the Riga airport could create a significant added value to the city residents giving them a fast and safe access to the airport. In addition, the planned future development of the RIX Business Park will create number of social areas and business places, and hence accelerate the growth of the national GDP. The high-speed railway connections will allow operation for high-speed trains to run four times a day and a Riga ring service every 30 minutes. It obviously creates an attractive base for establishing strong commercial and business activities at and around the railway station. Following design materials the future RIX station could become a multimodal station and provide multifunctional passenger services.

OPPORTUNITIES FOR RIGA AIRPORT (RIX) STATION

- Ensure a seamless experience between rail stations and airport terminals;
- Double - level connection to the surrounding areas allow it to respond both to airport passenger needs and the development of the area;
- Developing of the Riga Airport as a future terminal and business park;
- The future multimodal connections has high potentially to be integrated with the existing PT routes, incl. suburban and urban routes.
- Connecting travelers and area workforce providing a strong transport connectivity including bicycles;
- Great opportunity to develop Bike & Train services;



STRUCTURAL OVERVIEW OF THE STATION AREA (SOURCE: PROJECT CONSORTIUM, PROSIV)

KEY STATION MOBILITY AND ACCESSIBILITY IMPROVEMENTS :

- Future Airport Business Park with hotels, office centres, logistics and cargo warehouses should provide development options for various business types and should create new jobs for residents. The total territory intended for development is ~24 ha. The future RIX station should be developed as a multi-modal transport hub and create a successful environment for business establishment;
- Riga airport together with Rail Baltica should create a strong cooperation on promoting the future brand of the redeveloped area to increase its emotional value;
- A future design of a bus station should provide to passengers direct access to the railway airport building, including: a covered waiting zone with clear assigned area, digital screens on PT operation, city maps with interchange points, ticket machines;
- Station and surrounds accessibility to be improved with a barrier free concept. Some of innovative solution for international passengers like virtual interpreters could be established. For any urgent assistance call boxes at public places to be installed;
- The international station should provide for PRM special assistance on-board services and within the railway building area;
- Allocate a taxi rank at the airport providing clear operation and tariffs information;
- Introduce a strong bicycle concept at the RIX station and at the whole Airport City. Bicycles traffic at the airport area should be prioritised;
- Establish bicycle parking at the RIX station entrance and under the pedestrian bridge;
- Introduce freight bicycles connections, parking and charging station facilities (potentially under walking bridge) and repair shops at the railway and Airport City;
- Develop bicycle routes which will potentially connect the Marupe Municipality area, close located green zones with the Airport City;
- Introduce a car and bicycle sharing service at the RIX station;
- Introduce charging facilities for private and carsharing, directly located at parking;
- Redesign the open public walking zone in front of the railway station giving more places for public interactions including green zones with seating places;
- Potentially RB could provide to the Riga airport (The New Cargo Apron, DHL Terminal, Baltic Cargo Hub) train courier services along the corridor;
- Introduce Air- Rail service and combined tickets which could encourage travels by trains to the airport. Proper development of "rail – air luggage" service: integrated services where passenger will not need to have additional trips to pick-up or drop-off their luggage and therefore save their travel time;

5.5 PANEVEZYS INTERNATIONAL PASSENGER RAILWAY STATION

5.5.1 ARCHITECTURE AND URBAN FORM



PANORAMA OVERLOOKING THE CITY (SOURCE: WIKIPEDIA)

	PANEVEZYS, Lithuania		Bus, Car, Bike
	RB Panevys Station		Undefined new construction
	85 885 (Pop. 2020)		Undefined (2x main)
	~5000 (Passenger p. day)		Undefined (potential to add basic commercial services)

Panevezys is located at the north-eastern part of the country and is the fifth largest city in Lithuania. The city and its area has strong industrial and logistics development. The existing railway line is providing a service for goods and facilities transportation, and the narrow-gauge railway is used for tourism.

The existing passenger railway station is currently closed and does not serve passengers. The final location for the new international passenger railway station shall be still approved. The project is currently in the spatial planning stage which leads the analysis towards a general and strategic focus. The

consultant team developed a critical analysis based on the obtained documents from the City Municipality and aligned recommendations with the international best practise. At this stage no detailed station design documents were developed.

CONCLUSION ON KEY IMPROVEMENTS:

- The improved accessibility through the new Rail Baltica Station will bring Panevėžys to the map and awake new interest to the whole area;
- Creating a new station has the potential to become a public attraction, giving residents opportunities for new jobs, services;
- The primary station location (1) and alternative location (3) benefits from 2 crossing railway lines, the station typology can correspond to create a natural transfer point for passengers to regional rail destinations and enable a specific architectural station expression;
- The potential alternative location (2) next to the entrance road (A9, Klaipėdos g.) offers great opportunities from the perspective of urban context and real estate GVA. In the city masterplan this area would envision an extend the urban structure towards the station area. The excellent visibility of the station building near the main entrance road gives opportunities to create an iconic landmark as a Gate to Panevėžys. Near proximity to dense residential areas motivates NMT;
- Using all opportunities of a peripheral station such as the full support of existing and new business parks and residential real estate due to the dynamism of the new connection;
- Considering high level urban integration and avoiding barriers in future city expansion areas through an interwoven city planning and station design process;
- Promoting flexible and agile spatial systems to allow efficient future adaptations;

ILLUSTRATIVE BENCHMARK IMAGES WHICH RELATES TO PERI-URBAN STATIONS

KØGE NORD, STATION - DK



NAPOLI AFRAGOA HS STATION - IT



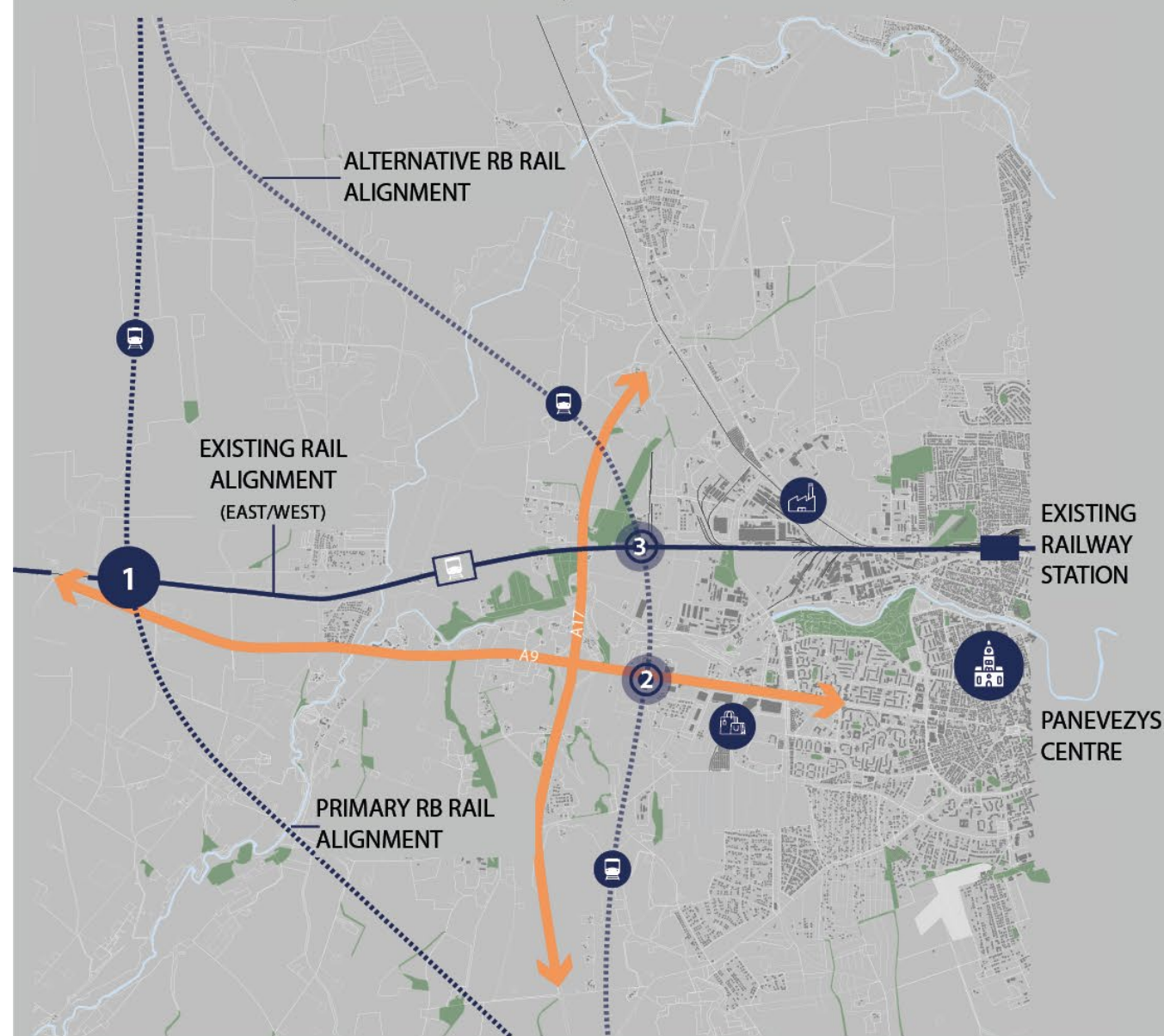
Due to track alignment it is suggested to locate the Rail Baltica Panevėžys station outside of the urban areas approximately 13 km west from the city centre (1) in a rural zone. The existing railway station north of the city at S. Kerbedžio street will not be used for it. There are also alternative plans

to locate the station closer to the urban city structure (2,3). In any case the station will be in a peripheral environment which can still enables excellent social environment and offering additional function of a dynamic workplaces and vital opportunities for residents nearby. Given the fact that three

different locations are under consideration the Consultant prepared a general site analysis with related suggestions.

- 1 PRIMARY RB STATION LOCATION
- 2 ALTERNATIVE RB STATION LOCATIONS
- 3

LOCATION WITHIN CITY (SOURCE: PROJECT CONSORTIUM)



LOCATION OVERVIEW

1 RURAL ENVIRONMENT

The planned primary location for the station is located within agricultural zone with limited potential to develop into a high-value urban area.

- 13km to inner city, 5km to ring road
- the city plan indicates future densification based on "intensive building structures (except residential)"
- Intersection of RB rail alignment and the existing East-West rail track

2 PERI-URBAN ENVIRONMENT

- 4km to inner city.
- located at entrance road to the city in a medium dense developed retail area close to residential district and existing retail provisions
- between ring road and city (A9, Klaipėdos g)
- the city plan indicates future "medium intensity building".

3 PERI-URBAN ENVIRONMENT

- 4km to inner city
- between ring road and city.
- adjacent to major industrial area.
- Intersection of RB rail alignment and the existing East-West rail track
- proximity to a developing free economic zone.

5.5.2 LAND USE AND COMMERCIAL DEVELOPMENT

Assessment of the existing plans and land-use diversity

The planned location (1) of the station is around 11 km from the city centre and more than 5 km from the ring road where the urban area starts. The area is mostly agricultural and has quite limited potential to develop into a highly valued urban area. Location is crossing the current east-west railroad and it could be possible to make the station an exchange station.

The rail line has also an alternative route that could locate the station much closer to the urban areas. Location

(2) next to the entrance road (A9, Klaipėdos g) seems the best of the alternative locations as it enables attachment to existing urban structure. The master plan indicates a possibility to extend the city structure towards the station area. Currently the closest high density housing areas are 2 km away of the pointed location towards the city centre. The area is mostly unbuilt with only a few big box retail units and low-density housing nearby.

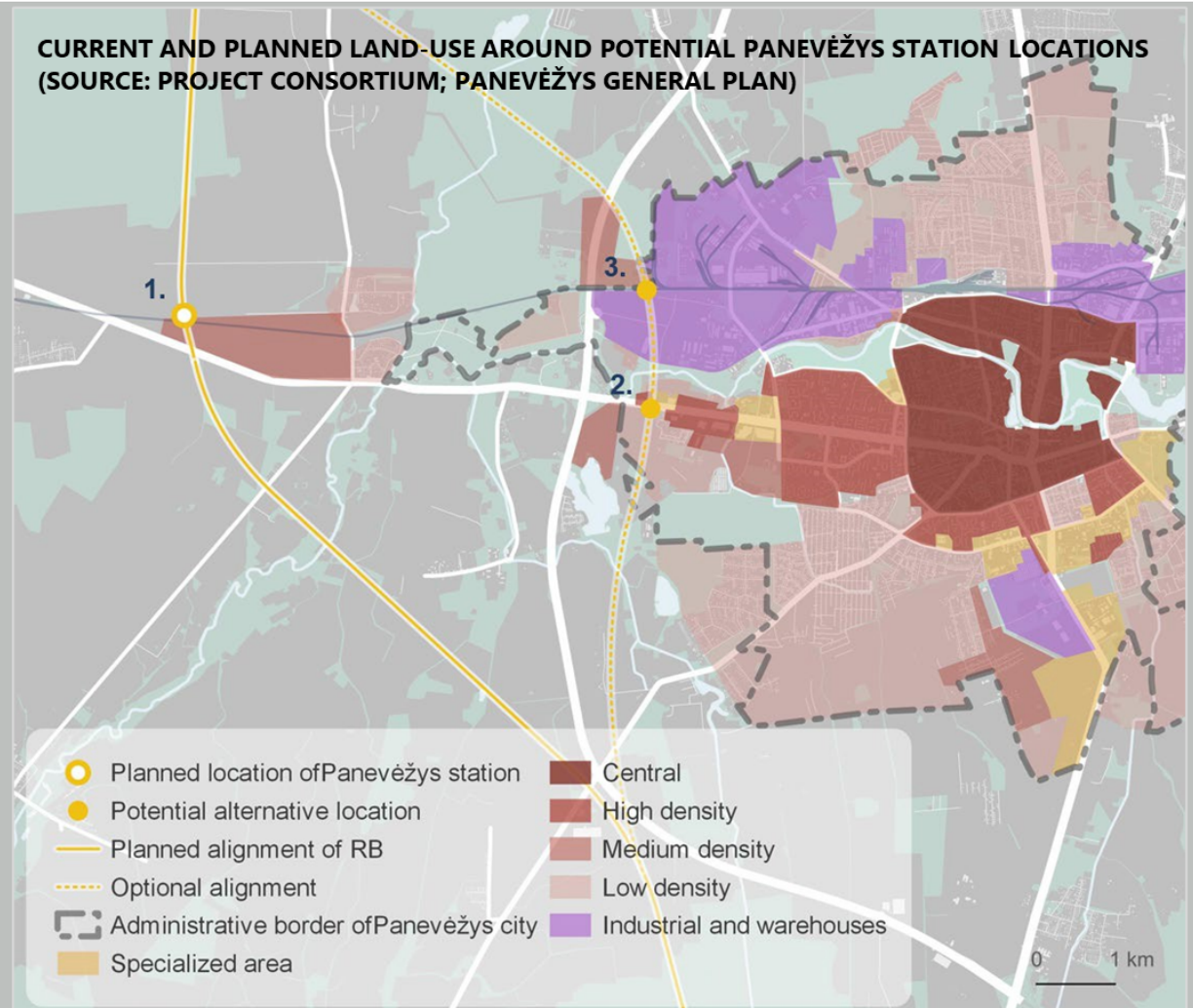
The third option (3) is in the industrial and warehouse area where free economic zone is being developed. This location also enables a direct connection to the current east-west railroad.

Consultant made the following main notes:

- The population development and forecasts for the Panevėžys area look very pessimistic at the moment. The new international and local train connections can help the whole area to turn the forecasts into more optimistic, but realism should be carefully considered.
- Locating the station as close to the city centre as possible would be advisable from purely real estate value-adding perspective without having a clear picture about the overall feasibility. The corridor between the station and the city centre would be attractive for many functions: retailing, offices and housing. The motorway next to alternative spot decrease the urban potential slightly as it forms a development barrier and an unwanted neighbour. Frequent local public transportation between the station and the city centre would be important to create the necessary conditions for optimal development.
- On the other hand, the primary location has a good benefit as the station can be directly connected to the current east-west railway. The same occurs with the third location option with less distance to city centre and developing free economic zone as a potential destination for the travellers, especially commuters. From the perspective of public transportation and national railway system, the connection to the east-west railway sounds crucially important.

CONCLUSIONS ON KEY IMPROVEMENTS:

- Panevėžys real estate market do not currently offer high development potential as the city's size is rather small and growth forecasts are quite pessimistic. Still, the new improving connection increase the potential for coming decades and might enable relatively interesting amount of added stock and GVA in all uses.
- The planned primary location of the station is mostly agricultural and has very limited potential to develop into a highly valued urban area. Still, the location is crossing the current east-west railroad and it could be possible to make a direct connection between the two railways. This seems crucial from the national long-distance public transportation point of view.
- The potential alternative location next to the entrance road (A9, Klaipėdos g) seems the best location from the perspective of real estate GVA. In the master plan this area is next to the possible high density urban areas and it would be possible to extend the city structure towards the station area. When considering only GVA deriving from added real estate stock, this location seems the best.
- Also the third option has clear benefits as it also has the possibility to be directly connected to east-west railway but with less distance to city centre. Moreover, the developing free economic zone and its development could be empowered by the high-speed rail if its development is seen as desirable. The area has better ability to attract office investments as the distance to city centre is half compared to primary location.



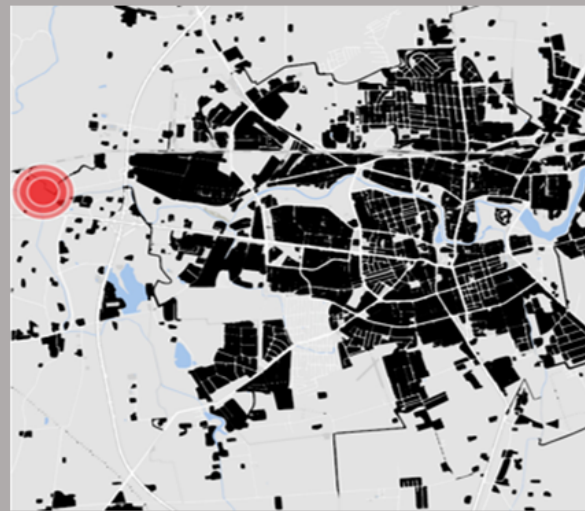
Retail symbiosis

The primary location outside the planned urban areas do not provide notable potential for commercial activities around the station. By locating the station next to the future urban areas it's possible to upgrade to service level. However, currently the largest shopping centre in the area (RYO) is located less than 2 km away from alternative location along the same entrance road, and it decreases the potential for larger retail entity also in this location. Minor retail centre with basic services, singular special retail and minor destination role could be achieved.

CONCLUSIONS ON KEY IMPROVEMENTS:

- The planned location does not provide potential for wider retail service spectrum while the alternative potential location especially close to inhabited urban structure has better potential.
- The close-by shopping mall decreases the potential for the widest service spectrum but minor retail centre with basic services, singular special retail and minor destination role could be possible.

5.5.3 MOBILITY



OVERVIEW OF THE STATION LOCATION (SOURCE: PROJECT CONSORTIUM)

The potential locations of the future station are in a rural area. It will be very important to identify clear aspects which might influence the mobility at the station. Any finally approved station location should consider a strong integration into urban structure and provide to residences and city visitors great urban connectivity to make their travels smoother and flexible. It will be especially important for passengers who will daily travel to Panevezys for work or study reasons. The station function could be a multimodal transportation hub establishing sustainable public transportation modes, with a special attention to bicycles. This is especially relevant for the potential station location Nr.2., which is reviewed under the mobility analysis part.

OPPORTUNITIES FOR PANEVĖŽYS STATION

- The proposed location of the railway station is attached to the city, where direct access to the motorway can be used to create convenient and fast urban transport links;
- The station could have great opportunity to establish a railway as a public transportation hub with strong international and national railway connections;
- Possible location of the station offers direct access to the Nevezis River. These natural resources could be used to create additional tourist and recreational areas (open green places) around the railway station and thus increase the added value for the development not only the station, but the city liveability;



POTENTIAL PT AND BICYCLE CONNECTIVITY TO THE STATION (SOURCE: PROJECT CONSORTIUM)

KEY STATION MOBILITY AND ACCESSIBILITY IMPROVEMENTS :

- Improve the station connectivity at national and international levels, establishing railway services to Riga, Vilnius, Kaunas, as well as to Klaipeda, Kaliningrad;
- The railway station could propose a reliable public transport being integrated into a potential future transportation hub, which will connect suburban, regional and national and international transport routes (bus & rail). The already existing operation of urban public transport to be harmonised with the railway services;
- To support the implementation of the SUMP Panevezys, especially its sustainable mobility action planning, it will be reasonable to allocate such services/ infrastructure as : sustainable PT with allocated charging infrastructures; bicycle network and charging facilities, repair shops; connect on - demand services;
- Station and surroundings accessibility to developed against a barrier free concept (for all passenger groups). The concept of the whole area should be PRM friendly and include: tactile floor paths, information in Braille and relief, safety decals, tactile warning strips, visual stairways, etc.). Station facilities should be designed for passengers in a wheelchair and travellers with kids (automatic doors, number of escalators and ramps at platforms and between station building levels, Some of innovative solution for international passengers like virtual interpreters could be established. For any urgent assistance call boxes at public places or at platforms to be installed.
- Potential air- rail service: the nearest international airport is Kaunas, which is 87 km away. Potentially air- rail services could be integrated between two cities. However, this is to be additionally studied. It is important to understand what is the potential demand and whether there is a sound economic basis for investing in rail infrastructure and facility development;
- Since the proposed future station area shows a high land availability, it is recommended to establish e- commerce services. The focus here could be on running on- demand trains for e-commerce companies. Since the city is closely located to the Latvian border, an international rail connections should be well developed. Potential location of the e- commerce services could be the considered peri-urban location Nr. 3 (close to free economic zone) (please refer to the figure 107).
- Establish urban logistic services at the station which will provide to passengers parcel machines;

5.6 KAUNAS INTERNATIONAL PASSENGER RAILWAY STATION

5.6.1 ARCHITECTURE AND URBAN FORM



EXISTING KAUNAS STATION (SOURCE: WIKIPEDIA)

Rail Baltica planned HSR station at Kaunas will bring new connections and mobility opportunities to the city, unfolding development opportunities within its city fabric. Kaunas is the second-largest city in Lithuania after Vilnius and an important centre of Lithuanian economic, academic, and cultural life. The future Rail Baltica Station will be located together with the existing historical main railway station and will significantly upgrade

the transportation and socio-economical potentials of the region and city district.

The station is located 2km southeast from the city centre of Kaunas and 3km from the Old Town. Kaunas station is located outside the dense urban fabric and is currently surrounded by industrial buildings, large rail yards, low density housing. The vicinity to the river can bring interesting urban

- KAUNAS, Lithuania
- RB Kaunas
- 295,269 (2016)
- ~7000 (Passenger p. day)
- Bus, Car, Bike
- Undefined transformation of existing station
- Undefined
- Undefined (potential to add basic commercial services)

opportunities in relation to improved pedestrian connections across the central area and new leisure destinations in relation to its urban development.

Currently the project is in an early planning stage, no developed design documents could be reviewed by the Consultant.

LOCATION WITHIN THE CITY (SOURCE: PROJECT CONSORTIUM)



AERIAL VIEW ARENA



AKROPOLIS SHOPPING CENTER



KAUNAS NEW PT TERMINAL

CONCLUSION ON KEY IMPROVEMENTS:

The new RB Kaunas Terminal to enable an important city district conversion with a modern transportation hub as a core of the design. The terminal serves as a highly integrated urban element and radiates its economical potentials towards the neighborhood.

- From an urban perspective the station should develop a stronger relationship to its forecourt and the main street leading to the inner city. Special emphasis should be given to car traffic reduction, at-grade pedestrian circulation and urban space qualities. New developments on either side of the station would strengthen it as an urban destination.
- The main street axis leading to the station can further evolve towards a vibrant urban environment that host retail, residential, hospitality as well as enhancing the pedestrian and bicycle flow to the station. The newly constructed PT-terminal gives an excellent impulse.
- The internal space adaptation concept for RB Kaunas station hasn't been defined yet. The consultant suggests the use of the historical substance in combination with new bridging elements that connect both the platforms and enable the option on linking the southern railyard site to the inner city. The strategical positioning of the station has potentials for unique retail/business concepts.
- If the southern station area will be included in the near future development strategy the Consultant suggests reviewing Vilnius "Green Connect" station design as one possible role model for Kaunas.





KAUNAS STATION (SOURCE: WIKIPEDIA)

The given site location and its context will bring multiple strength and virtues that can establish a successful transportation and district development.

The immediate proximity to nature (forest, river, parks), transportation networks and major business

areas (Arena, Shopping center) and being at the same time not too far from the historic inner city creates potentials for the site.

URBAN SURROUNDING (SOURCE: PROJECT CONSORTIUM)



URBAN ANALYSIS

The following points refer to the numbered areas indicated on the maps.

1 RB KAUNAS STATION AS AN INTEGRATED URBAN-PUBLIC TRANSPORT COMPLEX

The new Rail Baltica Kaunas station will be embedded into the existing historical station building (constructed in 1952). The project gives the opportunity to offer international, national, and suburban connections, together with tailored commercial that focus on passengers.

2 NEARBY NEW BUS STATION PROVIDES CONVENIENT RAIL-BUS INTERCHANGE OPPORTUNITY

3 SHOPPING CENTRE & EVENT ARENA

A major shopping center and event arena play a key role for developing the station district. Newly established river front pedestrian areas create attractive links, therefore, an improved connection to the riverside promenade can be considered.

4 INTERSECTION

Today a major traffic junction dominates the zone between the station and the riverbank. Downscaling the capacity of that main street will significantly change the character and allow new development potentials of the adjacent sites and the interrelation of the station to the northern area.

5 WATERFRONT DEVELOPMENT POTENTIAL

Kaunas city planning documents highlight a zone for high-rise structures at the riverbank south of the station. Such intention will impact the entire future of the southern area which can benefit from a bridging RB terminal that communicates with both sides of the city.

6 FUTURE LAND-USE AT THE TRACKS

Large railyard areas in proximity to the station can benefit from a land-use

analysis of that zone in the integrative planning process of the station.

7 STATION PLAZA CAN DEVELOP TOWARDS AN ACTIVE STATION-CITY LINK

This zone can clearly become one main feature of the station renewal. Interaction between interior and urban space, safe pedestrian crossings, green spaces, and smooth transfer to other transportation modes will create an open accessible relation.

8 DEVELOPING AN AGILE STATION DESIGN

Combining building heritage to new additions includes a strong opportunity for an upgraded identity. Not only can the new spatial addition connect to all platforms, but also to link the potential southern development to the station and inner city.

9 STATION-CITY AXIS

The main street connecting the station to the city has excellent potential to benefit from the increased passenger number and carries same time the responsibility to offer a welcoming, vibrant urban space that hosts retail, residential, hospitality as well as enhancing the pedestrian and bicycle flow to the station.

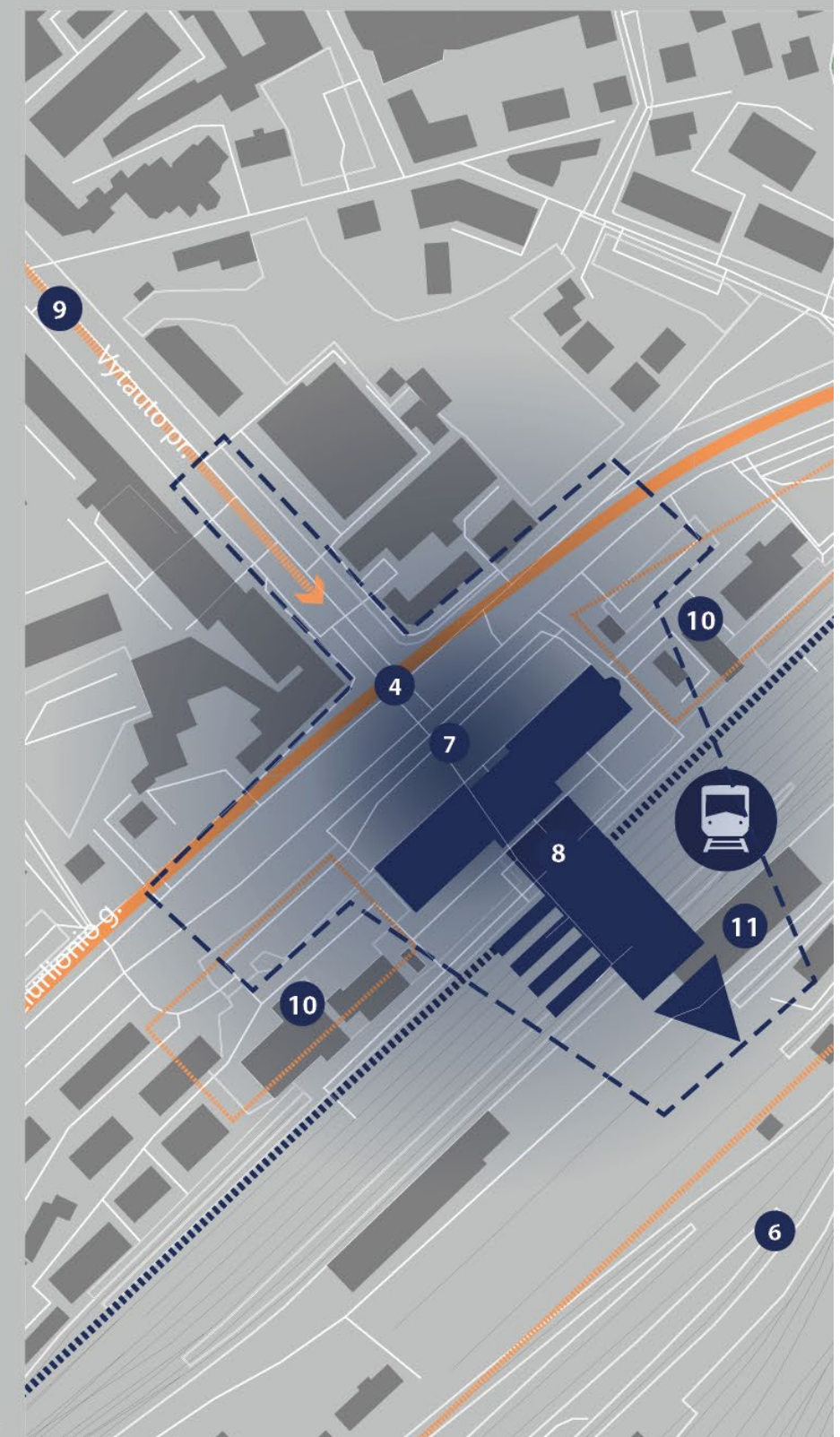
10 ADJACENT LAND-USE DEVELOPMENTS

The areas extending at the sides of the main station building are mainly used for parking and bus traffic. A new traffic concept can enable additional urban space and room for new development at close proximity to the station.

11 IMPROVED CROSS-TRACK CONNECTIONS

To instigate optimum synergies within the entire station area multiple traverse links for car/bike/pedestrian are favorable. The new terminal can play a major role in such developed permeable urban network.

URBAN SURROUNDINGS (SOURCE: PROJECT CONSORTIUM)

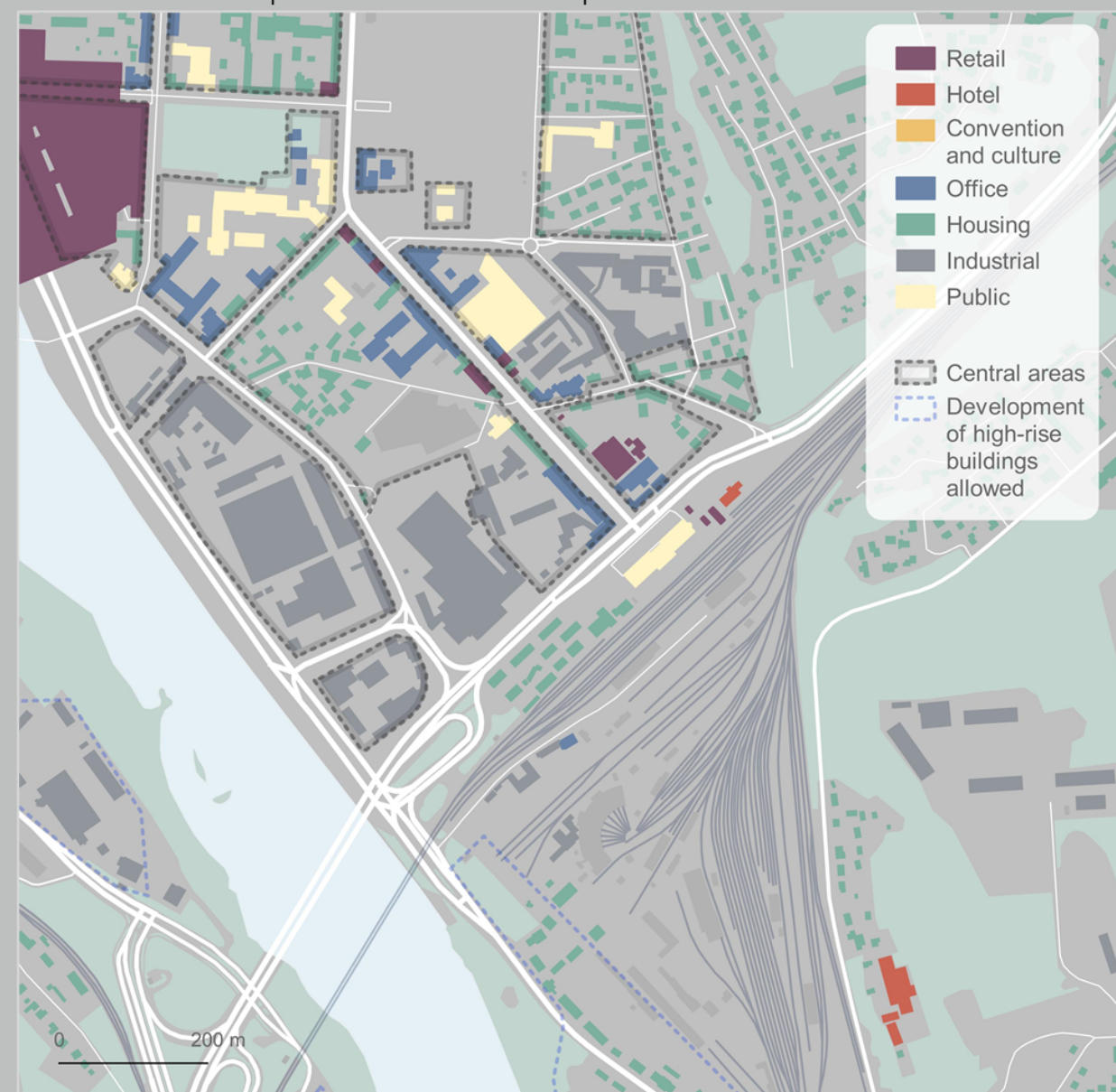


5.6.2 LAND USE

Assessment of the existing plans and land-use diversity

Currently, the southside of the station is dominated by the railyards and the hill area with low-density housing and industrial sites. On the northern side, other multiple land-use toward the city center dominate. The full commercial potential of the station area has not been yet realized in the area.

Improving international and domestic railway connections increases interest toward the area both from business and living prospective. The local master plan enables the utilization of the hidden value. Existing plans suggest the northside, that is heading toward the city centre, to be further developed with dense mixed-use city centre structure. The industrial use will be mostly relocated out of the area. See more about the current and planned land-use on the map below.



LAND-USE DIVERSITY AND PLANNED NEW DEVELOPMENT AROUND KAUNAS STATION
(SOURCE: PROJECT CONSORTIUM)

Consultant made the following main notes:

- The master plan shows a good and realistic level of ambition to fully utilize the GVA potential deriving from improving railway connections and urban development.
- On the northside especially the axis toward city centre and the riverside areas indicate high potentials for good value increase, but the question is how the change from industrial use to centre-type of structure could be assured in high quality matters. One of the factories will stay according the plans which challenges the overall plan in some level.
- The area should target bigger amount of added housing areas, but also offices and hotel that seem natural, especially in immediate proximity of the station. When it comes to retail, the close located shopping mall takes the biggest potential out, but the street level retail have clear possibilities to increase the vibrancy of the new city blocks. Retail is covered with more detail in next section.
- On the southside the plan does not introduce strong development and the focus is on replanning the northside. However, the riverside has been introduced with an idea of high-rise development. When taking this into consideration together with an assumption that the railyards could be directed to some more suitable location, the southside holds very good potential for attractive housing district. In this case suitability of the high-rise development should be carefully considered.
- In case the southside will be connected to northside, Kaunas station has very good potential for true mixed-use entity be connected to station. This way the station could include big number of offices, public actors, retail and accommodation forming significant added value for the site.

CONCLUSIONS ON KEY IMPROVEMENTS:

- The real estate market is looking healthy and market info supports locally relatively high possible added volumes for each category. Only retail seem to have a clear limitation for large-scale development due to nearby shopping mall.
- The plans of developing the north side of the station from industrial use to high-quality dense and mixed centre type of city structure is advisable and natural direction in order to seriously increase the role of the area and maximize added value deriving from Rail Baltica connection.
- The immediate proximity of the station holds true potential for modern offices and even accommodation, which still works better inside the developing housing-led centre type of quarters.
- The southside of the station seems to hold true potential for new attractive dense housing area with possible interesting destination activities in the historical rail yards, and in most extreme urban regeneration scenario the southside is connected to north by true mixed-use station structure with office-led commercial concept. This is especially advisable in case of riverside being developed for dense housing.
- The suitability of the high-rise building type to the riverside should be carefully considered in order to assure the best end result for the whole southside area.

5.6.3 COMMERCIAL DEVELOPMENT

Retail symbiosis

The railway area has industrial character, which will face a total change toward centre -type of a city structure. This will increase the population in the area dramatically providing better retail potential. The close located Acropolis shopping center limits the potential for the new centers, but especially the axis from station towards the shopping center and the city centre will enable street level retail with brick-and-mortar shops, restaurants and services. Next to this shopping mall there is a new indoor sports arena for 15 000 spectators, which should provide huge additional pulses of pedestrian flows to the area regularly. In case of southside being developed as dense housing-led area the station enables minor retail centre width with basic services, singular special retail and minor destination role. In this case the retail premises would be attached along the busiest pedestrian routes that would be formed for crossing and reaching the tracks.

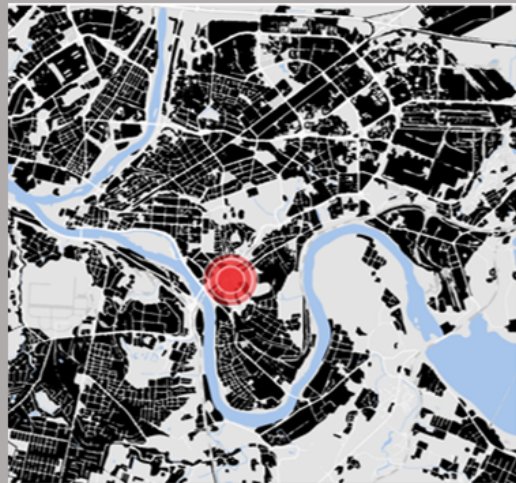


RETAIL AROUND KAUNAS STATION (SOURCE: PROJECT CONSORTIUM)

CONCLUSIONS ON KEY IMPROVEMENTS:

- The planned area reconstruction and development toward centre-type of a city structure will increase the population in the area providing better potentials for street level retails.
- The Acropolis shopping centre limits the potential for developing a new center, but especially the axis from station towards the shopping centre and the city centre will enable good amount of street level retails.
- In case of southside being developed as dense housing-led area the station could include minor retail centre width with basic services, singular special retail and minor destination role. In this case the retail premises should be attached along the busiest pedestrian routes that would be formed for crossing and reaching the tracks.
- Considering the potential retail concept and even bigger and accommodation potential the station holds a true potential for high share of rent-generating premises. This is an advisable direction to be further studied in order to maximize the station's GVA.

5.6.4 MOBILITY

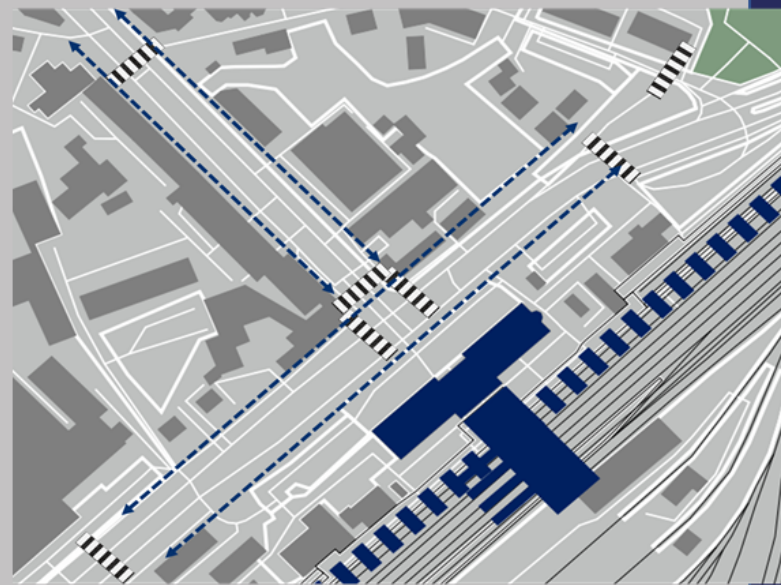


OVERVIEW OF THE STATION LOCATION (SOURCE: PROJECT CONSORTIUM)

Kaunas international railway station plays an important role as interchange point between the east- west and north- south axis on a global scale, with access to the central European railway network. At the urban level, the station is poorly connected to the city centre and lacks a clear function / role within the city itself. Few bus routes serve the station; however, their less appealing operational plan has caused residents to opt for private car or taxi when traveling to the railway station. Looking at the station itself, it is poorly integrated with the surrounding areas and offers only limited commercial activities, eateries, and hotels. Furthermore, the current traffic layout follows a soviet concept where priority is given to private cars at intersections.

OPPORTUNITIES FOR KAUNAS STATION

- To promote a modal shift towards public transportation and non-motorized modes of travel, the existing station area should be reorganized and redesigned with a pedestrian-friendly atmosphere, strongly connecting the area with the city centre and neighbouring;
- Strong integration of the railway station area with central and living districts (at south) over PT and NMT new connectivity;
- Great potentials for establishing integrated urban public transport system considering connections to the existing bus terminal which offers international, national and suburban connections;
- Following the SUMP outcomes, the railway station area could be a perfect place for attaching sustainable sharing opportunities: car- and bike sharing services;



NMT CONNECTIONS AROUND THE STATION (SOURCE: PROJECT CONSORTIUM)

KEY STATION MOBILITY AND ACCESSIBILITY IMPROVEMENTS :

- Enable the option of linking the southern railyard site with the inner city by connecting both platforms using a combination of the historical and new bridging elements;
- Reactivate the accessibility to the pedestrian bridge (200 m. at the northeast) for all passenger groups, as well as for bicycles;
- Urban transport to be integrated with railway operation times and provide a better urban service with a limited waiting time and direct routes to central city areas;
- Redesign the existing PT stations to provide more spaces for waiting areas (also for PRM) with a digital real time information of PT operations;
- Relocate existing taxi stations to provide direct, barrier free access to the railway;
- Improve road traffic layout by prioritizing pedestrians/ cyclists at the M. K. Čiurlionio street, and surroundings. Introduce number of crossings (no underground passing);
- Consolidate automobile parking, introducing medium sized P+R at the south;
- Establish K+R stops in front of the railway station building entrance;
- Attached parks should be better accessed from the railway station for pedestrians and bicycles. The existing green zones to be reorganised as social and recreation areas;
- Establish strong cycling connections at the station leading to the city's downtown areas, parks, a large shopping area (Akropolis) to the north, and Sakura Park on the island along the river and Caraliaus Mindaugo Street;
- Station and surrounds accessibility to be developed considering a barrier free concept (for all passenger groups). Station facilities should be also designed for passengers in a wheelchair and with kids. Install urgent assistance call boxes at public places;
- Potential air- rail service: Kaunas airport is not connected by rail with the central railway station. The closest to the airport railway station is Palemonas (5 km to the south). Potentially, this area could be extended to the airport and redeveloped as industrial (freight) and e-commercial area. However, this is to be additionally studied.
- The Kaunas central railway station does not have a high land availability to develop a heavy e-commerce area. The focus could be on running trains on- demand for e-commerce companies. This is, however, will be limited to the size of parcels. A collecting and logistic room potentially could be a part of the new future railway station building. The Ülemiste terminal can be considered as an example of building design and connectivity;
- Establish urban logistic services at the station which will provide to passengers parcel machines;

5.7 VILNIUS INTERNATIONAL PASSENGER RAILWAY STATION

5.7.1 ARCHITECTURE AND URBAN FORM



RB VILNIUS TERMINAL (SOURCE: ZHA)

Rail Baltica HS train line will have an international terminal in the centre of Vilnius located 700m near the Old Town . Few years ago Lithuanian Railways and Vilnius authorities signed an agreement for the development of the station and its adjacent area.

Envisioning a transformation of the city's main station into a multi-modal hub and a mobility center, including 20-hectares land around the station. Called "Vilnius Connect", the project includes modern office buildings, new headquarters, trade, services and entertainment

- VILNIUS, Lithuania
- RB Vilnius Terminal
- 542 366 (Vilnius pop. 2021)
- ~6000 (Passenger p. day)
- Bus, Car, Bike, (Airport 3 km)
- Station on bridge with with integrated historical building
- 13 Platforms (7x local trains, 6 x HSR trains)
- Mixed commercial service ≈ 3500m² (total building size 11 640 m²)

places and the new Rail Baltica Terminal supporting the historical railway station. An ambitious international competition was initiated and won by Zaha Hadid Architects. The Consultant used their winning proposal "Green Connect" as a base for the analysis.



LOCATION WITHIN CITY



3D VIEW NORTHERN STATION SQUARE



3D VIEW CONCOURSE BRIDGE



CONCLUSION ON KEY IMPROVEMENTS:

- The converted station plays a major urban connectivity role: "Green Connect" creates a robust binding element between three neighbourhoods. Fully synchronizing their relationships and direct urban links to instigate additional cross-urban synergies is suggested;
- RB Vilnius Terminal creates opportunities for high level public and business interaction at two station squares. Vigorous interdisciplinary stakeholder involvement in these key areas is crucial for the success as well as preserving the integrated urban planning vision throughout the entire process of the design;
- The impressive design is distinguished by spatial generosity and interlinking existing and new spaces with each other. Further verification of passenger flow and vertical service capacities at traffic nodes with challenging grade level differences is suggested;
- RB Vilnius Terminal hosts a substantial room program inside a multistorey building with potential of widespread functional offerings to attract supplementary customer groups beside travelers and to become a commercial DESTINATION .The current room program appears well-balanced and allows liveliness and vibrancy throughout the building:
 - Boosting commercial provisions in the historic station with focus on interaction with the public urban space is suggested;
 - Further improving access to the mezzanine floor above the concourse hall creates wider business opportunities;
 - Narrowing the commercial functionality of the station underpass enhances space use and clarifies relation to terminal bridge.
 - Allowing for natural daylight and improved views towards entrance areas would enhance spatial qualities
 - Promoting an interior connection between Public Transportation Terminal and Railway Station enhances pedestrian flows and can create a synergies between retail provisions
- Vast use of wooden materials in the new construction increases occupant connectivity to the natural environment. Lush green zones in front the station anchor recreational aspects, biodiversity, sustainability visually and functionally within the project. The Consultant encourages to implement such ambitious green building strategy to express sustainable design goals;

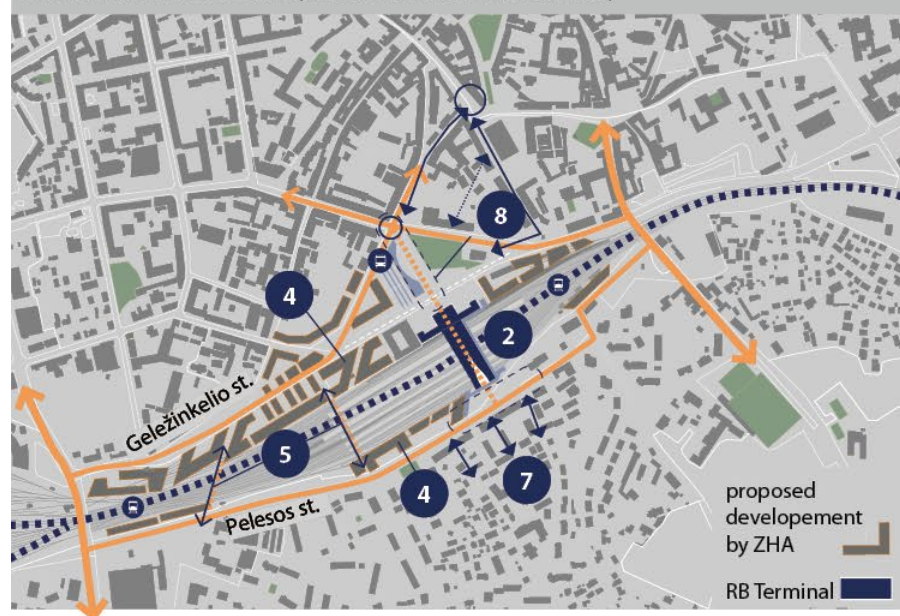


RB VILNIUS TERMINAL (SOURCE: ZHA)

Parts of the today's Railway district are still characterized by its industrial use but same time it developed a unique atmosphere through recreational land uses and cultural venues. City icons like Halės Market and the surrounding Art Nouveau buildings are nearby. Nevertheless, the station district is situated at a challenging border location between a vibrant historical urban pattern and peripheral underdeveloped industrial and residential area - south from the rail tracks. The city vision and ZHA's architectural competition proposal predicts a major conversion of the area between Geležin-

kelio and Pelesos streets to a modern multifunctional community for business, mobility, recreation, leisure and green areas. The new urban structure and station building will bridge and connect the Naujininkai district with the New and Old Town. By reconfiguring the city's transportation hubs, densifying the area, and redefining Stoties Square, the district will impress with a new vitality that will drive further developments. The design aims to transform the railway station from a barrier in the city to one that connects.

URBAN SURROUNDING (SOURCE: PROJECT CONSORTIUM)



URBAN ANALYSIS

The following points refer to the numbered areas indicated on the maps.

1 HISTORICAL RAILWAY STATION AND RAIL BALTICA TERMINAL: A new 150 meters long terminal bridge derives its shape from local context (inspired by the existing neoclassical station) and glides gently across the rail tracks to transform into the second main entrance hall at the Naujininkai district. The architecture states a clear identity and combines successfully the Old and the New.

2 THE TERMINAL AS A STRONG URBAN LINK: The spectacular new terminal bridge will unite the inner city to the Naujininkai district. Passengers can cross and access all rail tracks through the bridge and an underpass. The project shows a high level of urban integration. To further optimize the natural wayfinding and efficient passenger movement a careful circulation verification - that focuses on the challenging terrain height relations - is suggested.

3 STATION SQUARE - STOTIES: The proposal relocates the current bus terminal closer to the train station. The design provides an open and welcoming environment. The central axis of the station continues as a wide walkway towards direction Old Town. The western side of Stoties square will host an attractive multi-functional Public Transportation Terminal. The building forms a successful extension of the open park landscape. The Consultant suggests an even a stronger retail presence to take full advantage of its location alongside the main customer route.

4 GELEŽINKELIO AND PELESOS STREET DEVELOPMENT: The adjacent building stock alongside the rail tracks will be converted and densified to offices, workshops, retail. Valuable buildings such as a rail service depot complex should be adapted and preserved. The concept has a major potential to activate the southern part of the New Town and the Naujininkai district. The consultant suggest to concentrate retail at the station square.

5 NEW TRAVERSES: Beside the terminal there are multiple bike and pedestri-

an passages in distances of 200-300 m planned. Interlinking Naujininkai district and the city center will have a positive catalytic impact on the peripheral district.

7 LIMITED INTERACTION - NAUJININKAI DISTRICT: The typological character of Naujininkai area shows a diverse mix of apartment blocks and small-scale wooden housing. The urban fabric and road network corresponds only passively with the new development. The Consultant suggests a sensitive urban modification to create a stronger relationship.

8 OLD TOWN LINK: Only few steps away from Stoties sq. the attractive Old Town is introducing its atmosphere. This direct proximity is from major importance especially for international passengers. Strengthening walking routes from the stations square via Pylimo and Sodų Street and creating new traverse links through the closed city block at Hotel Panorama would be beneficial.

9 INDOOR CONNECTION BUS-RAIL: The consultant sees a true potential in an underground connection between PT Terminal/Car parking hall and train station to create a more convenient functional relation.

10 NAUJININKAI CENTRE: At the south side of the terminal an entrance lobby with ticket hall and small commercial premises interrelate to the new established Pelesos square. This small-scale counterpart of Stoties square is extremely important to anchor the station to the neighboring district. Limited space and steep terrain require integrative landscaping solutions.

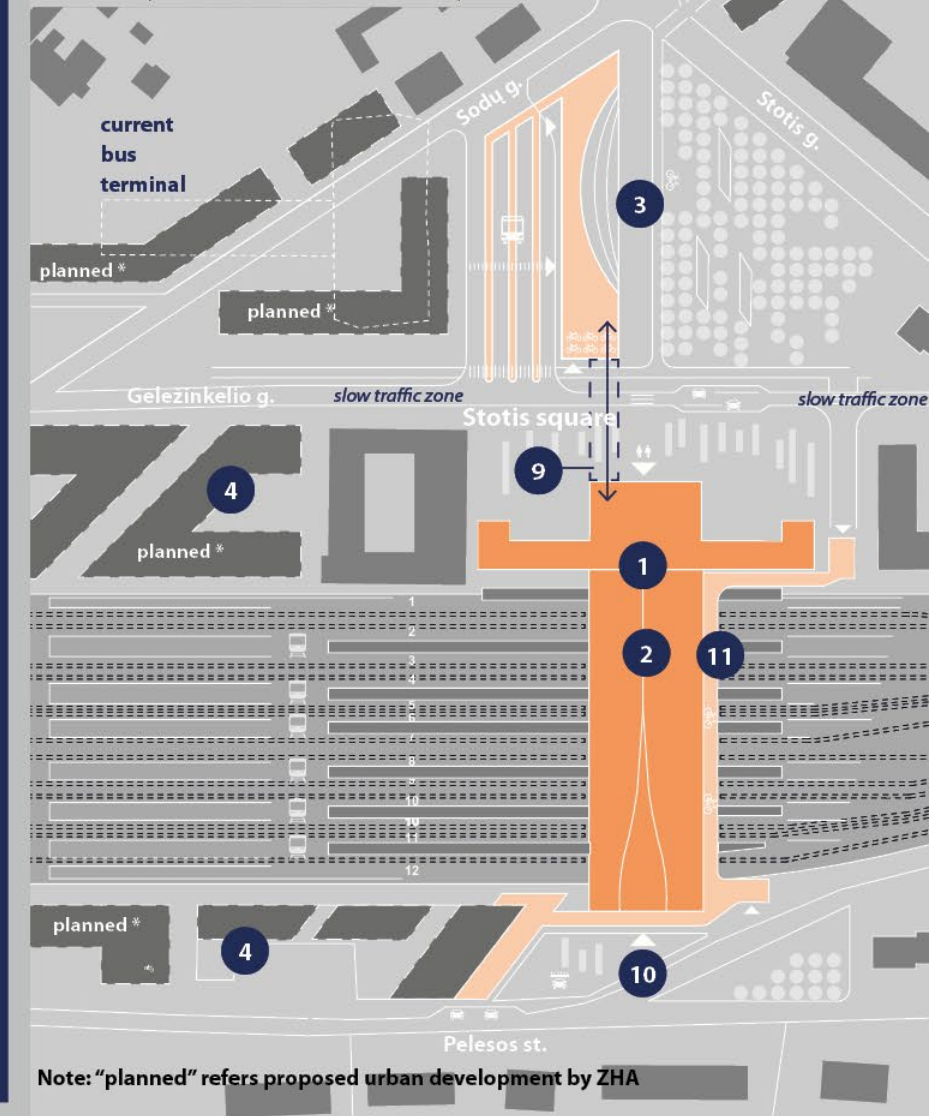
11 BIKING BRIDGE The terminal layout indicates to separate the pedestrian underpass from the bicycle traffic. An exciting bridge eastside of the concourse facade provides bike lanes with dramatic views. The Consultant suggest reviewing possible alternatives to the bike elevator which will create waiting and might discourage residents using that route.



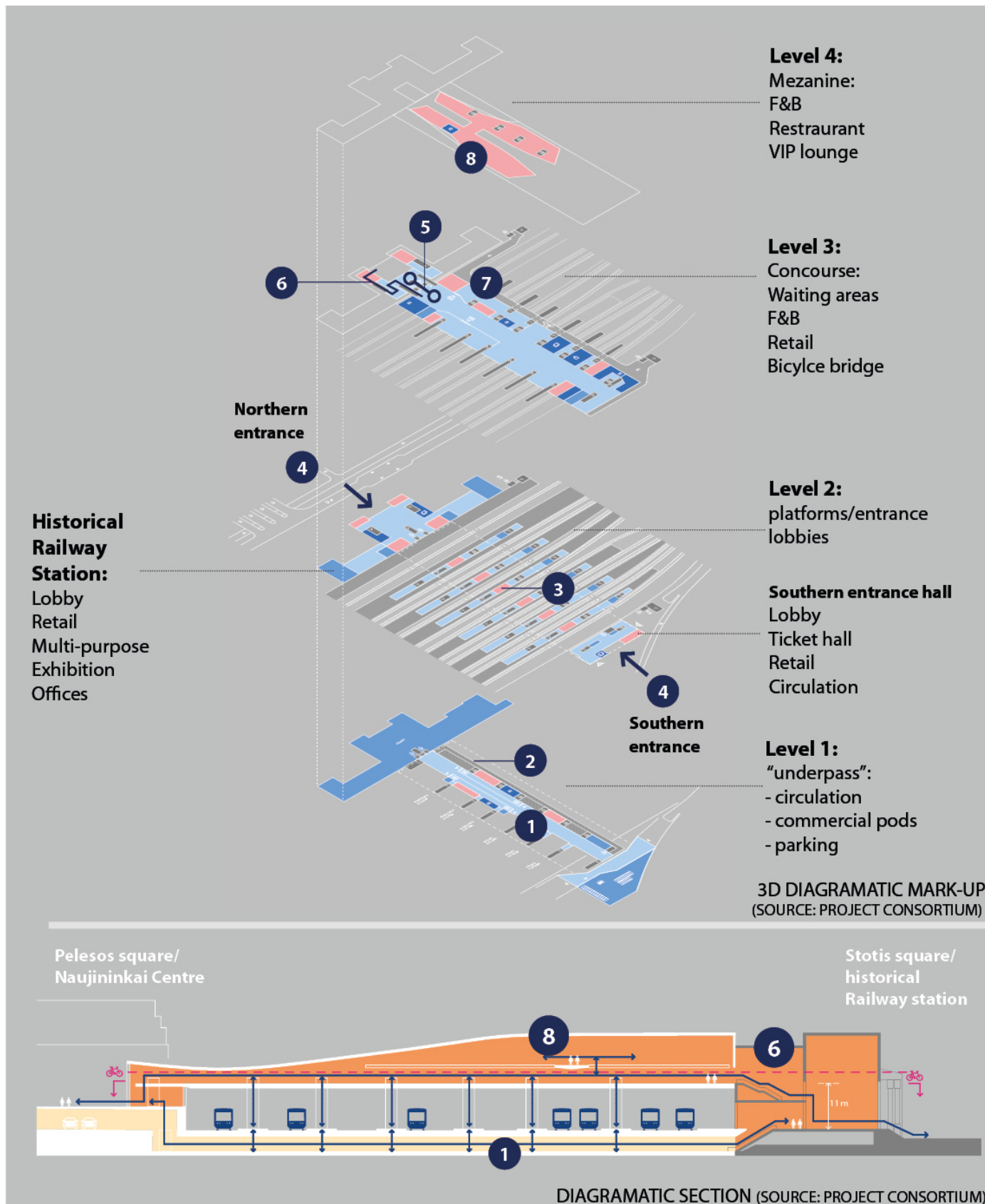
URBAN PERFORMANCE LEVEL - ORIENTABILITY AND VIEWS (SOURCE: PROJECT CONSORTIUM)

The urban set up and spatial qualities of the northern station square in interrelation to the route towards the Old Town performs with excellent wayfinding, orientability and views. Slightly reduced qualities can be seen on the southern entrance square with limited visibility from the fragmented nearby Naujininkai housing area.

SITEPLAN (SOURCE: PROJECT CONSORTIUM)



5.7.2 FUNCTIONALITY



The concept reimagines the existing railway station hall by removing temporary kiosks and office spaces in favor of a more open plan. The Grand hall of the station serves as impressive meeting, circulation and retail space. The entrance points of the Railway station and the Naujininkai centre are logically placed and well integrated into the urban context. Both have direct access to the underpass and station bridge as well as providing customers with service points and retail. There is a clear spatial hierarchy between the station bridge and the underpass. One serving as a main space and the other as a quick bypass or access route.

The following points refer to the numbered areas indicated on the map and section.

1 UNDERPASS WITH LIMITED ATTRACTIVITY DUE TO SPATIAL CHARACTER

The 140 m long narrow underpass lacks natural light, a strong visual connection towards entrance lobbies and faces challenges due to large grade level distances towards the Pelesos Street Lobby. Developing it into a simple circulation zone with clear wayfinding, added skylights and less retail focus is suggested.

2 LOADING AND SERVICE

The design presents a single loading bay at the east wing of the railway station feeding to a BOH corridor/elevator system. The Consultant suggests to verify commercial areas vs. service/loading area capacity. An additional larger loading area could be considered near the southern parking hall entrance.

3 COMMERCIAL ZONE AT PLATFORM LEVEL

Each platform provides a small scale (25 m²) retail area. Clear wayfinding is needed to promote that functionality - especially when entering the platform area by escalators or stairs. Innovative operation such as staff less retail can be explored.

4 VIBRANT RETAIL TO SUPPORT THE ADJACENT URBAN TERRITORY

The converted station interplays with the Stoties square and establishes a strong public urban value for the area.

A similar character and functionality has been designed for the Pelesos square where the Naujininkai centre will activate the neighborhood. Efficient commercial use in the historical station and around the station squares is suggested to take most advantage of the prime location. Including a vital mix of commercial, cultural and service provisions with direct access to outdoor terraces and urban spaces to anchor the terminal into the city fabric.

5 STRONG ARCHITECTURAL RELATION BETWEEN GRAND HALL AND NEW BRIDGE (OLD AND NEW)

The interrelation between Old and New will enable an impressive memorable experience along the passenger route from the Stoties entrance lobby via an intermediate level towards the concourse bridge. To preserve and further strengthen the visual connections between both parts is beneficial.

6 CHALLENGING ACCESS ROUTE FROM GRAND HALL LOBBY VIA INTERMEDEATE FLOOR TO BRIDGE LEVEL

Due to the major grade level difference (11 m) between entrance lobby and concourse bridge an efficient and smooth escalator/elevator route is essential. The current customers route follows a winding pattern, a detailed traffic simulations is suggested to create an optimized design. The significant grade level difference and

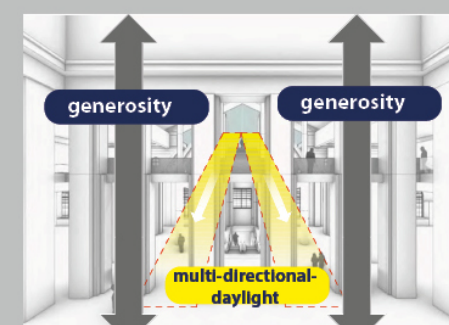
the total distance will be challenging for passengers with luggage or elderly. Further developing a well-balanced vertical access routes system through lifts and escalators is suggested.

7 VAST SPACE OF CONCOURSE BRIDGE ALLOWS FOR AGILE DESIGN CONFIGURATIONS

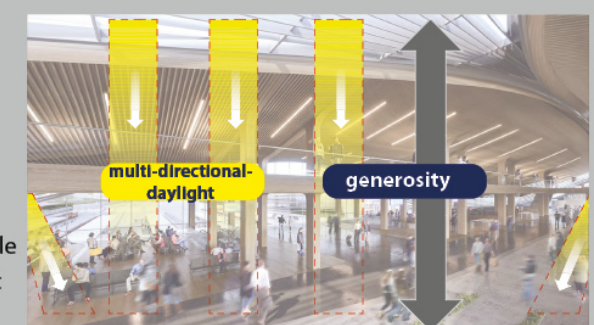
The open, spacious concourse bridge provides a positive experience for both passengers and urban pedestrians alike. It is easy to find routes to the platforms and lounges. All services areas are well located near the platform access points. There is a considerable amount of retail space throughout the station and on the bridge, which will enhance the customer experience of the station. The simple layout of the gallery allows multiple spatial configurations. Depending on demands additional retail zones can be beneficial. The Consultant suggests to investigate in a more centralized retail mid-aisle solution which can allow for more flexibility and increased visual presence.

8 IMPROVING ACCESS TO MEZZANINE:

The provision of a commercially used mezzanine increases the attractiveness. The Consultant observes challenges in terms of space use and access. Direct access from both main entrances would open the space for a wider customer group. The size of the mezzanine is too large to support only train passengers needs.



Both from a spatial and daylight point of view ZHA's "Green Connect" design proposal offers a high quality performance level. Most of the main customer areas offer ample room sizing and sufficient natural daylight.



3D DIAGRAMATIC MARK-UP: Grand Hall, Concourse Hall (SOURCE: ZHA + SOURCE: PROJECT CONSORTIUM)

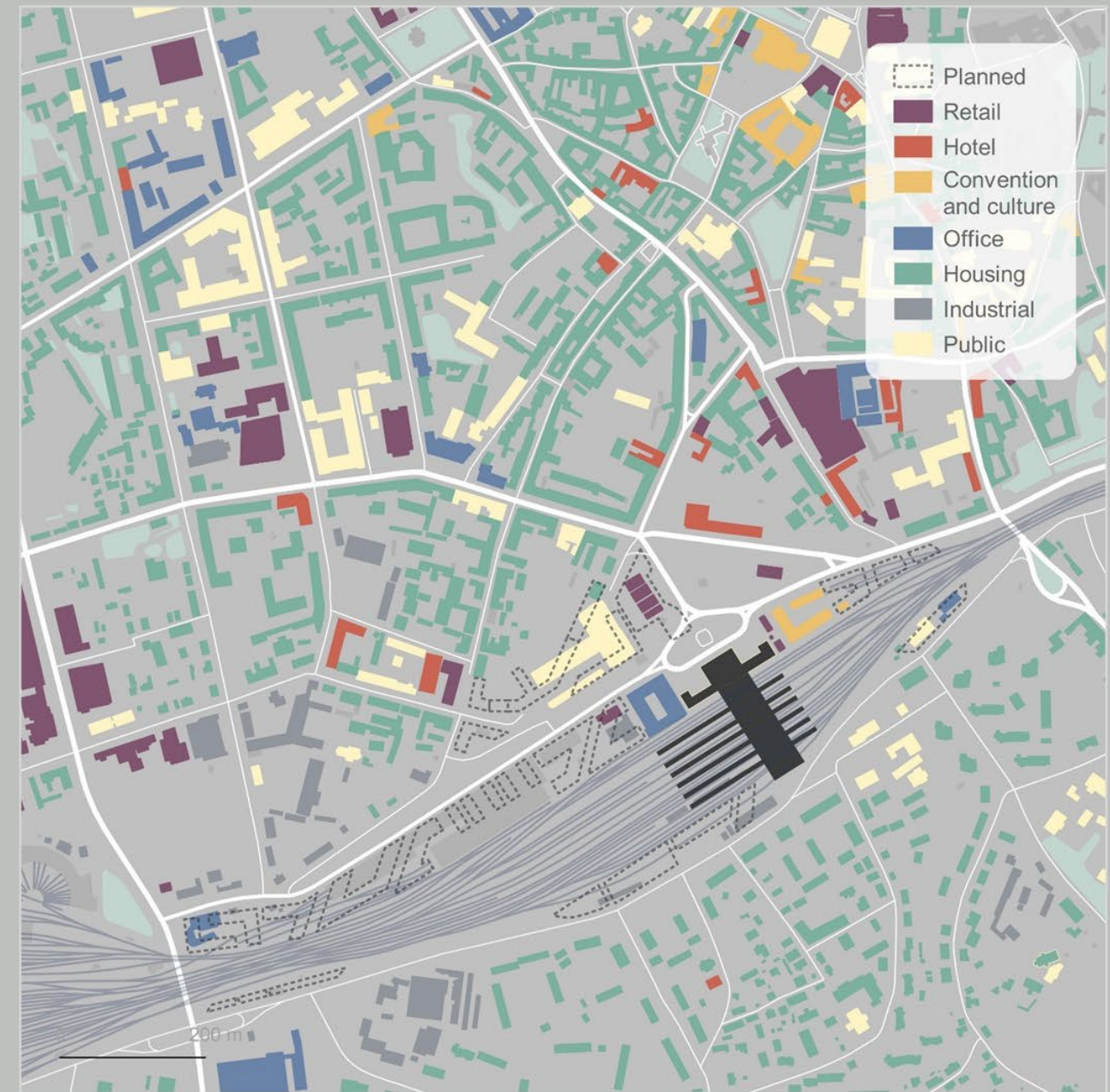
5.7.3 LAND USE

Assessment of the existing plans and land-use diversity

Southside of the station area is dominated by housing with small apartment buildings and a lot of green zones between these buildings. Areas next to the railway tracks on both sides have major potential for real estate development. Especially areas in the north-west side from the station have potential to complement the current underdeveloped blocks. The existing bus station is located next to the train station and new building are being planned to completely reshape the area. On the northside of the station dense housing areas reach toward the Vilnius city centre. There are a few hotels and office buildings as well as small retail blocks in the area as well. Large green areas are located next to the station building on the way to the city center.

Consultant made the following main notes:

- The current situation in retail draws a picture of good potential for significant development in the station area. The current plans indicate similar conclusions by the authors. Large over 30 000 sqm reservation for land mixed-use but retail-led entity has been proposed next to the station. The proposed location seems to be off from busiest pedestrian flows and may not fully utilize its potential. The consultant proposes further studies for additional retail locations on the main axis toward the city center, for example next to the bus station.
- The existing Vilnius station architecture has brought many new ideas to develop and modernize the 19th century station and its surrounding area. The winning proposal calls "Green connect" and it aims to make the station site a new focal point and a destination not only for the transient public using the transportation hub but for the city of Vilnius and its local community.
- Improving international and domestic railway connection increases interest toward the area both from business and living point of view. Existing plans show high and realistic level of ambition to fully utilize the GVA potential deriving from improving railway connections and urban development. On the northside and southside high number of office buildings near the tracks form a convincing new workplace area.
- Also, land-use efficiency is proposed to be left quite low when it comes the direction of city center. The need and basis for this solution must be carefully studied in order to avoid losing significant value-adding opportunities. Housing, offices, retail and accommodation would all fit in urban form to create good vibrancy to the area. Its important to understand that sometimes parks or other public spaces in wrong scale can lead to safety issues in the station surroundings if the density of activities is left too low. This should be also considered in further development process.



CURRENT LAND-USE DIVERSITY AND PLANNED NEW DEVELOPMENT AROUND VILNIUS STATION
(SOURCE: PROJECT CONSORTIUM)

CONCLUSIONS ON KEY IMPROVEMENTS:

- The real estate market is looking healthy and market info supports locally relatively high possible added volumes for each category. Also retail has major opportunities in this case.
- The plans of developing a new significant office-led workplace area next to tracks seems convincing, especially on northside and utilizes the GVA potential well as well as other infill proposals. Only the retail-led entity is seen challenging by its location and further studies are advised regarding better solution along the main pedestrian routes.
- Also in general, the direction of the city centre is proposed to have quite low density both in building volumes but also in services. The consultant challenges the thinking and advices further studies to make sure that the solution is well based and does not waste great potential, what these plots have for each use.

5.7.4 COMMERCIAL DEVELOPMENT

Retail symbiosis

The station area is located on the southside of the Vilnius city centre which includes number of offices, housing, accommodation but it does not include significant number of retail. Mostly the units are grocery stores or other small brick-and-mortar shops with only very local catchment area. The current situation draws a picture of good potential for significant retail development in the station area. Big reservation for mixed-use but retail-led entity has been proposed next to station, but off from busiest pedestrian flows. This way it does not fully utilize its potential. The consultant challenges the thinking and proposes further studies for retail locations on the main axis toward the city centre, for example together with bus station or replacing it.

The station building's proposal includes over 3 000 sqm of retail premises. The consultant sees that the station building has relatively good potential for high number or retail, but the focus would be in quick purchasing services. Small grocery stores could be studied for both sides of the station along the main routes.

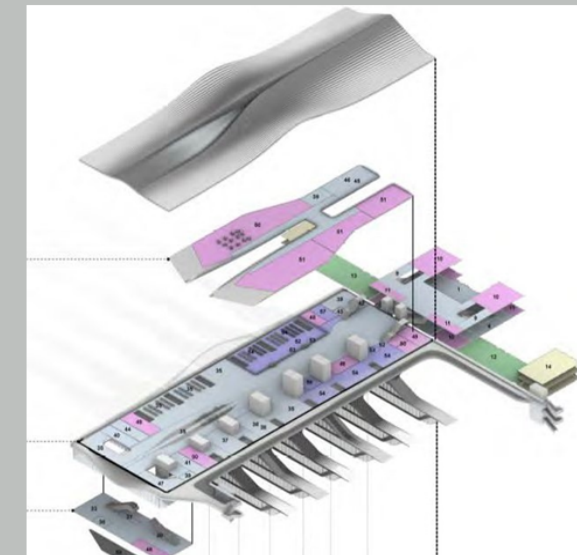


RETAIL AROUND VILNIUS STATION (SOURCE: PROJECT CONSORTIUM)

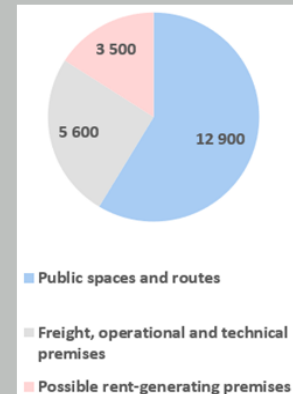
Commercial concept and functionality

Vilnius station's proposed commercial concept includes diverse basic services in which most of the premises are placed in the historical building and the mezzanine floor on top of the new station side. Small retail spots will be located at the new station floors. The structure proposal raises the following concerns and notions:

- In general, the solution targets to utilize the retail potential well and with further development well working rent-generator can be achieved.
- The biggest share of retail premises are located on the fourth floor with no clear commercial access. This separates the services and highest pedestrian flows in a way that creates problems. These could be redeveloped so that visibility and accessibility of the services for busier routes are maximized. High number of floors could possibly be decreased, and more united and cost-effective solution could provide more effective business environment for tenants.
- Small kiosks and retail spots at the platform and underpass level can be questioned and more centralized offering is advisable.
- Small grocery stores could work well in both ends of the station buildings directly connected to main routes. This should be carefully considered.



STATION'S FUNCTIONAL LAYOUT (UPPER FLOORS) AND SPACE TYPE DISTRIBUTION (SOURCE: PROJECT CONSORTIUM)



CONCLUSIONS ON KEY IMPROVEMENTS:

- The station area seems to have a good potential for significant retail and other commercial development.
- Currently the new shopping mall is located far away from the busiest pedestrian flows and it is not fully utilizing potentials. The consultant proposes careful studies for better location on the main axis toward the city centre, for example together with bus station, replacing it or other possible plots.
- In any case, street level retail should be added on the main pedestrian routes toward the city centre to form a vibrant urban environment as high potential exists.
- The station building's proposal includes significant amount of rent-generating retail premises, and the proposal and its volume is seen potential when focusing on fast purchasing services. Still, the plan has several clear challenges that needs to be solved.
- The mezzanine floor has attractive idea but considering the problems second floors usually have in this scale in terms of attracting customers, the potential needs to be carefully considered. The consultant advises to seek more centralized offering with better accessibility and visibility. Could decreasing the number of floors increase the cost-effectiveness and functionality at the same time?
- Small kiosks and retail spots in the platform and underpass level can be questioned and more centralized offering is advisable.
- Content-wise, small grocery stores could work well in both ends of the station buildings directly connected to the main pedestrian routes.

5.7.5 MOBILITY



OVERVIEW OF THE STATION LOCATION (SOURCE: PROJECT CONSORTIUM)

The railway station in Vilnius currently plays an important role of connecting urban public transport routes, as well as giving travelers direct access to the city's largest bus station. The location of the station is quite central, therefore establishing an attractive mobility will be a critical element of successful railway station organisation. The north part of the existing railway station has an access to the old city over the Stoties square. It is the most crowded area with number of commercial and business activities. Moreover, a high density of jobs is concentrated in this city district. The south part is mainly characterised by the housing estate, as well as some small shopping areas. The connection between both parts is possible over the long pedestrian bridge. Cyclists connections are not established at all. The station, therefore, lacks on adequate urban integration to an important housing stock.

OPPORTUNITIES FOR VILNIUS STATION

- The railway station district could have a great potential of developing TOD and provide to residents strong and attractive mobility point in the city. Under this category, the consultant focuses on redeveloping the station as **multimodal transfer hub**, which allocates number of sustainable sharing offers;
- That means that the future railway station area to be designed to daily allocate number of travellers, especially in peak hours;
- The future vision of the railway station should be adapted to the local environment and ensure the smooth movement of urban, suburban and daily visitors at the station;



EXISTING STATION (SOURCE: PROJECT CONSORTIUM)



OVERVIEW OF THE STATION DESIGN (SOURCE: PROJECT CONSORTIUM)

KEY STATION MOBILITY AND ACCESSIBILITY IMPROVEMENTS :

- Redevelop the station as a multi-modal interchange hub between different means of transportation (trains, buses, cars, bicycles and some of shared mobility services);
- Establishing operating rules for taxis on both sides of the station and introduce taxi ranks that allow 24 hours parking, giving travellers more options for direct taxi rides;
- Consider fast connections between the Vilnius Old Town and the future station via trams, dedicated bus lanes or other rapid transit modes;
- Assigning parking places with appropriate charging infrastructure for e- vehicles;
- Introduce operational rules at both K+R points at the railway station;
- Integrate pedestrian and cycling path solutions with the existing and planned city network;
- Reduce walking time between platforms and the PT terminal through a well- designed, easily accessible underground tunnel for NMT;
- Future bicycle paths could be introduced by highspeed connections, which should be visible at the railway station and have clear assigned rules, priorities among cars, pedestrian traffic. At intersections bicycle traffic should be regulated by traffic lights;
- Establish additional bicycle parking racks at the Pelesos street at the railway entrance;
- Allocate a bicycle charging infrastructure and a repair shop;
- Establish a low traffic zone with pedestrian and cyclist priorities at the Stoties square;
- Allocate shared micro mobility services (e- scooters and bikes) at the station. These modes could be used as a last mile connectivity;
- Improving the PRM access at the railway station, especially at the open public place at the Stoties square;
- The international stations should provide for PRM special assistance services on-board and within the building area;
- Vilnius international railway station is currently connected to the airport. Potentially air- rail could be introduced at both stations. At the central station it could be located at the BOH level;
- The Vilnius international railway station could potentially allocate service for private e-commerce services. The focus could be on running trains on- demand for e-commerce companies or private users. At the central station it could be located at the BOH level;
- Establish urban logistic services at the station which will provide to passengers parcel machines;

5.8 STATION OPERATION AND MANAGEMENT

Under this part the consultant summarised international examples from lessons learned, which could be applied to all RB stations:

5.8.1 GENERAL RAILWAY STATION OPERATION AND MANAGEMENT

An international railway station within an **urban context** plays a **crucial role** for creating a **positive passenger experience** as these stations are where travellers start or end their journeys. Therefore, a **station building**, and its surrounding area should **ensure a positive user experience**: accessible, welcoming, secure, comfortable, fit for purpose and **fully adapted to various passenger group needs**, which also a part of station operation and management approach.

According to best practice, efficient railway station building, and its **facilities management** is often run by only **one company** and is managed in a holistic, as well as intelligent way using **smart technologies** which could significatory **reduce management costs** and **optimize resource management**. To the right, the consultant present the example of ÖBB (state owned Austrian railway company) organisation chart, where all railway station operation and management are under one organisation.

Moreover, in case when an **international railway station** is a part of **TOD** including a mixed use of residential and commercial areas designed to maximize access to public transport and often incorporates features to encourage transit ridership, a station operation and management **shall include a complex cooperation structure with stakeholders** in order to keep the railway building as an important part of a TOD in the area. Building and managing an attractive railway station should first of all be a people-oriented endeavour and then directed to generate revenues.

There are several operational models and organisational structures that might be considered for Rail Baltica International Stations, such as an operational model where the manager:

is responsible both for stations construction, railway service operations, as well as for setting a communication and stakeholders framework between railway companies, city decision- makers and private companies

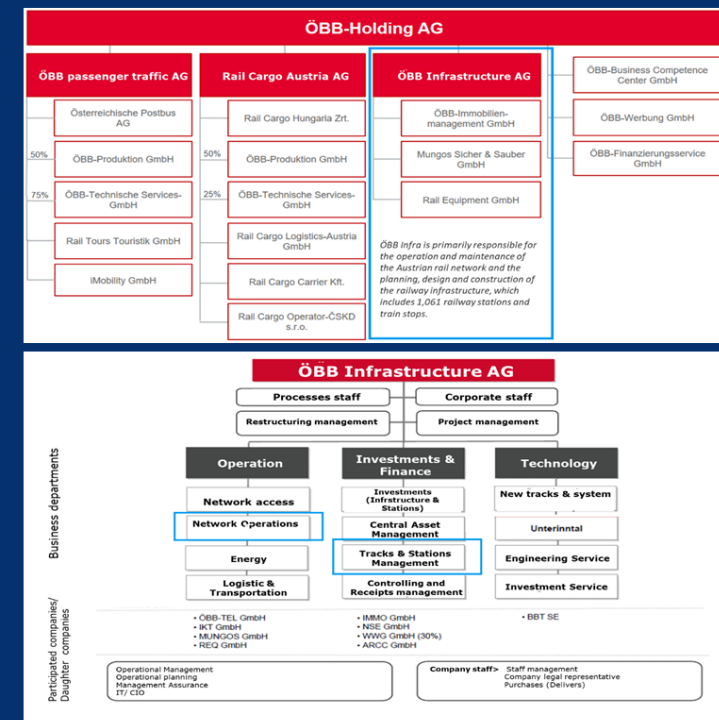
is responsible for building international railway stations, and later supports the existing railway operators to manage buildings. In this case the responsibilities of putting railway infrastructure remains under the Manager

Is responsible for operation and modernisation of railway infrastructure in three Baltic States, as well as responsible to build international railway stations. Later buildings could be sold to the city or a future private company, or to investors. General railway service (trains) will be provided by existing county railway companies

builds, operates and manages international passenger railway stations, as well as responsible for railway infrastructure in three Baltic States, with a close cooperation with Cities Municipalities, Ministry of Transport, and obtain their support, and where possible subsidies. The existing railway companies in Baltics will remain to run railway service

It is **important to consider**, that a future railway station operator, and railway infrastructure operator (in case two different entities are involved in such operations) **must have strong communication tools** to create a harmonized passenger service not only within a specific city or country, but also at the international level given the nature of the railway corridor.

STATION OPERATION & MANAGEMENT CHART (source: ÖBB)



Under station operation the next elements and services are provided by ÖBB:

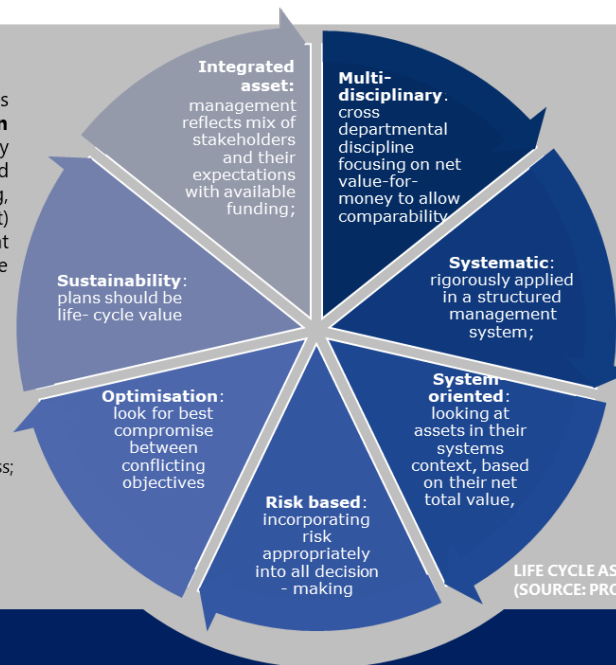
- Creating a full mobility concept at passenger railway stations;
- Developing urban logistic connections and services at passenger railway stations;
- Construction of railway stations, tracks and development relevant to operational systems;
- Market train service alignment and plan an economical route utilization;
- Manage daily train operation and capacity at each passenger railway station;
- Full passenger stations modernisation;
- Station Building Management;
- Ensure a well-functioning station and safe rail infrastructure;
- Produce traction current from hydropower;
- Ensure high safety, cleanliness and availability of customer information at train stations;

5.8.2 STATION LIFE- CYCLE ASSET MANAGEMENT

Providing International **railway service** is a **complex operation**, which includes **railway infrastructure, related assets** (including rolling stock) and the **station buildings** themselves. To establish an **asset management system** for railway station facilities a **strong connectivity between the station operational and organisation strategy**, and **daily activities** of individual departments (planning, engineering, procurement, operations, maintenance, performance management) should be set. An operational strategy of a railway station asset management could also **include an option** where station facilities **management (assets)** are assigned to a third company which will run daily business and management.

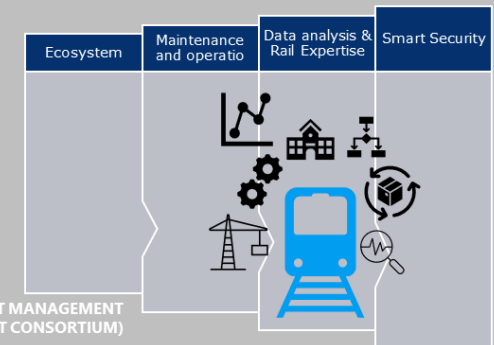
To guarantee an **efficient life cycle management**, the first stage shall start from **developing a general station concept**, creating **(sustainable) design** of the building and later its construction and operation (based on construction, operation, maintenance and decommissioning elements). It is an important set up, because at different implementation phases there are possible **interfaces** between the **railway station** and **railway infrastructure system**:

- Traction power accommodation;
- Electrical clearances from overhead lines;
- Communications equipment and rooms;
- Connections to the electric grid and power supply equipment;
- Sufficient and safe maintenance access;
- Trackside services equipment;
- Integration with rolling stock;
- Train dispatching,
- Security systems and control;

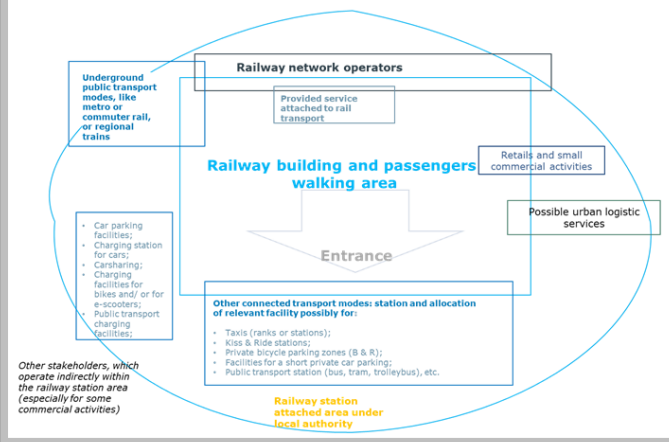


It is quite often that **railway station asset management** is done by using **BIM system**. This IT system allows managers to **structure asset data**, and **better planning of needs and supplies, assistance in maintenance, archive interoperability** between other applications.

MAIN BIM SYSTEM FUNCTIONS (SOURCE: PROJECT CONSORTIUM)



5.8.3 STAKEHOLDER ENGAGEMENT AND COOPERATION



According to the best international examples, the successful operation of a railway station is only possible through a **clear dialogue with stakeholders** and **cooperation** with them. A **cooperation** with local urban transport companies & mobility providers could **enhance passenger trips flexibility** and **quality** of international **railway station services** and directly impact on attractiveness of a railway transportation, which should be the backbone mode, especially for rural and international connections.

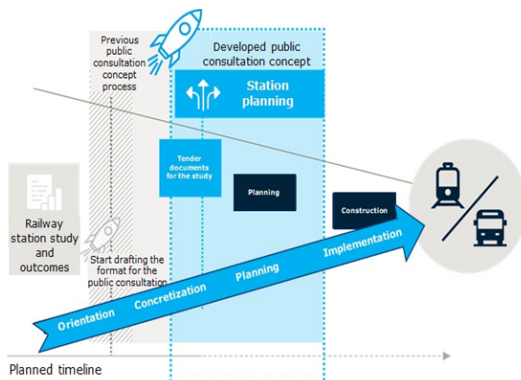
Within **urban space**, an international railway station should provide a seamless and **integrated multimodal transport system**, in particular by connecting large urban centers from high-speed rail to urban sidings, with additional connectivity to peripheral urban areas where the rail network is not present.

Moreover, to attract a high number of station visitors a service like commercial/retails developments should be established in

Establishing **strong cooperation** with private companies could bring **unique concepts** where a station building is an attractive business for **international food, fashion famous networks**. On the left, the consultant visualises a clear interaction and allocation of various above- described services and urban transport modes at a railway station.

Additionally, a passenger **positive travelling experience** implies **high digital solutions** through which **all booking, and payment** options are unified and at the end create a smooth, fast and simply unproblematic movements. A **unified digital platform** helps all transport parties to transparently **distribute all incomes** from sold tickets and **create a trustful cooperation** between **city government & transport providers**.

5.8.4 PUBLIC CONSULTATION



VISUALISATION ON PUBLIC CONSULTATION DURING VARIOUS STATION DEVELOPMENT PHASES (SOURCE: PROJECT CONSULTANT)

A railway station is a place **organised** and **designed** for **passengers** and station **visitors**. Therefore, a **station building**, **access to railway platforms**, **services** being allocated (commercial, urban transport, social places, etc.), station connectivity (central & living districts) are the **most important topics** being **aligned** with **public consultations outcomes**. Sharing concept ideas with public representatives could encourage them to come again and again to a railway station, help young people to stay there, make the station work better for the public, as well as even stimulate future investments.

Public consultations are the **strongest tool** to **create** a really **functional space** where **railway service** could be **harmonised** with other **public transport** modes, including **private vehicles**: cars, bicycles, which are still one of the important modes of personal mobility. Truly **safe** and **NMT** accessed **design** of the station could be obtained only **in a line with public needs** and **their critical comments**.

A guideline on how and when, as well as for what reasons to hold public consultations should be organized before and after railway station constructions in three Baltic States. **Once the final concept will be improved, Rail Baltica shall issue a study on developing and holding public consultations for all international stations.** It is expected that the **local Government** (City Municipalities, City Councils, Ministries of Transport, etc.) will provide a **strong support** on **promoting railway stations** and their **future public consultations**.

Within different station development phases it will require to connect various groups of public representatives and stakeholders:

- Phase 1:** invited representatives and organisations should have decision – making rights and give a feedback on: improved public transport connectivity, construction impacts, business disruption, operational changes, urban design features, environment and heritage, land impacts;
- Phase 2:** city and rural communities (residents) to present outcomes and design ideas to obtain their feedbacks;
- Phase 3:** participants from Phase 1 & 2 to give a clear action and completion plan;
- Phase 4:** future consultations when any changes in station design or operation comes;

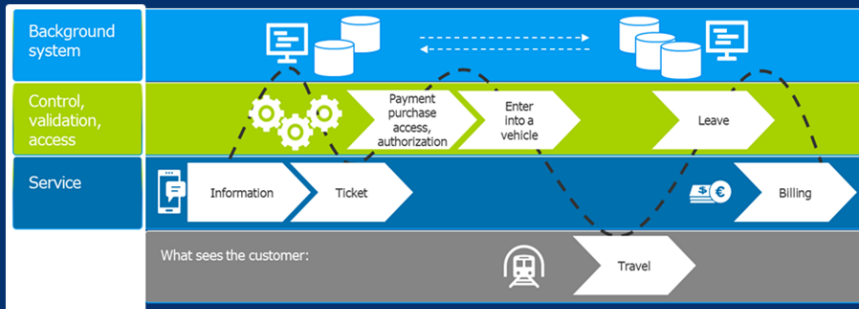
Form of holding public consultation could be:

- Formal official consultation processes;
- Direct interviews (in person/ per phone);
- Open online engagements;

For organising public consultations possible channels could be utilised:

- Official website of the Transport Ministry;
- Official city website;
- Project website (if any);
- City advertising channels;
- Newsletters and publications;
- Displays/information stalls;
- Direct invitations using official letters;
- Social media;
- Public videos in open spaces;
- Media articles/releases /kits;

5.8.5 DATA COLLECTION AND INTEGRATION



VISUALISATION ON DIGITAL REQUEST TO PURSUE TICKET FOR VARIOUS TRANSPORT MODES (SOURCE: PROJECT CONSORTIUM)

Digital system usually built in the way of creating a mobility eco system, synchronising booking options, possible passenger automatic check in-/ check out.

Nowadays, **digitalisation** and **smart data** play an **important role** in creating **integrated transport connections** in an urban space. **Data** is the **most important** resource to **create** or **improve passengers services**. For example having a data of passenger travels, their traveling chains a railway station could better estimate **needs of commercial service**, understand if there are **high potentials** for **connecting new mobility services**, as well as where they could be **efficiently allocated** **improve accessibility** at international railway stations, etc..

The digitalisations could create additional benefits for railways by:

- Offering connected railways by providing reliable connectivity for safe, efficient and attractive railways
- Enhancing customer experience by offering better and added value for customers
- Increasing capacity by enhancing reliability, efficiency and performance of railways
- Boosting rail competitiveness by making the most of transport data

Improving digital solutions could also make it possible to:

- Synchronise mobile applications offering real-time information about vehicles in motion, ticket purchase, etc.;
- Onboard infotainment services;
- Dynamic passenger, timetable information implemented at stations being integrated with all other PT modes;

6. KEY RECOMMENDATIONS FOR RAIL BALTICA INTERNATIONAL RAILWAY STATIONS

Below the consultant summarised only important and critical recommendations. Their details and descriptions are presented in the section 2 of this report.

RECOMMENDATIONS PER CATEGORY	Ülemiste	Pärnu	Riga central	Riga airport (RIX)	Panevezys	Kaunas	Vilnius
STATION OPERATION AND MANAGEMENT							
• Based on the benchmarking, investigate the most appropriate model for the operation and management of international stations;	X	X	X	X	X	X	X
• Establishing a clear communication framework with existing railway service providers in three Baltica States, and discuss required reorganisations (based on benchmarking outcomes);	X	X	X	X	X	X	X
• Developing a study on identifying the most sustainable station asset management system, and identify the most suitable to each of 8 international stations;	X	X	X	X	X	X	X
• Identifying life- cycle facility management and appropriate IT solutions, which could support in efficient management and costs saving(based on the benchmarking the BIM system is applied);	X	X	X	X	X	X	X
• Developing a stakeholder list (cooperation partners),	X	X	X	X	X	X	X
• identify their involvement (based on station implementation phased) and creating a strong stakeholder dialogues in all three Baltic States;	X	X	X	X	X	X	X
• Creating a framework for a future smart data, and data exchange. Developing innovation ideas on digitalisation of mobility services at railway stations;	X	X	X	X	X	X	X

RECOMMENDATIONS PER CATEGORY	Ülemiste	Pärnu	Riga central	Riga airport (RIX)	Panevezys	Kaunas	Vilnius
<ul style="list-style-type: none"> Developing an action and implementation plan for public consultations; 	X	X	X	X	X	X	X
ARCHITECTURE AND URBANITY							
<ul style="list-style-type: none"> Activating public, urban and commercial territories around the station, creating a natural urban mix concept; 	X	X	X			X	X
<ul style="list-style-type: none"> Increasing the visual presence of international stations by connecting to prominent adjacent buildings; 	X	X					
<ul style="list-style-type: none"> Full integration between railway stations, their strategic locations, excellent visibility and maintaining their presence in the local future developments; 		X			X		
<ul style="list-style-type: none"> Developing a dense network of traverse links; 	X		X			X	X
<ul style="list-style-type: none"> Promoting "destination character" in a surrounding square, with specific complementary programmes; 			X			X	
<ul style="list-style-type: none"> Developing a robust relationship between stations, their forecourt and a main street leading to the inner city in order to reactivate public and commercial prospects; 	X					X	X
<ul style="list-style-type: none"> Introducing an integrated urban planning process combined with stations development to enable maximum socio-economic benefits; 			X	X	X	X	
<ul style="list-style-type: none"> Using all opportunities of peripheral stations to support existing and enabling new business parks and residential real estates; 				X	X		
<ul style="list-style-type: none"> Considering a high-level contextual integration and avoiding barriers in future city expansion areas; 		X		X	X		
<ul style="list-style-type: none"> Establishing a right balance between impressive architectural approach and a compact stations functional volume; 			X			X	X

RECOMMENDATIONS PER CATEGORY	Ülemiste	Pärnu	Riga central	Riga airport (RIX)	Panevezys	Kaunas	Vilnius
<ul style="list-style-type: none"> Investigate towards an agile and flexible station typology that allows future coupling and traversability; 						X	
FUNCTIONALITY							
<ul style="list-style-type: none"> Exploring tailored functional provisions that act as attractors for supplementary customers; 	X		X	X		X	
<ul style="list-style-type: none"> Strengthening/establishing a central meeting and arrival point at the station by unfolding a strong commercial and spatial presence; 	X	X		X			
<ul style="list-style-type: none"> Verifying an optimisation to achieve a higher level of compactness, shorter internal walking distances, and a supportive layout with improved synergies between access points; 		X	X		X		
<ul style="list-style-type: none"> Avoiding large monofunctional spaces by promoting diverse programmes that act as attractor; 			X			X	
<ul style="list-style-type: none"> Improving access to decentral station areas to guarantee vibrancy; 			X				X
<ul style="list-style-type: none"> Enhancing interplay between cyclists, pedestrians travellers and customer access points to avoid "collisions"; 	X		X				
<ul style="list-style-type: none"> Developing a balanced correlation between customer circulations and service areas/urban networks; 	X		X				X
<ul style="list-style-type: none"> Promote a clear functional hierarchy (transportation/commercial functionality) between underpasses and bridges. 	X		X				
<ul style="list-style-type: none"> Introducing architectural elements that provide natural daylight and increasing visual views and openness to the underpass; 	X		X				X
<ul style="list-style-type: none"> Promoting flexible and agile spatial systems; 	X				X	X	

RECOMMENDATIONS PER CATEGORY	Ülemiste	Pärnu	Riga central	Riga airport (RIX)	Panevezys	Kaunas	Vilnius
LAND USE							
• Introducing and enabling efficient, mixed land-use around stations both sides of the tracks;	X	X	X	X	X	X	X
• Preparing an aerial development program together with key actors and utilize market dialogue models if better understanding about investors' perspective is needed;	X	X	X		X	X	X
• Take the busiest and most important transport routes into consideration when placing new retail entities to new urban fabric;							X
• Preparing a study on exploring possible potentials for residents and creation of workplaces due to the new fast rail connections to the Baltic capital cities;		X					
COMMERCIAL DEVELOPMENT							
• Consider improving the efficiency of station's form in order to improve the economic balance;	X	X	X				
• Creating a true mixed-use station entity that offers multiple types of commercial services together with high-quality paths for crossing;						X	
• Locate retail premises in more unite form along the busiest pedestrian routes and ensure excellent accessibility;							X
• Introducing street level retail along the busiest urban axes to utilize retail potential fully and to improve areal vibrancy;	X	X	X	X	X	X	X
MOBILITY							

RECOMMENDATIONS PER CATEGORY	Ülemiste	Pärnu	Riga central	Riga airport (RIX)	Panevezys	Kaunas	Vilnius
<ul style="list-style-type: none"> A future international railway station should be closer located to the city and the urban area. This will help to create a strong mobility synergy; 					X		
<ul style="list-style-type: none"> Introducing a strong public transport connectivity at railway station and fully integrate the urban transportation service with railway operation schedules; 	X	X	X	X	X	X	X
<ul style="list-style-type: none"> Public transport at railway stations should offer urban and intercity connections. Introducing stronger suburban and regional bus connections; 	X	X	X	X	X	X	X
<ul style="list-style-type: none"> Introducing PT stations design, which will provide digital operational information on all transport modes (including rail), information on connections and interchange points, tariffs. 	X						
<ul style="list-style-type: none"> Public transport stations should be protected from the weather and located within the shortest walking distance from the entrances to the stations; 	X	X	X	X	X	X	X
<ul style="list-style-type: none"> Station and surrounds accessibility to be developed against a barrier free concept (for all passenger groups). The concept of the whole area should be PRM friendly and include: tactile floor paths, information in Braille and relief, safety decals, tactile warning strips, visual stairways, etc.). Station facilities should be designed for passengers in a wheelchair and with kids (automatic doors, number of escalators and ramps at platforms and between station building levels, Some of innovative solution for international passengers like virtual interpreters could be established. For any urgent assistance call boxes at public places or at platforms to be installed. 	X	X	X	X	X	X	X

RECOMMENDATIONS PER CATEGORY	Ülemiste	Pärnu	Riga central	Riga airport (RIX)	Panevezys	Kaunas	Vilnius
<ul style="list-style-type: none"> The international stations should provide for PRM special assistance services on- board and within the building area. 	X	X	X	X	X	X	X
<ul style="list-style-type: none"> Considering additional passenger needs like: enable accompany elderly passengers throughout their entire journey (creating special ticket offers), travelling with animals (creating places at railway stations for big boxes), additionally provide personal care services, such as help with eating and drinking, taking medication or using the toilet, carry heavy or excessive amounts of luggage. Such kind of service should be possible to book offline and online; 	X	X	X	X	X	X	X
<ul style="list-style-type: none"> All transport station should clearly assign PRM places, as well as places for elderly travellers and passengers with kids; 	X	X	X	X	X	X	X
<ul style="list-style-type: none"> Establishing taxi stations close to railway building entrances (at least for 6 vehicles). Developing suitable taxi operation rules and introduce taxi racks which allow them to park 24h; 	X	X	X	X	X	X	X
<ul style="list-style-type: none"> Relocate taxi parking in front of the railway station building; 						X	
<ul style="list-style-type: none"> Establishing K+R zones for at least 3- 5 vehicles. Operating rules of such stations to be established. Parking time could be from 15 min. to 30 min. ; 	X	X	X	X	X	X	X
<ul style="list-style-type: none"> Preferably at international stations, the movement of pedestrians and cyclists should not interfere. Reorganise general traffic giving priorities for NMT; 	X	X	X	X	X	X	X
<ul style="list-style-type: none"> Reviewing an option of reducing number of car parking: remove parking zone Nr 2 and create an open public walking place, which could be used for holding city social events and activities; 		X					




RECOMMENDATIONS PER CATEGORY	Ülemiste	Pärnu	Riga central	Riga airport (RIX)	Panevezys	Kaunas	Vilnius
<ul style="list-style-type: none"> Consolidation of new car parking zones; Redesigning a car parking into open green zone, with a possibility of allocating bicycle parking; 				X	X	X	
<ul style="list-style-type: none"> Introducing car charging zone providing suitable infrastructure and facilities; 	X	X	X	X		X	X
<ul style="list-style-type: none"> Establishing car parking for families and travellers with kids, as well as for PRM where the fastest access to the railway platforms is possible; 	X	X	X	X	X	X	X
<ul style="list-style-type: none"> Introducing better and safer pedestrian connections (additional crossings) at a railway station area; 	X	X	X	X	X	X	
<ul style="list-style-type: none"> Introducing additional safe crossings at the station; 	X	X	X		X	X	X
<ul style="list-style-type: none"> Pedestrian and cycling path solutions should be integrated into the existing city planned network of pedestrian and cycling path; 	X	X	X		X	X	X
<ul style="list-style-type: none"> Introducing a proper bicycle access at the pedestrian railway station bridge; 		X					
<ul style="list-style-type: none"> Complete new design of bicycle and pedestrian flows at the railway station and airport surrounding areas; 				X			
<ul style="list-style-type: none"> Construction of a bicycle parking house with such additional services as bicycle repairs; 			X				
<ul style="list-style-type: none"> Introducing B+R and P+R stations; 	X	X	X	X (only additional B+R)	X	X	X
<ul style="list-style-type: none"> Introducing a mobility hub for bike sharing and e-scooters sharing services; 			X	X			
<ul style="list-style-type: none"> Introducing sharing mobility offers at a railway station (based on the travel demand model); 	X	X	X	X (only car and bike sharing)		X	X


RECOMMENDATIONS PER CATEGORY	Ülemiste	Pärnu	Riga central	Riga airport (RIX)	Panevezys	Kaunas	Vilnius
<ul style="list-style-type: none"> E- rollers sharing parking options could be regulated at a railway station, and allowing parking preferably at the south station side; 			X				
<ul style="list-style-type: none"> Developing Air-to-Rail services, which will be separated from passenger flows. Proper developed of "rail – air luggage": integrated services where passenger will not need to have additional trips to pick- up or drop- off their luggage and therefore save their travel time; 	X			X			
<ul style="list-style-type: none"> Introducing "Air- Rail combined tickets" which could encourage travels take trains to the airport; 	X			X			
<ul style="list-style-type: none"> Develop an e-commerce area. The focus could be on running trains on- demand for e-commerce companies. 	X	X	X	X	X	X	X
<ul style="list-style-type: none"> Establishing urban logistic services at stations which will provide to passengers smart parcel machines; 	X	X	X	X	X	X	X

7. APPENDIX

7.1 Appendix I. Benchmarking analysis


The colours used within the next table for international railway station's location and their responsive urban connections mean:

	Central railway station location
	Airport station location, as well as railway connection types to airports
	Peripheral location with a focus on sub-urban connections

	Aarhus Central (DK)	Amsterdam Central (NL)	Bordeaux Saint-Jean (FR)	Berlin hbf (DE)	Copenhagen Central (DK)	Frankfurt hbf (DE)
						
Architecture	Historical station transformation with commercial centre addition Historical station adaptation with commercial space addition.	Historical national monument with modern vaulted glass roof addition towards waterfront.	Renovation of historical building with new building on the opposite side of the tracks.	Newly constructed iconic landmark building on historic site. Light-flooded elevated arched train shed (central nave) with intersecting station building.	Historical building renovation with main hall acting as a covered public space including a market.	Historic neo-renaissance head terminal building with vaulted & glazed train sheds.
Land-use	Well mixed, high efficient land use in which high retail potential has been utilized well by both street level and mall type of structures along the natural and highest pedestrian flows. Housing, offices, retail, accommodation, industrial and public spaces etc. included with notable shares.	The land availability is very limited as the station lays next to sea, and thus the example is not optimal from land use point of view.	The surrounding of the station does not appear as diverse mixed city structure and seems to hide unutilized retail and office potential.	The surrounding land use seems unbalanced by its mix as offices and universities have dominant role over naturally mixed city structure, also limited by waterfronts. The commercial potential is not utilized fully nearby the station.	Well mixed, high efficient land-use in central area with well located retail clusters. Amusement park just next to station introduces an example of clear destination but with unoptimal location.	High density mixed urban structure, in which the station has the biggest retail role in the immediate surroundings. End station of the rail line and thus have a different role.
Commercial	Type 4 commercial concept: Comprehensive commercial service with connected shopping centre Bruun's Galleri (GLA 37 000 sq m, 100 shops, 10 000 sq m extension planned). Station itself has typical convenience stores, restaurants and shops.	Type 3 commercial concept: 6 300 m2 of retailing inside the station. More than 20 restaurants and several speciality stores and a small supermarket. Hotels around station. The station has been especially redeveloped to hold targeted customers. A diverse retail mix is organised into three sections: 1. lifestyle 2. day 3. work located alongside gate free passage ways (IJ & Amster Passage)	Type 2 commercial concept: Around 10 restaurants and a few stores targeted for the railway passengers. Separate halls of services in both sides of the station. Expansion tied to southern master plan of Bordeaux.	Type 3 commercial concept: Integrated commercial services to station, also called "Shopping center with a rail connection" (3 levels occupied by 80 stores 15 000m2 shops, offices).	Type 2 commercial concept: more than 30 different shops, restaurants and service facilities marketed as a shopping centre. Historical renovation with passenger services (food, small retail)	Type 3 commercial concept: 2 level retail areas for shops and restaurants. 40 bakeries, cafes or restaurants, small grocery store and several small shops and services.
Functional	The commercial addition to the back of the station created an circulation axis between the historical centre and through, activating therefore both side of the tracks. The station plays a crucial role having a function of a Medium-size hub, connecting international and regional destinations. From an urban mobility and accessibility points of view, the station offers not only typical railway service, but also connects regional city areas with central destinations (though commuter services) and bring users to restaurants, shopping streets and parks nearby (less than 100 m). The geographic location connects two parts (districts) of the city.	Highly functional, efficiently organized, multimodal HUB with two gate free, commercially used passage ways + bike tunnel that connects city center that with waterfront/ferry docks area. Improved integration to urban fabric thru ongoing station square redevelopment. The Station is the real heart of the city: central not only by the name, but also as the biggest public transport transfer spot, serving residents and city visitors. Therefore, the Amsterdam Central is strongly connected with the airport offering fast local trains during the day which depart every ten minutes. It is one of the most attractive urban space in the city. Since the location of the Amsterdam Central is very central, the railway station plays a role of historical meaning, small recreation/ fun zone with water access and small parks, combining shopping offers.	Efficient addition of new building to house the HSR as well as a car-park building. The station acts both as a transport hub and an urban space, centre of the new redevelopment of Bordeaux's southern neighbourhood. The station consolidates a major hub for inter-modal transport for the metropolitan region and city. It provides an interchange in Aquitaine and links Bordeaux to Paris, Sète, Toulouse Matabiau and Spain. It is quite an international railway medium hub with modernised railway infrastructure and service.	Represents a modern "Citygate" connecting Spreebogen/Humboldtshafen with Berlin Moabit. Efficiently densely packed & stacked room program and logistic service. Well thought-out routing system creates easy wayfinding thru architectural Leitmotif: "short distances and daylight". Crossing point of existing east/west and new north/south train line, Europe's largest two-level railway station. Fully city integrated regional and international railway hub, combining urban transportation and mobility services. The railway station is positioning itself as a digital hub for business spaces and innovative solutions. The integration with commuter trains, which brings residents from rural areas, shows one of the best example for setting suburban connections. This is especially combined with NMT (private bicycles), and partly by on-demand service. The central and historical location of the station is highly attractive for tourists, therefore - long distance trains and buses are well operated, especially in a high summer season.	Copenhagen main station provides both an array of transport modes and switch opportunity but also hosts a generous station hall with many shops. Largest national station with a function of a multimodal transit DSB hub, connecting regional, suburban and international rail and road transportations, as well as connects airport with the city center area. Since the central station is almost the first point for arrived tourists, it has a lot of informational boards which explain how travel within the city centre, points of the tourist attractions and fast connection to the Kastrup Airport - as well as featuring details of the most highly rated places to stay near København H. Moreover, the station plays a crucial livability role in the city and attract residents for a private/ business meetings next to the station.	Traditional headstation terminal located at the end of Kaiserstrasse which connects directly to market square. Simple two level station layout with long distance trains on streetlevel and commuter/metro on subterranean level. Today weak attractiveness of subterranean level - redevelopment is in planning stage. The second-busiest railway station in Germany connects to diverse local and regional destinations. The central location in Europe allows for long-distance international connections also. In addition the airport is connected with high-speed rail. The station connects all these passenger networks immediately to central business district, with office development at the city center where the station is located.
Operational	The stations is operated by DSB (building owner), Arriva and Midttrafik. The train services are provided by DSB, Arriva and Deutsche Bahn.	The main station operation is done by NS Stations. National and international railway services are also provided by the NS.	The station is owned by the railway operation RFF / SNCF.	The stations is owned by the Deutsche Bahn (DB) and operated by DB Netz and DB Station & Service.	Operated by Danish Railways (DSB)	Owned by DB Netz and operated by DB Station & Service.
Mobility	Multimodal hub with various traffic connections: 1. Public transport (buses, trams and taxi stands); 2. Sharing offers: bicycles. Moreover within the area there are parking facilities for private cars (underground) and bicycles. The area around the railway station offers pedestrian walking zones and quick direct access to the central area of the railway station and platforms.	The station is connected with the city through several tram lines and buses, as well as at the waterfront side there is a stations of city ferry lines taking cars and passengers to Amsterdam North (Amsterdam Noord). Also the tourist boats sailing through canals depart on the City side. The city ferry boat lines linking the city with Amsterdam North are behind the station at the waterfront (IJ-zijde) as well. Moreover, within this area is several taxi and inter-city buses stations. This railway station allocates almost the biggest bicycle parking station with 7000 spots. There are special direct access from bicycle highways or platforms to the parking zones. For private cars there are attached more than three parking buildings.	Arriving to the station it will be possible to take public transport (metro, bus and tram) , and use a car rental service. To improve access to the public stations, as well as railway, there is a large pedestrian zone in front of the station. The airport could be reached not only by trains, but also by the airport shuttle: Jet'bus, which is partly designed including some of city tourist routes. Walking distance (150 - 200 m) there are bicycle sharing stations.	Beside local urban public transport modes (metro, tram, commuter and buses, taxis) the station is integrated with new mobility services: ridepooling, carsharing, bicycle, scooter and roller sharings. There are physical , as well as virtual (within the common for all urban transportation) stations highlighted in the application. The design and planning of the railway station and attached area using free- steps solutions.	The standard railway service, as well as bicycle connection are well integrated. The transfer from bicycle to train, which includes the walk through the station building and on to the platforms, show a convenient integrated planning. Therefore, in front of the stations are numbers of bicycle parking facilities, and locking stations.	At the station, many modes of public transport connect. The station is connected with local, regional, national and international railway lines, and locally with metro, tram, bus and taxi services also. In addition, there is station-based and freefloating car- and bike sharing services available making the station a true multimodal hub.

	Helsinki Central (FI)	Leipzig hbf (DE)	Malmö Central (SE)	Rotterdam Central (NL)	St. Pancras International (GB)	Utrecht Central (NL)
						
Architecture	Historical landmark building in national-romantic style. Continuously further developed within tight heritage boundaries.	Sensible conversion of Europe's largest historical Terminus (head station) in to a modern transportation hub with underground shopping promenades.	The transformed station repurposed the historical building for services while creating an efficient annex defining its extension as well as enhanced connectivity to the area regeneration around it.	Newly constructed multi-modal station with large scale folded roof structure that covers both platforms, concourse and extends into the public space.	Sensible conversion of Barlow train shed (originally considered as the largest enclosed spaces in the world) to fit the new needs of rail and commercial services.	Newly constructed station that bridges the railway tracks with a dynamic undulating roof. The overpass creates an easily navigable single hall concept with two city squares on its ends.
Land-use	Well mixed, high efficient land use in historical CBD location that is going to see further development in coming years.	High density commercial and housing mixed use but with different problematics as its the end of railline.	Well mixed and high efficient land use with well working positioning.	Very effective land use but with slightly unbalanced mixing with very strong clustering. Retail possibilities and their positive vitality effects unutilized from the other side.	Exceptional urban transition adjacent to station, embedded into London's King Cross area that will be developed into an attractive business and cultural region. Land between and behind Kings Cross and St Pancras stations is being redeveloped as King's Cross Central with around 2,000 new homes, 464,500 m of offices and new roads.	Well mixed, high efficient land use utilizing especially retail potential in outstanding way.
Commercial	Type 2 commercial concept: Currently 3700 m2 of commercial use for shops, restaurants on main platform level and at underground metro hall. Efficient indoor connection to adjacent shopping centres. Re-developed east wing: former offices converted to modern hotel/restaunt. Ongoing overall interior redevelopment to increase retail strength.	Type 4 commercial concept: Around 90 shops, 40 restaurants and several services in 3 different levels. Historically preserved interior with fully integrated and visually connected subterranean commercial areas.	Type 2 commercial concept: Inviting meeting and eating place for passengers and neighbouring blocks. Over 20 shops and restaurants. Car sharing and renting services. Addition of commercial activity within station transformation.	Type 2 commercial concept: The spacious hallway leading to the railway platforms is lined in 25 stores. station as a tool for urban development and regeneration.	Type 3 commercial concept: Lower level (= street level): Retail units, toilets, ticket offices, escalators down to the Thameslink platforms, Eurostar departure lounge with shops, cafes. Upper level (with access from the forecourt): Trains, tracks & platforms; bars, pub & restaurants. Retail below platform level. Overall concept divides into four zones: Rendezvous, Circle, Arcade and Market. New streetside hotel extension.	Type 4 commercial concept: Train station convenience stores and restaurants connected to the large shopping centre Hoog Catharijne. There are various shops alongside the "station promenade/bridge" but most retail is located around the urban squares and inside the adjacent shopping centre.
Functional	Well integrated into urban fabric. Station services, shops, restaurants and mobility facilities are well integrated into urban fabric thru underground passages and direct vicinity towards two major urban squares (east/west). Improved accessibility and cross connection via a new bicycle tunnel underneath the platforms. (construction ongoing) The station is the busiest in Finland and it's a multifunctional landmark of the city. It serves as a node of public transportation and connects the rail network to the inner city and its commercial development of Helsinki in both on and below ground level. The station also serves as connection to the airport.	Simple and successful wayfinding thru visually connected transportation and commercial functions. The station works both as a destination and travel link. Its spatial, functional qualities and commercial set up serves as a vibrant part of the inner city. The station connects the urban city centre to the long-distance rail network in Germany and abroad. It integrates with housing and offices directly across the station.	The transformed station works as a node for the re-development of the old harbour area. Urbanistically it enhanced the connections between the historical centre and the new neighbourhood while adding new train lines to Denmark. Station is a key part of local and regional rail traffic with international connectivity as well. The station plays a large role in city development, and connects the passenger network also to the airport.	The station roof folds to create a grand spacious station concourse, which also provides direct access to the new metro station below. All functions happen underneath the new roof. The powerful exterior gesture of the large welcoming canopy carries the new identity and modern urban character of the place. Fast access to all public transport modes. The station has a central location with a function of regional urban and mobility hub. The new construction connects two parts of the city and consolidate a unique single station. Moreover, there are some of international railway destinations to: London, Antwerp, Brussels and Paris up to 14 times a day and to Disneyland Paris.	High-quality station retail integrated within the historic building fabric. The railway terminus has reinvented itself as a shopping and dining destination. With direct connection to various transport modes and door-to-door to Kings Cross Station. The station plays a role of international (the terminus for Eurostar services from Belgium, France and the Netherlands) and regional railway hub connecting Europe and north/east and west of the country. From an urban scale it is one of the largest and most innovative redevelopments in London. The transformed industrial wasteland attracts city inhabitants also for a daily business and serves as a meeting point in London.	The "station promenade" serves as a public street, which crosses the railroad tracks and connects all modes of transports in the same way. The station is part of the urban fabric, with logical walkways and a better connection between different city districts. At the national level the Utrecht station has an important role of connecting various international destinations and assume its transportation synergy. The station was transformed however not only to allocate high-speed lines/trains, but also to connect surroundings around the station. This means that the area of the station is fully integrated with district structure and concept (business, tourists attractiveness, commercial developments, etc.). This railway station is the largest passenger railway station in Netherlands.
Operational	Owned and operated by national railways (VR)	Owned by DB and operated by DB Netz, DB Station & Service.	Owned by Jernhusen, operated by Skånetrafiken, Öresundstrafik and SJ.	The railway operations are provided by the Dutch railway company Nederlandse Spoorwegen N.V.	The station is owned by HS1 Ltd. The management and operational responsibilities are provided by Network Rail (High Speed) for HS1 Ltd, Eurostar and Network Rail (Thameslink platforms).	The station is owned by ProRail, however operations and management of the station is covered by Nederlandse Spoorwegen.
Mobility	The station connects with local, regional, national and international railway lines, and locally with metro, tram, bus and taxi services also. There are rail and bus connections to airport. At the station there is also car and bike parking available, and freefloat micromobility services are allowed around the station as well.	The station is connected with local, regional, national and international railway lines, and locally with tram, bus and taxi services also. There is a rail connection to the airport. At the station there is also numerous car and bike parking available.	The station has a large role in the border-crossing Öresundstrafik international train network. Locally it connects to bus services also at the station and facilitates daily international commute between southern Sweden and greater Copenhagen areas. The station offers multimodal connection to regional and local buses, as well as the regional Pågatåg trains.	The station offers various urban transport modes and private car access, but clearly prioritizes the role of sustainable transport, and therefore, creates a clean and pleasant streetscape. The new Rotterdam Centraal Station is an open and transparent public transport terminal which functions as an iconic meeting point. It is also an integrated railway terminal especially with metro, tram and bus networks. Being a mobility hub, the station offers facilities for private bicycles (5000 parking slots within the parking house, and 200 stations around the railway terminal). Moreover, within the station a small bicycle repair shop could be found. The rebuilding process of Rotterdam central station was also used to place in a tunnel the rail routes heading south from the city center and crossing the river Maas. This has created a large mile long promenade along the east side of the city center that is being used to expand and modernize the post war built environment.	The station integrated with public transport modes like: metro, city buses, taxis. Regional destinations provided by regional trains or regional high-speed trains. Connections to the airport are covered by high speed trains. A big attention is given for supporting development of sustainable transport modes. Therefore the station area allocates number of bicycle parking slots and offers huge pedestrian zones and walking areas.	The area of passenger railway station is designed in the way to connect non motorised transport and assume an easy access especially to passengers who travel with private bicycles. There is the world largest bicycle parking station on the east side. Moreover, at bicycle parking stations some additional offers/ facilities such as bicycle repairs, customer facilities - showers or lockers could be found. The territory of the railway is connected to bicycle highways network. Within the walking distance from railway there is the largest and the busiest international bus station. The connected public transport modes are: trams, buses and taxis. The gems in the network are three public squares: Vredenburg to the east of Hoog Catharijne - renewal; Jaarbeursplein to the west of the station - metamorphosis; and Westplein at the head of Lombok - the regained square. Therefore a pedestrian and walking zones are quite developed around the station.

	Vienna hbf (AT)	Copenhagen Airport (DK)	Oslo Airport (NO)	Amsterdam Amstel (NL)	Beijing West (CN)	Canary Wharf - Cross rail station (GB)
						
Architecture	The newly constructed Vienna Station (area of former Südbahnhof) is a multimodal hub with significant architectural values like: generosity, openness and transparency. Created by a large diamond-shaped roof that hovers above the platforms. It also forms skylights & public space canopies.	Station integrated within airport building with access to the metro.	Oslo Airport station provides an integrated transport solution to access the airport. It provides platforms through the national railway as well as segregated platforms for the express train.	Historical building with new public space and enhanced urban and transport integration.	Large metropolitan-region station with a large array of multimodal connections. The main building is considered a landmark monument.	Newly constructed seven-storey mixed use complex (above and below dock level) - visually floating the dock. A 310 metre-long timber lattice roof, with a tropical garden and retail centre acts as a "hood" of the underground station. Collectively called "Crossrail Place" (Cross rail station stands in focus of that benchmark)
Land-use	Very effective and well mixed land use including big share of completely new development, and areas retail core in the heart of station serving both sides.	Airport area laying in immediate proximity to low efficient housing-dominated sub-urban area that includes also office quarters closeby.	The airport is located far away from urban structure and the surrounding does not include added land uses.	The surrounding area consists multiple land uses but with unsatisfying connection to each other. Currently undergoing a development consisting of housing, offices, retail and public spaces which will improve the current situation and fulfill the overall land use by retail entity.	Very dense, mixed land use including housing, offices, accommodation, retail and recreational areas with significant roles each.	Attached to high efficient office area with retail and accommodation offering on one side but lacking 360 dense urban structure as the first layer on the other side is dominated by car and train traffic.
Commercial	Type 3-4 Commercial concept: The BahnhofCity shopping centre with wide retail offerings inside the station 20 000 m2. 64 Shops and 26 restaurants. Streetlevel and 2 sub terrain floor.	Airport station. Connected to airport terminal 3 where there are plenty of shops and restaurants. A few restaurants and shops on top of the railway station. Check-in counters between terminal and railway station.	Airport station. Connected to the terminal building with several shops and restaurants. No commercial services at the railway station.	Type 2 commercial concept: Small supermarket, a few speciality stores and some mostly fast food restaurants. Surroundings develop with mixed uses such as commercial dev.	Type 2 commercial concept: Fast food restaurants and cafes and shopping areas connected to the station platforms.	Type 2-3 commercial concept: 9290 m2 retail/leisure on 4 floors on top of it a public roof garden which incorporates a community performance spaces, restaurants. Cross rail station itself is interwoven in larger shopping and business surrounding of the district.
Functional	Elevated platforms with large areas for commercial premises in below allow for direct walk thru the shopping areas without interference of the transportation level. Gate-free station areas connect northern and southern part of the city. New station is a major part of the nearby city renewal. Significant role for tourism. Public space integration, trains converge at single location, all traffic modes and travel destinations connected in one point.	The CPH airport station provides smooth access to the airport building but also acts as a normal train station connecting Sweden to CPH and the metro. The airport's railway station is the closest to the check-in and arrival area in Terminal 3 which provide a high accessibility to/ from airport areas. The main role of this station is to connect city and airport areas. Moreover, departures from this station are also carried out between regional and suburban areas. As an additional function the area offers some resting (sitting) zones for travelers.	The station provides an ample array of services within a generous hall that works as a connecting and meeting space with a series of services. The station and the rail connection serve as the primary connection between the airport the capital city Oslo. The station connects the airport to other regional cities also, driving development for both business and tourism. The airport is out of reach of the local transport network, so the high speed rail connection is crucial for efficient transportation.	The renovated station updates the significance of the building to an expanding neighbourhood with expanded rail connections. Improved urban space as well as bike parking facilities. The station is located in the very center of the famous business district, and therefore plays the role of a business hub. Nevertheless, within the urban context the station plays a crucial role in providing daily commuter services to residents. The station itself is quite simple planned and designed not being central, however more regional station to allocate daily urban traffic.	The station acts as a main metropolitan station for western Beijing. Its massive building accommodates a series of services and shops while becoming a functional landmark for the neighbourhood. The function of this station is strongly connected to traditional railway service and serves the city as a multimodal transportation hub, allocating several terminals for both "traditional" and high-speed trains.	Beside being a connection between Canary Wharf business district and the City of London the "Crossrail place provides a welcoming public space between the residential neighbourhood of Poplar and the business district of Canary Wharf, demonstrating the role of infrastructure as the 'urban glue' that binds a city together," (Foster + Partners) The station role within the urban is to provide a connection to the National Rail network and additionally provide an interchanges between the Canary Wharf station, the London Underground as well as Canary Wharf, West India Quay and Poplar stations. The location of the station is very much attached to the commercial activities and to the waters access of the North Dock within the existing commercial port complex.
Operational	The station is owned and operated by Austrian Federal Railways (ÖBB)	Operated by Danish Railways (DSB)	The railway station is operated by Bane NOR while its real estate subsidiary, Bane NOR Eiendom owns the station. The railway service model is complex and involve several operators: Bane NOR, Flytoget, Go-Ahead Norge, SJ, SJ Norge, Vy, Vy Gjøvikbanen, Vy Tåg	The main station operation is carried out by NS Stations. NS Holding is the owner of all railway stations in the Netherlands.	It is operated by the CR Beijing and Beijing Subway companies.	The operation and management of the station is done by TfL Rail and all infrastructures is owned and maintained by Transport for London.
Mobility	The station shows a best example of implemented multimodal mobility hub integrated with standard railway service. The station is served by such municipal public transport services as: metro, buses and trams.	The railway station is connected to the metro station, and other commuter train services. Within the walking distance (100/ 150m) from the station located few taxi stops.	The station is connected to norwegian rail network, providing easy access for airport users to/from the city. There is also a bus station connection. Smart parking facilities, car maintenance is available as well as car rental services.	The station planning/ design was conceived not purely as a railway station, but also as metro station. At the time of its design, Amstel was planned to be a transit station. The mobility idea behind was to connect as much as possible existing urban modes, calling it "before and after" modes of transport. Therefore, beside regional railway, metro services the station is strongly integrated with bus and tram services. In front of the station, there is a taxi stand. As other railway stations, Amsterdam Amstel is integrated with NMT modes, especially with bicycle infrastructure network.	Only typical public transport modes connections: metro, buses and commuter rail. The area in front of the station is purely designed as a pedestrian walking area and offers a direct interchanges to attached public transport stations.	The modern project connects such urban transportation as: buses, metro, tram and commuter trains. Nearby the station are few taxi parking (pick up) slots.

	Copenhagen Nørreport (DK)	Helsinki Pasila (FI)	Køge Nord (DK)	Liege-Guillemins (BE)	Naples Afragola (IT)	Zaragoza-Delicias (ES)
						
Architecture	The new station uses an urban approach to station design. By understanding the urban as well as passenger flow it creates a square that provides the infrastructure the station needs as well as a framework for urban development.	Re-built train station on top of existing platforms. Building massing consists of three repeating tower-courtyard typologies. Significant landmark function thru visual unification, repetition, order.	The building of the newly constructed station is a bridge over the wide infrastructural axis passing through the site in the periphery of Køge. It efficiently connects different transport modes while providing a smooth park and ride access.	Newly constructed iconic landmark that translates the historic train shed aesthetic into a modern and expressive monumental arched roof with seamless interaction between exterior and interior.	The new interchange railway station bridges over the motorway while providing ground level access in a greenfield site. The station uses the language of the architectural landmark to encourage regional use and incentivize the use of mass transport in the region.	The architecture of the station incorporates an array of programmes that allow users to use the building actively. It connects the new neighbourhood provided by the Expo while providing also a generous carpark for easy access from the adjacent motorway.
Land-use	Minimal land use of station itself leaves room for high efficient surroundings in central CBD location in which modern development does not have a significant role.	Diverse and efficient sub-centre area in which the station acts as a true catalyst. Mix of old and modern sides that are well connected to each other.	Sub-urban location surrounded mostly by low efficient housing and greenfield.	Sub-central location surrounded by recreational area and mixed dense structure currently being redeveloped. Clever locations.	New station is currently surrounded mostly by agriculture, but plans are to fill the area with research facilities, big box retail and exhibition centre.	Inefficient and poorly connected land-use not utilising its potential as a mixed urban environment.
Commercial	Type 1 commercial concept: small kiosks, ticket selling machines and bicycle parking. Framework for Commercial and Urban development around.	Type 4 commercial concept: Station blends smoothly into the commercial environment. Shopping centre Mall of Tripla is 85 000 m2 of leasable area with 17,5 million visitors in 2020. The hybrid complex links business, shopping, culture, housing, work places and entertainment to rail / public transportation. Strong synergy of different users thru multi functionality.	Type 2 commercial concept: Minor convenient shops.	Type 2 commercial concept: Some indoor retail facilities such as restaurants, cafes, book store, florist, small supermarket and pharmacy. Also tourist information centre. Mostly convenience store and take away concepts to serve the passengers. Hotels and new office development next to station.	Type 1 commercial concept: only cafes at the moment. More services will open once the amount of passengers and train lines increase. Large entrances at both ends of the station guide visitors up to the elevated public zones lined with shops and other amenities. Meeting point in a central atrium with cafes and restaurants.	Type 2 commercial concept. Small amount of cafes, small shops and services inside the station.
Functional	<p>The station acts as another node of transport in the city. The urban approach to its design reframes the urban square as a typology providing access to the different platforms, stores, bicycle parking and an enhanced commercial opportunity for the area.</p> <p>One of the most used stations in the country with a high average of personnel daily throughput, the station connects its immediate urban area to local, regional, national and international destinations. The pedestrian zone was built to connect easily to the medieval city centre and the surrounding commercial activities. The renovation of the station aimed at creating a safe and healthy immediate environment that is easy to identify and still be able to throughput mass transit easily without disruption of people flow.</p>	<p>Pasila train station (through station) operates as one of multiple stakeholders inside the large scale mixed-use building complex, travellers and shoppers mix in the station hall which is part of the Mall. The building complex bridges east/west city parts with indoor and barrierfree outdoor routes. Kicks off significant new urban developments north and south from it. Successful multimodal hub with built in metrostation (to be connected in future)</p> <p>The station links business, shopping, culture, housing and entertainment to the Finnish rail network. The station is housed within the same building as the massive multi-use mall of Tripla, and it connects also with pedestrian walkways to the adjacent city districts of Länsi-Pasila and Itä-Pasila. The station allows for large future development due to excellent sustainable commute possibilities.</p>	<p>The primary function of the station is to bridge the two sides of this wide infrastructural axis while providing a meeting space and multi-modal connections. The bold architectural move also works as a landmark for signaling its park and ride opportunity.</p> <p>The station has the function of an intermodal transport hub for the entire Copenhagen region, connecting high-speed and local trains. The station also has direct access to Denmark's busiest motorway. One of the main ideas of this station is to bring passengers from suburban areas to central city parts, offering them a sustainable and fast mode of transportation, thus reducing their travel time, costs and improve city carbon footprint (by reducing the number of private cars in the city). From an urban point of view, Køge Nord is also an excellent example of a landmark for green mobility.</p>	<p>Connects two under-developed city districts with almost seamless interaction thru open and see thru station hall design. The tracks are at grade & pedestrian walkway elevated above tracks. Iconic architecture creates attention and uplifts the attraction of the surrounding. Connects to regionally important rail link.</p> <p>The station connects two city parts together and is due to its situation a regionally important rail link in western European rail traffic. It connects also to motorway and has bus and car access to the airport. The station has been a significant force in driving city development in the area, enabling excessive urban regeneration.</p>	<p>The station provides an iconic landmark for inter-modal switch for regional and national transport. Coupling it with an easy access to the motorway and ample parking, it provides an opportunity to work as a regional hub while reducing congestion in inner Naples.</p> <p>The station plays an important role of major regional hub connecting railway passengers from north to south of Italy. The function of this station is also to serve the entire Campania region by integrating the southern expansion of Italy's high-speed network with the Napoli Canello line and the extension of the Circumvesuviana commuter railway. The capacity of this station allows to allocate 18-28 high-speed trains in each direction. Moreover it is planned to enable a further 200 regional and local train services at Napoli Afragola daily, improving the important interchange between the national, regional and local rail networks. The main idea of building this hub was to support the economic development in the south of Italy.</p>	<p>The station works as a bold node, providing services and enhanced connections between a new urban area to historic city centre. It becomes also an important switch station due to its proximity to the motorway and generous car park.</p> <p>The station connects new urban area to historic city centre. It ties in with the local and regional rail systems with additional international connections. The station was regarded as a catalyst for urban development. It also contains mixed uses providing lot of different services for both passengers and urban dwellers, creating a true urban hub.</p>
Operational	Operated by Danish Railways (DSB)	Owned and operated as part of the private KOY Tripla Mall.	The station is operated by Danish State Railways (DSB)	Owned by Infrabel, operated by National Railway Company of Belgium.	The railway service is provided by the operator - Rete Ferroviaria Italiana (RFI) .	Owned by Adif, operated by Renfe Operadora
Mobility	The station connects metro lines, the suburban train system for Copenhagen area, and many DSB-operated train connections both regional and international. Only express trains are exempt from the stations train mobility services. The station has remarkable bicycle storage facilities and trains can be boarded with bicycles, just not during rush hours. There is also good bus connectivity with various lines on ground level at the station.	The station is connected with local, regional, national and international railway lines, and locally with tram, bus and taxi services also. There is a rail connection to the airport. At the station there is also car and bike parking available, and freefloat micromobility services are allowed around the station as well.	The station is connected only to the commuter railway line. At the both side at the entrance there are Park and Ride Facilities, as well as private bicycle stations. Around the station there are walking zones and small park areas.	The station is connected to regional, national and international rail network. Airport connection via shuttle bus and the motorway, that the station is connected to also. In addition, pedestrian connections to the city districts and several bus connections around the area.	The intermodal hub provides park-and-ride services and facilities, as well as it connects to the local bus network. The frontal area of the station allocate a huge walking area with small park corners and open green fields.	The station is an intermodal traffic hub. It connects via rail network to both national and international destinations and has extensive regional connections as well. The bus service connects also, and it has a series of public spaces for pedestrian and bicycle connectivity.

7.2 Appendix II. Lessons Learned

Below the consultant describes detailed explanations of each lessons learned attaching relevant visualization and illustrations.

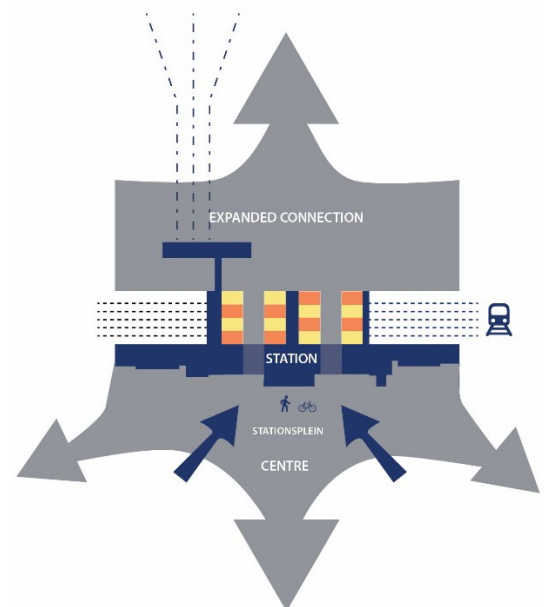
A1	Central Station– Architecture	Amsterdam Central	Interdependencies
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Well-performing stations and its adjacent surrounding act as interdependent urban clusters, “actively interlocked”.

The urban cluster must constantly synchronise, optimise, and adapt their connection points and functionality to be able to work as an entity. The spatial organisation of a station presents an important framework in order to establish urban and spatial interdependencies strengthening connections and bringing value to the urban cluster.

A best practice station, from an architectural perspective, can be seen as an integrated member of the city reinforcing connections and becoming a catalyst for new urban opportunities. The station, therefore, becomes a true driver and partner for adjacent urban regeneration.

The paired integration and sensible addition create a further relationship between an existing building and its new connections. Amsterdam Centraal is well integrated into the inner-city circulation through Stationsplein Square fabric toward the south. In addition, it enhances its ferry connection to Amsterdam-North, promoting its development.



AN ACTIVELY INTERLOCKED STATION STRENGTHENS TRANSIT CONNECTIONS INTERNAL SERVICES AND BRINGS VALUE TO THE ENTIRE URBAN ENVIRONMENT. ROLE MODEL: AMSTERDAM CENTRAAL (SOURCE: AUTHORS)

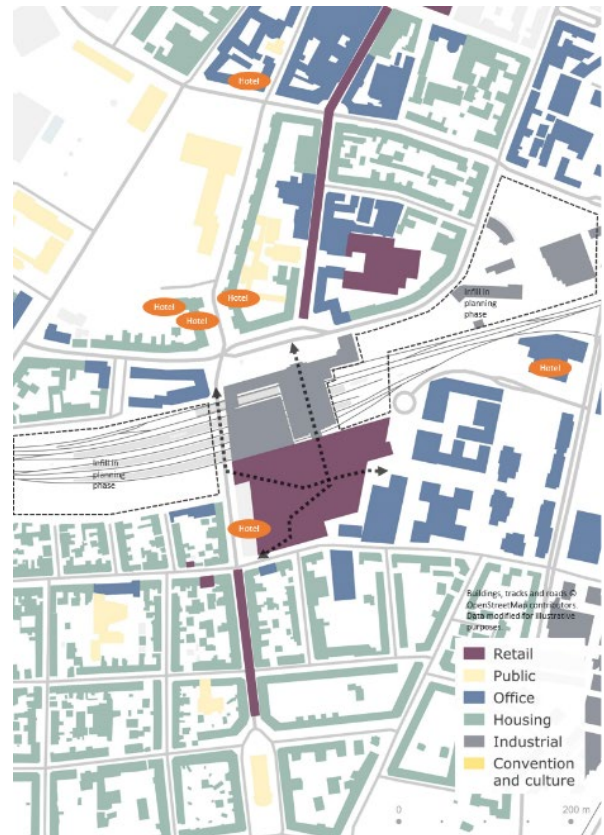
GVA is maximised by dense and diverse land use with careful positioning of the station

Aarhus central station in Denmark is located one kilometre away from the Central Business District (CBD) area and has a clear role of stitching the communities on both sides of the tracks. The surrounding land use is dense and well mixed including very well positioned retail hotspots, office clusters, accommodation and housing. And it's not only the current status of the area but also future development plans that make it an excellent example of successful station area development in its scope.

There are several main lessons to be considered. First, great short and long-distance accessibility increases property values which should be utilized by high plot and area efficiency. Second, central location of stations and high pedestrian flows enable relatively high retail potential as well as workplace and accommodation clustering, and housing keeps the life rolling around the clock so mixing uses is highly advisable. Mixing also improves fast actualization as multiple sub-markets can take up more volume compared to less varied volume, and this strengthens positive spiral for development.

When it comes to retail location, in the form of street level or shopping malls, units should be located on direction of the highest potential pedestrian flows. The city needs also low (or non-existent) economic or commercial value land uses. For example, public spaces, roads, parking spaces, freight and mobility services all have an important role in a well-functioning entity but keep these in sensible scale. If necessary, improve existing low efficient form in order to create additional space for uses with higher economic or commercial value.

The possibility of placing rail lines underground should be carefully studied. Underground stations can create easier and more appealing crossings, would limit community physical divisions and to create possibilities for developing city blocks even above the rail lines. If not feasible, limit the barrier effect with high quality crossing structures.



LAND-USE DIVERSITY AND POSITIONING AROUND AARHUS STATION (SOURCE: AUTHORS)

A3

Central Station– Commercial

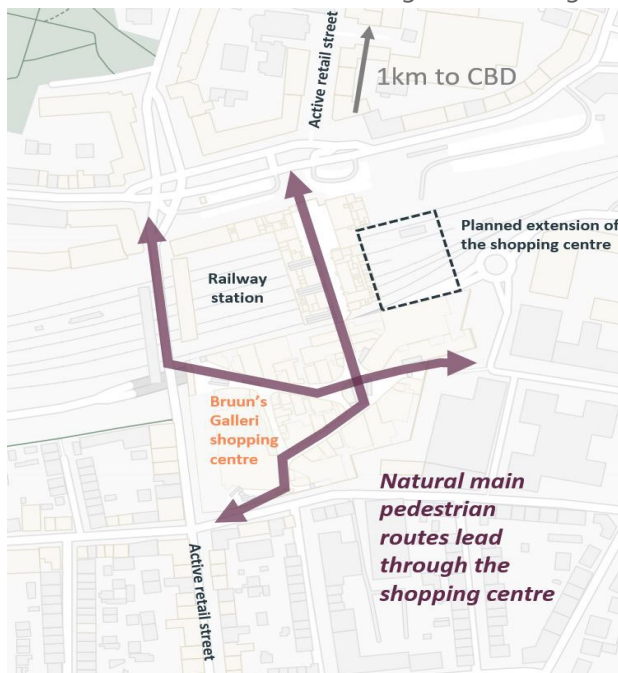
Aarhus Central

Commercial anchor point

Station area as a strong commercial hub that will benefit the whole city centre.

Aarhus railway station itself has mostly convenience stores and fast-food restaurants but it is combined with a three-storey shopping centre (Bruun's Galleri) featuring approximately 100 stores, restaurants, and cafés and a large underground car park. It's the largest shopping centre in Aarhus. The most important lessons that can be drawn from these stations include:

- Central location next to the busy railway station will create possibilities for new major retail and other commercial development. Great accessibility by all means of transportation is important for the commercial success of the location. Fluent and pleasant pedestrian routes and areas are particularly important in the busy city centre area.
- Underdeveloped (unbuilt) areas next to the railway station can be attractive locations for major commercial developments. It is possible to develop a new commercial anchor next to the busy railway station. Clear land to build even the largest shopping centre and/or hybrid centre near the current city centre.
- Shopping centre and the railway station building will help to combine the city parts on both sides of the railway tracks. Locating the commercial anchor (shopping centre) "behind" the station building from the city centre's point of view may help the development of the adjacent plots and areas
- Seamless connection of active shopping passages of both the railways station building and the adjacent shopping centre. Also direct connection to the busiest pedestrian and shopping streets to/from the station. Smooth customer flow through the buildings and to the other parts of the city centre.



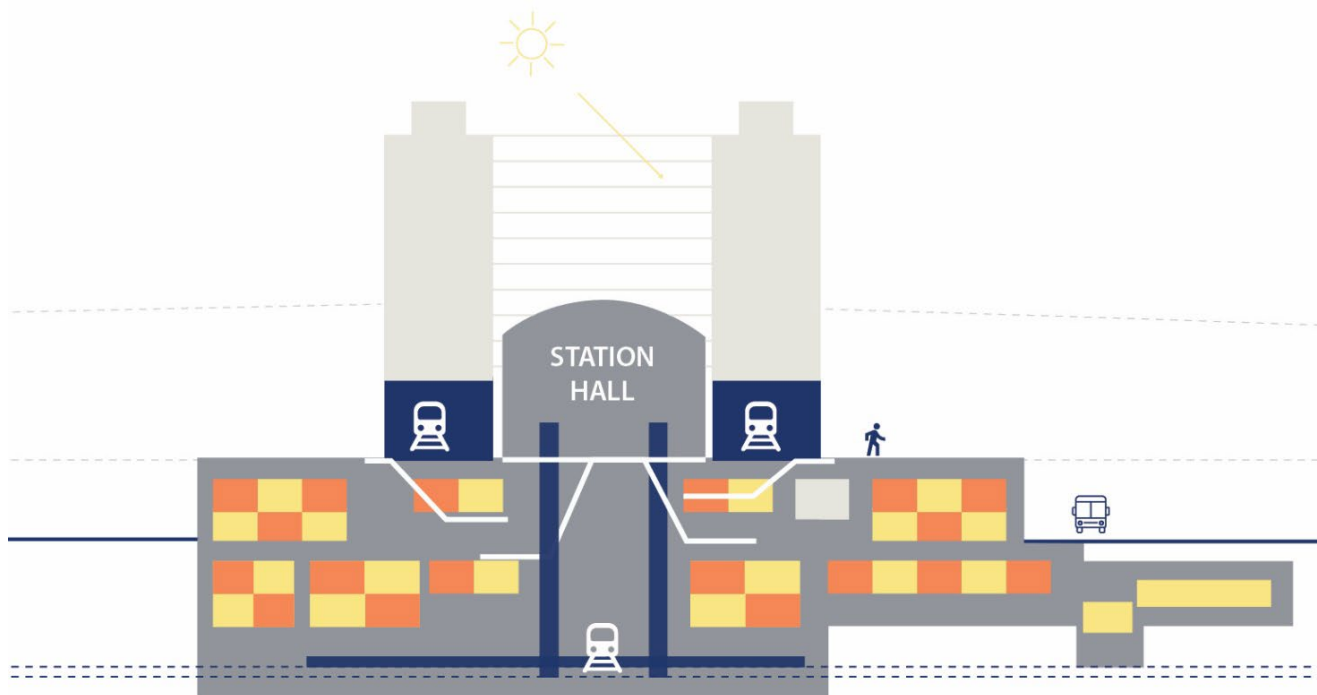
SHOPPING CENTRE ATTACHED TO THE AARHUS STATION WORKS AS A NATURAL PART OF THE CITY STRUCTURE AND PEDESTRIAN ROUTE NETWORK (SOURCE: AUTHORS)

A4	Central Station – Functional	Berlin Central station	Generous Flexibility
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A contemporary station uses its internal space both as a “gate to the city” and as a “flexible living room” with overlapping public and commercial functions.

A multifunctional railway hub achieves its greatest potential and attractivity by a symbiosis of travel experience, exploration, meeting points, working and daily public life. The newly built and centrally located Berlin Central station showcases that concept through generous spaces, rigorous customer convenience and functional flexibility in an excellent way.

Its efficient, densely packed and stacked room program and logistic service arrangement paired with grand spaces, daylight all the way to underground railway platforms and visual connections responds to current demands in modern railway hubs. Short distances and clear wayfinding in-between the different transport modes create smooth and safe interchange. A diverse functional mix which includes offices, shopping, restaurants stacked and interwoven into the transportation layers of the complex allow the station to work as an urban hub which has a chance to react to future changes and needed adaptations. Therefore, a best practice station can further connect to its diversity of users by offering an equally diverse range of services and opportunities.



AN EFFICIENTLY INTERWOVEN ROOM PROGRAM WITH DIVERSE COMMERCIAL AND LOGISTIC SERVICES PAIRED WITH NATURAL DAYLIGHT CREATE A “GENEROUS” MODERN HUB. ROLE MODEL: BERLIN CENTRAL STATION (SOURCE: AUTHORS)

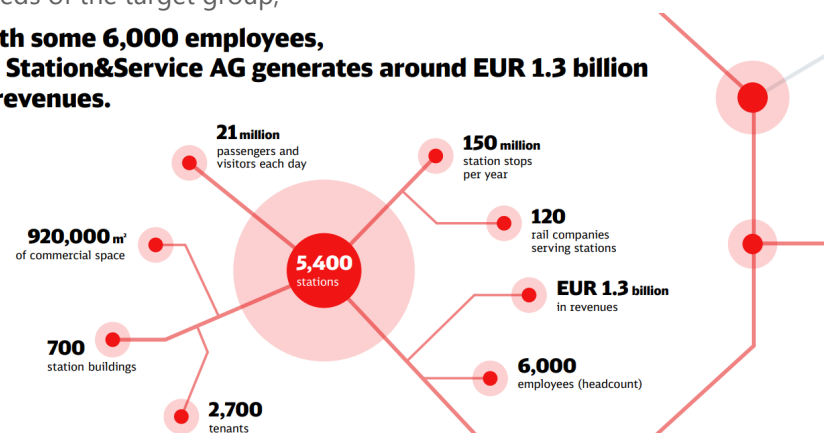
A5	Central Station–Operational	Berlin Central station	One- hands solution
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One company operation for a full passenger railway station experience

The central railway station in Berlin is fully managed and operated by the DB Station & Service AG (being created under the DB Netz). With about 5,400 stations, DB Station & Service AG is Europe's largest station operator. The function of the company is not only to manage and build the stations, but also to drive the development towards the urban centre with creative energy and passion for the benefit of customers. Moreover, DB Station & Service take management of one of Germany's largest convenience store chains – Service Store DB – and, with DB Bahn Park, one of the country's largest station car park operators. In order to identify required changes and improvement for the passenger railway station, DB Station & Service AG have rights to develop strategies. For example “Strategy 2020” where the aim to turn a station vision into a hub for human interaction and mobility into a reality. The strategy is pursuing various activities specific to the business unit in four strategic directions: “customer and quality”, “profitable growth”, “change in corporate culture”, and “resource preservation/emissions reduction”. The Berlin Central railway station is providing and integrating transport services and leasing station spaces not only for profitability, but also for a greater growth of the potential areas outside (around) of the station. Having a “one hand solution” for managing and operating the railway station, Berlin central railway station has such benefits as:

- Efficient construction and facility management which is in a line with DB operator development plans;
- Full overview for developing better opportunities to connect logistic and urban, mobility services;
- Full freedom in planning and development of conceptual design, infrastructure and real estate development;
- In- house knowledge for developing investments programmes, financial strategies and their full management;
- Transparent and efficient data collection, which also helps to have a better and safer station equipment to meet the needs of the target group;

With some 6,000 employees, DB Station&Service AG generates around EUR 1.3 billion in revenues.



OVERVIEW OF THE DB STATION & SERVICE AG STRUCTURE¹

¹ Source: company brochure DB Netz

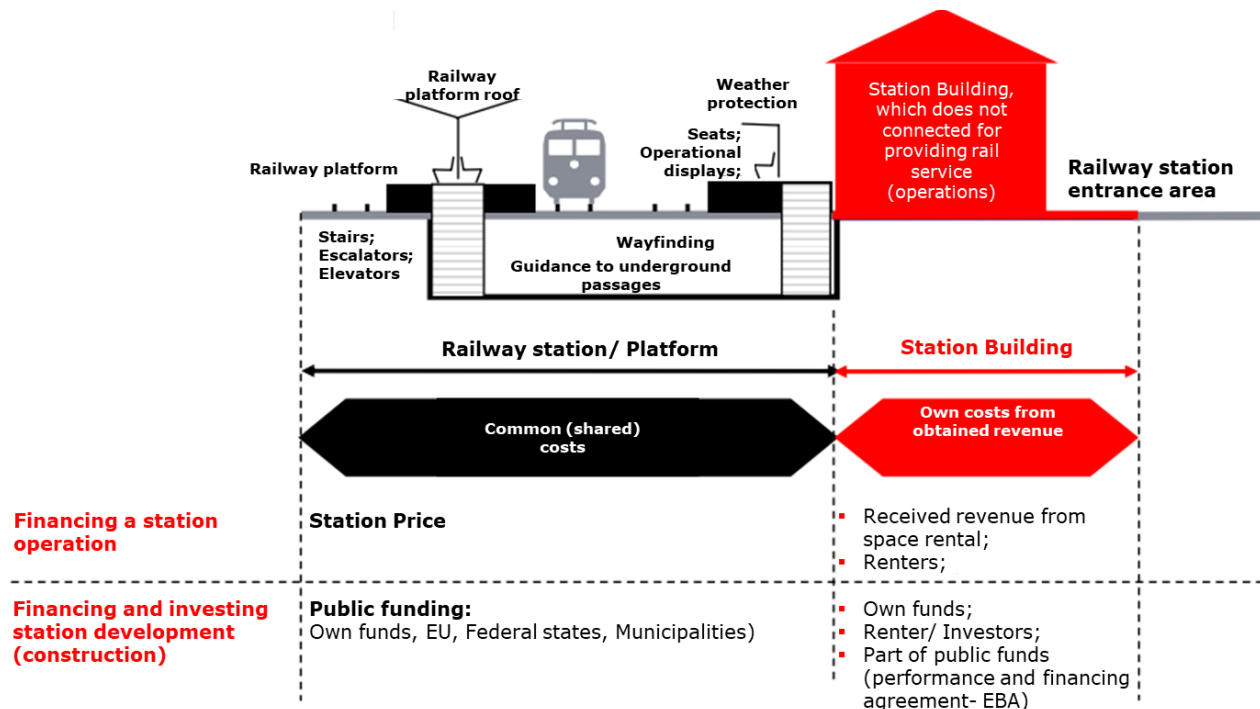
A6	Central Station–Operational	DB railway stations in Germany Berlin Central station	Efficient cooperation form to finance railway service
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Shared costs to assure modern, safe and attractive railway station to the public

Financing new railway stations, as well as their operation & maintenance in Germany is quite a complex system and implies separation of the area assigned only for railway/ trains operation and the railway station building itself. Both areas have different operational models, as well as allocated for users services:

- Railway station platform: the area provides its pure railway transportation service for passengers and allocate trains and provides passenger information system, as well as a small waiting area at platforms,
- The building itself mostly allocated commercial services, or railway information centers.

Below is presented a general overview of these two areas, their elements and existing financing flows for each of this area and elements:



EXAMPLE OF A STATION FINANCING AND ITS OPERATIONAL COSTS BY DB (SOURCE: DB NETZ)

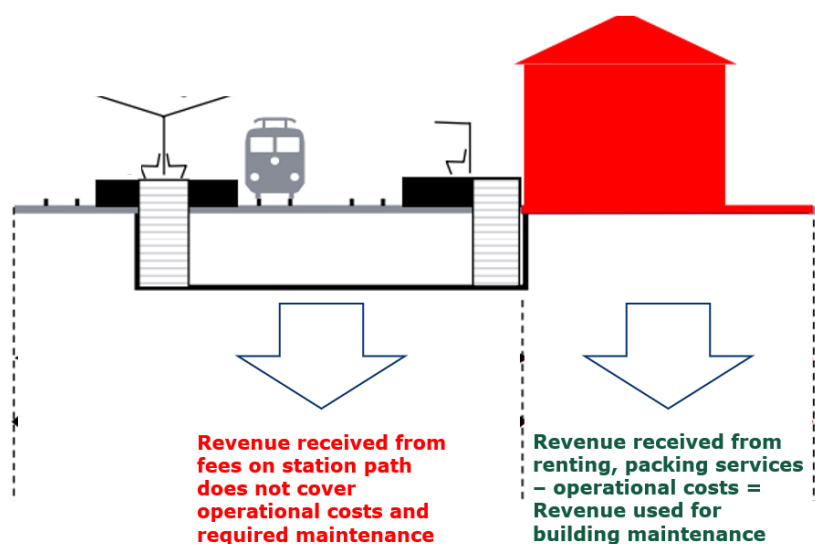
As it was mentioned before, railway stations operation and their financing (partly) are under the responsibility of DB Station & Service AG. The organisation of financing station platform areas are done using received revenue from paid by railway operational companies fees (station price for a train path), which provide local, regional, national and international train connections.

It means that railway operators, including DB are paying fees (train path prices) to DB Station & Service AG for using platforms and their attached area. The train path prices make up a high proportion of the ticket prices of around 20% to 25 % and are the equivalent of a toll to finance roads.

Revenue obtained from a railway entrance building remains by the company, and they are used to cover own costs, and some are planned for required renovations.

For example, in 2020 DB Station & Service AG invested about 1.1 billion euros into railway stations and their infrastructure.

However, revenue received after paid costs is usually very limited and does not cover railway infrastructural needs (construction and maintenance). Below is presented a graphic from obtained incomes by DB stations and Service AG.



OVERVIEW OF RECEIVED REVENUE BY DB STATION & SERVICE AG (SOURCE: AUTHOR)

As it is seen the costs for operating station platforms and attached railway infrastructure are higher than obtained incomes from path fees. Therefore, this area, which allocates mainly only services directed to trains operation, and this service is seen as a part of public transportation being sub- financed by state authorities. The starting point for the annual calculation of the compensation payments is the basic remuneration agreed in the contracts. This indicates the amount of the payments that DB Station & Service AG receives if they provide the services ordered in the agreed quality.

A7	Central Station–Operational	Pasila station	“Win-Win” Situation
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PPP enables economical “win-win” situation especially for large-scale station development projects

The new railway Pasila station was constructed by a private development consortium which was selected based on bids on building right price. The model was possible due to public land- ownership of the surrounding areas. In the price the developer took into consideration responsibilities to also build the public spaces and station building itself in addition to profit- generating housing and commercial developments.

Also, station maintenance issues and responsibilities of commercial, public, station and platform spaces were discussed and agreed before the call for bids was published in order to make it clear for all parties .

Pasila station, as described under the C3 lesson learned, is related to a wide group of entities, including a shopping mall, hotel, and offices. Thus, it was possible to move the station building’s management to a privately owned real estate company. The size of the entity makes it possible as the additional cost does not compromise economic feasibility. Still, the overall contractual model includes also yearly maintenance payments from public transportation operators to the private owner of the station.

Other owners of the station parts are the Finnish Transport Infrastructure Agency who owns and manages the rail infrastructure itself and the city, who owns and manages the streets and related outdoor public spaces.

The Pasila PPP model type has such benefits as:

- Utilization of increased land values to public space development and to railway operator’s core business like railway infrastructure investments and maintenance;
- Assuring efficient construction design and market-led commercial content;
- Station building’s construction and part of operational costs can be covered by commercial entity in an efficient way;



PASILA – TRIPLA PROJECT COMPARE OF STATUS BEFORE AND NOWADAYS (SOURCE: TRIPLA)

A8

Central Station–Operational

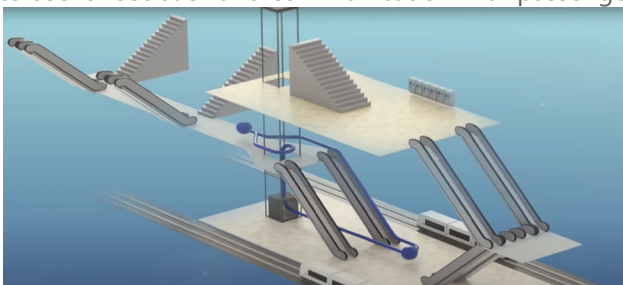
Nørreport railway station

Highly designed
wayfinding system

Allocation of passenger information and wayfinding system as a strong tool for integrating the railway station into an urban concept

In order to integrate an international passenger railway station into an urban context, allocating a passenger information system and wayfinding could be a strong implementation tool. Every transit or transport interchange stations (especially an international one) within urban areas must provide clear information about routes, stops, and connections to other transport modes. Under passenger information could be reviewed information stands or electronic table for passenger information like routes, system maps, schedules, expected travel time, real departure and arrival time, ridership procedure, etc. All these can also support a positive experience of user's satisfaction. For huge transportation hubs there are numbers of wayfinding system applied, which is used not only for passengers' logistic movements, but also for optimisation of user flows to support the functionality of the spaces and improve spaces utilisation. Such a wayfinding system directed not only on design for transportation connections, but also considers commercial development in and around railway stations, which could influence travellers' stress-free and relaxed journey, giving passengers extra time to shop, have a coffee or just relax before their journey. Under that system there are key functional elements identified (including comments on best practises): *Passenger Information Systems* (establish general network maps at convenient locations; show landmarks on a large city map for a passenger orientation; automated announcements for the train operation; electronic tables used for train destinations and its stops); *Display Screens* (connect information for other urban transport modes operations with allocation of walking time between stations); *Signage* (used for commercial or public displays signs, as well as it makes it easier to find bus stops, especially where stops for opposing travel directions are not located immediately nearby each other); *Navigation*; *Accessibility* (improving separation of passenger flows through separate stairwells, walking lines; opening underpass to 24/7 access; improving automatic quick check in areas and entrances) .

As a benchmarking for establishing a great wayfinding system the railway station Nørreport was considered. The system navigates users between public transport (bus, metro), regional and international trains, as well as commuter service. All these modes are allocated at different levels and connected with elevators and quick access using escalators which lead directly to boarding platforms. The passenger information is synchronised with a digital application (through all transport modes) and in parallel allocated at big screens at each departure levels and waiting (entrance) hall. In order to design the wayfinding the Nørreport station implemented a project, which included detailed station design accessibility analysis, review of transfer areas and their improvements for navigation, identifying improvement context and system design focus. Within the project, a large part was given to user's feedback and communication with passengers.



EXAMPLE OF PHYSICAL CONNECTIONS BETWEEN TRANSPORT MODES, AND WAYFINDINGS AT THE NØRREPORT RAILWAY STATION (SOURCE: YOUTUBE)

A9	Central Station–Operational	St. Pancras International Canary Wharf Railway Station	Contracts on operation of railway service facilities
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Station repairs and facility management under several contractual agreements with set out clear roles and responsibilities for British stations

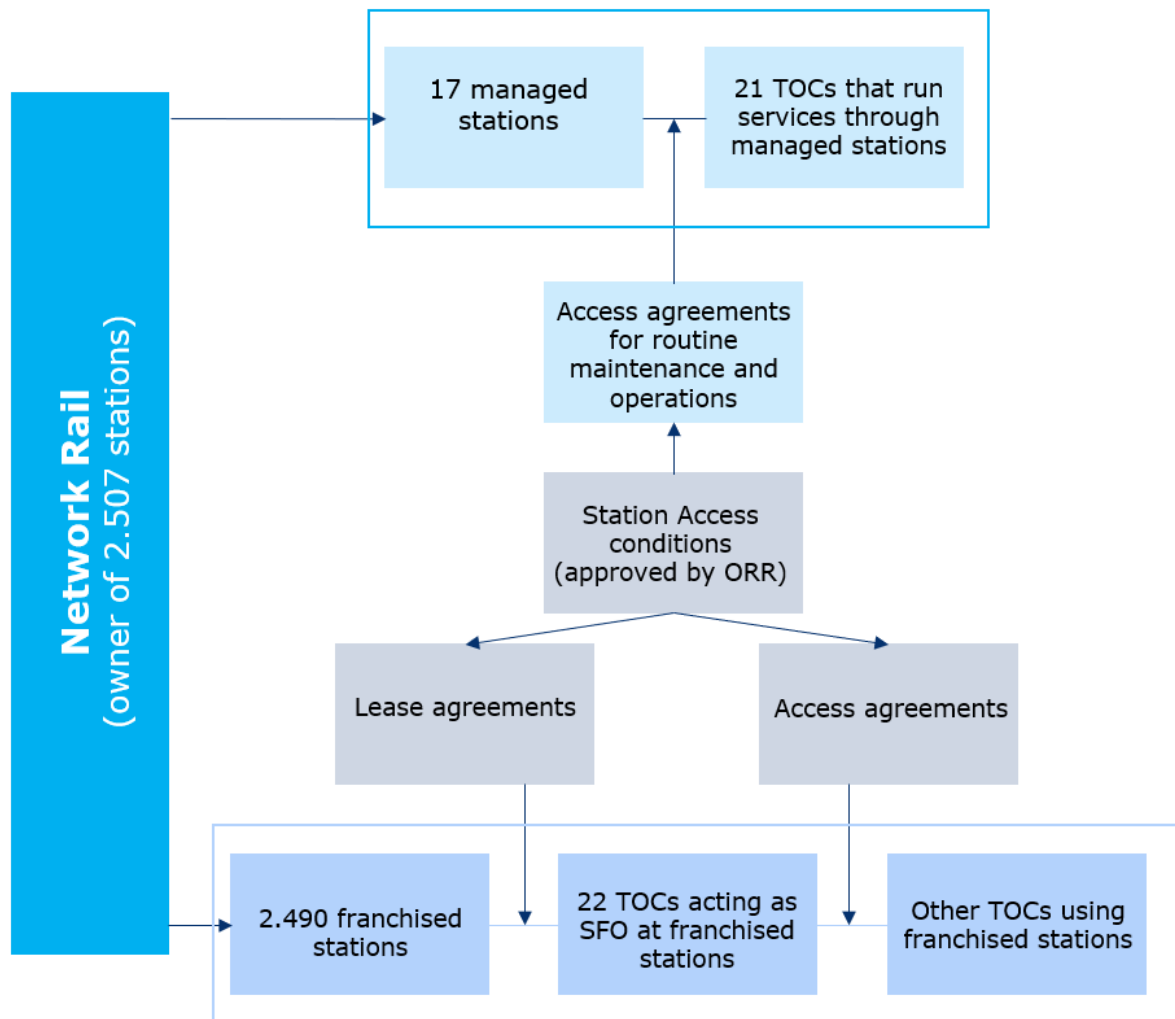
The British railway network and railway station are under ownership and control of the Network Rail (NR) company. The company is responsible for repairs and renewals at all international railway station (incl. repairs of clocks on platforms, check and modernisation of electronic passenger information systems and platform surfaces and footbridges, replace sits at platforms and repair lifts and elevators which are leading to platforms, etc.). It carries out repairs and renewals within expenditure limits and against annual targets for the condition of stations set for it by the Office of Rail Regulation (ORR, Government department²).

Network Rail operates under a network licence granted by the ORR. Train operation companies (TOCs) acting as station operators which must hold a station operation licence, and which should also support by the station renovation and asset management.

Below, is presented a structure of existing agreements between Network Rail and Train Operation Companies (TOCs) with respective roles and responsibilities:

- Network Rail (NR) acts as a station facility owner (SFO), where responsibility includes daily maintenance, cleaning and operations. Currently NR operates by itself 17 largest stations in UK, because of their size and strategic importance to the railway network. Range of TOCs has an agreement with NR to run services and amenities that NR is required to provide at its managed stations.
- Moreover, NR can lease the stations for the period of seven years (for example currently they lease 2490 stations to 22 TOCs that could act as SFO, also being responsible for daily station operation and facility management. Under the leasing contracts the SFO pays rent (including regulated charges) to NR to meet the costs of repairs and renewals and to provide a return on NR assets.
- Other TOCs may run passenger train services that call at franchised stations. For each of these franchised stations are separate agreements between SFO and other TOCs.

In order to set minimum standards for facilities needed and services such as information displays, waiting areas, or any other communication tools for passengers there was created an Office of Passenger Rail Franchising (OPRAF) to manage these responsibilities, and monitor compliance with requirements and commitments to make improvements. That independent office was created by the Strategic Rail Authority (SRA) who has a key role to play for awarding passenger rail franchises (to TOCs) and manage these franchises.



DIFFERENT CONTRACTURAL AGREEMENTS OF NETWORK RAIL AND THEIR CONNECTIONS TO RUN INTERNATIONAL RAILWAY STATIONS OPERATION AND MANAGEMENT (SOURCE: NATIONAL AUDIT SERVICE)

² <https://www.orr.gov.uk/>

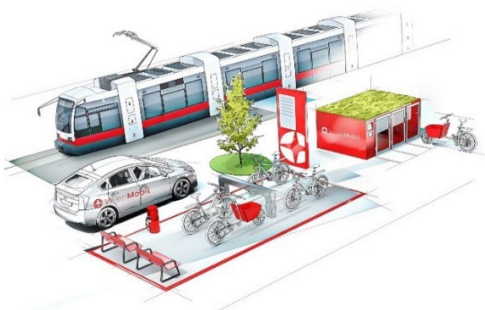
A10	Central Station - Mobility	Vienna Central	High integration & full mobility
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The railway station positioned as a central mobility hub offering digital integrated multimodal transport service

In 2014, the city of Vienna and the railway transport operator ÖBB set a new symbol for the railway station calling it "Vienna Main Station is a new mobility hub in the heart of Europe". The initiative was directed to reorganise and redesign the station also developing a whole city district by creating living places (houses) and changing the railway station into a mobility hub offering a one stop shop for end users (incl. tourists) and a hub for mobility. The idea behind is to help optimise the benefit of the overall urban transport system for users. The station is perfectly connected and integrated with urban public transport modes (metro, rapid transit, tram and buses). Moreover, to better organise the station spaces, car parking with 600 spaces and bicycle parking were allocated. In order to provide a smart technology to digitally connect mobility offers, railway service and therefor create a hub, as well as to give uncomplicated and fast access to primarily low-emission, comprehensive mobility around the clock, a new digital system of "Wien Mobil" was introduced. The system integrates all available urban transport modes, as well as new mobility offers (incl. sharing last mile solutions: e-bike sharing, car sharing, an e-charging station, a cargo-bike, bike-safety-boxes, a bike pump). Since Vienna Central station is an important hub for night train connections in Europe, it means that the station supports millions of tourists and business visitors every year. Having exact statistics of passenger's flow, the allocated mobility offers at the railway station are fully integrated with tourist's demand. Allocation of e- scooters, and carsharing services gives business visitors and tourists additional freedom of traveling within the city, offering flexible tariffs and digitally integrated with a railway service online booking platform. The digital application gives a function of planning a route with the most famous tourists' attractions.

Benefits of the lessons learned:

- A great boost to the international trend of the sharing economy, which replaces the need for owning;
- Reduce car traffic in the city and offer flexible (free- floating and station based) and affordable mobility offers for tourists and residents;
- Promote public transport and railway services;
- By creating a "Wien Mobil" service it was helpful to set a framework for data collection and sharing between stakeholder, possible live- data evaluation (especially for PT and railway operation), and making transport service attractive by providing to users an overview of connected transport modes, as well as integrated payment system;



MOBILITY HUB DESIGN AND CONCEPT (SOURCE: VIENMOBIL)

B1 Airport Station – Architecture Canary Wharf Hybrid Density

Even airport stations can benefit from a diverse service spectrum that hosts more than air-rail interchange and breaks out from a mono-functional context

Very often Airport-based stations work as a closed model and focus on purely serving travellers switching from air to other transportation modes. Nevertheless, current inner-city terminal typologies such as Canary Wharf Crossrail Place could become a reference model. ("Canary Wharf" refers to Canary Wharf Station - Crossrail Place, which is not an airport station, neither are there direct services from Canary Wharf station to an airport but due to its functional provision it can serve as a model for such)

The airport station, when located in the right context should also be an open active urban place. Both the station and its near surrounding (Airport City with residential and commercial content) would create a favourable mix of customers (travellers, businesspersons, inhabitants) on the landside and therefore an opportunity to maximizing GVA.

To diversify services, densify station provisions and to attach public areas such as green spaces, is to add value both to the station and the services it provides. Hybrid density as achieved in the neighbourhood of Canary Wharf is not contradictory to airport surroundings if an integrated urban planning approach into this direction is targeted.



AIRPORT RAIL INTERCHANGE AS AN ACTIVE LINK BETWEEN AIR-TRAFFIC AND CITY, ALLOWS CUSTOMER AND FUNCTIONAL MIX. SERVICE SCOPE WIDENS BEYOND TRANSPORTATION. ROLE MODEL CANARY WHARF (SOURCE: AUTHORS)

Rail connection enables high-value development also at airport surroundings

Airport surroundings are often avoided by higher value land uses and development even though they have their clear advantages, especially with international and local rail connections. For example, long distance accessibility is relatively excellent as air, rail, and car traffic lead easily directly to spot without lacking parking place availability.

Also large-scale buildings and their negative effect for urban environment is not significant negative factor in such areas. Noise-producing uses, like concert halls, sports arenas and such have better freedom of activities as housing does not exist nearby.

Based on this study, it is notable, that most high economic and commercial value land uses, like hotels, offices, exhibition centres, sports arenas, retail facilities have great potential for generating value even just beside airport facilities. The term airport city is used for airport surroundings combined with multiple uses. When moving further away from the airport, housing density increases and replaces some of these retail facilities. Still, it needs to be noted that various modes of transport are needed to connect different quarters. In some of these cases, micromobility could play an important role to avoid accessibility issues in what is often referred as to “the first and last mile” problem.

Utrecht central as a case example is not an airport surrounding but the station’s westside has multiple airport city characters. For instance, large scale offices, hotels and convention centre together with bus station all represent land uses with great potential also in close proximity of airports.



LAND-USE SPECTRUM AND POSITIONING AROUND UTRECHT STATION (MODIFIED FOR AN AIRPORT BENCHMARK PURPOSE) (SOURCE: AUTHORS)

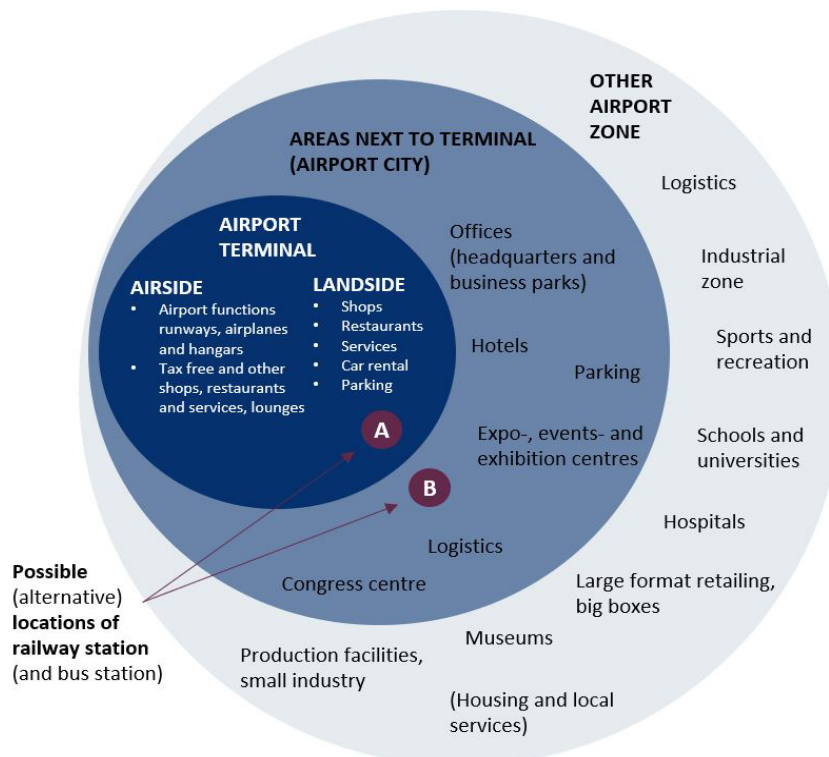
B3	Airport Station – Commercial	Copenhagen Airport Station	Limited retail
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Excellent connections and traveller amounts create hotel and office potential

Airport railway stations can be directly connected to the terminal building (landside) where the retail spectrum is usually quite limited. Typical services, mostly for air passengers, are: kiosks, small grocery store; restaurants and cafes; commercial services (exchange offices, hairdresser, massage etc.); car rental offices; ticket vending machines (for railway station, bus station, parking);

All these services can be used by air-passengers but also office-workers, hotel and conference visitors and even near-by inhabitants. Airside services (tax-free shops and other airside stores and restaurants) can only be used by the air-passengers. Airport railway station can also be located outside the terminal building and be part of the airport city. Typical and potential functions at the airport city are:

- Train station with kiosks, cafes and small commercial services – the amount of potential services and the role of the railway station depends on the amount of offices, hotels and other activities in the airport city;
- Offices;
- Hotels;
- Exhibition centre, convention centre, sports centres/arénas;
- Parking structures;



POTENTIAL USES IN AIRPORT CITIES (SOURCE: AUTHORS)

B4	Airport Station– Functional	Copenhagen Airport Station	Multi-layered integration
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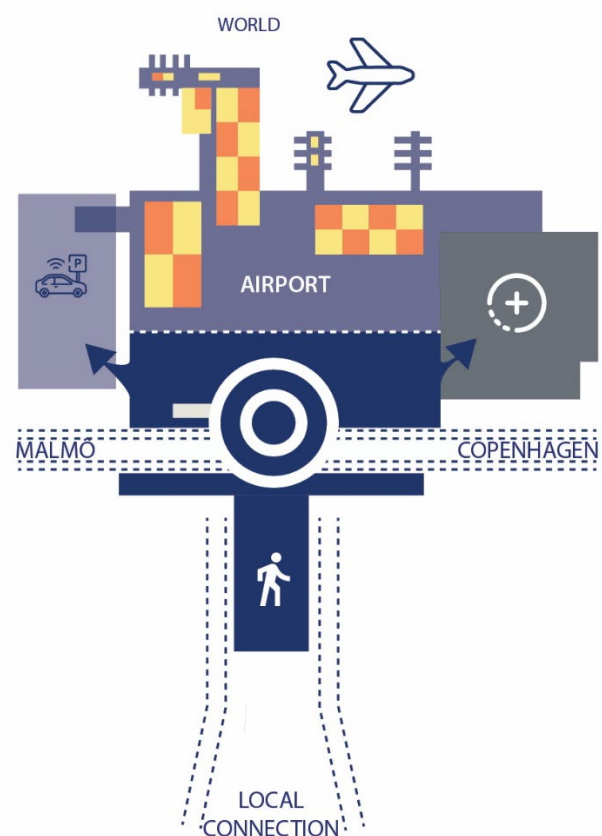
The spatial character of an airport link station focuses typically on smooth interchange. Integrated supplementary services are only beneficial if a stress-free transit can be guaranteed.

Unconstrained routes in-between air-rail transport modes with simple and clear circulation pattern are necessary to allow stress-free journeys and relaxed customer experience; this is especially relevant at busy air hubs. Copenhagen Airport Station acts as another node of transport-related to air traffic and related public transport to the city, suburbs and further into Sweden.

The station is functionally and volumetrically integrated to the airport building, incorporating an excellent passenger flow and creating an infrastructure for supportive functionality. The layered functionality between the station and airport allow for a blurred interaction between services while providing a clear passenger flow therefore increasing the GVA of the station.

This concept of a 24/7 vibrant place is optimized from a transportation point of view and could be enriched with further connected activities in the future, fully exploiting its full potential as a multi-layered hub.

Copenhagen airport station consolidates a spatial approach to integrate Air-Rail services and transfers. Whereas it offers services for remote luggage handling such as door-to-door luggage service and multi-modal passenger information for other transport needs it can still enhance its integration provision. An even more comprehensive approach has been implemented at Zurich Airport. It includes air-rail tickets and satellite luggage check-in in the inner city. It truly creates more convenient customer experience with less waiting at the airport.



THE AIRPORT STATION AS A NODE OF SAFE AIR-RAIL INTERCHANGE AND RELATED PUBLIC MOBILITY WITH POTENTIAL LANDSIDE ACTIVITY. ROLE MODEL: COPENHAGEN AIRPORT STATION (SOURCE: AUTHORS)

B5

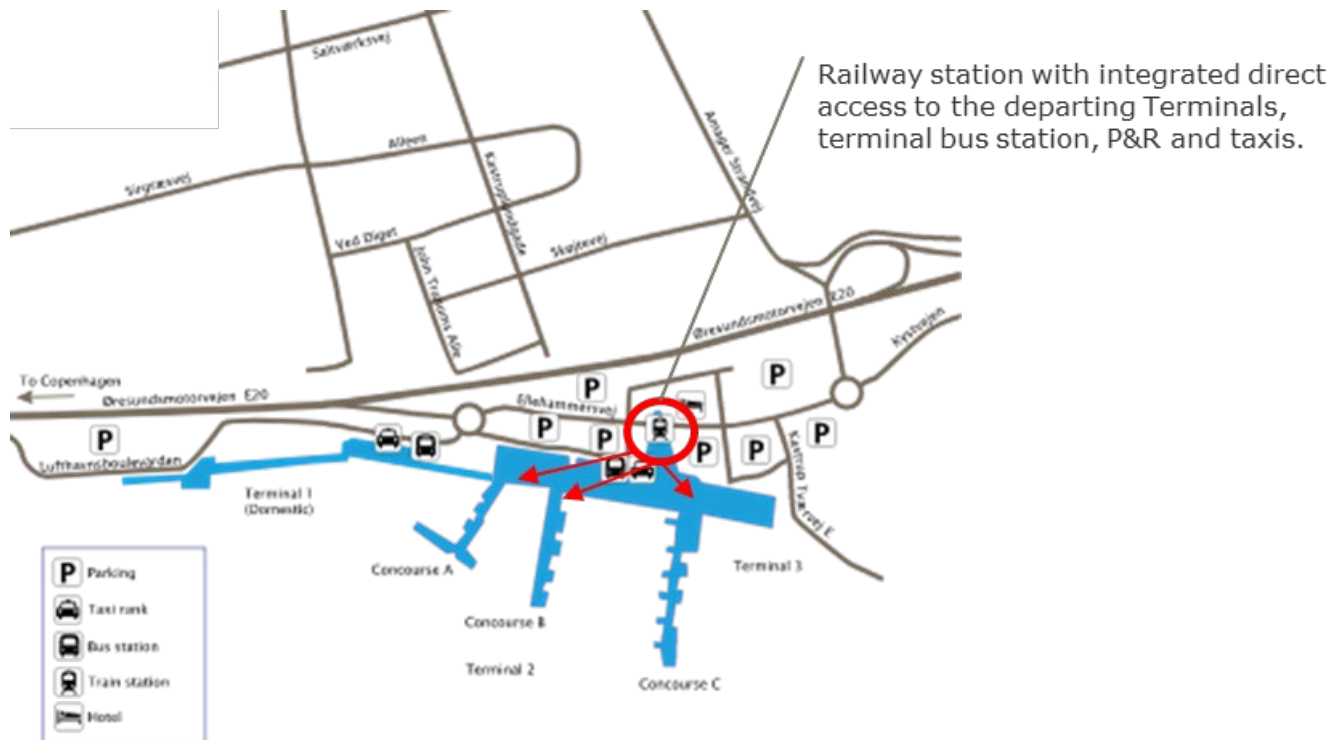
Airport Station– Operational

Copenhagen Airport

High operational efficiency

Efficient railway scheduling time and operational model

The Copenhagen airport is the leading airport in providing the most efficient operation in Europe³. The airport invests in digitalisation, assuring fast urban and national transportation, as well as in innovation. Moreover, it offers a strong railway connections, both rail and airport are integrated in the national transport system. The train station is underneath Terminal 3. Therefore offers a quick accessibility, design integration between railway station and departing halls though close location, clear signs, numbers of escalators to and from platforms 1 or 2 (depending on railway destinations – urban, regional, national or international), barrier free solutions, access to P&R, bus and taxi stations.



CPH RAILWAY STATION (SOURCE: CPH)

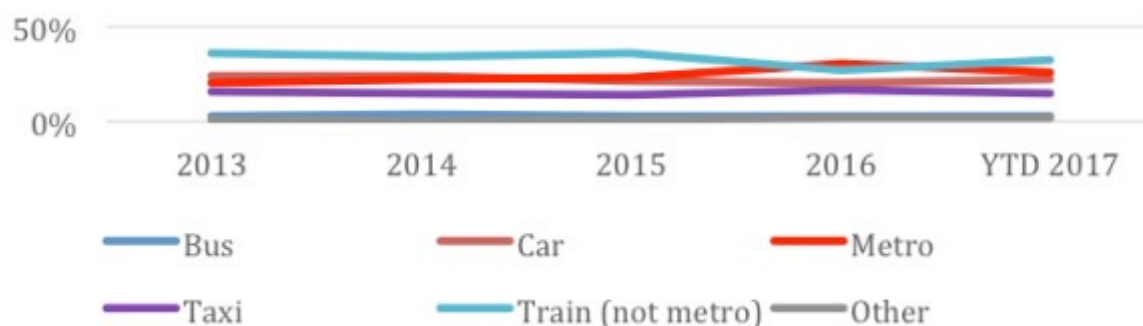
Considering the mode share of rail for airport travel, Copenhagen airport is among the leaders in the world as 34% use the regional train service to travel to and from the airport. That is a total of 60% of airport passengers using a rail service. The railway operates quite efficient and offers short waiting times. Travel time from the airport to Copenhagen Central Station is approximately thirteen minutes and twenty-four minutes to Malmö Central. The trains run approximately every 15 minutes. Some trains on its way to central areas of the city stop at urban, non-touristic areas like Tårnby, Ørestad, and Niva stations.

Most of these stops are not of use to tourists, although changing at Ørestad to the metro is a quick way to travel to the Bella Center (alternatively use the metro and transfer at Christianshavn). Regional trains, like to Sønderborg, operate every two hours. For Bornholm, there are four or five trains a day. Trains to Malmö run every twenty minutes as well. To Gothenburg and Kalmar there are trains every other hour.

³ The award is presented annually by leading international researchers and aviation experts at the Air Transport Research Society (ATRS)

Beside an efficient railway service, additionally railway could provide to passengers who are traveling from or to the airport high punctuality and reliability. Moreover, in order to develop airports more attractive, the Danish airports are collaborating on connecting Denmark with even creating a better connectivity of rail to airports, as main sustainable transport mode. Improving rail connections and making it more efficient will support Denmark to meet environmental challenges as a significant proportion of the CO₂ emissions at airports, which are generated by passenger and staff journeys to and from the airport.

Creation a high-quality, intermodal transfer rail facility will also require a high degree of cooperation between the airport and the rail system designer/operators.



MODAL SPLIT OF COPENHAGEN AIRPORT TRANSPORT USE⁴

⁴ Source: Interreg central Europe, Air-Rail Link, - a LAirA Project Report

B6 Airport Station – Mobility

Oslo Airport station

Archiving sustainable mobility

Create “Air- Rail” links to balance possible negative road traffic impacts at the airport area (district). Establish mobility strategic ideas and high integration of a railway station with other public transport modes

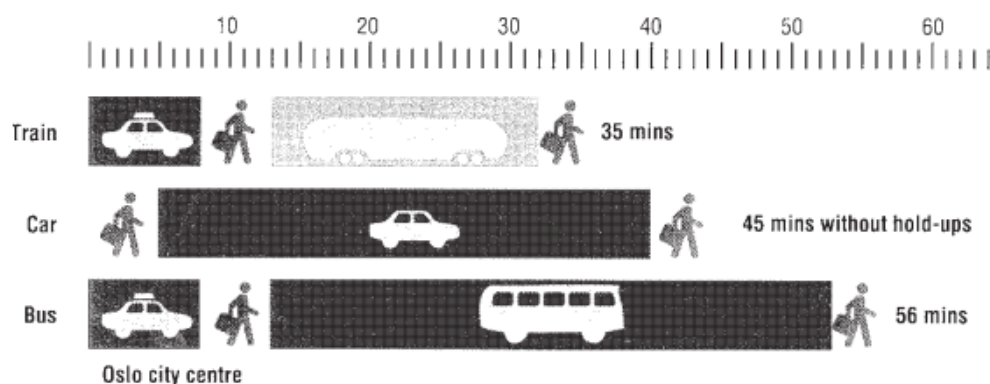
The Oslo Airport railway station is served by two railway providers: Vy (Norwegian State Railways), who operates express trains from Gardermoen to the airport (105 km in 23 min.), and by Flytoget (airport express train) – the fastest NSB trains – up to six trains in an hour. The Oslo Airport Express train can be considered as an example of the implementation of a strategy that is based on obtaining high running speeds and low terminal-to-terminal travel times. Archiving sustainability by providing fast- running speed trains and short travel times were established as part of a larger political process of siting a new airport for Oslo.

One of additional best practises relevant to such a service is Arlanda Express in Stockholm (not listed in the benchmarking cities long- list), which also provides an air-rail service connecting Stockholm Central Station with the Stockholm Arlanda Airport outside of the city. Within central Europe a similar benchmarking shows railway connections and services provided by the CAT city airport trains and ÖBB Railjet in Vienna, which runs from the city center directly to the Vienna airport without any additional stops within the city.

While constructing the airport building, as well as railway station, only sustainable design and green building materials were used (for example glulam, recycled steel, and a mixture of concrete and volcanic ash).

In order to establish a strong concept of air & rail and assure rail operational efficiency, it was decided to construct a tunnel which made it possible to meet the originally planned 19-min. travel time to the downtown terminal, compared with the 33-min travel time during the temporary service.

Moreover, the railway station at Oslo airport has a direct access to the bus station. In order to support its sustainability it was decided to allocate only electric buses.



DOOR- TO- DOOR MOBILITY FROM THE OSLO RAILWAY STATION⁵

⁵ Source: TCRP Report 62: Improving Public Transportation Access to Large Airports (Part 2)

C1

Sub-Center –Architecture

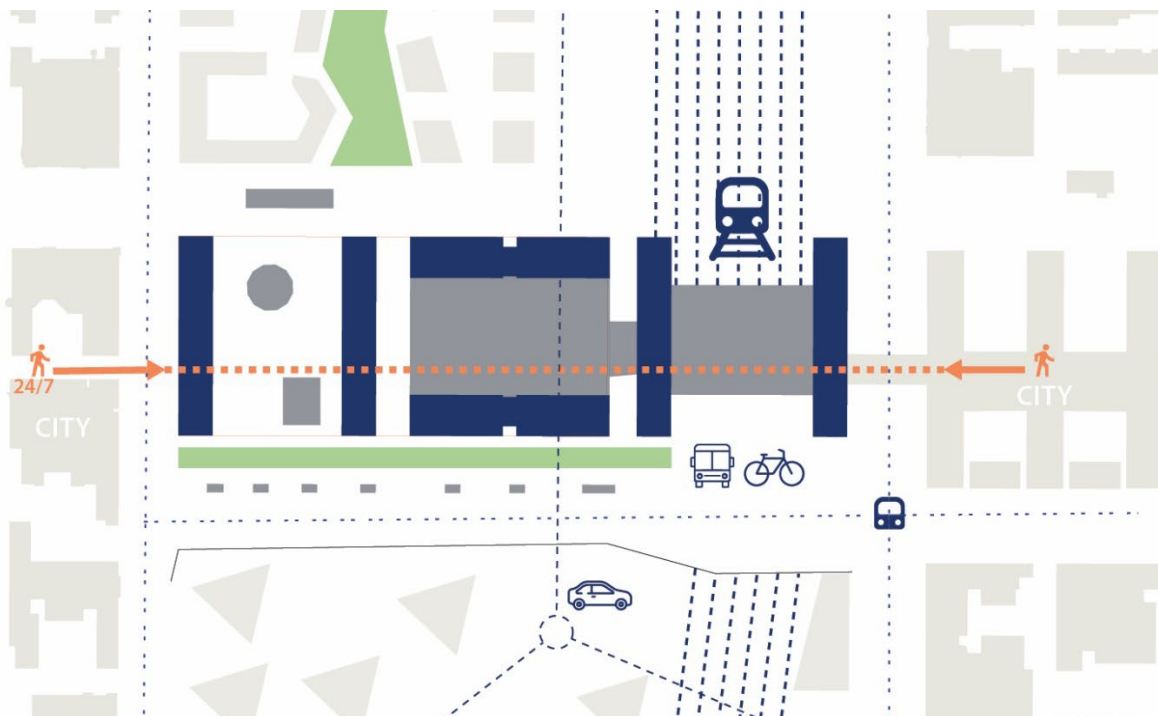
Helsinki Pasila

Contextual Bridging

Peripheral locations should use their great potential to create new additional urban links and interaction platforms to bridge their off-centre location with the core network, inner city and near-by surrounding.

The case of Pasila Station and its urban extent shows how a modern, bold and brave city block with an integrated transportation hub can be the kick-off and repair kit in a formerly weak urban context. Its strength and success required sufficient available space and territory. The method of upscaling and reframing the existing urban typology of a modernistic city fabric and to bridge the unbuilt gap on a former railyard shows an impressive impact.

The peripheral station inside a mixed-use complex becomes a new micro-institution for the area and beyond. Sub-centre locations allow for future change and agile modifications due to more flexible urban environments and less constraints, as in historical or heritage, binding inner city locations. New concepts can be tested and easily be implemented.



PASILA STATION AS AN INTERWOVEN URBAN DEVELOPMENT WHICH CONNECTS TRANSPORTATION, PUBLIC SPACES AND COMMERCIAL SERVICES WITHIN A NEW CITY BLOCK (SOURCE: CONSULTANT)

Strengthening of existing and adding missing uses can raise the area's role to new level in city structure and real estate markets

During the master planning phase Pasila was a deteriorating office area, but with excellent rail accessibility, even from outside the capital area, was seen to have enormous potential for high quality and dense urban regeneration.

The planning built on current features of the area. Notable office sub-market was to be reinforced by a significant amount of modern development, housing was introduced in large scale to form a true mixed urban structure and retail was brought to both serve the local community but also utilize the superb location and high traffic flows on the central mobility hub. Careful market analysis was carried out in order to provide realistic look on potential.

In 2019 the station, shopping mall and first office unit was completed, and currently large share of housing quarters are in construction. On the south side though, the development has faced difficulties as more complex and ambitious tower buildings have turn out problematic from feasibility point of view.

According to the Pasila case, it is advisable to build on current strengths and introduce the uses needed to meet the mixed-use targets. Commercial hotspots should be placed at the core and along the highest pedestrian flows. Pasila shows that very high-volume retail unit can be located immediately adjacent to the rail tracks, and in terms of GVA maximising, this is highly advisable given the myriad of economic and social opportunities immediately attached to railway platform. In sub-centre locations this is usually also the needed jump in order to get full spectrum of services to the area. Although Pasila meets various best cases scenarios, it also has weaknesses, as the street level retail potential may be narrowed to minimum.

Its notable that complexity of quarters (shape or multiple uses) increase risks for realization. Still, by combining different uses in a sensible manner, it is possible to wrap up very complex projects under one investor.



LAND-USE SPECTRUM AND POSITIONING AROUND PASILA STATION (SOURCE: AUTHORS)

Developing sub-centres may have hidden potential for large-scale retail and other commercial activities, which will have a huge impact on a railway station GVA

Pasila railway station is part of the large five-storey Mall of Tripla that has 250 stores including more than 60 restaurants and extensive range of specialty stores and entertainment services. It has also the largest supermarkets in the area. In the same massive block there are also apartments, offices, and a hotel connected to the 2 300 underground (multipurpose) parking places. The whole Tripla entity serves passengers, as well as the inhabitants and workplaces nearby and in the larger catchment area.

Mall of Tripla has made Pasila a major retail area. Before there were only a few specialty stores and restaurants with a handful of small grocery stores. Location next to the Pasila railway station together with extensive bus and tram connections makes the location unbeatable. Pasila station and Mall of Tripla are easily reached by car from the whole region due to its central location.

Most important lessons learned are:

- Sub-centres next to the busy railway station may have hidden potential for large scale retail and other commercial activities;
- Great accessibility by all means of transportation is important for the commercial success of the location. Area next to the railway station has potential to become the new attractive centre of the whole city district;
- Station is a natural location for the retailing and commercial services targeted for the whole city district. If the competitive situation and city plans allow it may be suitable location for the regional shopping centre complemented by offices, hotels and apartments;
- Important customer group for the services at the railway station are the passing passengers. By diversifying the range of services it's possible to enlarge the catchment area. A large number of restaurants and other commercial services next to the railway station can also improve the demand for the neighbouring housing and office lots;

5th floor

ENTERTAINMENT AND WELL-BEING

This cosy and fresh floor includes a cinema, restaurants and wellness services.

4th floor

LITTLE MANHATTAN

A lively mix of urban culture, culinary experiences and shopping. Access to the railway station.

3rd floor

HIGH STREET

Specialty retail floor full of fashion and design. Casual restaurants and a terrace area add to the unique atmosphere of this floor.

2nd floor

SHOPPING STREET

This floor is for those who are serious about shopping. The central plaza is surrounded by the bright and high-ceilinged Food Street, the beating heart of this zone.

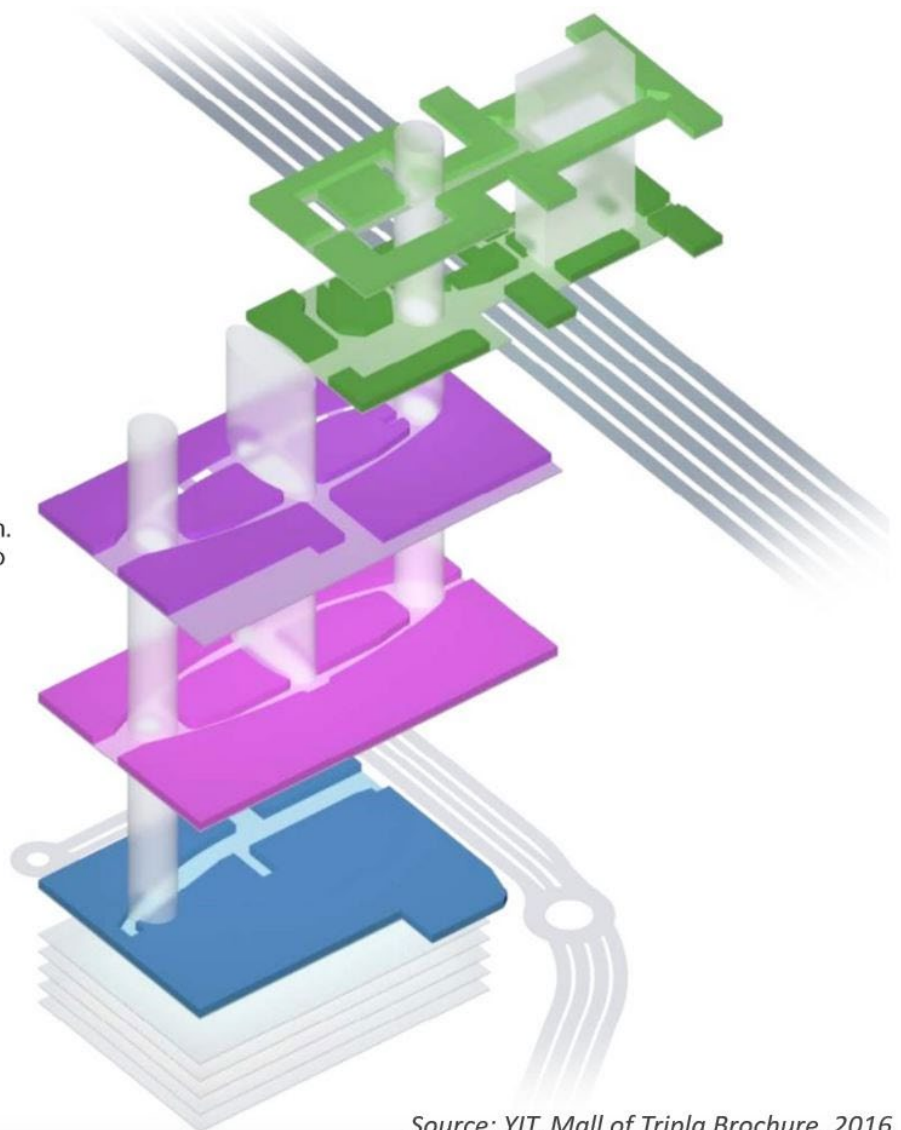
1st floor

FOOD MARKET

The Market Zoo on this floor is a collection of street food, sweet shops and the unique atmosphere of an indoor market.

PARKING

Parking on five levels.



Source: YIT, Mall of Tripla Brochure, 2016

SHOPPING MALL SMOOTHLY CONNECTED TO RAILWAY STATION⁶

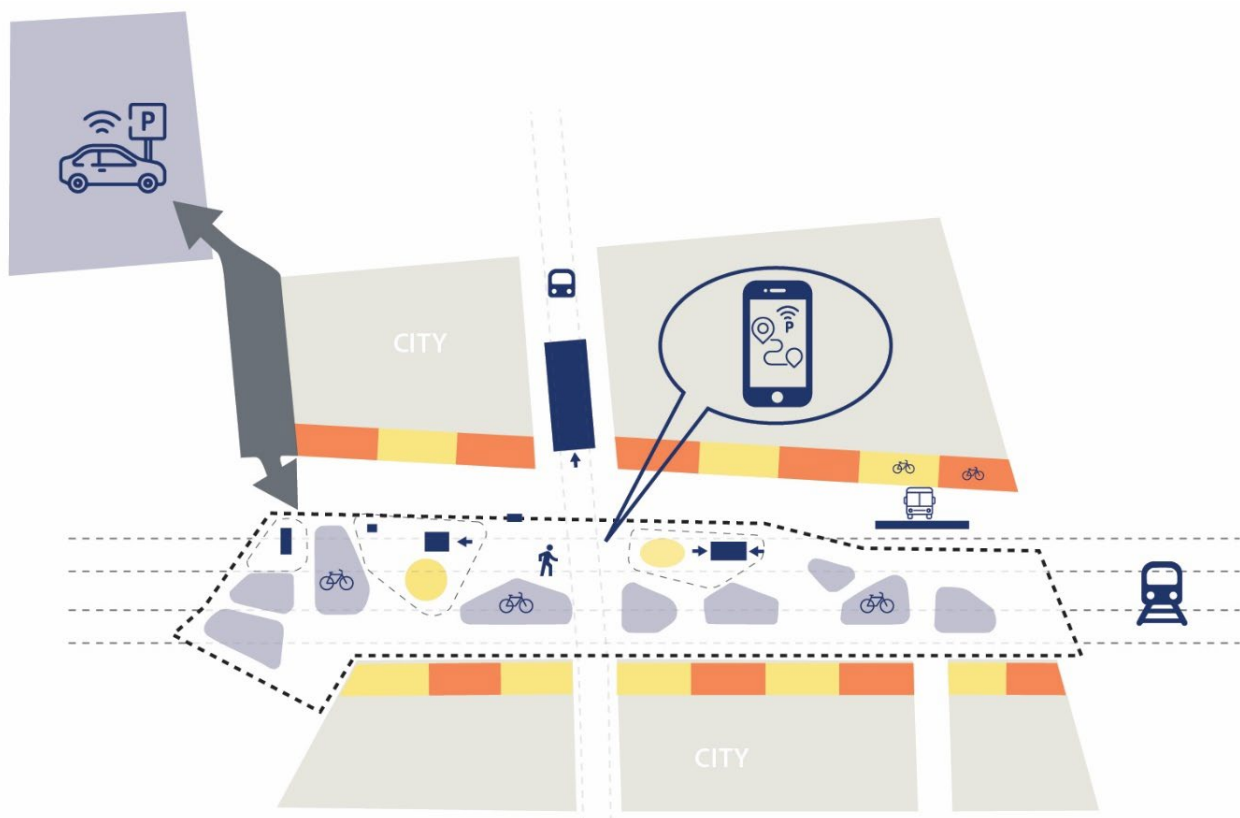
⁶ Source: YIT, mall of Tripla Brochure, 2016

C4	Sub-Center – Functional	Copenhagen Nørreport	Smart Switch
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The “smart-switch” intensifies the interaction between overlapping modes of transport, services and technology at and around the station.

Enabled by overlapping transport modes, services, and digital technology, the “smart switch” could become a new building typology in which it becomes easy to switch between private and public transport modes, upscaling and downscaling or seamlessly switching between different transport providers. Nørreport station is a complex example in which the proximity of two different rail lines was used as a starting point to define an urban approach to connect a myriad of transport opportunities.

The station became an urban smart-switch in which the transition between transport modes and providers is enabled by the design of the station and its interface with the city. Furthermore, Nørreport proposes these transitions to happen in a city square that facilitates the interaction between passengers and citizens in a public space framed by a bustling commercial vibrancy.



URBAN SMART SWITCH SETS ITSELF INBETWEEN PRIVATE AND PUBLIC TRANSPORT MODES AND ENABLES LINKS TO COMMERCIAL FUNCTIONALITIES (SOURCE: AUTHORS)

C5	Sub-Center –Operational	Køge Nord station	Early public-private collaboration
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Efficient collaboration between public (local & national) and private entities on railway station construction and later operation

Development of international railway station effects on multimodal transport systems, international passenger rail systems, local and regional passenger rail systems, and the actual city areas in proximity of the station. In order to establish a modern passenger railway station providing sub-urban transfer hub, there were successfully established PPP cooperation between the entities: Banedanmark, railway maintenance and traffic control government agency, DSB public for-profit state-owned rail corporation. The private part of this cooperation was given to consulting companies and architectural designers to visualise the station, as well as support the City of Køge at the construction phase. These organisations worked together on the JV base to develop a competition approach for creating a station design. The railway construction was split to smaller contracts to limit company risks in awarding too large construction projects. Many of them were then undertaken by private enterprises or joint ventures. The station construction was part of the Banedanmark's Copenhagen-Ringsted project. During the project, a company CAD-manual was made based on project experiences to support BIM for design and construction, but also for facility management in operation and maintenance. As a result the railway station shows a great operational efficiency covering:

- Support the City of Køge needs in urban development and proving a sustainable and quick, as well as efficient transportation;
- Great value for the rail service operator to enhance its business and operational area;
- Integration of international passenger traffic to regional suburban rail service;

The key lesson learned from this is Early public-private collaboration. By using this operative approach for developing a new and modern station, wider value-added perspective could be achieved already in planning phase. Currently the station operates by the DSB, while Banedanmark is taking responsibility for station maintenance.



TRANSFER FROM THE BUSIEST MOTORWAY TO RAILWAY TRANSPORTATION (SOURCE: KØGE)

C6	Sub-Center – Mobility	Amsterdam Amstel	Transfer hub between suburban and central city connections
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Central suburban transfer point with a strong focus on a last mile complementary service

The railway station plays a role of transfer hub and oriented to provide a daily service to city residents, as well as suburban travellers. Due to its location in the business district, which allocates the Rembrandt Tower and the Leeuwenburg campus of the Hogeschool van Amsterdam, the railway station is highly integrated with other available urban transport modes: tram lines, three metro lines, buses (both local and regional bus services), altogether providing a large feeder traffic from the surrounding areas (both adjacent and regional) for the high-speed international rail service originating to/from Amsterdam. All public transport stations are integrated with the railway station through direct and free from cars pedestrian walking areas. The passenger rail service offers local (sprinter) and national-international IC connections to other regions in Netherlands.

Moreover, the station offers numerous possibilities for first/last mile connectivity, which is one of the parts of city developments strategy – enhancing sustainable transportation. Therefore, there is a bicycle parking with underground indoor and outdoor facilities. A bicycle rental service “OV-fiets” is located in front of the railway station and its rental service offers a concept for a last mile connectivity giving an attractive price for a daily usage. The rental service could be added to a passenger travel seasonal card without extra charge. However, for using free-floating service, as well as other existing “OV-fiets” station nearby railway could be booked for extra costs.

To enhance rail and urban transport usage, especially bike usage, the station offers an access pass service for the residents, in order to give them an opportunity for a quick access without a valid travel ticket that would otherwise be necessary to enter the station, utilizing the station also as a fast pedestrian connection link between the city areas separated by the rails.

Widescale e-scooter rental services is not available at the station area, since there is the law prohibits use of devices at public roads. Only “special moped” granted devices are allowed (insured, limit of 25 kmph, equipped with lights and reflectors, user at least 16 years of age) to park at the station with few allocated parking facilities.

In order to better organise private car connectivity there is a few parking spots at the railway station, however the main focus here put for electric car usage offering EV charging stations and EV car- rental services.

Lessons learned:

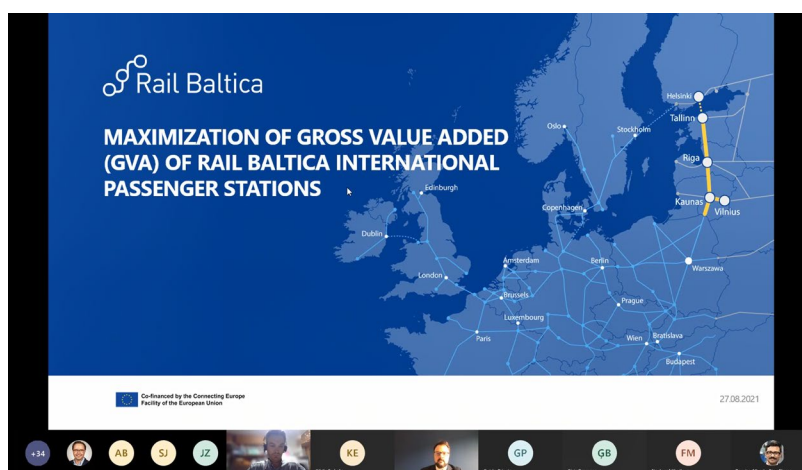
- Strong focus on sustainable transport connectivity rail & bicycle;
- Developing last mile connectivity as a complementally transportation to the railway station offering tickets integration;
- Developing a better mobility at railway station could attract not only residents, but also some commercial services characterised for daily traveling passengers, for example cafes, shops and banks;

7.3 Appendix III. Summary of the project stakeholder workshops

To follow up the project scope of work the consultant team organised, with a strong support provided by the RB Rail AS team, two stakeholder workshops.

The **first workshop** was held at the end of the week 34 of 2021 (27.08.2021). The purpose was to:

- Present project goal and potential outcomes;
- Provide existing knowledge on the topic of railway passenger stations GVA. Discussions of important criteria's for maximalisation of stations GVA;
- Presentation of international best practices and their lessons learned. Explaining the methodology, how best cases were selected and how could they be relevant to the RB international railway passenger stations;
- Request stakeholders to share with the project team relevant data and studies to develop a critical analysis of seven international railway stations.



SCREENSHOT FROM THE FIRST STAKEHOLDER WORKSHOP

The participants included more than fifty (50) experts from the Baltic States, mainly from such organisations as:

- | | |
|---|---|
| <ul style="list-style-type: none"> ■ Ministry of Economic Affairs and Communications, Estonia; ■ Ministry of Finance, Estonia; ■ Mainor Ülemiste (Ülemiste City developer); ■ Tallinn airport; ■ Ministry of Transport, Latvia; ■ Road Transport Administration, Latvia; ■ Marupe Municipality, Latvia; ■ SJSC Latvian railway; ■ RM LLC Rigas satiksme; ■ The Latvian Cyclists' Union; ■ Riga City Architect; | <ul style="list-style-type: none"> ■ City for People, Latvia; ■ European Railway Line; ■ Panevėžys City Municipality Administration; ■ AS Pasažieru vilciens; ■ LTG Infra (Lithuania railways group); ■ Grupa93; ■ Academy of Arch. & Urban Studies, TalTech; ■ Zaha- Hadid architects, and others; |
|---|---|

Once the workshop was finished stakeholders from Estonia, Latvia and Lithuania shared with the consultant team some of the requested data to develop a critical analysis of the stations and, especially for their surroundings.

The **second workshop** was organised on November 22, 2021. The purpose was to:

- Present critical analysis outcomes on development plans already prepared or in the process of being produced for RB Rail AS international passenger stations. The analysis will highlight the strengths and weaknesses of the current development plans considering the results of benchmarking activity. The critical analysis will be carried out based on the available documentation as well as on information gathered through workshops with the RB Rail AS international passenger stations' stakeholders;
- Discussions on proposed key recommendations to improve the design and connectivity of the RB international passenger railway stations;

In order to cover all important aspects being discussed during the call, the consultant organised one meeting room with all participants to present project implementation status, team and methodology for the WP2 and WP3 and later to present the critical analysis part three parallel ongoing workshop virtual rooms were organised. The total duration was more than three hours.



SCREENSHOTS FROM THE SECOND STAKEHOLDER WORKSHOP

The participants included more than fifty (50) (out of 200 invitations) experts, mainly from such organisations as:

- Ministry of Economic Affairs and Communications;
- Ministry of Transport, Latvia;
- Estonian Ports Association;
- Ministry of Regional development;
- Ülemiste city;
- Port of Tallin;
- Tallin airport;
- Riga City Council, City Development and Traffic Committees;
- Pärnu city;
- Transport Competence Agency;
- Riga investment and tourism agency;
- Latvian Investment and Development Agency;
- Lithuanian transport safety administration;
- Board member, AS Pasažieru vilciens;
- SIA "Eiropas dzelzceļa līnijas";
- Association of Hotels and Restaurants of Latvia;
- Head of Public Transport division at VSIA Autotransporta direkcija;
- Estonian Railways Ltd;
- Riga bus station;
- Riga airport;
- Association of Latvian architects;
- Foreign investors council, Latvia;
- Latvian trade and commerce chamber;
- Elron Rail;
- Panevezys Municipality;
- Kaunas City Municipality;
- Vilnius City Municipality;
- Mārupes uzņēmēji;
- Bus operators;
- Transport administrations;
- Latvian Railways;
- Pasazieru vilciens (passenger carrier);
- Association of Architects Estonian Landscape Architects' Union Zaha Hadid Architects;
- Association of Local Authorities in Lithuania;
- Lithuanian Tourism association;
- Architectur Plus;
- City for people;

- Private companies for mobility and sharing services;
- Private investors;

During both workshops the consultant did not receive critical feedback, but few additional ideas for improving stations environment and their services. Moreover, the team had open discussions on potential developments for:

- Riga central station – improving station accessibility considering best international cases;
- Tallinn Ülemiste station- enlargement of the future Helsinki tunnel;
- Ülemiste railway terminal- general summaries on what is important to be covered under a station accessibility, multimodality and integration with other services;
- Panevezys railway station – discussions on three potential railway station locations explaining why the chosen by the consultant team location has the strongest benefits compare to the other two potential locations;
- Suggestions on improving air- rail services at RB Rail AS stations;
- Existing international options to organise an open access to railway stations and platforms;
- Establishment of barrier-free environment at railway stations;

Both meetings were held online. The recordings and relevant presentation materials, including meeting notes, were shared with the RB Rail AS and all participants.