Rail Baltica

Maximization of Gross Value Added for Rail Baltica International Passenger Stations

Co-financed by the Connecting Europe Facility of the European Union

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Abbreviation	Explanation
EU	European Union
GVA	Gross Value Added
KPI	Key Performance Indicators
LVC	Land Value Capture
PT	Public transport
PRM	Passengers with Reduced Mobility
PPP	Private Public Partnership
RB	Rail Baltica
TOD	Transit-Oriented Development
WP	Work package

1. Introduction

1.1 Authority for the assignment

This inception report has been prepared under the authority of the contract signed between the RB Rail AS (The Client) and the leading company Ramboll Denmark A/S, as well as project sub-contractors: Gottlieb Paludan Architects, Soini & Horto Architects, Realidea Ltd., and Ardenis Consult (the Consultant or Consulting team). This study is being developed under the "Maximization of Gross Value Added for Rail Baltica International Passenger Stations" project being co-financed by the Connecting Europe Facility of the EU.

Rail Baltica implementers have made significant progress in the design process of the new greenfield, high-speed railway corridor, and are currently implementing the planning, design and construction of the respective seven international stations. The stations include: Tallinn, Parnu, Riga central, Riga Airport, Panevezys, Kaunas and Vilnius. These stations are at different stages of the planning and design process and the Client wants to develop a good understanding about the commercial, housing and business opportunities of the surrounding areas.

In this context, within the current report the Consultant conducted a study on catalytic effects for generating and maximizing GVA by reviewing relevant literature and analysing proposed examples of best international railway stations (best practise). As the second step the Consultant will focus on a detailed benchmark analysis of the most relevant international experiences related to passenger railway stations.

1.2 Project scope of work and study area

The overall goal of maximization of GVA for Rail Baltica international passenger stations is to ensure that the planning process and the actual physical design of the stations is informed by international best practices to ensure that the potential for generating economic, social and commercial value is realized. Furthermore, a specific objective of this study (within the final report) is to provide the Client with sound policy recommendations on maximization of GVA for the Rail Baltica seven international passenger stations. This study considers commercial, socio-economic, environmental, and mobility-related aspects of passenger railway stations. The outcomes will be developed and proposed by the Consultant and agreed with the Client.

This report mostly relies on European best practices, however, at the Client request, there is room to include some of the best examples from other international cases outside of the EU.

FIGURE 1: PROJECT STUDY AREA INCLUDING HSR STATIONS (SOURCE: RAIL BALTICA)

The project is organized in specific Work Packages (WPs), ranging from WP1 to WP4, as seen in FIGURE 2 below. The current Inception Report (WP1) contains of WP1.1 through WP1.3 as listed below.

WP1: Background Information	WP2: International Best Practice benchmarking	WP3: Critical analysis of current Rail Baltica international passenger stations development plans	WP4: Final Report
• **WP 1.1** Overview of catalytic impacts to modern railway passenger stations • **WP 1.2** Overview of international experiences • **WP 1.3** List of international railway stations for the benchmarking	• **WP 2.1** Commercial opportunities and stations' space usage • **WP 2.2** Station operation and governance structures • **WP 2.3** Station integration with urban environment & urban regeneration • **WP 2.4** Station integration with urban and regional mobility • **WP 2.5** Key recommendations	• **WP 3.1** Critical analysis of existing development plans • **WP 3.2** Applicability of key recommendations to Rail Baltica	• **WP 4.1** executive summary, introduction, • **WP 4.2** background information, • **WP 4.3** international best practices benchmarking, • **WP 4.4** critical analysis of current development plans, applicability of the best practices, • **WP 4.5** conclusions and recommendations

FIGURE 2: THE STRUCTURE OF THE GVA MAXIMIZATION PROJECT (SOURCE: RAMBOLL)

The project outcomes are expected to be delivered in a form of Consultants recommendations for the planning and design of the seven Rail Baltica railway stations and their immediate surrounding areas, including recommendations on possible design solutions and suggestions for a long-term plan development. The specific focus of the recommendations will vary depending on the current implementation status of the stations; planning and design recommendations will be provided only for the stations for which planning and design phases are at an early stage or not yet started, while for

stations in a more mature phase of implementation (including where construction has already started) recommendations will be modulated accordingly.

1.3 Structure of the inception report

The current inception report is structured with the objective of providing the Client with a brief and clear update on some of the initial activities of this project, the progress on data collection efforts and the process of crafting strategic recommendations and policy guidance to consider during the planning, design and development process of Rail Baltica international railway stations.

The inception report sections are structured in the following manner:

1. **Introduction**- brief project information, overview and approach to deliver the inception report;
2. **Data collection assessment**- overview of data collection efforts. A brief data assessment is provided by the consultants in order to highlight progress and next steps in data collection;
3. **Background information (WP1)**- delivery of all content within WP1, including literature review, description of catalytic impacts related to modern railway passenger stations and overview of proposed long list of international stations that will be used for benchmarking;
4. **Draft planning and policy recommendations** – providing the Client with an overview based on the international best practice on relevant planning design and policy recommendations on how to promote and maximize long-term value creation in and around Rail Baltica railway stations;
5. **Team and project communication** – brief description of the Consultant's project management activities in order to improve project communication and quality assurance;
6. **Risks and quality management** – overview of identified project potential risks and proposed how the Ramboll team will address them and will handle project quality management;
7. **Workplan and actions required** – overview of project timelines updates, and important milestones;

During the process of developing this report, the team has leveraged the firm´s Nordic heritage and global expertise in the development of transport infrastructure, engineering and design, and urban planning knowledge. In this process, the team has leveraged the rich experience of the partner architectural firms to strengthen the existing planning efforts via the following process:

- **A careful and meaningful communication and ideation process** through several critical-thinking exercises with highly skilled architects, transport economists, engineers, and planners, who have reviewed a number of best practices in GVA creation in railway stations;
- **Establishing a prioritized draft list of custom benchmarking criteria** for each station and defining best practices specific to the subject stations and adjacent areas. This process has been started with the inception

report but needs to be finalized in the following deliverables. The Consulting team started the identification of KPIs and will continue with this process once detailed information about the stations is available;

- **Preparing draft guidance on recommendations** to strengthen and optimize plans and designs of Rail Baltica International stations. At this stage, given critical information is not available, the team has produced a general list of recommendations that will be refined once specific station data is available.

- **Careful evaluation of Rail Baltica Stations and urban elements**; the Consultants will critically evaluate each station´s planning, design, and urban element documentation to provide the Client with sound recommendations to strengthen the GVA maximization strategy. Gathering of the relevant documentation will be implemented during the following stage of the project throughout the direct engagement with relevant stakeholders at workshops.

The above process has been taken into consideration in the contextual frames of urban regeneration, commercial development, station operation & management, and mobility. Ramboll's work will be based exclusively on the character of existing stations and the previously developed station plans, with an understanding of the visions of each station, reflected against the best international practices incorporated to the work.

Moreover, all our recommendations are to be discussed with the Client.

2. Data availability assessment

2.1 Progress on data collected

During the first weeks of the project, the Consultant developed a system to identify critical data required for the development of WP1 (1.1-1.3). The Consultant has requested the Client to provide relevant information to the project, including raw data on population and population growth estimates, commercial activity, and project specific information such as station classification, planning and design. Although good progress has been made in collecting relevant data, at the time this report was produced, some of the key data points - such as detailed plans of the Rail Baltica station areas and site development plans - were not yet available.

The Consultant plans to request online meetings with the Client to discuss timelines for obtaining the data immediately after the inception report is accepted. Nevertheless, general information for setting up the first steps in implementing the WPs and to provide a general overview on maximization of GVA in international railway stations is available.

The main documents required for the development of this study are listed in the Table 1 below. The list contains technical documentation as required by the Client, as well as some additional documents recommended by the Consultant to complement and enrich this project. The "status" column shows the requested data that the Consultant has successfully collected (in green) and the information that the Consultant has not yet been collected/received (in red) from the relevant stakeholders as of the submission date of this report.

Topic	Key Content	Status
Visuals	• Visual identity guide, logo package	Received
Visuals	• Liverpool report	Received
Integration	• AECOM Riga station report	Received
Operations	• RB operational plan	Received
Design	• Station elements • Network elements • Urban elements • Station capacity planning	Received
Development	• RB CBA • One Works White Paper and other examples	Received
	• Master plans of the case cities • Detailed plans of the case station areas • Site Development Plans • Existing project pipeline around the stations • Existing (rail)traffic numbers • City area structure and growth data • Land ownership around information around stations	Not yet received
Common data	• Area-specific population data for case cities (GIS) • Area-specific workplace data for case cities (GIS)	Received (partial)
	• Population forecast of the case cities • Consumption power studies in Baltics • Most relevant real estate market reports of the case cities if existing • Previous commercial analysis related to the city or the site itself if done	Not yet received
Urban design	• Existing city structure in relevant surrounding area (important urban functions, POI, main business roads) • Forecasted city structure development in relevant surrounding area (by city planning authorities real estate developers)	Not yet received
Architectural design	• Introduction to each station (history, current operation) by photographs, plan/section layouts, text descriptions	Not yet received

TABLE 1: OVERVIEW OF RECEIVED REQUIRED DATA FOR DEVELOPMENT OF WP1

Such missing data below, should be obtained:

- Architectural design of passenger railway stations;
- Detailed plans of the case station areas;
- Site Development Plans;
- Existing project pipeline around the stations;
- Existing (rail) traffic numbers;

As agreed with the Client, the RB team will facilitate contact details from relevant stakeholders, which could provide the Consultant with some of the requested information and nourishing discussions for the project. Direct discussions will give the Consultant a clearer picture in the development of each stations and surrounding areas.

An initial list of potential stakeholders is provided in Table 2 below.

Stakeholder Type	Specific Relevant Stakeholders
Elected Officials	• Mayor's office; • City council;
Government Agencies	• Public transport authorities; • Departments of transportation (and mobility) • Departments of housing, planning and economic development
Private Sector	• Real estate developers (commercial and housing) • Business associations/ retail or commercial trading groups
Local Partners	• Local interest groups • Community/advocacy groups

TABLE 2 – POTENTIAL KEY STAKEHOLDERS FOR INTERVIEWS

Obtaining the complete set of data as indicated above will ensure the Consultant has a clear understanding of the technical progress of the project and will enable the Consultant to evaluate the design of the Rail Baltica stations. This step will be useful in order to finalize findings and recommendations against international best practise, considering Client and city development plans for these stations, and surrounding areas.

Although there are still some important gaps on data collection efforts for critical aspects of this project, the Consultants have made their best efforts to work on this report based on research and expert knowledge.

2.2 Critical path to obtain missing project data

At this stage, most of the specific technical documentation related to the seven Rail Baltica international stations and city-specific information is not available, or not in the Consulting team´s possession. The Consulting team proposes to collect the relevant information from the Client, when the Client is the owner of such information, and from project stakeholders as needed.

Such critical path will ensure an effective delivery of the first interim report, as well as the successful completion of the next deliverables (WP2 & WP3). It is proposed to establish online meetings with the Client to discuss data gaps and the proposed critical path for obtaining such data. It is important to note that the currently unavailable information is essential for developing detailed recommendations for each Rail Baltica station, especially for providing detailed guidance on how to scale up and add more value generation in and around the Rail Baltica station areas.

3. Inception report main contents

During the inception process, the project team has put in place a systematic approach to brainstorm, discuss and analyse the objectives of this project to maximize the value provided to the Client while providing the highest quality in the deliverables of WP 1. Furthermore, during the phases leading to this deliverable, the team has had several online meetings with the Client.

The following communication approaches were put in place to ensure highest quality and efficiency for delivering the WP for this project:

1) align the expectation levels on the deliverables between the Consultant team and the Client;

2) effectively divide the workload between expert teams to ensure efficiency and a holistic approach;

3) created a thorough understanding on the impacts related to modern railway passenger stations.

The consulting team has started to conceptualize and structure important aspects of GVA maximization in modern railway stations during their planning, design, and operation phases, as well as listing a number of critical questions of such process for the Client to have in mind during this process, for example:

1. **What is the status of the development sites?**

- Are there specific concerns or needs that have resulted in the desire to carry out this exercise?
- What are the forecasts of population and purchasing power in the areas and the regions?
- How do the urban and traffic structures look?
- Are there development plans or objectives underway or in the near future, at or near the stations, that may impact (positively or negatively) the planning?

2. **What are the typical induced and/or catalytic impacts to the modern railway passenger stations?**

- What does the literature highlight as transformative in terms of GVA maximization for railway projects?
- What are some of the most influential aspects of planning and designing a station that should be considered in the Rail Baltica project?
- How does construction of railway stations can bring about the transformative urban change in surrounding areas?
- How can railway stations be built to integrate and promote the use of sustainable mobility options?
- What aspects of TOD could be of value in the development of the Rail Baltica stations?

As Ramboll and the Consultant team have mentioned previously, there are specific characteristics of each city where the Rail Baltica stations will be developed that make it difficult, or of diminished value to evaluate entirely from the distance. Furthermore, the Consulting team has also mentioned that it would add much value to comprehend the sites as early on in the process as possible via field visits or very detailed information about each site as a part of the early information gathering phase of the WP 1.

Within the sections of this chapter, the team will explain the methodological framework in the development of WP1. The outline of activities is based on specification and requirements for the study and the reflection of the work performed per Client requirements.

3.1 WP 1 – Background Information

During the inception phase, critical aspects of the project (understanding of scope, identification of data collection needs and ideation of GVA maximization outcomes) have been established through a solid communication channel with the Client. Furthermore, the dialog with the different stakeholders, effective communication, and constant feedback during the duration of this project will be crucial in the finalization of project reports with its developments of the next study phases.

Considering Consultant's international experience and technical expertise, the consulting team has developed an overview of some of the most influential aspects of station planning and design and their GVA maximization potential. The team started the consolidation of a long list of international best practices that will be used for benchmarking, as seen in the next sections.

3.1.1.WP 1.1 – Overview of induced and catalytic impacts to modern railway passenger stations

Railway stations are not only transportation and mobility hubs, they could also be planned and designed (greenfield projects) or redeveloped (brownfield projects) to incorporate important land uses that generate various degrees of socio-economic value, becoming catalysts of commercial and housing development and contributing to the improvement of urban life.

In order to capture the full benefits of such mega-projects, and maximize value creation opportunities, it is critical to develop a literature review exercise that can guide the discussion of how to induce catalytic impacts on GVA during the station planning and design process. Such discussion for GVA maximization, findings and international examples will largely guide the policy recommendations and opportunity identification that the consulting team will provide to the client during the development of this report. The Consultant has developed an extensive review of selected literature (the list of references is attached to the Annex I) and with such literature in mind, has proposed a list of international railway stations to be reviewed under the benchmarking (WP 2), which should be later discussed and agreed with the Client. Consultant's main objective for developing outcomes of this WP was to focus on design and planning policy recommendations highlighted in the selected literature but also seen in the list of selected stations.

At the later stage the team will incorporate more visuals and will provide a detailed design-and-infographic-oriented report.

3.1.1. Overview of the selected literature

In recent history, railway stations have mainly served as a single or limited number of land uses, playing a major role in facilitating rail and passenger traffic. However, in more recent years, a more holistic approach to the development of stations and their surroundings have gained momentum due to the potential of generating and capturing economic value. Such value is understood as the delivery of socio-economic and environmental benefits. Such effects could be

seen with the presence of commercial and housing developments, that with their mix of land uses, effectively attract employers, workers, shoppers, and other types of customers. In today´s urban environments, railway stations have the potential to develop various land uses and deliver so much value through each of those uses.

To summarise important key elements, the Consultant team has considered number of online and offline available literature. The focus has been on the identification of main catalytic impacts related to modern railway passenger stations, as well as on how the development of these megaprojects, especially station planning and design, could be leveraged to integrate them with their immediate surrounding areas and beyond (railway corridors with high demand). Below, the team briefly presents a selected number of the literature reviewed for this deliverable. These sources are considered as recent publications that will add important value to the project. Some of the most influential sources analysed during the inception report include:

- Consultant's thoughts on station development opportunities by Oneworks;
- Train Station Area Development Mega-Projects in Europe: Towards a Typology by Peters, D & Novy J.;
- Atlas of Practices and Experiences of railway hubs and their urban benefits by ENTER, HUB;
- The Urban Rail Development Handbook by World Bank Group;
- Railway Stations - Adapting to Future Society by UIC;
- Development Around Stations – Exploring International Experience and Lessons for the UK by Tracks;
- Railway Stations – Boosting the City by UIC;
- Station Area Planning for High Speed and Intercity Passenger Rail – US DoT;

Furthermore, while analysing the contents of the selected literature Consultant identified important aspects that project developers may want to take into consideration in order to maximize GVA of railway stations.

The Consultant has made a list of the most important aspects of railway station development, as per below:

- **Model/ Concept and classification of a railway station:**

In order to establish or improve a railway station attractiveness, it is important to define how the railway station will be operated in terms of governance and spatial interaction. The operation models are also connected to a city concept, landscape and territory availability, potential functionality, surroundings, and future developments. In some cases, historical aspects play an important role. In this case, the two modes are identified: "Introverted Station Model" and "Open Station Model".

A Station build based on an introverted model concept will have less interaction between different spaces (surrounding and the city itself), meaning mono- functionality, within the station, as well as having less interactions (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 on opposite way and provides a greater interaction between spaces, people and different potential users and uses. Stations with such concept are easily integrated in the urban surroundings. In addition of

providing a railway station, these stations will also act as transport hubs for different modes of transport, a business / commercial centre and a town square by exploring various aspect of placemaking.

- **Locating a railway station:**

Generally, cities have common challenges due to high population density, its economic and historical activities, high number of road traffic, and various pollution issues. This is an important reason why Consultant's literature review suggests placing stations in the urban core areas, where the maximum benefit is achieved for the public and for the system itself. One of the most important aspects of locating the station is to integrate the station's planning in the urban planning strategies. For instance, utilizing the guidance of TOD, including Land Value Capture can aid in the holistic planning process of the station itself, but also can be integrated into an urban planning strategy. This could be done as a strategic project in the development of Metropolitan-wide development plan, as a city proper sustainable urban mobility plan or as a small area plan or specific land use plan. This enables to define the location where the station can play an integral part in city's growth and vice versa.

- **Urban integration and integration with surrounding areas:**

Urban integration connects a railway station with other urban land uses and functions, and could include the following aspects:

  - **Modal integration**: possible connection between railway, road and urban mobility transport modes as well as integrated with a land use plan. The improvement of an urban traffic system and construction of transferring points could harmonise a railway station impact area and improve its added value.

  - **Economic activity generation**: promote economic growth and spur development in station neighbouring areas. Railway stations can contribute to the improvement of the regional economy by offering mobility and access for the labour force, provide accessible employment options, shopping, and housing opportunities. These developments can also provide opportunities for value capture that could support to cover the project capital investment costs/ operational costs or provide additional sources to municipal finance.

  - **Urban regeneration:** Modern railway station development contribute not only to the urban regeneration of less vibrant parts of cities, but they could also spur new investment and attract residents and employers in already high activity urban centres.

  - **Regional and International integration:** Taking into consideration the integration aspects of railway stations, it is extremely important to address international and interregional train traffic, especially due to the privileged location of the Baltic region. The integration of rail passenger traffic of the RB project with the general EU transport ecosystem will add much value region-wide. This is extremely important as sustainability efforts are increasing to incentivize long-distance High-speed rail travel to substitute air travel.

- **Designing a station:**

According to the consulting team´s literature review, the early stages of station planning and design, considerations should be given for user needs and preferences. The architectural quality and placemaking should be given high

importance during the design. The literature suggests that during the design phase, stations shall not just be transport nodes or goods movement, but a destination by themselves, meeting places where people can congregate shop and carry out everyday life activities. Railway stations with high value-added indicators should be designed to allocate various facilities like shopping areas, retail services (both places and services, like rental cars or bikes), food stores and other relevant commercial spaces. Here it is important to pay attention on identified urban context in order to allocate additional facilities such as covered bicycle parking buildings, or small mobility hubs with proposing a transport sharing concepts.

The literature also notes that although passenger safety and operational efficiency should be at the forefront of the design and implementation of any railway project, user needs and wants should also deemed critical during the design.

Based on the literature reviews it can be concluded that to maximize the GVA of a rail project particularly a railway station project, it is important to engage all the different stakeholders (both active and passive) during the early planning stages of the project. The stakeholder list should include, but not limited to, different government authorities, users, operators, real estate agents, retail/commercial/trading groups, contractors and other commercial players. For a list of findings and recommendations that was partly informed by this literature review can be found in Section 5 – Findings and Planning, Design and Policy recommendations.

3.1.2.WP 1.2 – Overview of international experiences in the field of railway passenger stations GVA maximization, presentation, and critical discussion of the results

In this section, a long list of stations has been produced, based on the understanding created in section 3.1.1 about the induced and catalytic impacts to the stations. The original idea was to develop this long list with the full understanding of each of the sites where the RB stations will be developed. However, due to lack of details on specific design documentation for each station and the local site premises at this stage of the project, a more in-depth analysis could not be developed. Nevertheless, the Consulting team has taken this into consideration and has developed a long list that can potentially cover most of the typologies specific to the RB stations. Although this needs to be revised by the consulting team once station-specific data needed for this analysis are available.

Furthermore, after receiving such data the consulting team will hold workshops with local stakeholder as requested by the contract. The Consultant has developed an initial list of applicable stakeholders that will guide the workshop and interview process.

Interviews will be conducted by the local supporting team Ardenis. Results of the interviews will be recorded. The stakeholders that will be interviewed, will be decided as per the Client's preferences, in the earliest steps of the project. Selecting a "long list" of stations will allow us to select a suitable benchmark list where all of the seven planned stations have several different potential comparable, before the list is condensed (with Client's approval). The main selection criteria process has been started but will need to be refined/finalized in collaboration with the Client to ensure the maximum suitability of the stations to be studied.

In order to provide relevant and suitable international experiences to the RB project, the Consulting team reviewed case studies around the World which show best examples of GVA for railway passenger stations. Moreover, all selected cases

were analysed against its multi-functionality and urban mobility connections, availability of commercial opportunities and stations (internal) space usage, goods and services offered in the railway station and in surroundings, connectivity and accessibility for users.

The selected case studies have been chosen in European cities. However, the team has also identified and added stations outside of the EU to enrich the analysis.

In order to make this process more valuable, the team has produced factsheets for each of the railway stations in the long list, as to provide basic but sound information about specific design, construction and/or operation data that will be useful during the selection of a short list in the final version WP1.3. These fact sheets have been developed by Consultant's rail experts and the architect teams and includes criteria that would add much value to the benchmarking process.

The Table 3 below provides an overview of the 23 proposed stations included in the long list. To each of these station the team provides a factsheet. These factsheets will be discussed with the Client and the best suitable to the RB station practises will be chosen.

Once the Consulting team receives the design and concept data for each RB station, a comparison exercise will be developed to arrive at a shortlist for WP1.3 and to be used in the benchmarking exercise of WP2. In Section WP1.3, the team presented a long list of 23 stations that is the basis of analysis for the next section WP1. 3.

TABLE 3 OVERVIEW OF PROPOSED BEST INTERNATIONAL RAILWAY STATIONS FOR A REVIEW

ID	Benchmark proposed stations	Population data [1]	Number of pax/ per day[2]	Station Design	Best Practice Reference
1	Leipzig Central Railway Station (DE)	597 000	120 000	Historical	• Seamless multimodal integration; • High-density commercial and housing mixed uses;
2	Liége- Guillemins Railway Station (BE)	197 000	15 000	Modern reconstruction on historical site	• International connections; • Facilities for international travellers (hotels next to station);
3	Amsterdam Central Station (NL)	1 558 000	192 000	Historical	• Multimodal integration; • Good example of TOD development;
4	Utrecht Central Station (NL)	550 000	195 000	Modern reconstruction on historical site	• Multimodal integration, with important focus on NMT; • Seamless integration with urban space; • Good practice in TOD development;
5	Berlin Central Station (DE)	3 769 000	350 000	Modern/ incl. Green fields	• Multimodal integration; • International railway connections; • Important mixed land uses: commercial activities incl. shared offices and private logistic services (DHL Smart Locks) concepts;
6	Frankfurt (Main) Hauptbahnhof (DE)	764 000	493 000	Historical	• Good-Practice in European intermodal (hub function) with a direct high- speed railway connections; • Important connectivity from airport to other cities in Germany and neighbouring countries; • Intermodal travel concepts integrating air, rail and road transportation;
7	Vienna Main Station (AUT)	1 911 000	268 000	Historical	• Good practice as a major hub for European railways, both passenger and freight- TENT corridors 7, 22;

[1] sSource: Wikipedia – Sources will continue to be revised during the first interim report
[2] Source: Wikipedia - Sources will continue to be revised during the first interim report

					• Ample mixed land uses such as housing, public space, educational facilities and commercial land use.;
ID	Benchmark proposed stations	Population data [3]	Number of pax/ per day[4]	Station Design	Best Practice Reference
8	Copenhagen Central Station (DEN)[G]	794 000	103 000	Historical	• High speed rail connections in Oresund region (regional and international); • Mix-land uses in central area; • Intermodal connectivity;
9	Helsinki Central Railway Station (FIN)[S]	656 000	200 000	Historical	• Best practice in multi-modal integration; • Important mixed land uses including over 37 000 m2 of commercial space (restaurant, office, hotel); • Urban integration with mobility facilities and services in a radius of 200- 300 m; • Good example of repurposing a transportation only facility to cover important land uses;
10	Pasila Railway Station (Tripla), Helsinki (FIN)[S5]	656 000	65 000	Modern	• Best practice in effectively developing mixed land uses, with an important focus on high population and commercial density; • One of the most successful examples of intermodal facilities that include bus, metro, tram and NMT connectivity; • Seamless integration of urban and public space with the station and commercial area; • New developing urban area with extra high accessibility design (also for disabled people), offering a largest shopping area/center (Tripla) in the Nordic countries;
11	St. Pancras International, London (UK)	8 961 000	99 000	Historical	• Best practice in inclusion of development of the station with a large urban development plan (Kings Cross); • The station locates in one of the central part of London and surrounded by business facilities, hotels and restaurants; • The planning of railway service is integrated with urban transportation, especially with underground connections (more than any other London station) though constructed tunnels;
12	Copenhagen Airport Station (DEN)	794 000	22 000	Modern	• Copenhagen Airport Station is an important and growing mobility hub, that connects the international airport to the rest of the country and southern Sweden; • Best practice on connectivity of Airport main terminals with the rail waiting area through direct escalators;
13	Malmö Central Station (SWE)	348 000	33 000	Historical	• Central transportation hub in Malmö. The design of supporting commercial services was planned to attract not only tourists, but business travellers/ residents offering some retail, supermarkets and restaurants; • International connectivity with Kastrup Station in Copenhagen;
14	Oslo Airport Station (NOR)	697 000	n.a	Modern	• Regional and local train connection to Oslo airport; • Mixed land uses that include car rental, hotel and other commercial opportunities;
ID	Benchmark proposed stations	Population data [6]	Number of pax/ per day[7]	Station Design	Best Practice Reference
15	Aarhus Central Station (DEN)[G]	300 000	17 000	Historical	• The station is a part of an urban quarter that integrates new pedestrian and bicycle connections to the newly transformed waterfront;

[3] Source: Wikipedia – Sources will continue to be revised during the first interim report
[4] Source: Wikipedia - Sources will continue to be revised during the first interim report
[5] https://ramboll.com/media/rgr/tripla
[6] Source: Wikipedia – Sources will continue to be revised during the first interim report
[7] Source: Wikipedia - Sources will continue to be revised during the first interim report

					• Offers a major expansion of the shopping mall Bruun's Gallery;
16	Amsterdam Amstel Station (NL) G	1 558 000	50 000	Modern	• intermodal good practice that connects trains, trams, buses, and bikes; • The surrounding area is being developed with new public spaces, shopping facilities, housing, and offices; • The development also considers better routes for different modes of transportation and new bicycle parking facilities;
17	Rotterdam Central (NL)	1 273 000	110 000	Modern	• Full and complex rebuilding of the old station providing fast access to trains, buses, the subway, light rail, taxis and bicycle infrastructures, which come together to serve Rotterdam and other parts of The Hague metropolitan region; • The concept of the station also shows a best practice of 15 min. walk to urban centers. The redevelopment project has a strong impact into the Long-Term Value of Temporary Urbanism;
18	Nørreport station (NL) G	794 000	50 000	Modern reconstruction at a historical city site	• The main objective to design the station was to take the practical requirement for bicycle parking to another level and provide convenient and accessible parking for 2,100 bicycles; • Another objective was to enhance the surroundings and to build modern premises to serve increasing numbers of passengers. Nowadays the railway station is located at the most central parts and provide a quick and safe pedestrian access to urban busiest and historical locations;
19	Beijing West Railway Station (CN)	21.54 million	400 000[8]	Modern	• Highly- modernized high speed train station with a best experience of developed connection to railway network through the whole country;
20	Zaragoza-Delicias Railway Station	681 000	11 000	Modern	• Zaragoza-Delicias is an intermodal hub, that was built during the Expo 2003; • It connects Barcelona and Madrid but has also connection to Bilbao and France. The station facilitates hotel, department store, business center, and restaurants. The station connects new urban area to the old city of Zaragoza;
21	Naples-Afragola station	63 000	10 000	Modern	• Naples-Afrangola Station is a major intersection that connects the southern Italy high speed rails to northern Italy and Europe. The station is located 12km from the Naples and is an intermodal hub that is designed relieving the congestion from the city centre;
ID	Benchmark proposed stations	Population data [9]	Number of pax/ per day[10]	Station Design	Best Practice Reference
22	Bordeaux Saint-Jean	927 445	48 500	Historical	• Bordeaux Saint-Jean is the city's main station, that was renovated and upgraded in 2017. The station area is ongoing changes due the new master plan of the city. Bordeaux aims to be a metropolitan region in southern France and is planned to have many new high-speed lines, including Eurostar connection from London;
23	Canary Wharf Railway Station	8 961 000	69,759	Modern reconstruction at a historical city site	• Good mix of land uses: housing and commercial, good connectivity between; • key business district to the City of London, the West End and Heathrow Airport. Stiches few neighbourhoods utilizing a bridge between two communities - Canary Wharf Estate and Poplar to the north;

[8] https://en.wikipedia.org/wiki/Beijing_West_railway_station

[9] Source: Wikipedia – Sources will continue to be revised during the first interim report

[10] Source: Wikipedia - Sources will continue to be revised during the first interim report

G = Gottlieb Palludan Project S= Soini & Horto Project

LEIPZIG CENTRAL RAILWAY STATION

Leipzig Central Station. Source: https://en.wikipedia.org/wiki/Leipzig_Hauptbahnhof

General information:

Leipzig Central Railway Station is the largest terminus in Europe measured by floor area and has 23 platform tracks. It contains international, local, and regional train lines. This modernised historical building is located adjacent to the city centre. The station is owned by DB and operated by DB Netz, DB Station & Service.

Location: Leipzig, Germany
City population: 597,000
Number of passengers: 120,000 passengers per day
Construction period: The Central Station was built in 1915, and fully modernised in 1996- 1999.
Size: The converted area amounts to 1.560.000 m3 on 83.640 m2 surface area. The building is 298 m long.
Station type: Passenger terminal, shopping centre, and transport hub (mixing urban, regional, and international connections)
Design: Historical, the design was done by William Lossow, Max Hans Kühne
Connection to the airport: 2-3 trains per hour to the airport

Type of railway services

The station was designed to provide railway passenger service:

- Weekday EuroCity connects Leipzig to Prague;
- Connected to the long-distance network of German railways by several Intercity Express and Intercity lines;

Multi-modal integration

Walking area	●
Commuter rail	●
Buses	●
Metro	●
Tram	●
Regional train	●
Taxi stations	●

Additionally, the station allocate sharing offers, like carsharing.

Commercial activity

- Over 120 shops and restaurants on three levels inside the station;
- At least 4 hotels with walking distance of 200 - 300m;
- Car rental;

Urban development

The station is located right next to urban quartier and offers full integration with:

- Modern living houses and offices;
- Cultural buildings like the Opera house and museums;
- Old town in 10 min walking distance;

Additional facility / access

- 1 Parking building, 1300 place;
- P+R spaces- free and against payment- 80 parking places, 140 boxes;
- Bicycle parking stations;
- Dedicated taxi stations;
- Ticket machines;
- DB travel centre and information stands;

Accessibility

- Two main entrances from different city parts;
- Connection between platforms and levels though elevators and escalators, ramps, signs, or guide systems;
- Direct connections with public transport, regional buses, and trams;

Summary: The cornerstone of Leipzig Central Station was laid in 1909 and it was opened in 1915. By that time, it was one of the largest railway stations in the world. The building has a 298 meters long facade and a multi-level concourse with towering stone arches.19 overground platforms are housed in six iron train sheds.

LIÈGE-GUILLEMINS RAILWAY STATION

Liege-Guillemins TGV Station Source: https://en.wikipedia.org/wiki/Liège-Guillemins_railway_station#/media/File:Vue_de_la_gare_des_Guillemins.jpg

General information:

The development of the railway industry, including high-speed trains (HST) gave an opportunity to the city of Liège to become one of the most important nodes of the high- speed rail network. L-G Station is the third largest in Belgium, one of the most important hubs in the country and an indispensable link between London, Paris, Brussels, and Cologne.

It is one of the few railway stations in Europe directly connected to a motorway.

Location: Liege, Belgium
City population: 197,000
Number of passengers: 15,000 passengers per day
Construction period: 1842 first railway station at the site; 1882 - 1905 the station was modernized and improved for the World's Fair in Liège; 1958 Beaux-Arts station was replaced by a "modern" International style building; 1996-2009 new monumental „arch-station, 160 m long and 32 m high
Size: 25 000 m2
Station type: modern construction on historic site – 150 mm away from previous station
Design: Modern, Santiago Calatrava
Connection to the airport: connected to Liege Airport by car or shuttle bus (15 min travel time)

Type of railway services	Multi-modal integration	Commercial activity
• 9 tracks and 5 platforms all suitable for HS trains; • International HS trains to France/Germany/UK/Netherlands; • New tramline to be opened in 2022; • 5 bus stops close neighbourhood;	Walking area ● Commuter rail ● Buses ● Metro ● Tram ● Regional train ● Taxi ●	• Few shops, cafes, supermarket beneath railway tracks; • Car rental; • Three hotels next to station;

Urban development	Additional facility / access	Accessibility
• Connection two parts of the city; • Public spaces created: 10; • Urban requalification projects: 1; • Rehabilitated urban zones: 45 000m2;	• 3 storey-parking hall (800 lots) adjoining the platforms;	• proximity of the A602 motorway; • access via underpass and two transverse footbridges above the tracks;

Summary: In 1994 an analysis of the exiting station led to the fundamental decision replace the complex on its historic site and to accommodate domestic and international services in a completely new building. The intermodal hub is a new link between two distinct and underdeveloped city areas which were separated by the tracks. In the coming years the areas around the station will emerge 500 homes, 100 000m2 of offices, 10 000 m2 hotels, restaurant, and cafes. Calatrava´s monumental, expressive, transparent, and airy architecture establishes an extraordinary relation between transportation and the surrounding city environment. It shows that the station has had most powerful driving forces for a city.

AMSTERDAM CENTRAL STATION

Amsterdam Central Station Source: https://commons.wikimedia.org/wiki/File:Amsterdam_centraal_side.jpg

General information:

Amsterdam Central Station is an impressive Neo-Renaissance building that has been open to the public in 1889. As the city grew, the station had to change. The new bus terminal had been recently added at the back of the station. This station has a high functionality, efficiently organized and proposed accessible integrated transport hub where trains, buses, ferries, trams and buses are all tightly connected.

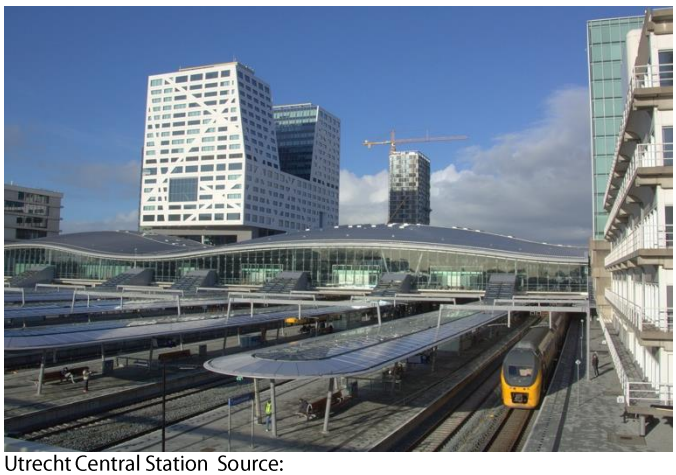
Location: Amsterdam, Netherlands
City population: 1,558,000
Passengers per day: 192,000 passenger per day
Construction period: 1889 the station was opened; 1997-2015 added large scale elevated bus station; 1998-2018 Renovation of both wings; Retail premises embedded "IJpassage" and "Amstelpassage"; 2009 South-eastern high-speed domestic services introduced; 2018-23 renewal of Stationsplein
Size: n.a
Station type: Redevelopment and preservation of an iconic historical landmark building
Design: Original building by Pierre Cuypers + A.L. Van Gendt, modern redevelopment by Benthem Crouwel
Connection to the airport: Local trains to the Amsterdam Schiphol Airport (15 min travel time)

Type of railway services	Multi-modal integration	Commercial activity
• 15 platforms, six used by the Eurostar; • Fast train connections with other European cities as Brussels, Paris and Cologne; • Eurostar via Brussels to London (high -speed trains); • Thalys to Paris and Bourg-Saint-Maurice; • Intercity Express to Basel via Germany;	Walking area ● Commuter rail ● Buses ● Metro ● Tram ● Regional train ● Taxi ● 3 Metro lines, 33 bus lines, 10 Tram lines, water way ferries directly from station.	• 6300 m2 shops, restaurants with advanced retail concept; • Main tourist office inside station; • Car rental service; • Number of hotels on a walking distance;

Urban development	Additional facility / access	Accessibility
• Renewal of Stationsplein, building of underground bike parking garage and the construction of new tram stops and the expansion of the open harbour front;	• Bicycle parking (7000)- B+R Facilities (incl. storage boxes); • Private parking spaces ; • Lockers and packing service; • Royal Waiting Rooms;	• 1 entry tunnel, 2 other tunnels which lead to the platforms; • Area 'shared space' keeps the traffic flows without interruption;

Summary: The station of the future is no longer just a place to catch a train. Transit is more than a moment in time: it is a place to be, to meet, to connect, and to relax. The new Amsterdam Central Station makes this possible by a diverse offering of retail, restaurants and bars. Besides the renovated central tunnel, two gate free passages were created between city centre and IJ that are accessible without a ticket or OV chip card.

UTRECHT CENTRAL STATION



Utrecht Central Station Source: https://en.wikipedia.org/wiki/Utrecht_Centraal_railway_station

General information:

Utrecht Centraal is the most important railway hub of the country. The train station is transformed (for the arrival of the high-speed line, amongst others), but also the connecting surroundings around the station. This integrated approach to station and station environment reinforces the identity and vitality of the city.

A 250m x 95m long wave-like roof covers this vast transport hub and using two new city squares on either end as main entrances.[11]

Location: Utrecht, Netherlands
City population: 550,000
Number of passengers: 195,000 passengers per day
Construction period: 1843 first railway operation; 1970 station was demolished (to build Europe's largest Mall); 1989 & 1995 station enlarged - triple size and new platforms; 2010-2016 major reconstruction: the previous station hall was replaced by a new, much larger hall, housing all modes of public transport. New station got separated from the Hoog Catharijne shopping mall. Made up of train, bus and tram platforms, the new Utrecht Central Station is three times the size of the city's original transport hub.
Size: 25 000 m2
Station type: modern construction
Design: Benthem Crouwel
Connection to the airport: Intercity to Amsterdam Schiphol Airport (travel time 29 min)

Type of railway services	Multi-modal integration	Commercial activity
• 16 platforms (of which 12 - tracks); • International, national and local services, most notably the Inter City Express trains, intercity services to the northern and southern Netherlands, and local commuters bus platforms 35+5;	Walking area ● Commuter rail ● Buses ● Metro ● Tram ● Regional train ● Taxi ●	• The station area currently contains the City's largest shopping center, Hoog Catharijne, the Jaarsbeurg Convention Center, Beatrix Theatre, and the Rabobank high-rise, and is a major employer in the area;

Urban development	Additional facility / access	Accessibility
• The station is a major link in the entire urban redevelopment of Utrecht central district and a significant catalyst and connection point;	• Underground three-storey bike parking (12,500); • P+R stations; • Lounge rooms;	• The building is flanked by two city squares – open spaces that ensure that the city and the station complex flow seamlessly; • Easy navigable single space hall;

Summary: The Utrecht station reconstruction is especially interesting to review because it resembles one of new train stations typologies in the NL which are referred as 'cathedrals of a new areas. Its development showcases a functional and architectural concept of clarity and simplicity in complex urban surroundings. Furthermore the "side-by side relation" between transportation and commercial functions are worth studying further

[11] source: https://www.benthemcrouwel.com/projects/bus-station-amsterdam-cs

BERLIN CENTRAL STATION (LEHRTER BAHNHOF)


Berlin Central station. Source; (Ramboll)

General information:

The Central railway station is one of the modern and largest European train station providing long-distance, regional, international and local transport connections. It was built on its historical site in the Tiergarten District, west of Humboldthafen, and directly connects travellers with the most famous tourist attractions of the city. The stations is owned by the Deutsche Bahn (DB) and operated by DB Netz and DB Station & Service. The design and railway service planning was separated into platforms (total 17) and levels (4) combining regional, local and international connections.

Location: Berlin, Germany
City population: 3,769,000
Number of passengers: 350,000 passengers per day
Construction period: The station has a long-time history with several construction periods: 1868 - 1871 - opened for the first connection to Hannover; 1882 - 2002- station reorganisation new constructions; 2006 – fully operated.
Size: Total size - 175,000 m2, 21,000 m2 - rail transport which occupies two levels and has 14 platforms, 15,000 m2 - shops and restaurants, office space- 50,000 buildings and 5,500 bridge functional purposes of the railway. The platforms are spread over an area of 32,000 m2 and the garage area occupies about 25,000 m2.
Station type: Passenger terminal and transport hub (mixing urban, regional and international connections)
Design: Modern building designed by architects from Meinhard von Gerkan of Gerkan, Marg and Partners
Connection to the airport: Direct connection by commuter and high- speed trains, as well as by buses and taxis

Type of railway services	Multi-modal integration	Commercial activity
The station is designed to provide railway passenger service, proposing: • Long- distances trains (regional and international) with a perspective of building a hub for night trains; • Regional and domestic trains (IC and ICE), as well as international; • Urban connections (Commuter rail);	Walking area ● Commuter rail ● Buses ● Metro ● Tram ● Regional train ● Taxi stations ● Additionally, the station allocate sharing offers, like: carsharing, bike-sharing stations (both free floating and station-based offers). There the station connected by Ridesharing.	• Three floors of shops and restaurants between the two levels of terraces, including Shopping centers; Food and cosmetics stores (together 80 shops); • At least 4 hotels with a direct access (max. walking distance 400 m); • Coworking spaces; • Logistic storages (for private deliverables, like DHL); • Smart locks and package service; • Car rental;

Urban development	Additional facility / access	Accessibility
The station is located directly in urban quartier and offers full integration with: • Modern living houses; • Government historical, administrative buildings; • Parks, green fields and direct access to the river	• 1150 storages for private use • P+R spaces- more than 900 • Bicycle parking stations (free of charge in front of the station) • Taxi stands and drop-off areas • Ticket machines (both at the station and platforms) • DB travel center, info. stands • Restring, lounge-business rooms	• 2 main entrances; • Connection between platforms and levels though elevators and escalators, ramps, signs, or guide systems; • Direct connections to PT, regional buses; • Step free planning, design solution • Service for people with reduced mobility;

FRANKFURT (MAIN) HAUPTBAHNHOF

Frankfurt (main) Hauptbahnhof. Source: https://en.wikipedia.org/wiki/Frankfurt_(Main)_Hauptbahnhof

General information:

Frankfurt Hauptbahnhof is the third-busiest railway station outside Japan and the second busiest in Germany after Hamburg Hauptbahnhof. It's central position in Germany and also in Europe makes it an important transport hub. The station has 26 tracks on one level and access to commuter trains, metro lines and trams. The station is owned by the DB Netz and operated by DB Station & Service.

Location: Frankfurt, Germany
City population: 764,000
Number of passengers: 493,000 passengers per day
Construction period: Originally built in 1888, extension at the 1970s, latest renovation in 2005.
Station type: Passenger terminal, shopping centre, and transport hub (mixing urban, regional, and international connections)
Design: Neoclassical architecture, Renaissance Revival architecture designed by architects - Hermann Eggert, Johann Wilhelm Schwedler.
Connection to the airport: Direct high- speed railway connection

Type of railway services	Multi-modal integration	Commercial activity
The station is designed to provide railway passenger service, proposing: • International ICE lines and services, also ICE Sprinter lines; • Long distance night trains to several locations; • Diverse local/regional rail options;	Walking area ● Commuter rail ● Buses ● Metro ● Tram ● Regional train ● Taxi stations ● Additionally, the station allocate sharing offers, like carsharing (free floating and station based) and bike sharing.	• Over 50 shops and restaurants on two levels inside the station; • Restaurant quarters next to the station; • Several hotels right next to the station; • Car rental;

Urban development	Additional facility / access	Accessibility
The station has a central location and offers full integration with: • Directly in the city centre; • Quick access to parks and river side; • Modern office buildings;	• P+R spaces; • Bicycle parking station; • Taxi rank; • Ticket machines; • DB travel centre and information stands;	• Barrier-free accessibility at the station; • Elevators and escalators, ramps, signs, or guide systems; • Direct connections with public transport, regional buses, trams, and metro; • Triple-S concept is a MP for safety and customer focus around a clock;

Summary: The central location of the Frankfurt Hauptbahnhof has made it busy mobility hub with 493 000 daily passengers. It connects the well-known business city directly to the airport, but also offers straight rail lines to several location all over the Europe. The station area has developed through the years and has grown to be a part of the city centrum. The area is full of different services that benefits from the constant passenger flow.

VIENNA MAIN STATION

Vienna main railway station. Source; (Wikipedia)

General information:

The period of 2006 - 2010 was characterised for Vienna as implementation of large-scale infrastructure projects, where the main railway station was reorganised with a design of internationally attractive location for business, research, tourism and living providing a high accessibility for all users. The new railway station is owned and operated by the Austrian Federal Railways (ÖBB). It allocates 16 tracks and 15 platforms, including five roofed platforms and ten platform edges. It is planned that the railway station should be further developed as an international train hub connecting international destinations though night train services. Moreover, existing mobility hubs (WienMobil) are integrated with central railway station from a planning point of view.

Location: Vienna, Austria
Population of city: 1,911,000
Number of passengers: 268,000 passengers per day
Construction period: The first construction phase – 2010 -2012, and the full operation of the station- 2015
Size: The total area is 45,000 m3, 20.000 m2 for the shopping area, 550.000 m2 for business and offices
Station type: Passenger with an offer of multi-modal transport hub
Design: Modern in a historical city area by architects from THEO HOTZ
Connection to the airport: direct connections by high- speed trains- RailJet, the City Airport Train and commuters

Type of railway services

- International high-speed train connections;
- Regional ICE and IC trains;
- Regional commuter trains and night trains;

Multi-modal integration

Walking area	●
Commuter rail	●
Buses	●
Metro	●
Tram	●
Regional train	●
Taxi stations	●

Commercial activity

- Car rental services;
- Over 100 shops and restaurants
- Supermarkets (2);
- Sharing office places and conference rooms;
- Trading areas;
- At least 5 hotels in a walking distance of 500 m;

Urban development

The station is located directly in urban quartier and offers full integration with:

- Connection with living houses ;
- Parks (8 ha) and a direct access of green fields and a lake;

Additional facility / access

- Ticket offices, Info. stands;
- Vending machines ;
- Security stations;
- The parking garage below the station, with 600 spaces;
- B+R stations and repair shops;
- Kiss & Ride areas ;
- Restring/lounge- rooms ;
- Storage and smart lockers;

Accessibility

- 2 entrances (central and smaller);
- Connection between platforms and levels are done though escalators and/or lifts lead up to platforms;
- Unrestricted wheelchair access;

Summary: The design of the Vienna railway station project is a smart balance of urban development, mobility (public transport, soft mobility, private transport and car parks), the station itself and a new surrounding residential and ecological zone. Itself the station is located around 5,000 apartments which are built to accommodate 13,000 residents, offices for 20,000 employees and space for hotels, shops, services and catering operations. Travellers and commuters benefit from direct and rapid connections from the new station and can change trains quickly and conveniently. Moreover, due to the project's great significance, the partners decided to involve concerned parties much more than the law stipulates.

COPENHAGEN CENTRAL STATION

(sv.wikipedia.org/wiki/K%C3%B8benhavns_Hovedbaneg%C3%A5rd#/media/)

General information:

Copenhagen Central Station is the main railway station in Copenhagen, and the largest railway station in Denmark.

The station has 7 platforms and 13 tracks, and on the station concourse there are many small shops, cafeterias, and fast-food outlets.

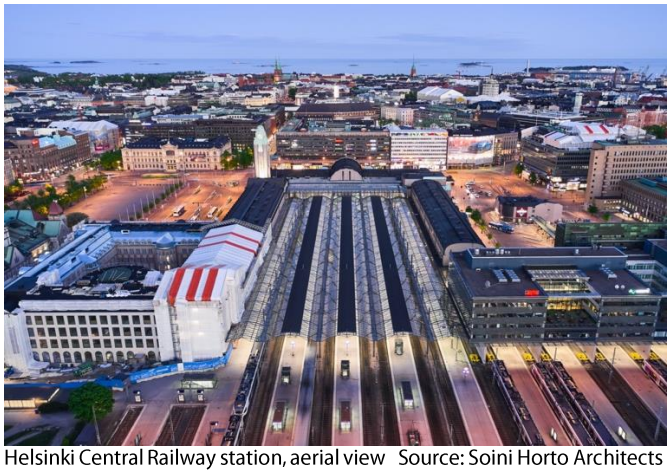
Location: Copenhagen (Denmark)
City population: 794,000
Number of passengers: 103,000 passengers per day
Construction period: Originally from 1911. Renovation and upgrade in 2008
Size: 7500 m^2
Station type: A historical iconic railway station building / Renovated and upgraded.
Design: Architect Heinrich Wenck by The Danish Railways. Renovation and upgrade by Gottlieb Paludan Architects.
Connection to the airport: Trains directly to Copenhagen Airport (13 minutes)

Type of railway services	Multi-modal integration	Commercial activity
The station is designed to provide railway passenger service, proposing: • Hub of the DSB railway network. Local S - trains; • Øresund train, InterCityLyn, InterCity • International trains connect to Stockholm and Hamburg;	Walking area ● Commuter rail ● Buses ● Metro ● Tram ● Regional train ● Taxi stations ●	• Number of small shops, cafeterias, restaurants, and fast-food outlets; • Several hotels in a walking distance of 500 meters; • Next to Tivoli, a famous amusement park;

Urban development	Additional facility / access	Accessibility
• Located in the city centre, and of great importance for the infrastructure in Copenhagen, and its connection to the rest of the country;	• Bicycle parking facility; • Travel center; • Supervised toilet/shower sections; • Luggage storage;	• Access directly from the city centre to the concourse hall. And from the concourse hall to the platforms by stairs escalators end elevators.

Summary: The current station building opened in 1911 and is the work of architect Heinrich Wenck. The station has 7 platforms and 13 tracks. On the station concourse there are many small shops, cafeterias, and fast-food outlets, a center for information and manual sale of tickets and two large toilet sections which are under manual supervision and clean. Shower rooms are also available for a smaller fee. The platforms begin under the main passenger hall. A hotel (Astoria) is built above the S-train tracks in the Northern end, but the remaining tracks are uncovered below street level. (Open areas between tunnel sections were necessary to have during the era of steam trains, while the S-trains always have been electrical). In the opposite (platform) end, all platforms are covered with the typical railway arched roof. This roof is shorter than the platforms, but all tracks remain below street level and can also be accessed from the street Tietgensgade. The transfer from bicycle to train, which includes the walk through the station building and on to the platforms, becomes a convenient integrated route.

HELSINKI CENTRAL RAILWAY STATION



Helsinki Central Railway station, aerial view Source: Soini Horto Architects

General information:

The history of Helsinki Central railway station shows a continuous agile development from Finland´s main railhead station to a multifunctional transportation business and public complex. Over the past 50 years the iconic historical building underwent major functional upgrades to cope with current needs. Today the building is both a landmark for the capital city and it serves as a modern node of public transportation.

Location: Helsinki (Finland)
City population: 656,000
Passengers per day: 200 000 passenger per day
Construction period: 1919 Central railway station by Eliel Saarinen; 1967-2003 various extensions (under-ground, on-ground, platform canopies); 2016-2021 Hotel transformation (east wing)
Size: 43 200m2
Station type: Renovation & Extension & Redevelopment of an historical iconic railway station building
Design: Historic building by Eliel Saarinen, Hotel transformation (Soini & Horto Architects, Futudesign)
Connection to the airport: Connected directly to Airport via ring rail (30 min travel time)

Type of railway services

- 19 railway platforms;
- Railhead station;
- Integrated metro station and attached bus terminal;
- Connection to St. Petersburg;

Multi-modal integration

Walking area	●
Commuter rail	●
Buses	●
Metro	●
Tram	●
Regional train	●
Taxi	●

Commercial activity

- 1000 m2 transportation facilities;
- 1000 m2 shops;
- 4250 m2 restaurants;
- 3000 m2 offices;
- 28 950 m2 new hotel (500 rooms);

Urban development

- Network of underpasses connect the station to adjacent shopping, parking and nearby city destinations;
- Right in the city centre;

Additional facility / access

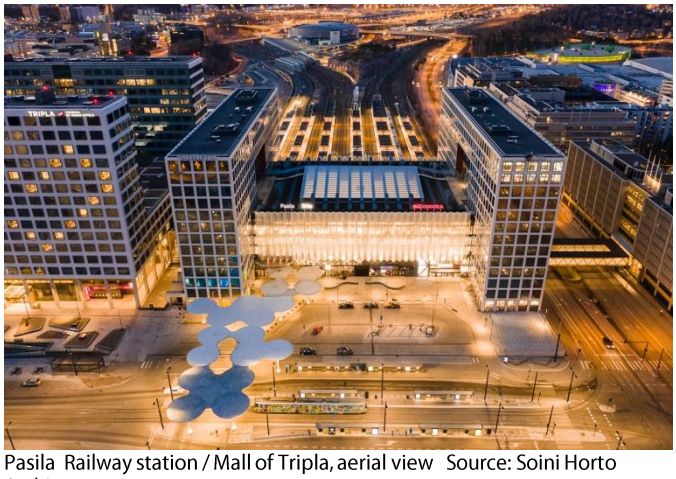
- Bicycle parking (620);
- Parking space (480 lots);
- Resting rooms;
- Soundproof work booths;

Accessibility

- Raised platforms, accessible entry onto low-floor train;
- Assistance service at the station;

***Summary**: The careful transformation of Helsinki central railway station from pure transportation aspects to a modern multifunctional commercial and public building shows typical challenges in city planning and station usage. Nowadays a well organised network of underpasses connect the station level to metro, shopping, parking and nearby city destinations. Customer comfort and safety was significantly improved by adding a glazed roof structure on top of the platform areas. Shopping and restaurant facilities were integrated into the historical building and recently the national* railway company VR's administrative office building was transformed into a unique hotel. *There is also an ongoing redevelopment of the eastern bus terminal right that focus on additional commercial and public functions and improved outdoor spaces.*

PASILA RAILWAY STATION



Pasila Railway station / Mall of Tripla, aerial view Source: Soini Horto Architects

General information:

The Station together with Mall of Tripla is Finland´s largest and latest multimodal hub with a fully integrated urban city life. The stations is located approximately 3.5 kilometres north of Helsinki Central and is the second busiest railway station in Finland. It´s focus is on linking business, shopping, culture, housing and entertainment with transportation to gain a greater value from investment. The new station has been built on top of the operating platforms and railway tracks by demolishing the existing terminal. Moreover, the station offers an international car loading/ uploading service on trains and has specially designed area called – Pasila car-carrier station, accessible also for PRM[12].

Location: Helsinki, Finland
City population: 656,000
Number of passengers: 65,000 passengers per day
Construction period: 1990 station construction ; 2003- redevelopment: architectural competition, winning proposal; (Soini & Horto Architects&OMA,); 2015-2017 New Pasila Station & Mall of Tripla (demolition+reconstruction);
Size: 49 000 m2 (Station + Mall of Tripla 350 000 m2)
Station type: Renovation & Extension & Redevelopment of an historical iconic railway station building
Design: Soini & Horto Architects, Sweco Architects
Connection to the airport: Connected directly to Airport via ring rail (22 min travel time)

Type of railway services	Multi-modal integration		Commercial activity
• 11 platforms (9 existing ones and 2 new tracks for regional and airport traffic)through station terminal; • Metro station reservation; • Attached bus, tram terminals;	Walking area	●	• 5000 m2 transportation facilities; • 10 900 m2 shops, restaurants; • 30 000 m2 offices; • 85 000 m2 retail in connected mall; • 28 000 m2 in connected apartment-buildings; • 17 500 m2 in connected hotel;
	Commuter rail	●	
	Buses	●	
	Metro	●	
	Tram	●	
	Regional train	●	
	Taxi	●	

Urban development	Additional facility / access	Accessibility
• Integrated with new shopping mall; • Modern office buildings around the station; • Walking connection to exhibition centre and sports arena; • Public urban green "boulevard";	• Bicycle parking / "bike hotel" (3400); • 3 floor underground parking space (2300) ; • Lounges; • Wi-Fi zones ; • WC and resting rooms;	• The city block has been carefully integrated into the street network, a new tunnel directly thru the building leads traffic literally thru the building; • Multiple entrances and a complete 24/7 public route system thru the block creates a barrier-free system;

Summary: The entire development was enabled thru a railyard quarter re-organisation and a major cargo harbour relocation. Pasila Station/Mall of Tripla is located at Central-Pasila which is responsible for a large urban development in its surrounding. The new building complex is an important catalyst for a city transition which includes, Itä- Pasila, Konepaja, Ilmala, Pohjois-Pasila. In direct vicinity of the station multiple high-rise buildings and mixed-use city quarters are under planning/construction. By 2040 the population of Pasila is supposed to triple to 30 000 and the workplaces will double to 50 000

[12] https://www.vr.fi/en/railway-stations-and-routes/pasila-car-carrier-station

ST PANCRAS INTERNATIONAL

Eurostar at St. Pancras International Source: https://en.wikipedia.org/wiki/St_Pancras_railway_station

General information:

St Pancras International Station is one of the biggest landmarks in London and serves as a gateway to Europe and home for the HS train Eurostar. The redevelopment plan restored the station to its Victorian-era glory and added retail and hospitality areas.[13]

Location: London, United Kingdom
Population of city: 8,961,000
Number of passengers: 99,000 passengers per year
Construction period: 1868 St. Pancras station opened as terminus for Midland; 2007 The complex underwent an £800 million refurbishment to become the terminal for the Channel Tunnel Rail Link/High Speed 1/HS1 and part of an urban regeneration plan across East London. As part of the redevelopment plan, the Barlow train shed was extended by 200m to accommodate domestic rail services; 2007 Retail premises added; 2009 South-eastern high-speed domestic services introduced
Station type: Redevelopment with a historical content and preservation of an iconic historical landmark building
Design: original building by William Henry Barlow, modern redevelopment by Pascall + Watson Limited
Connection to the airport: direct rail connections to London airports: Heathrow, London Gatwick, Luton, London City.

Type of railway services	Multi-modal integration	Commercial activity
• 13 platforms, six used by the Eurostar; • 4 main rail services from the station: Eurostar, East Midlands Railway, Southeastern and ThamesLink; • International services: at the station are provided by Eurostar over HS1; • Metro: Connection to 6 lines;	Walking area ● Commuter rail ● Buses ● Metro ● Tram ● Regional train ● Taxi ●	• 8 200 m2 culture, restaurant, retail, shopping centres; • Staffing and customer service stands; • Several hotels on walking distance; • Offices spaces around the station;

Urban development	Additional facility / access	Accessibility
• The railway station is the part of a large-scale urban redevelopment plan "Kings Cross";	• Bicycle parking slots; • Parking spaces (300); • Rest- 1rst class rooms; • Luggage rooms;	• Facilities for the disabled with entrances located at street level providing level access to the lower concourse and Eurostar lounge;

Summary: The integration of the St Pancras main station with the new Eurostar terminus, Midland Mainline, Thameslink, London Underground and adjacent King's Cross Station's has created a coherent transport hub and a true "Gateway to Europe". The key feature of William Barlow's design is the Barlow train shed, which is considered to be one of the largest enclosed spaces in the world has been kept as an identity of the complex. Today the station plays a major role in the urban scale of King´s Cross, which is one of London´s largest and most exciting redevelopments in London. Transformation went from an underused industrial wasteland to a new part of the city with homes, shops, offices, galleries, bars, restaurants, schools, and university.

[13] source: https://www.railway-technology.com/projects/stpancrasinternation/& //www.pascalls.co.uk

COPENHAGEN AIRPORT STATION

Copenhagen airport station, platform.
(//en.wikipedia.org/wiki/Copenhagen_Airport,_Kastrup_Station)

General information:

Copenhagen airport station is an underground station and one of Denmark's busiest. It is an open construction with two platforms, each serving its own track. The station is a traffic nerve centre, a continuation of the Oresund connection and Terminal 3. The design of the station shows a high accessibility and well-planned organisation for PRM.

Location: Kastrup / Copenhagen (Denmark)
City population : 794,000
Number of passengers: 22,000 passengers per day
Construction period: 1993-1998 Realized at the same time as Terminal 3
Size: 5.000 m2
Station type: New construction, an extension of the airport.
Design: Vilhelm Lauritzen and Rasmussen & Schiøtz A/S.
Connection to the airport: Connected directly to airport.

Type of railway services	Multi-modal integration	Commercial activity
The station is designed to provide railway passenger service, proposing: • InterCity and InterCitylyn connections to Denamrk and southern Sweden; • Øresundstrains connects the station to Malmö; • International highspeed train connection to Stockholm.	Walking area 🟢 Commuter rail 🔴 Buses 🟢 Metro 🟢 Tram 🔴 Regional train 🟢 Taxi stations 🟢	• Shops and cafés; in relation to the airport; • Two hotels in the area; • Car renting services;

Urban development	Additional facility / access	Accessibility
• Great importance of connecting the airport to the rest of the country and to Malmö; • Copenhagen airport is an important and growing international mobility hub;	• Bicycle parking facility; • Parking space; • Motorcycle parking space;	• Access directly from the airport to the platform by escalator and elevator; • Step- free solutions;

Summary: The station is an immediate extension of the tip of Terminal 3 and appears with the same high quality as the rest of the airport. Architecturally, the steel, glass and granite of Kastrup Station is a continuation of the spaciousness and materials of Terminal 3 particularly ." Kastrup Station is designed as a natural transition from train to flight. The clam station welcomes the passengers with its daylight, materiality and the same aesthetic simplicity as rest of the airport. The station is characterized by a long gap just above the rail tracks, opening the underground station whilst it proving a natural ventilation of the room. The platforms form a solid granite base, ceilings are plastered, and the walls covered with travertine adding a warm glow to the room. Kastrup Station is free of adverts. Instead, there is photographic art framed in tombak on the sound reducing walls. [14]

[14] (https://www.vla.dk/en/project/kastrup-station/)

MALMÖ CENTRAL STATION

The glass hall at Malmö central station
Sourse; (https://nl.wikipedia.org/wiki/Station_Amsterdam_Amstel)

General information:

Malmö Central Station is located in the city centre of Malmö. Over the last 150 years, the station has been altered, converted and extended. The modern architecture efficiently caters for the increasing flow of people travelling, while the older parts of the station have been given a different use with a great focus on service.

Location: Malmö (Sweden)
City population: 348,000
Number of passengers: 33,000 passengers per day
Construction period: Originally from 1856 latest extension (The glass Hall) constructed in 2011
Size: 10,000 M^2
Station type: Renovation, transformation, extension of an historical iconic railway station building.
Design: The Glass Hall designed by Metro Arkitekter.
Connection to the airport: Direct train to Copenhagen airport, and buses to Malmo airport.

Type of railway services	Multi-modal integration	Commercial activity
The station is designed to provide railway passenger service, proposing: • Øresundstrains to Copenhagen; • Trains to Göteborg Helsingborg, Stockholm; • Local and regional trains;	Walking area: ● Commuter rail: ● Buses: ● Metro: ● Tram: ● Regional train: ● Taxi stations: ●	• Inviting environment for people to meet and eat; • Over 20 shops and restaurants; • Car sharing and renting service; • Over 5 hotels in walking distance of 400 meters; • Coworking places near the station;
Urban development	**Additional facility / access**	**Accessibility**
• Malmö station is a key part of a larger network between many tourist and business destinations, And the station plays a huge role in the development of the city;	• Ticket offices; • Toilets, showers; • Storage lockers; • Parking facilities for bikes and cars; • Taxi rank;	• Elevators, escalators, stairs; • Assisted travel service at the station; • Accessible entrance and toilet;

Summary: Since opening in 1858, the city's first railway station has been rebuilt, extended and modernised to cater for changing passenger needs over the decades. The original Terminal Building is in two sections. The smaller Green Hall was a waiting room for third-class passengers in the 1920s. The Central Hall started out as an open platform building. Its old brick walls and herring-bone tiled floor have been carefully preserved. Beneath the domed roof, 15 shops and restaurants provide an inviting environment for people to meet and eat. The City Tunnel, opened in December 2010, is an underground rail link connecting Malmö to the Öresund Bridge and Copenhagen. At Malmö Central Station, passengers enter the subterranean station through the Glass Hall, a 130-metre terminal that unites Malmö's busy city streets with its elegant waterfront[15].

[15] *ηττπσ://αασαρχηιτεχτυρε.χομ/2013/02/μαλμο-χεντραλ-στατιον-βψ-μετρο-αρκιτεκτερ.ητμλ*

OSLO AIRPORT STATION

General information:

Oslo airport station opened in 1998 at the same time as Oslo airport. The airport is located 30 minutes outside of the city center of Oslo, and the railway is the main connection from the city to the airport.

Location: Gardermoen (30 km from Oslo Norway)
City population: 697.000
Number of passengers: n.a (Airport Express train has 15,000 passengers per day)
Construction period: 1993-1998
Size: Part of Oslo Airport (140.000 m2)
Station type: New construction an extension of the airport
Design: Nordic, NIELSTORP +arkitekter, Skaarup & Jespersen
Connection to the airport: Connected directly to Airport

Type of railway services	Multi-modal integration		Commercial activity
The station is designed to provide railway passenger service, proposing: • Oslo Airport express; • NSB trains to Hamar / Trondheim; • Regional and local trains;	Walking area	●	• Shops and cafés in relation to the airport; • Hotels at the airport area; • Car renting services;
	Commuter rail	●	
	Buses	●	
	Metro	●	
	Tram	●	
	Regional train	●	
	Taxi stations	●	

Urban development	Additional facility / access	Accessibility
• The airport is a key part of the infrastructure in Norway, and the stations plays an important part of connecting the capital to the airport. Making a huge impact for both business and tourists in Oslo.	• Ticket office; • Own platforms for the express trains; • Smart parking facilities; • Auto care and repair service; • Parking spaces for electric vehicles;	• By escalators and elevators directly connected to the airport terminal; • Parking spaces for disabled;

Summary: When the Parliament of Norway in 1992 decide to build a new central airport for Eastern Norway, they also decided that the main mode of ground transport to the airport should be by railway. While the previous airport, Oslo Airport, Fornebu, was located just outside the city limits; the new Oslo Airport, Gardermoen, would be located some 50 kilometers north of the city, outside the reach of the existing public transport systems. The line and station were opened in 1998, at the same time as the airport that gave the line its name. It is used by the Flytoget airport express train service as well as express trains by Vy. It is the only high-speed railway in the kingdom, with a maximum permitted speed of 210 km/h (130 mph).

AARHUS CENTRAL STATION

Entrance hall Aarhus central station. Source; (https://da.wikipedia.org/wiki/Aarhus_Hovedbaneg%C3%A5rd#/media/Fil:AarhusH_forhallen.jpg)

General information:

Aarhus central station is located at the edge of the inner city bordering the district of Frederiksbjerg. The station serves as the central hub of transportation for the citizens of the city, areas and towns surrounding it.

In the same building operates a three-storage mall that adds great amount of services for the passengers. The station is operated by DSB Arriva Midttrafik.

Location: Aarhus (Denmark)
City population: 300,000
Number of passengers: 17,000 passengers per day
Construction period: 1927, renovated in 2015
Size: 1700m^2
Station type: Historical building (1927)
Design: 1927 K.T. Seest. Gottlieb Paludan Architects, COWI and Aart Architects 2015
Connection to the airport: Bus to Aarhus airport, and trains to Copenhagen and Billund

Type of railway services

The station is designed to provide railway passenger service, proposing:

- Local trains ;
- Regional trains;
- Intercity Lyn;
- Light Rail (Tram) ;
- International connection to Hamburg;

Multi-modal integration

Walking area	●
Commuter rail	●
Buses	●
Metro	●
Tram	●
Regional train	●
Taxi stations	●

Commercial activity

- Inside the station lies shopping centre on three levels;
- Almost 100 hundred stores and restaurants;
- 4 hotels in walking distance of 400 meters;

Urban development

- Public spaces;
- Stores;
- Residential buildings;
- Cultural institutions;
- Supermarkets;

Additional facility / access

- Bicycle parking and sharing facilities;
- Underground car park;

Accessibility

- Stairs, escalators, elevators;

Summary: Aarhus central station is the biggest station in Denmark outside of Copenhagen. It consists of 9 tracks and 4 platforms and is situated in the middle of the city. The tracks and platforms go underneath the station and the shopping centre Bruuns Galleri with a direct connection from the platforms to the shopping centre. Aarhus central station was rebuilt in 2015 to improve the connection with the city's infrastructure. Every day more than 50,000 passengers and shoppers pass through the station. The focus for the design of the station have been on user flow, the seamless interchange between different modes of transport and the station's continued role as one of the city's hubs for, among others, the shoppers in the shopping centre adjoining the station.

AMSTERDAM AMSTEL STATION

Amstel Station entrance. Sourse; (https://nl.wikipedia.org/wiki/Station_Amsterdam_Amstel)

General information:

Amstel Station is a transit station located in Amsterdam near the Amstel river. The station is an historical building from 1939 and is decorated with two murals by Peter Alma.

The station consists of 4 tracks and 2 platforms where track 2 and 3 are serving the metro while the tracks 1 and 4 are serving NS trains.

Location: Amsterdam (Netherlands)
City population: 1,558,000
Number of passengers: 50.000 passengers per day
Construction period: 1936-1940 opened 1939. Metro opened in 1977. Currently undergoing construction
Size: 10.000 M^2 Station building and 8000 M^2 bicycle cellar
Station type: Historical building, transformation
Design: Schelling (1939) Gottlieb Paludan collaboration with Office Winhow 2019
Connection to the airport: 21min to Schiphol Airport via Duivendrecht

Type of railway services	Multi-modal integration		Commercial activity
The station is designed to provide railway passenger service, proposing: • NS trains; • GVB Metro; • Trams;	Walking area	🟢	• Convenience stores; • Food stores; • Hotel next to the station;
	Commuter rail	🔴	
	Buses	🟢	
	Metro	🟢	
	Tram	🟢	
	Regional train	🟢	
	Taxi stations	🟢	

Urban development	Additional facility / access	Accessibility
• The surrounding features public spaces, stores, shops offices and residential buildings; • Located in business district;	• Bicycle parking; • Taxi rank; • Luggage storage; • P+R services;	• Elevators, stairs, escalators; • Guiding lines; • Accessible platform; • Assistance service;

Summary: Since the initial design and construction, the station has been thought to be a transit spot for different kinds of transportation, such as trains, bicycles, buses, and trams. Amsterdam central station is merely 6min away by train. The surrounding area is undergoing a development consisting of housing, offices, cafes, shopping facilities and public spaces. Alongside the development of the surrounding area the station is undergoing a renovation which intend to bring it back to its original state of coherence and appearance. In addition, the renovation will ensure new and enhanced connections with the area's light rail and bus lines, roads, and bicycle paths as well as new, extensive bicycle parking facilities, both above and below ground. The design of the new station building in the west will integrate with its surroundings by opening towards the Amstel River and a new urban development area. An original underground passage, providing access from the station to the western side of the railway tracks will be extended and converted to become part of the new station building. Thus, the projected passenger flows provide the basic structure of the design and the transfer from bicycle to train, which includes the walk through the station building and on to the platforms, becomes a convenient integrated route.

ROTTERDAM CENTRAL

Rotterdam Central main entrance
(https://en.wikipedia.org/wiki/Rotterdam_Centraal_station)

General information:

Rotterdam Central is a multi-modal station located in Rotterdam, the Netherlands. The station has been completed in 2014 following the demolition of the 1957 building. Rotterdam Central was built in the post-war period to consolidate into one, the previously dispersed stations of Rotterdam. The Rotterdam Central is providing a myriad of connections with international, national, regional, and local transport opportunities.

Location: Rotterdam (Netherlands)
City population: 1,273,000
Number of passengers: 110,000 passengers per day
Construction period: 2014 (current station)
Size: 46.000 m^2 station building and 5000 m^2 underground bicycle parking
Station type: New construction (2014), replacement of a former station (1957-2008)
Design: Benthem Crouwel Architekten, MVSA Meyer & Van Schooten Architects and West 8
Connection to the airport: Connected to airport by train (20min)

Type of railway services	Multi-modal integration	Commercial activity
The station is designed to provide railway passenger service, proposing: • High-Speed train (Thalys, Eurostar); • National Rail (NS) ; • RET Metro; • Trams;	Walking area ● High-speed rail ● Commuter rail ● Buses ● Metro ● Tram ● Regional train ● Taxi stations ●	• Convenience stores; • Food stores and supermarket; • Big hotels next to station • Modern offices and coworking spaces at the area ;

Urban development	Additional facility / access	Accessibility
• Enhanced urban connection towards the north side of the city; • Stores and Commercial buildings; • Public square;	• B+R for 5200 bikes; • P+R facilities; • Service point for small repairs and wide variety of services;	• Guiding lines; • Accessible platform; • Audio connection in Tickets Shops or at information desks;

Summary: The station operates as a multi-modal station as well as a tool for urban development and regeneration. The building plays a role of a connector between two city districts. The enlarged circulation corridor unfolds a series of amenities and shopping opportunities while providing access to the platform and across the station from south to north. The station works as a hub, providing an underground bicycle parking for 5200 bikes and creating a square that can be used for events. Within the station a series of shops and services caters for the passengers; the strengthening urban connection allowed for new commercial opportunities to flourish both directly north and south of the station. The design of Rotterdam Central has a strategy to both consolidate a complex transport hub and strengthen the urban connections of the site could be fulfilled.

NØRREPORT STATION, COPENHAGEN

General information:

Nørreport station, originally opened in 1918. Since then, it has been rebuilt several times, latest by Gottlieb Paludan Architects in 2011-2015, Which transformed the old station into a new plaza for urban life, and a safe and attractive spot in the city centre.

Location: Copenhagen (Denmark)
City population: 600.000 (metropolitan area)
Number of passengers: Approx. 165,000 people a day (including metro)
Construction period: Originally opened in 1918 rebuild in 1934 and 1986 and 2011-2015
Size: 10.000 M^2
Station type: Transformation, urban space, and new construction.
Design: Transformation in, 2015 by Gottlieb Paludan Architects, collation with COBE and SWECO
Connection to the airport: Trains directly to Copenhagen Airport (15 minutes)

Type of railway services	Multi-modal integration		Commercial activity
The station is designed to provide railway passenger service, proposing: • Local s-trains; • Øresundstrains, InterCityLyn, InterCity; • International trains connected to Stockholm and Hamburg;	Walking area	●	• Small 24-hour open shop with tickets, food and drinks;
	Commuter rail	●	
	Buses	●	
	Metro	●	
	Tram	●	
	Regional train	●	
	Taxi stations	●	

Urban development	Additional facility/ access	Accessibility
• A new Urban life, and a safe and attractive urbane space;	• Bicycle parking facility;	• Access to platform level mainly though stairs/ elevators;

Summary: Nørreport Station is Denmark's busiest transport hub, and following, the transformation, it is the centre of an urban space with smooth passenger flows and a distinct city pulse. Cyclists and pedestrians have been prioritized via rerouting and reducing of vehicular traffic. Urban life, intermodality, passenger flows, wayfinding and accessibility, were key values during the transformation project. The development of a new bike parking concept has more than doubled the parking spaces available as well as easing their use. The lighting has been designed to create a safe and attractive urban space -also after dark. The project was awarded The Danish Lighting Award 2016. The project fell into three sub-projects: The urban space project with new station designs and buildings, pavings and surfacings, bicycle parking, access and traffic arrangements; the modernization of the platform for long-distance trains; and the renovation of the concrete structures above the underground platforms..[16]

BEIJING WEST RAILWAY STATION

[16] https://www.vla.dk/en/project/kastrup-station/).

Beijing West railway station:
https://en.wikipedia.org/wiki/Beijing_West_railway_station

General information:

The West Railway station is one of the biggest in China and the main one in Beijing. It is operated by the CR Beijing and Beijing Subway companies. The concept was developed to serve the city as a multimodal transportation hub providing a terminal for both "traditional" and high-speed trains. The station allocates 10 platforms, 20 rail tracks. In front of the station, there are 2 entrances: South and North Squares with ticket pick-up machines. It is also connected to two subway lines and passengers are able to change the lines using the cross-platform interchange method. Besides, it could be seen that train services offer many sleeper trains to North/North-East of China and to Moscow, Mongolia or other countries.

Location: Beijing, China
City population: 21,54 million
Number of passengers: 400 000 daily passengers (273 daily trains to other cities/ 192 regional high-speed trains)
Construction period: 21 January 1996- the station was open; 31 December 2011- connection of underground cross city railway, which passes though the urban areas of Beijing
Size: total area: 51ha - measuring 510,000m^2
Station type: multimodal transportation hub
Design: Combining Chinese style and modern architecture by
Connection to the airport: The distance of 40 km to the airport served by the high-speed trains from the station.

Type of railway services	Multi-modal integration	Commercial activity
• International high-speed and Local/ regional classical trains; The station could serve the next rolling stock (train) types: "A" low speed trains; "K" very fast speed trains; "T"´/"N" - super-fast/ express; "Z" - super-fast, sleeper-class; "D" -bullet trains, the fastest; "C" trains -inter-city trains; "Y" trains - tourist trains; "L" trains are temporary trains.	Walking area ● Commuter rail ● Buses ● Metro ● Tram ● Regional train ● Taxi stations ● • South Square: bus station, airport shuttle bus; • North Square: bus station, taxi stand;	• Offices and banks; • Shops and restaurants ;

Urban development	Additional facility / access	Accessibility
• Integrated into urban life around the station, especially connected to parks nearby;	• Ticket machines/ offices/ info desks; • Stores and Luggage service; • 13 Waiting halls (incl. mother & children's rooms); • Car parking slots;	• The main entrance and two plazas entrances, each allocates escalators and lifts to each railway platform and within shopping areas;

Summary: The station shows a good example of railway service organisation, its infrastructure availability (especially for high-speed trains), connection of waiting rooms at each platform, and well as easy check in system. Moreover, it is integrated with bus and metro network, which could connect passengers to the central areas of the city.

BORDEAUX SAINT-JEAN

Bordeaux Saint-Jean Railway station
(https://en.wikipedia.org/wiki/Bordeaux-Saint-Jean_station)

General information:

Bordeaux Saint-Jean is the main station in Bordeaux. The original building served as a regional and national station for the city. In 2017 a renovation and expansion of the station has been realized to receive new high-speed lines in relation to the ambitious master plan of Bordeaux currently being implemented.

Location: Bordeaux (France)
City population: 927.445 (Urban)
Number of passengers: 48.500 (2019)
Construction period: 2017 (current station)
Size: 30.000 m^2 (15.000m2 expansion)
Station type: New construction (2017), extension of existing station (1855)
Design: SNCF Gares & Connexions / AREP / Agence Duthilleul
Connection to the airport: Connected by buses only (40min)

Type of railway services	Multi-modal integration	Commercial activity
The station is designed to provide railway passenger service, proposing: • High-Speed train (TGV) ; • National Rail (SNCF) ; • Regional Train (TER) ;	Walking area ● High-speed rail ● Commuter rail ● Buses ● Metro ● Tram ● Regional train ● Taxi stations ●	• Convenience stores; • Food stores; • Supermarket;

Urban development	Additional facility / access	Accessibility
• Connected to southern development of Bordeaux; • Local increase in density for both commercial and residential buildings;	• Bicycle parking slots (360); • Car parking (850); • WC and resting rooms;	• Stairs; • Escalators; • Elevators;

Summary: The station consolidates a major hub for inter-modal transport for the metropolitan region and city. It is located in the southern axis of the city, at the heart of the Euroatlantique urban development being the first of many phases of the Bordeaux 2030 MP. Currently it is redeveloped area, which was extended from 1855. The redevelopment is inserted in the city ambition of transform itself into a metropolitan region and the station should allocate HS trains (TGV) from Paris with ongoing plans of extension to Tolouse (2029). The inclusion of Eurostar connections from London is also in the short-term plan of SNCF (expected by 2022).

NAPLES AFRAGOLA

Naples Afragola railway station
(https://en.wikipedia.org/wiki/Napoli_Afragola_railway_station)

General information:

Naples Afragola is a multi-modal station located in Naples, Italy. The station has been completed in 2017. It was built as a multi-modal hub in the outskirts of the city.

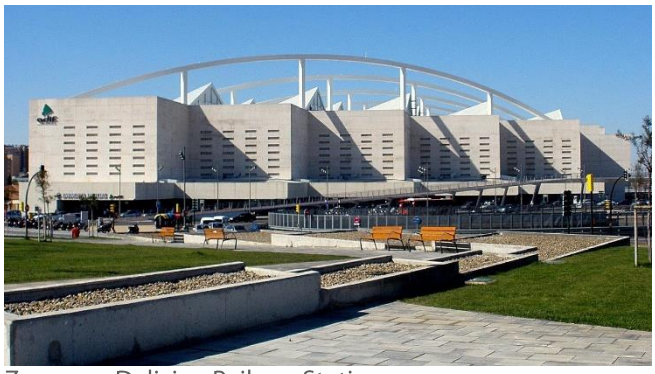
Location: Afragola- Naples (Italy)
City population: 63 000
Number of passengers: 10.000
Construction period: 2003-2017 (including design)
Size: 30.000 m^2 station building
Station type: New station crossing over tracks
Design: Zaha Hadid Architects
Connection to the airport: Connected by buses only (40min)

Type of railway services	Multi-modal integration	Commercial activity
The station is designed to provide railway passenger service, proposing: • High-Speed train (Frecce); • National Rail (FS);	Walking area ● High-speed rail ● Commuter rail ● Buses ● Metro ● Tram ● Regional train ● Taxi stations ●	• Café; • Shops (planned);

Urban development	Additional facility / access	Accessibility
• Outskirts of Naples with potential local development; • Connections to Suburban developing areas;	• Car Park (major suburban transport switch);	• Stairs; • Escalators; • Elevators;

Summary: The station was created to be a new regional hub connecting the high-speed line linking major Italian cities with the regional and local railways. The move was made with the intention of relieving some of the train traffic into the congested Naples central. Naples- Afragola was conceived as an architectural icon for the area. The station bridges over the 8 tracks while providing a generous parking space for 500 cars facilitating a suburban inter-modal switch.

ZARAGOZA- DELICIAS



Zaragoza-Delicias Railway Station
(https://en.wikipedia.org/wiki/Zaragoza%E2%80%93Delicias_railway_station)

General information:

Zaragoza-Delicias is an intermodal station located in Zaragoza, Spain. Not only does it provide a major stop for the high-speed line connecting Madrid and Barcelona, but it also provides a series of amenities. The station was completed in 2003 in connection with the Expo and the expansion area of the city. It sits between the Expo area and the historical centre of Zaragoza.

Location: Zaragoza (Spain)
City population: 706.904 (Municipality)
Number of passengers: 11.000 (2018)
Construction period: 2001- 2003
Size: 200.000 m^2
Station type: New construction (2003),
Design: Carlos Ferrater, Jose Valero, Felix Arranz and Elena Mateu
Connection to the airport: Connected to airport by train (20min)

Type of railway services	Multi-modal integration	Commercial activity
The station is designed to provide railway passenger service, proposing: • High-Speed train (AVE, Avant); • National Rail (Renfe); • Local Trains; • Commuter Trains;	Walking area ● High-speed rail ● Commuter rail ● Buses ● Metro ● Tram ● Regional train ● Taxi stations ●	• Convenience stores; • Food stores; • Supermarket; • Hotel; • Business centre; • Car rental; • Department store; • Bookshop; • Tourist information and shop;

Urban development	Additional facility / access	Accessibility
• Easy access from the motorway; • Connecting new urban area (Expo) with historical centre.	• Car parking stations; • Bike parking; • Bike sharing stations;	• Stairs; • Escalators; • Elevators;

Summary: The station was planned and built in the context of the Expo 2003 which provided an expanding urban area for the city. The station is built as an intermodal hub, being the main stop for trains between Madrid and Barcelona but also with connections to Bilbao and to France. The station anchors its own urban context providing a series of services such as hotel, department store, business centre, etc. This allows to further strengthen its potential as an urban catalyst linking the old and new urban areas of the city. Furthermore, Zaragoza-Delicias provides easy access from the motorway and ample space for cars and bikes. The station is conceived as a regional hub for transport inter-modality while still grounding itself as an urban agent by providing an array of services within the station and a series of public spaces with pedestrian and bike connections.

CANARY WHARF RAILWAY STATION, LONDON

Canary Wharf Railway Station
(https://en.wikipedia.org/wiki/Canary_Wharf_railway_station

General information:

The main access point for the Crossrail station was to be the rebuilt Great Wharf Bridge. Construction of the station was to predominantly take place on Hertsmere Road. The project design involved digging a 9 m (30 ft) wide shaft to the station depth of 30 m (98 ft) below the dock water-level to enable crew and equipment to begin boring the box that would form the station. The operation and management of the station is done by TfL Rail and all infrastructures is owned and maintained by Transport for London. As part of the redesigned station, a large shopping centre and a park above the platforms situated in the middle of the dock was opened.

Location: London, UK
City population: 8.961.000
Number of passengers: 69.759 (2006) and 12 trains per hour
Construction period: 2009- 2021
Size: 31 500 m2
Station type: New construction (2009)
Design: Foster & Partners
Connection to the airport: rail connection to the Heathrow airport

Type of railway services	Multi-modal integration	Commercial activity
The station is designed to provide railway passenger service, proposing: • Commuter connections;	Walking area: ● High-speed rail: ● Commuter rail: ● Buses: ● Metro: ● Tram (LRT): ● Regional train: ● Taxi stations: ●	• Convenience and food stores; • Supermarkets; • Hotels and Business centre in the walking distance of 5 min.; • Tourist shops and refreshments; • Post boxes and offices;

Urban development	Additional facility / access	Accessibility
• The roof garden; • Integration with urban areas and living buildings; • Direct access to a water park;	• Car parking station; • Bike sharing stations; • 24-hour travel information; • Station seating facilities. • ATM machine; • Internet zones;	• Eight long-rise escalators from the promenade; • Step-free from street to train; • Trolleys for PRM;

Summary: The Crossrail station in Canary Wharf is one of the largest timber construction projects in Great Britain. With this building, London receives another architectural highlight. The station design is quite complex and include a semi open-air timber lattice roof, which allows commuters to see the new green space, shops, restaurants and facilities outside the dock. At both ends of the longitudinal sides, the roof cantilevers a spectacular 98.4 ft over the water surface. The station is quite unique and fully integrated into the urban area.

3.1.3.WP 1.3 – List of international railway stations proposed for benchmarking

Based on WP1.1, the consulting team presented a discussion of a long list of 23 stations, highlighting the most influential and comparable criteria for the generation and maximization of gross value added in railway stations based on international best practices. The process of benchmarking is based on a suitably selected shortlist of acceptable comparable facilities. The team began this process by identifying a broad selection of international railway stations to which a shortlisting exercise is performed.

Moreover, to effectively develop a detailed overview of each benchmarking case the consultant team proposes some of additional shortlisting criteria, besides typical profile elements, such as passenger trips and freight volumes, to be considered as main GVA element. The current criteria are listed in each of the factsheets for the long list of stations in section WP1.2 above.

3.1.4.Table of contents for the first interim report

The Consulting team has focused on brainstorming for delivering the first interim report, which will include the final summary of the full WP2. The content for such report will include:

- Best practices and lessons learned in the field of commercial opportunities and stations (internal) space usage;
- Best practices and lessons learned in the field of station operation and governance;
- Best practices and lessons learned in the field of station integration with the urban environment and effects on urban regeneration;
- Best practices and lessons learned in the field of station integration with the urban and regional mobility aiming to the development of a transit-oriented system;
- Best practices in baggage and/or cargo delivery, as well as movement through the terminal to meet business needs without disturbing passengers;
- Key recommendations about maximization of GVA of (international) railway passenger stations;

The Interim report will greatly rely on visual tools (including infographics, images, etc.) to exemplify, strength and communicate in a straightforward way the content and recommendations from the study. All visuals developed will be discussed with the Client and submitted in a fully formattable and adjustable format (including source files). More details on the table of contents for the first interim report will be delivered in the final version of the Inception report.

4. Findings and planning, policy, and design recommendations

Modern railway project development brings important transport and mobility-related benefits to urban dwellers. Such projects improve mobility options for people living near stations and provides important transport connections between the wider economically active population and employers. However, these projects also present a once in a lifetime opportunity to create wider impacts in the economy. To maximize the potential benefits of generating, capturing, and delivering such value, the consulting team has gathered a list of findings from the extensive literature review and analysis of the long list of stations. This overview of findings and recommendations have been pulled from international experiences and contain theoretical and practical applications.

The main list of recommendations as identified in the literature are listed below:

1. **Make it about people: stations as meeting places** – In order to reap the benefits of GVA maximization around railway stations, it is important to take into consideration the idea of placemaking. Stations should not be seen as transport facilities alone, but they should be planned and designed as meeting places, as places where people want to gather and connect with others and that are integrated to other land uses, opportunities and experiences. Designing stations for people also should incorporate the idea of designing places at human scale, this means, designing infrastructure and transport facility at a scale that is enhanced for human use.

2. **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, providing 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 attract potential customers who pass through the station, but also those that live near the stations. Moreover, it is important that station designs include considerations for people with reduced mobility (planning and design for example: barrier free/ step, free entrances and/ or "unassisted" accesses, 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.

3. **Rigorous integration with surrounding urban development** – Development around the stations should be conceptualized and designed in parallel with station infrastructure to maximize economic, social and environmental positive externalities. These include a meaningful and communicative relationship with stakeholders including potential developers, city (and or state) governments.

4. **Designing beyond the urban transport hub** – Stations should not only be transport and mobility hubs, but they are also urban clusters that integrate retail/commercial, housing and employment land uses. Thoughtful design of the interconnection of rail with cycling infrastructure and services, bus-based transport modes and above all, walking will be an important aspect of enabling seamless integration. It is recommended that RB stations

consider the idea of modern urban hubs that can integrate walking, public transport bays, private car kiss-and-ride facilities, provide space to facilitate shared transport options such as micromobility services and ridesharing, curb space for loading and unloading of goods.

5. **Integration of station planning and design into land use and mobility planning**- Development of railways stations in the RB cities will have such a long-lasting impact on land use and transport activity, that it is recommended to be integrated into the mobility and land use planning through the development or update of the city´s transportation or sustainable mobility urban plan. Developing urban mobility plans around such large mega-projects can be beneficial not only to improve mobility and access in the short to medium term, but to plan for long lasting change and value creation through society. Effective integration requires high coordination with each city to understand how urban and transport plans are being carried out to incorporate the development of the stations. Beyond city-wide mobility plans, the cities can also develop smaller plans in the areas of the stations to ensure there will be an optimized housing-jobs balance that would allow an organized and planned growth but also will channel such growth into important/prioritized corridors (with high mobility demand).

6. **Maximization of non-motorized transport use**- Bicycle and walking facilities are the key to a successful station design and implementation. Efficient planning must take into consideration non-motorized transport modes and accommodate future increases in bicycle use and walking, improving facilities that incentivise users to arrive in such modes. In an urban context, best practices include considerations for covered parking facilities for personal bikes and spaces for microsociety vehicles, or other small non-motorized shared vehicles.

7. **Ancillary revenue streams** – Commercial development adjacent to railway stations has an important potential to generate ancillary revenues, complementing fare box revenues to cover for capital and operational investments. Some of the most utilized ancillary revenue streams include station naming rights, commercial rental of commercial spaces and advertising.

8. **Land value generation and value capture** – Improvements and increase in transport supply in general, bring benefits to society in terms of greater access to economic and social activities and increased mobility. These benefits make it desirable to acquire and increase the demand for land around railway stations. This increase in demand leads to significant price increases, which also presents an unprecedent opportunity to generate and capture these value increases. Capturing these value increases can also provide important resources to cover capital expenditure and operational costs of the stations. It is recommended that during this stage of the design process of the RB Stations, that such opportunities are identified, stakeholders are identified and that a communication channel is established to attract potential commercial and housing investors, planners, and architects. According to several examples in Europe and North America, it is estimated that commercial properties within 400 meters from a commuter mass transport station, increases value by more than 16 percent,

but that commercial property values can increase up to 150 percent in some cases.[17] During the final version of the inception report, the consulting team will provide more details on the specific vehicles utilized to generate and capture value, such as development-based or tax-based instruments.

9. **Legal and regulatory framework** – During the development process of railway stations, in particular international stations, it is important to review each country/city legal and regulatory frameworks to understand potential barriers for the implementation of gross value-added activities such as commercial and housing development, Land Value Capture schemes and the implementation of Public-Private Partnerships. For instance, some of the questions that could be encountered would include:

    - Does a PPP law exist in the country where the specific station will be developed?
    - What Governmental entity or entities could potentially engage in PPP could municipalities engage in PPPs or is it the National Government?
    - Is there any regulation that provides development incentives that could spur mixed land uses?

10. **Review of land use regulation** – For rail megaprojects, , it is important to have a clear understanding of land use regulation for sites immediately attached and surrounding the station. Some of the most important aspects of land use regulation include questions such as:

    - Is there height limitation per regulation to build high-density mixed land uses that can support such gross value added near stations? What are the steps to remove such barriers?
    - Are there any limitations on how developers can be incentivized to consider carrying out commercial or housing developments around the stations? Are changes in existing land use regulation needed? What are the time horizons expected for such regulations to be updated?

11. **International traveller needs** - Thus, international stations in the RB project should consider the needs of long-distance users of the RB rail line but also with the integration of other high-speed rail systems in Europe and Western Asia. For instance, some of the more important aspects regarding international travel include facilities such as short-and-long-term lockers and other facilities within the station such as lounges, the availability of lodging opportunities in or near stations and wayfinding to potentially support tourist and international travel activities.

12. **The 3Vs and 5Ds of railway station design** – A general good practice during the planning and design processes of rail project stations draw from the "3V" and "5D" approaches. The "3V" approach can be summarized by the identification of three essential values that are recommended to be included in the conceptualization of an urban rail station: node **V**alue, place **V**alue and market potential **V**alue. The "5D" approach refers to TOD typologies and

[17] The World Bank. Urban Rail Development Handbook. 2018

refer to the following aspects of conceptualizing an urban railway station: density, diversity, design, destination and distance to transit[18]

[18] The World Bank Urban Rail Development Handbook, 2018

5. Team and project communication

5.1. Project Team introduction

Ramboll has organized a holistic team of global and local experts to deliver the desired results. The project team led by Ramboll's multi-disciplinary project managers, includes the right prowess of urban planners, urban planning and mobility experts, economic and real estate analysts, as well as world-class architects who understand the challenges and needs of complex, multi-modal railway station facilities.

The expert team that has worked in this report and will continue working in the deliverables to come include:

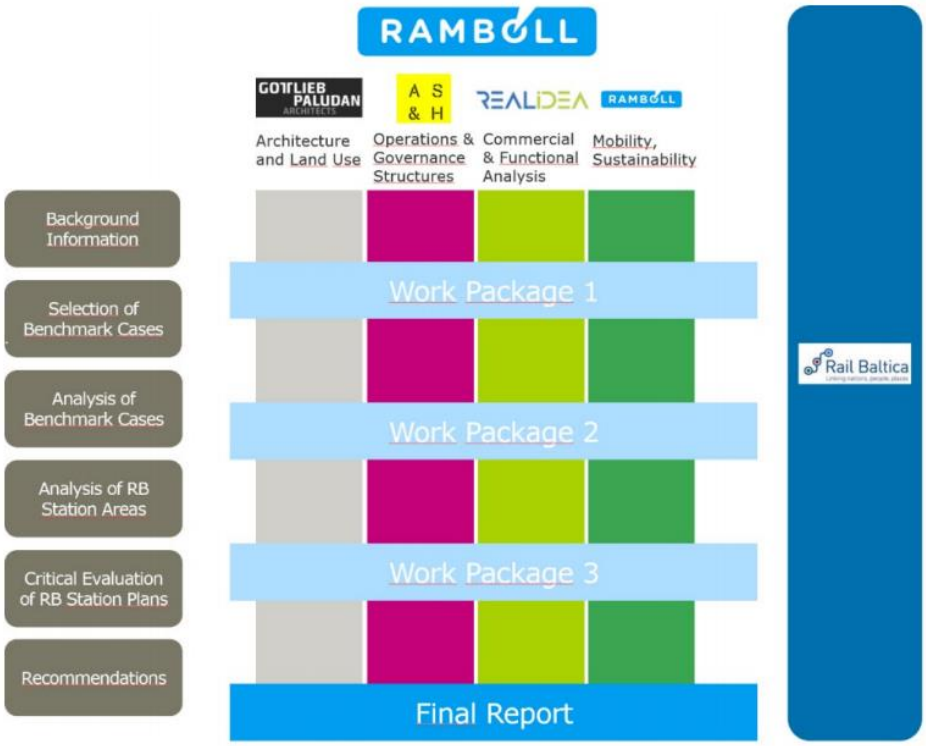


FIGURE 3 VISUALIZATION AND STRUCTURE OF THE FIRMS THAT CONFORM THE CONSULTING TEAM

LEADING CONSULTANT: Ramboll- the colleagues who have worked previously with the RB have been consulted and, where relevant, included in our team for this project. Within this project, Ramboll manage overall operations and provide expertise specifically in the field of multi-modal mobility. We have also tapped into our global network of railway infrastructure expertise to enrich the development of the benchmarking and best practices tasks. The Ramboll team has been leading a world-class team including the following organizations:

SUBCONSULTANTS:

Gottlieb Paludan Architects (GPA) will be responsible for railway station operation and railway station management parts of the work. GPA will contribute to this project with in-depth knowledge about the challenges and potentials that require address when designing large-scale mobility solutions.

Architects Soini & Horto Ltd - the company has built a reputation as a designer of complicated, mixed-use and historical building re-use projects. The Company is focused on creating value for its customers by designing buildings' maximum commercial potential and impressive architecture. The experts will provide technical service for developing commercial services and its connection and value added within the railway stations.

Realidea Ltd. will be responsible for the commercial development characteristics of each station. Realldea staff offer solid experience and proven success in development, analysis, including several railway station projects, international and domestic, relevant to the RB project.

Ardenis Consult is the project sub consultant providing local technical teams. The Company has successfully completed the RB assignment "Rail Baltica control-command and signalling (CCS) subsystems procurement and deployment strategy", also in the role of Ramboll's subconsultant. Technical support provided by Ardenis Consult in liaison with local authorities includes the organization of virtual workshops with RB Rail stakeholders and data collection, collection, in-depth interviews with local stakeholders, and analysis of interview results; support to Ramboll in the analysis of induced and catalytic economic impacts regarding the best industry practice of railway passenger stations; and, Elaboration of recommendations for the RB project (international passenger stations).

Furthermore, Table 4 below also lists the key experts that have been in charge of this report and that will be working in all future deliverables.

TABLE 4 RAIL BALTICA GVA MAXIMIZATION PROJECT TEAM

Tommi Eskelinen	Project Manager	Ramboll Finland, Espoo
Ian Sacs	Deputy Project Manager	Ramboll Finland, Espoo
Von Lopez-Levine	Multi-Modal Mobilty Expert	Ramboll Singapore
Sami Horto	Leading Architect	Architects Soini & Horto / Helsinki
Stefan Oschner	Architect	Architects Soini & Horto / Helsinki
Tine Kjærulff Bay	Leading Station Expert	Gottlieb Paludan Architects / Copenhagen
Peter Sim Sand	Station Planning Expert	Gottlieb Paludan Architects / Copenhagen
Markku Hietala	Leading commercial expert	Realidea / Helsinki
Mika Korhonen	Commercial expert	Realidea / Helsinki
Gatis Kristaps	Local Consultant	Ardenis / Riga
Saku Käsnänen	Transport Planner	Ramboll Finland, Espoo

Meanwhile administrative, as well as coordination measures will be undertaken by PM and backstopping staff.

5.2. Project collaborative tools and communication with the client

SharePoint:

The Consultant has set up a Ramboll SharePoint (Microsoft One Drive) website for the project. All communication within the team and internal processes, such as storage of collected/received project data related to the production of the project deliverables have been uploaded in this website. This process guarantees a truly collaborative environment and maximizes productivity and quality of the deliverables.

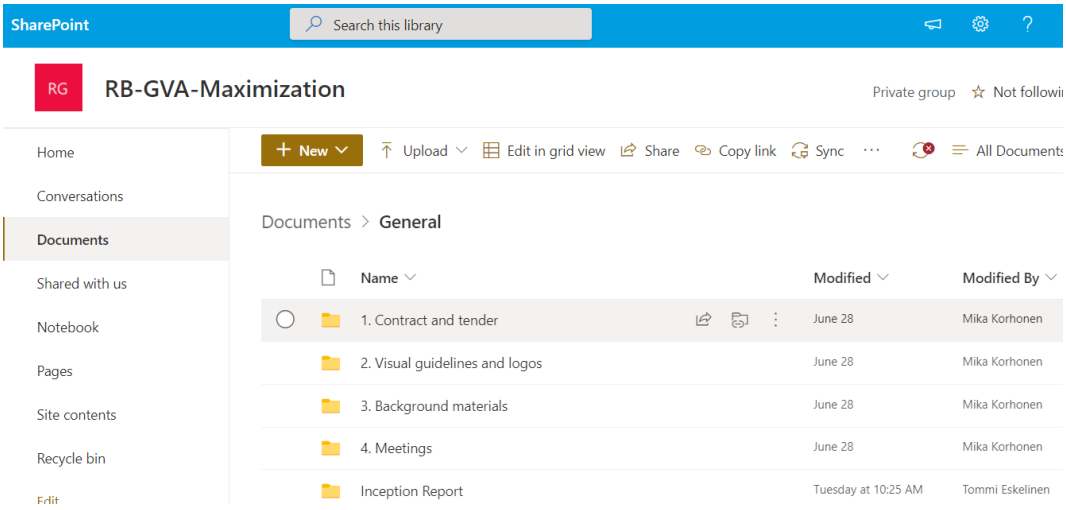


FIGURE 4: PROJECT ONLINE WORKSITE

Share of documents with the Rail Baltica Team:

In order to give a full access to the ongoing progress of the project the Consultant has given access to the RB team to the SharePoint, in order to improve data collection and feedback for the deliverables. In case of any issues, as an alternative option could be proposed- Microsoft one drive, we will sort out an alternative to enable the client to enable data to be accessed. The SharePoint solution will be available at least for the duration of the project and during successive. All data will be hosted on the server owned and administered by the Contractor. This approach speeds up project work und provides the following advantages:

- one or more separated team folders for exchange with Client, technical working group and other stakeholder as required;
- separate internal team folders for internal data exchange ensure that all members of the project team have access to required data regardless of their location (e. g. Germany, Denmark, Latvia);
- high level of data security and availability (servers are constantly monitored, daily backup is ensured, dedicated administrators and quick support);
- possibility of collaborative work on reports to speed up project execution, if necessary, involvement of the Client (comment, review);

During inception phase it is ensured that the necessary team members can access the SharePoint to provide data and to follow project documentation (reports, MoM and presentations of stakeholder and WG meetings). Supporting communication between the Client and the Contractor is ensured by telephone and e-mail.

6. Risks and quality management

6.1. Assumption and risk management

To ensure a smooth implementation of the project, the Consultant verified at this stage possible upcoming risks and aligned them with assumptions. Below is a compiled list of the main and necessary project assumptions as identified by the Consultant in the offer and comments made based on the initial findings.

- **Local data availability:**
  - Close monitoring on the missing data with the RB;
- **On-site visits and holding required project meetings:**
  - Due to the COVID-19 situation it will be difficult to organise side- visits of our team and travel to the project country. However, we check periodically the official updates and communications from the RB Health and Safety manager to learn if it is possible for our experts will meet the Client and relevant stakeholders;
  - We are going to enable local support in order of getting the missing data;
  - Moreover, the Consultant will keep updated the RB against upcoming issues which need to be discussed at an early stage;
- **Risks associated with the work plan and project execution:**
  - The collection of documents and existing data is ongoing, and some data has already been received and is being partly reviewed;
- **Alignment of expectations:**
  - At the start of each task there will be a need to match the expectations concerning content and level of detail according to the allocated financial resources for the tasks as well as the quality of available data – or put in a slightly different way to develop an operational baseline that can be used for monitoring the impact of the work to be done". This step should always be directly discussed and agreed with the Client;

7. Workplan and actions required

7.1. Project timeline

The timeline, general project duration and delivery schedule of the study did not change since the Contract of the current Assignment was signed. The delivery timeline was confirmed by the RB team. Status of ongoing work will be assessed during progress meetings in closed cooperation with the Client, and possibly stakeholders.

The total duration of the project remains 20 weeks with additional 4 weeks of reworking last comments received from the Client.

7.2. Project Execution Plan and Progress Reporting

The final deliverables and submission deadlines were not changed since the Contract was signed, and they remain as per the table below:

Report	Content	Deadline	Final submission
Inception Report	Project management: overview of work held during the inception; full scope of WP 1	AO*+4 weeks	AO*+6 weeks
First interim report	Full scope of WP 2, Table of contents Second interim Report	AO+8 week	AO+11 week
Second interim report	Full scope of WP 3. Table of contents Final Report	AO+16 weeks	AO+19 weeks
Final report	Adjusted and finalised Draft Final Report (Note: Maximum 2 review/edit cycles)	AO+20 weeks	AO+24 weeks

TABLE 5: PROJECT DELIVERABLES TIMELINE

7.3. Key Follow-up Actions

The Consultant set a working framework between all team members. We are planning to continue implementing the project establishing the next critical meetings:

- All outstanding missing data will be pursued with the relevant stakeholders, as data collection continues;
- Establish a meeting with the RB team and relevant stakeholders to pursue data collection needs;
- Preparing a plan for required and missing data to be obtained from relevant stakeholders;
- Develop a Stakeholders list (their engagement) and a short action plan (to be submitted together within the first interim report) with a support from the RB team and identifying the next steps;
- Provide a plan for interviews with local stakeholders and potential ways of organising and holding workshops to be previously discussed/ agreed with the Client;

- Establish a meeting with the Client in order to finalize the benchmarking cases and shortlisting criteria's;
- Continue to liaise with the Client on project progress and any issues that arise;

Moreover, the Consultant team is continuing to develop benchmarking studies as per WP 2.

8. List of Annexes

8.1. Annex I – List of criteria for selection of long list of stations

Currently we have developed the factsheets with critical data listed below. This is a general list that includes KPIs and other descriptive technical data. The consulting team will further refine and finalize this list with the guidance of the Client.

1. **Basic station information:**
    - Official station name;
    - Location of a station;
    - Opening date and Construction period (if any);
    - Information on architects- designers of a railway station;
    - Building context (historical, green field, sustainable building or modern);
    - Size of a station- general size of area allocated for railway operation and the area for commercial activities;
2. **Population and passenger specific information:**
    - City population;
    - Daily passenger volume per day or per year (depends on the latest available data);
3. **Characteristic and function of a railway station:**
    - Type of railway services provided – mainly passenger, freight or mixed;
    - Multimodal integration – including urban integration with various transport modes, including new sharing mobility offers;
    - Availability of additional facility- this could include information on availability of mobility hubs, P+R-, B+R Stations, parking slots, Kiss and Ride stations, dedicated Taxi slots, etc.;
4. **Multimodality and urban integration of a railway station** – this could include availability and connection to different urban transport modes, as well as regional and international long – distance connections (both by buses and trains).
5. **Additional:**
    - Accessibility of a railway station – description of number of entrances, escalators, elevators, as well as connection between platforms (direct or with additional log- in access);

- Description of attached commercial services- activities (at a railway station area and in surroundings) – here could be shopping centres, food stores and restaurants, hotels, resting and waiting rooms (private), play yards, etc.;

Additionally, we would like to suggest the Client to discuss other potential quantitative and qualitative criteria's which might be interesting to screen during the development of the final list of KPIs.

1. Passenger data:
    - Cross- border demand- information on traveling number of tourists which at least one time cross the border;
2. Characteristics and functionality of a railway station:
    - Number of platforms;
    - Additional service at platforms (information & ticketing, security);
    - Additional railway sale service available (incl. traveling centers);
    - Train destinations and connections;
    - Train operators;
3. Railway station accessibility:
    - Walking time from PT stations/ Regional bus stations (A type - high accessibility (until 5 min.), B type- medium (8 min.to walk), low – more than 10 min. to walk);
    - Platform's access (limited by A-free, B- valid ticket, C- open for dedicated trains/long distance);
    - Tracks & Platforms levels (organisation of regional and long- trains distances);
    - Walking time between platforms;
    - Barrier-free solutions;
4. Safety & Security:
    - SSTV Security;
    - Number of accidents;
5. "Trends & progress":
    - Gender & Diversity planning – design;
    - Digital innovations;
    - Check in & Check out (regional and long- distance trains);
    - Smart locks;
    - Package & Storage service;
    - Sharing offices/ Coworking spaces;

6. Additional environmental criteria's:
    - Urban green projects including parks or walking areas for passengers;
    - Number of jobs accessible within 30-60 min commute – increases strength and vibrancy of a city;
    - commercial vs. transport extension of the station;
    - Time spent in station;
    - Station - Place making attributes;
    - Bus-rail integration attributes;
    - Fare integration policy;

Rail Baltica

Maximization of Gross Value Added for Rail Baltica International Passenger Stations

First Interim Report
WP 2: International best practice benchmarking

15.09.2021

Co-financed by the Connecting Europe Facility of the European Union

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List of abbreviations

Abbreviation	Explanation
CBD	Central Business District
EU	European Union
GVA	Gross Value Added
KPI	Key Performance Indicators
LVC	Land Value Capture
PT	Public transport
PRM	Passengers with Reduced Mobility
PPP	Private Public Partnership
RB	Rail Baltica
TOD	Transit-Oriented Development
WP	Work package

1. Introduction

1.1 Purpose of the first interim report

Large scale rail development projects do not only deliver the transportation and mobility value based on the services they provide. These mega projects have proven to also shape the urban landscape around their stations, delivering substantial economic, social and environmental benefits at scales that go beyond local, regional and even national borders. Developing new region-wide rail lines pose development opportunities that go beyond transporting passengers from point A to point B, they are opportunities to employ thousands of local employees, consolidate commercial activity around the stations and spur sustainable urban development.

Based on these opportunities for the Rail Baltica HSR project to generate tremendous amounts of value that will ripple through entire communities and regions in the Baltic Nations, it is important to understand the most influential aspects of rail design and implementation, through the lens of international best practices. Learning from such influential and refence cases, will provide the Rail Baltica teams as well as their local stakeholders with a solid understanding of the design, implementation and operational characteristics that have been implemented successfully in countries around the world and the benefits to society that these have spurred as a consequence.

The purpose of the first interim report is to build on the materials developed during the inception report to develop a benchmarking exercise that will inform the Rail Baltica project on the potential to generate value inside, around and beyond the international stations of the Rail Baltica railway. The goal of this report is to inform on the economic, commercial and urban development opportunities that could be guided through such investment. During this process, the Consultant, together with the Client have developed hours of brainstorming and guiding conversations in relation to rail infrastructure and operations that include space usage and optimization, retail development, illumination maximization, interaction of users with the internal and surrounding space and other important aspects of design and usage of the station.

What is benchmarking? Benchmarking is a practice used to compare performance between two or more entities or process. The benchmarking process is also used to identify "the best of" in a given field. In this sense, it marks the best case or best practice in a specific field or action. In this case, the benchmarking analysis will help the Rail Baltica team highlight what are the best international stations based on specific categories. In this report, the Consultant has identified the stations that will be used as benchmarks and these would be very useful for the Consulting team to provide design, policy and related recommendations in the development of the Rail Baltica stations.

The benchmarking methodology presented in this project was carried out by a highly experienced team of rail experts, architects and urban mobility planners and was enriched during several meetings and brainstorming sessions between the Client and the Rail Baltica team. Furthermore, this process was also informed by the development of an online workshop where a number of Rail Baltica Railway stakeholders provided their inputs.

Accordingly, the benchmarking analysis developed was informed by the interactions previously described and guided by the following four critical categories:

- Architecture review of the benchmarking case;
- Land- use opportunities, service allocation;
- Internal station space usage and commercial opportunities;
- Station functionality within its urban and operational context;
- Station integration with urban transportation and reginal mobility;

This report summarizes an intensive benchmarking research process, and highlights the lessons learned that were extracted from international best practices, including key recommendations to be considered in order to maximize Gross Value Added (GVA) for the international railway passenger stations. It is important to mention that this benchmarking exercise is not just a research exercise that will end with the finalization of this report, in fact, it is a detail process that is currently evolving and will continue to evolve as more information becomes available regarding the Rail Baltica International Station design documentation. The culmination of this exercise will come once our team of experts is able to review all information available to each of the international stations and provides design, policy and operational recommendations during the development of WP3, which, the Consultant hopes it can influence the design and development of some of the international Rail Baltica stations in order to be able to maximize the regional and international value generation and positively impact the lives of people in this region.

1.2 Our approach to create and deliver valuable benchmarking

Originally, the idea of developing a benchmarking exercise comprised of selecting only a few railway stations and providing a detailed assessment of each station against specific categories. However, based on a very interactive process between the Client and the Consultant after the culmination of the inception report, it was evident that a more focused methodology would add much more value to the benchmarking process. The outcome of this methodology development was very positive, and all parties believe that it would be most effective to focus the best practices to be applied to the RB station development. Therefore, within the current report and based on the WP1 outcomes, the consulting team analysed a long list of 24 stations, highlighting the most influential and comparable assessment for generation and maximization of GVA in railway stations. The process of benchmarking had in mind the potential suitably and comparability of facilities to the RB passenger railway stations.

1.3 Key summary of the report

The report is divided into the two parts: 1) main context of the WP 2 outcomes, and 2) a project implementation and progress status description.

1 *Under the chapter 2* the Consultant described main benchmarking assessment outcomes, and description of identified lessons learned, which will be valuable during the critical analysis of the RB international railway passenger stations (WP3). The main focus of the benchmarking (WP2) was to extensively analyse the long list of benchmarking stations, extract best practices that may be the most useful for comparing RB international stations, while keeping these in mind to utilize them possibly further at a later stage. For this report, six categories were

utilized to distil best practices. From these categories, (architecture, land- use, commercial activities, functionality and operation, mobility and urban integration), the Consultant identified one station to be the best practice and lessons learned from the benchmarking station.

2 *Under the chapter 3* of this report, the Consultant describes the current project implementation status, where almost 50% of the project work has been delivered. Moreover, the consultant highlights that data availability is still identified as an existing issue. The Consultant proposes to contact specific stakeholders to try to obtain station-specific urban mobility and development plans. The Consultant is continuing to develop their data availability assessment and critical analysis based on the obtained materials, online researched and feedbacks from project stakeholders based on the initial workshop. The consultant has also developed a detailed plan to reach out to specific stakeholders to try to obtain the data needed.

2. Interim report main contents

The main content of this report comprise of a systematic approach to construct an assessment that will result in a high-quality deliverable of the requested WP 2. The approach that the Consultant chose for the development of this deliverable aims to provide an effective discussion of international best practices in a way that is effective for the purposes of this project, always caring to provide the highest quality and covering the needs of the Client. Furthermore, WP2 was constructed with the following aspects in mind:

1) Report created based on fully understanding the impacts related to modern railway passenger stations presented in WP1;

2) Carefully calibrating needs and expectation levels on the deliverables between the Consultant team and the Client. Regularly aligning on the construction of a methodology that would be most suitable for benchmarking Rail Baltica International stations and arrive at a consensus on the most important aspects of delivering lessons learned and policy recommendations.

3) Effectively incorporating discussions with project stakeholders, received during the first workshop and related to the current state of development of the station sites and the needs around project RB international stations. This helped the Consultant team to generally understand:

- Concerns and needs to be improved for the RB international railway stations;
- Existing urban traffic structure at railway stations;
- Existing development plans at or near the railway station with its possible impact;
- Existing ideas for transformative urban changes in surrounding areas;
- Existing plans to integrate railway stations into urban life and promote its usage as a sustainable transportation, etc.;

Based on the above-mentioned inputs and considerations, the Consultant methodological framework for delivering the WP 2 were structured as presented in Figure 1 below.

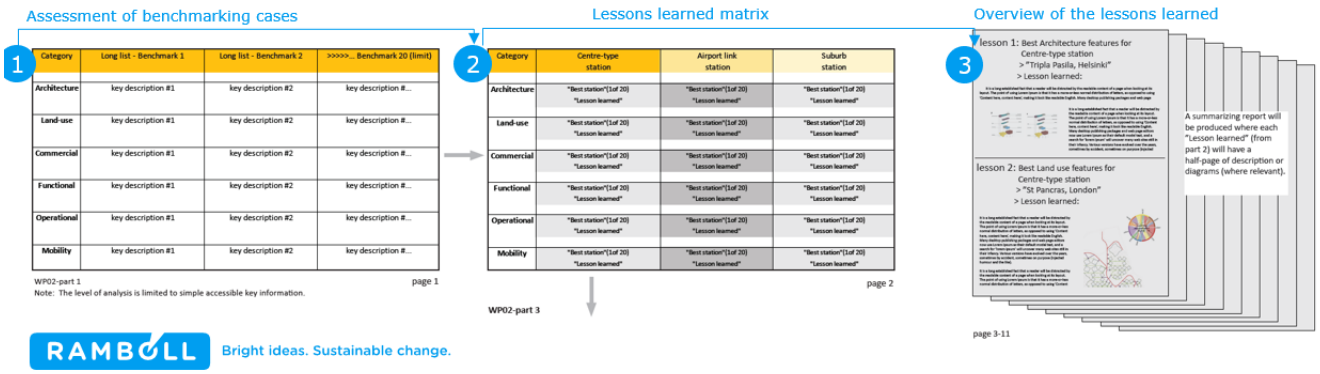


FIGURE 1 STRUCTURAL APPROACH TO DELIVER THE BENCHMARKING (SOURCE: AUTHORS)

As Figure 1 shows, the Consulting team developed an assessment of 24 stations, selected a group of stations that had the most potential to (i) add value and (ii) be comparable to the 7 international Stations of the Rail Baltica railway and then the Consultant carefully selected and analysed, based on Ramboll's rail expertise, the team developed a lessons learned matrix to then prepare individual overviews of each lesson learned to be utilized during the next deliverable - WP 3.

All activities under the WP 2 are based on specification and requirements for the study and the reflection of the work performed per Client requirements.

2.1 WP 2: International best practice benchmarking

2.1.1. Introduction

During the inception report the long list of the chosen best international benchmarking passenger railway stations was developed and submitted to the RB team. At the beginning of the interim report stage, the proposed final list of international best practices were accepted by the Rail Baltica.

The benchmarking list presents 24 best cases which were reviewed by the Consultant in detail, providing an overview of railway station operation, existing connections, and its integration with urban, as well as commercial and social developments. The Consultant also reviewed architectural and innovative solutions applied during station design and construction. Each of 24 cases were analysed against lessons learned, which are presented within **Error! Reference source not found.** part of this report.

The review of international railway stations was carried out based on existing data, drawings, plans and photos of the station and the surrounding areas. Our team focused on communicating the assessments of the chosen stations in a schematic and simple way in order to ensure clear comparability. The conclusions of the benchmarking review will form the point of departure for the following analysis of the Rail Baltica railway stations. In order to provide the Client with a concise but rich summary of the lessons learned from each of the selected stations, the Consultant prepared the following summary matrix that highlights the best practice findings:

ID	Benchmark stations	Population data [1]	Number of pax/ per day[2]	Station Design	Best Practice Reference
1	**Leipzig Central Railway Station (DE)**	597 000	120 000	Historical	• Seamless multimodal integration; • High-density commercial and housing mixed uses;
2	**Liége- Guillemins Railway Station (BE)**	197 000	15 000	Modern reconstruction on historical site	• International connections; • Facilities for international travellers (hotels next to station);
3	**Amsterdam Central Station (NL)**	1 558 000	192 000	Historical	• Multimodal integration; • Good example of TOD development;
4	**Utrecht Central Station (NL)**	550 000	195 000	Modern reconstruction on historical site	• Multimodal integration, with important focus on NMT; • Seamless integration with urban space; • Good practice in TOD development;
5	**Berlin Central Station (DE)**	3 769 000	350 000	Modern/ incl. Green fields	• Multimodal integration; • International railway connections; • Important mixed land uses: commercial activities incl. shared offices and private logistic services (DHL Smart Locks) concepts;
6	**Frankfurt (Main) Hauptbahnhof (DE)**	764 000	493 000	Historical	• Good-Practice in European intermodal (hub function) with a direct high- speed railway connections; • Important connectivity from airport to other cities in Germany and neighbouring countries; • Intermodal travel concepts integrating air, rail and road transportation;
7	**Vienna Main Station (AUT)**	1 911 000	268 000	Historical	• Good practice as a major hub for European railways, both passenger and freight- TEN-T corridors 7, 22;

[1] Source: Wikipedia – Sources will continue to be revised during the first interim report
[2] Source: Wikipedia - Sources will continue to be revised during the first interim report

ID	Benchmark stations	Population data [1]	Number of pax/ per day[2]	Station Design	Best Practice Reference
					• Ample mixed land uses: housing, public space, educational facilities and commercial.;
8	Copenhagen Central Station (DEN) [G]	794 000	103 000	Historical	• High speed rail connections in Öresund region (regional and international); • Mix-land uses in central area; • Intermodal connectivity; • Best practice in regional economic integration
9	Helsinki Central Railway Station (FIN) [S]	656 000	200 000	Historical	• Best practice in multi-modal integration; • Important mixed land uses including over 37 000 m2 of commercial space (restaurant, office, hotel); • Urban integration with mobility facilities and services in a radius of 200- 300 m; • Good example of repurposing a transportation only facility to cover important land uses;
10	Pasila Railway Station (Tripla), Helsinki (FIN) [S3]	656 000	65 000	Modern	• Best practice in effectively developing mixed land uses, with an important focus on high population and commercial density; • One of the most successful examples of intermodal facilities that include bus, metro, tram and NMT connectivity; • Seamless integration of urban and public space with the station and commercial area; • New developing urban area with extra high accessibility design (also for people with reduced mobility), offering a largest shopping area/centre (Tripla) in the Nordic countries;
11	St. Pancras International, London (UK)	8 961 000	99 000	Historical	• Best practice in inclusion of development of the station with large urban development plan (Kings Cross); • The station locates in one of the central parts of London and surrounded by business facilities, hotels and restaurants; • The planning of railway service is integrated with urban transportation, especially with underground connections (more than any other London station) though constructed tunnels;
12	Copenhagen Airport Station (DEN)	794 000	22 000	Modern	• Important and growing mobility hub, that connects international airport to the rest of the country and southern Sweden; • Best practice on connectivity of Airport main terminals with the rail waiting area through direct escalators; • Best practice in regional economic integration
13	Malmö Central Station (SWE)	348 000	33 000	Historical	• Central transportation hub in Malmö. The design of supporting commercial services was planned to attract not only tourists, but business travellers/ residents offering some retail, supermarkets and restaurants; • International connectivity with Kastrup (airport) Station in Copenhagen;
14	Oslo Airport Station (NOR)	697 000	n.a	Modern	• Regional and local train connection to Oslo airport; • Mixed land uses that include car rental, hotel and other commercial opportunities;
15	Aarhus Central Station (DEN)[G]	300 000	17 000	Historical	• The station is a part of an urban quarter that integrates new pedestrian and bicycle connections to the newly transformed waterfront;

[3] https://ramboll.com/media/rgr/tripla

ID	Benchmark stations	Population data [1]	Number of pax/ per day[2]	Station Design	Best Practice Reference
					• Offers a major expansion of the shopping mall Bruun's Gallery;
16	Amsterdam Amstel Station (NL) [G]	1 558 000	50 000	Modern	• intermodal good practice that connects trains, trams, buses, and bikes; • The surrounding area is being developed with new public spaces, shopping facilities, housing, and offices; • The development also considers better routes for different modes of transportation and new bicycle parking facilities;
17	Rotterdam Central (NL)	1 273 000	110 000	Modern reconstruction at a historical city site	• Full and complex rebuilding of the old station providing fast access to trains, buses, the subway, light rail, taxis and bicycle infrastructures, which come together to serve Rotterdam and other parts of The Hague metropolitan region; • The concept of the station also shows a best practice of 15 min. walk to urban centres. The redevelopment project has a strong impact into the Long-Term Value of Temporary Urbanism;
18	Nørreport station (NL) [G]	794 000	50 000	Modern reconstruction at a historical city site	• The main objective to design the station was to take the practical requirement for bicycle parking to another level and provide convenient and accessible parking for 2,100 bicycles; • Another objective was to enhance the surroundings and to build modern premises to serve increasing numbers of passengers. Nowadays the railway station is located at the most central parts and provide a quick and safe pedestrian access to urban busiest and historical locations;
19	Beijing West Railway Station (CN)	21.54 million	400 000[4]	Modern	• Highly- modernized high speed train station with a best experience of developed connection to railway network through the whole country;
20	Zaragoza-Delicias Railway Station	681 000	11 000	Modern	• Intermodal hub, built during the Expo 2003; • It connects Barcelona and Madrid but has also connection to Bilbao and France. The station facilitates hotel, department store, business center, and restaurants. The station connects new urban area to the old city of Zaragoza; • Good practice of regional and international connectivity and economic integration
21	Naples-Afragola station	63 000	10 000	Modern	• Naples-Afragola Station is a major intersection that connects the southern Italy high speed rails to northern Italy and the rest of Europe. The station is located 12km from Naples; • Intermodal hub that is designed relieving the congestion from the city centre;
22	Bordeaux Saint-Jean	927 445	48 500	Historical	• Bordeaux Saint-Jean is the city's main station, that was renovated and upgraded in 2017. The station area is ongoing changes due the new master plan of the city. Bordeaux aims to be a metropolitan region in southern France and is planned to have many new high-speed lines, including Eurostar connection from London;
23	Canary Wharf Railway Station	8 961 000	69,759	Modern reconstruction at a historical city site	• Good mix of land uses: housing and commercial, good connectivity between; • Key business district to the City of London, the West End and Heathrow Airport.

4https://en.wikipedia.org/wiki/Beijing_West_railway_station

ID	Benchmark stations	Population data [1]	Number of pax/ per day[2]	Station Design	Best Practice Reference
					• Stitches several neighbourhoods forming a bridge between two communities - Canary Wharf Estate and Poplar to the north;
24	**Køge Nord**	38 155	90 000	Modern	• It sits in the outskirts of Køge, part of a major off-centre switch and the implementation of a new High-Speed line between Denmark and Germany; • The station bridges over the two sides of the motorway and tracks allowing passengers to easily interchange and stay while facilitating the access to the commercial district of the city.

TABLE 1 BEST INTERNATIONAL RAILWAY STATIONS

2.1.2. Assessment of the benchmarking cases

In order to identify the best practices and having in mind their comparability and suitability to the Rail Baltica railway stations, the Consultant team reviewed in detail each of twenty-four international Benchmarks against five categories, which would have a strong impact on maximalisation of the GVA.

- **Architecture and land use**- under this category, important elements such as station design and its architectural functionality were reviewed. Moreover, the architectural assessment covered a 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 maximizing practices. These aspects include elements under the category of: urban structure, real estate markets, land-use efficiency and agglomeration benefits, railway station commercial content and functionality.
- **Operational**- Under this category the team has reviewed available online information and expert own knowledge on stations operations and management, the detailed overview was done for chosen lessons learned including how the operation was structured in cooperation with different public and private stakeholders as well as financing. Such analysis was done to show that functional value can be increased through specialised planning, with a particular focus on understanding the railway station operation. This information is presented under section **Error! Reference source not found.** of this report.;
- **Mobility**- under this sub-task of the benchmarking exercise analyses physical connectivity between railway stations and other public transportation such as metro/light rail, bus services. Furthermore, the analysis also reviews railway station accessibility by other modes of transport, including pedestrian connections and facilities, bicycle infrastructure and parking, automobile (availability of Park & Ride, Electric Vehicle (EV) charging infrastructure and car sharing facilities, availability of taxi services and relevant arrangements.

The **Error! Reference source not found.** below presents a detailed summary of the benchmarking exercise for twenty-four international passenger railway stations described against five categories as above:

	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 railline and thus have a different role.
Commercial	Type 4 commercial concept: Comprehensive commercial service with connected shopping centre Bruun'a 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 crutial 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, shoppping streets and parks nearby (less than 100 m). The geographic location connects two parts (districts) of the city.	Highly functional, efficiently organized, multi-modal 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/Humboldthafen with Berlin Moabit. Efficiently densly packed & stacked room program and logistic service. Well thought-out routing system creates sesy wayfinding thru architectural Leitmotif: "short distances and daylight". Crossing point of existing east/west and new north/south train line, Europes 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 espacially 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 distrance trains and buses are well operated, espacially 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 subterrain level. Today weak attractivity of subterrain level - redevelopement 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 dony 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 plattforms.	The station is connected with the city though 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 busses stations. This railway station allocates almost the biggest bicycle parking station with 7000 spots. The are special direct access from bicycle highways or plattforms 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 highlated in the application. The desing 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 and 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 subterrain 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, entrance to Eurostararture lounge. 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 ae well integrated into yrban fabric thru undergound passages and direct vicintiy 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 sucessful wayfinding thru visually connected transportation and commercial functions. The station works both as a destination and travel link. Its spacial, 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 ghesture of the large welcoming canopy carrythe 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 unic signle station. Moreover, there are some of international railway destinations to: Lodon, 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 transformated industrial wasteland attracts city inhabitance 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 ony 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, commerical developments, etc.). This railway station is the largest passenger railway station in Netherlandes.
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, Oresundtrain 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 managemetn 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 öresundtrain 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 espacially with metro, tram and bus networks. Being a mobility hub, the station offers facilities for private bicycles (5000 parking slots withing the parking hous, 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 developmen 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 espacially to passengers who travels 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 und 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 (GB)
						
Architecture	The newly constructed Vienna Station(area of former Südbhf) 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"
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 fullfill 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 foor 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 distinations 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 accessability 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 facilies. 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 crutial role in providing daily commuter services to residentials. 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. It's massive building accomodates 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 compelx 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, espacially with bicycle infrastructure network.	Only typical public transport modes connections: metro, buses and commuter rail. The area in front of the station is purly 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 consits 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 conencts 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 utilixing its potential as a mixed urban environment.
Commercial	Type 1 commercial concept: small kiosks, ticket selling mashines and bicykle 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 differernt 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	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, bycicle parking and an enhanced commercial opportunity for the area. 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.	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. Sucessful multimodal hub with built in metrostation (to be connected in future) 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 walkpaths to the adjacent city districts of Länsi-Pasila and Itä-Pasila. The station allows for large future development due to excellent sustainable commute possibilities.	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. 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 cental 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.	Connects two under-developed city districts with alomst seamless interaction thru open ans 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. The station connects two city parts together and is due 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.	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 congetion in inner Naples. The station plays an important role of major regional hub connecting railway passengers from north to sought 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 Cancello 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 buidling this hub was to support the economic development in the south of Italy.	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. 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.
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 Faciliies, as well as private bicycle stations. Aroung 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 conenctions 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 hug 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 estensive regional connections as well. The bus service connects also, and it has a series of public spaces for pedestrian and bicycle connectivity.

2.1.3. Categorisation of lessons learned and their summary

2.1.3.1. Criteria 1 – Architecture. Urban & social placemaking

Since the railway and its supplementary structures arrived in the city in the 19th century, it has been influencing the urban fabric and its usage. Since then, both city spaces and railway stations underwent major evolution and adjusted their building typologies. The relation between the station and the inner-city fabric has been increasingly emerged to a more and more complex and multi-functional approach. In many cases the earlier physical, functional and social conflicts that derived from the arrival of the railway have been solved through the integration of transport and urban development policies. In many cities, urban regeneration is directly related to redevelopments of railway station areas. The station of the new era often requires a constant redefinition and reshaping of the building and its interaction with the surrounding environment to satisfy the needs of society and utilizing technology to optimize its use and aesthetics. Currently the concept of "transport nodes" and "places/destinations" in the city are suggested[5]. The chosen stations for the benchmarking exercise and extraction of lesson learned are characterized through outstanding urban collaboration between station and city fabric.

Summarised benefits of reviewed railway stations:

- The station as an interlocked member of the city;
- The station as an open and active urban space that encourages developments right up to the entrance door and removes thresholds for diverse usage;
- Both station and adjacent city context must accept a continuous synchronisation and agile adaptation in-between each other;
- Attached public areas such as green spaces add value to both station and the services it provides;
- Especially peripheral hub locations develop urban micro-institutions for broader functionality and social placemaking;

2.1.3.2. Criteria 2 - Land-use

Railway station areas have been developed, densified and unified with other city parts all over Europe during the last few centuries. 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 realisation of important GVA and city attractiveness potential in these areas. The TOD approach in urban planning suggest multicentred city structure with sub-centers that include most of what people need in their daily lives, and accessible easily within 15 minutes by walking or biking.

Land use should enable critical mass and needed intensity especially in terms of housing, commercial services and workplaces in order to form attractive entity for both citizens and investors. Immediate surroundings of the stations and directions to the busiest pedestrian zones gather the highest pedestrian volumes, making them optimal locations for

[5] Source: City's station to station city - An integrative spatial approach to the (re)development of station areas, Ana Luísa Martins da Conceição ,Delft University of Technology, Faculty of Architecture and the Built Environment, Department of Architecture

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 the potential.

Summarised benefits of reviewed railway stations:

- The surroundings of a mobility hub have naturally relatively high land value, and these have been utilized by high volumes of mixed development in order to maximise GVA;
- Diversifying land uses around stations present an opportunity not only to generate value through the increase in land prices and increase desire to live, work and shop in the area, the opportunity also arises for public entities and rail project owners to potentially capture such value through:
    - Land value increase tax assessments
    - Developer-paid infrastructure development (new/improved sidewalks or bike infrastructure);
- Land-use mixing enables faster completion of the area development as market take-up requirement for single real estate market sector decreases;
- Retail has an important potential in immediate proximity of the station which should be utilized by positioning on the busiest natural pedestrian routes;
- Allocating railway platforms and tracks requires land availability, as well as in some cases it could divide city districts blocking its connections/ integrations. Following the benchmarking exercise, in many cases, in order to a better use the available land, railway platforms, especially for regional and national services, could be placed underground, when feasible;
- Low-value land uses have their role in urban structure, but these should be developed in sensible and efficient way to enable the best possible GVA;

2.1.3.3. Criteria 3 – Commercial use

Railway stations can differ significantly from each other by commercial concept and service structure. Each station includes basic services such as ticket sales, kiosk and cafes, but in a feasible market environment even shopping mall concepts can be successful implemented, and result in an increase of the station's role to a significant retail hot spot (see typology below). Central location next to the busy railway station, other public transportation and natural pedestrian flows will create a possibility for new major retail and other commercial development. In particular, railway stations close to the city centre and in developing sub-centres have such a transformative potential. Railway stations themselves, have mostly small-scale retail and other services for the passing passengers. More diverse range of retail services can be combined with adjacent shopping centre with 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. Based on information from this benchmarking exercise, the Consulting team concludes that in general, Railway stations next to the airports are usually only extensions to the terminal building and often 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 and related activities.
- TYPE 2 Diverse basic services; typically includes minimal basic services with added grocery and related activities.
- TYPE 3 Minor retail centre width; typically includes basic services with added singular special retail and minor destination role
- TYPE 4 Shopping mall width; typically includes clustered special retail with clear destination role

Summarised benefits of reviewed railway stations:

- Railway passengers create natural customer base for convenience stores, restaurants and other take-away services;
- Great accessibility and central location in the city can expand 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 expand the busiest retail areas and strengthen the service structure of the whole city centre.
- Areas attached to railway station can be used as a location for allocating regional shopping centres complemented by offices, hotels, and apartments. In this case a greater attention should be paid to city development plans and existing competitive situation;

2.1.3.4. Criteria 4- Functionality

The evolution of the railway has shown that the railway station has an important impact on, and it becomes part of the city fabric. Although stations and other transport infrastructure have mostly been thought to have a single functionality, throughout history it has become more evident that a railway station is functional in so many aspects. Furthermore, this is also true for the space and activities that happen inside the station building itself. The metamorphosis focuses clearly on combining transport services with retail and public spaces. The common benefits that connect those functions are clearly seen in their central location, architectural significance, long opening times, crossing customer streams. The modern railway multifunctional building typology carries important social responsibility and acts, at the same time, as a public living room. Stations are no longer formatted for one specific customer group, it is enabled for travellers, shoppers, by-passers, residents. Today, everybody meets under the common umbrella of the station roof.

New spatial concepts (physical and functional) must optimize the balance between "Traffic Node" and "Meeting Place". This spatial adaptation from a classical terminus 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.

Summarised benefits of reviewed railway stations:

- 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;

2.1.3.5. Criteria 4- Station operation

The railway passenger service has 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 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 station itself is quite a complex management approach which includes not only general management, but also rail operation & its operational integration with other rail and urban transport services, sales and commercial management, stakeholder cooperation & management, financing station development or improvements, facility management and life- cycle asset management, among others.

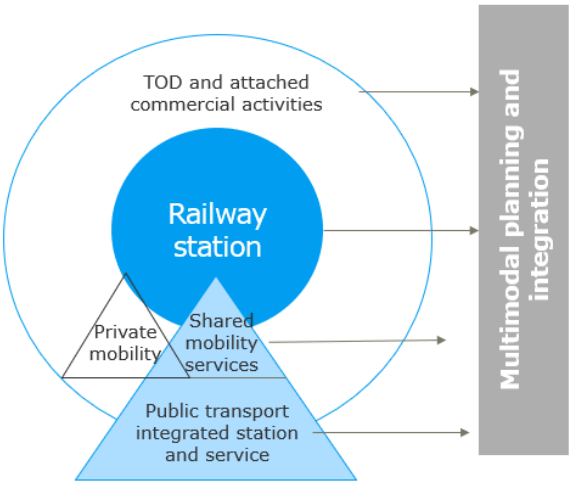
Summarised benefits of reviewed railway stations:

- Railway stations are often operated by the same company that provides railway services. Such arrangement provides benefits in terms of providing a holistic railway service organisation, 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..
- Structure station management and service based on the level of traffic, buildings and facilities in place;
- Developing optimisations based on the local station analysis a space utilisation and leasing concepts;
- Developing mobility services based on the customer satisfaction;

2.1.3.6. Criteria 5 – Mobility

This category has been developed borrowing on the benefits identified under the TOD ecosystem and provide urban mobility complementary support to reorganise the traditional railway service and station operation into a modern hub. This approach also aims to include mobility integration and access to national, regional, and international passenger railway destinations. Moreover, a modern hub in this case bear different categories depending on its size (large, medium and small) and role within the urban area (central, transfer, urban and suburban transportation complementary etc.).

Figure 2 Below presents a structural overview of planning a multimodal service at a railway station, integrating it with existing (or developing) urban transport services. This structural overview is the basis of the TOD approach to provide railway stations that integrate land-uses and mobility services.



RAMBØLL

FIGURE 2 STRUCTURED INTEGRATED MOBILITY FOR CONNECTING A RAILWAY SERVICE AND TOD[6]

The railway station as a central mobility hub is a human- and transit- centred space to expand travel experiences by providing a variety of mobility offers, combining it with recreation areas around a station. Developing any mobility hub at railway station, as shown by the benchmarking analysis, should also strongly offer connecting walking distances to / from residential areas, local centres and public transport / mobility hubs. Moreover, space availability for allocating relevant facilities (NMT Stations, charging stations, etc.) should be considered and it will depend on a size and role of the railway station mobility hub (mini-, medium and major/ central mobility hub).

Summarised benefits of reviewed railway stations:

- Integrating a railway station a part of urban mobility system, therefore improving its operational efficiency. This is often done by creating a local or region-wide sustainable urban mobility plan with special focus on the railway station;
- Improving urban transport integration, connectivity and accessibility;
- Promoting sustainable urban mobility for all, focusing on low-carbon transport modes (walking, biking and public transport) and planning for equity, so that transit stations are accessible for all users regardless of their gender, socio-economic status or ability;
- Promoting sustainable modes of transport, reducing the necessity of using automobiles and reducing greenhouse gas (GHG) emissions and air pollutants;
- Enabling new business opportunities through increased accessibility not only from increased mobility but also from attracting multiple land uses and economic activity around the stations;
- Better city social and economic integration through increased job opportunities, housing and other activities around the stations;

[6]Source: Ramboll

2.1.4. Lessons learned matrix – detailed overview from the selected cases

The Consultant carefully reviewed and prepared the assessment of the long list of twenty- four international stations. This exercise culminated in a condensed summary of lessons learned and related best practices extracted from each station benchmarks. The Consultant team then categorized all the lessons learned by the GVA maximization criteria. Each station was further categorized by railway connections types A, B, and C. The final outcomes of this approach could be found in the table below. The index table provides an overview of the selected passenger railway stations per related categories, describing their main lessons learned.

TABLE 2 BEST PRACTICE STATION SELECTION AND LESSON LEARNED INDEX

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. r "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"	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 connections"

Within the next chapter below the Consultant presents detailed explanations of each lessons learned attaching relevant visualisation and illustrations.

A1	Central Station– Architecture	Amsterdam Central	Interdependencies

Well-performing stations and its adjacent surrounding act as interdepended 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 inter-dependencies 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 though Stationsplein Square fabric toward the south. In addition, it enhances its ferry connection to Amsterdam-North, promoting its development.

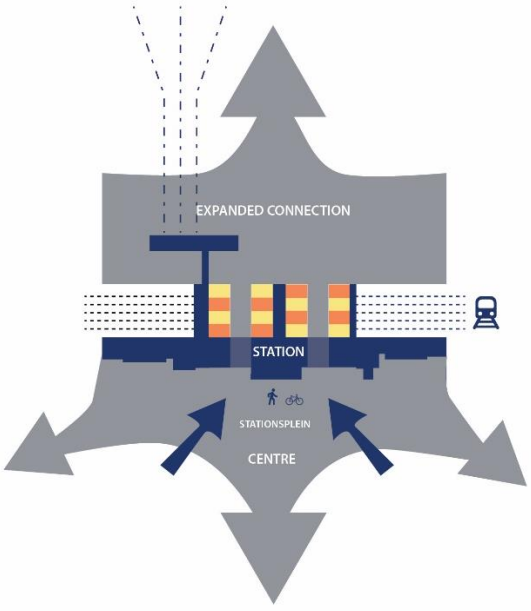


FIGURE 3 AN ACTIVELY INTERLOCKED STATION STRENGTHENS TRANSIT CONNECTIONS INTERNAL SERVICES AND BRINGS VALUE TO THE ENTIRE URBAN ENVIRONMENT. ROLE MODEL: AMSTERDAM CENTRAAL (SOURCE: AUTHORS)

A2	Central Station – Land-Use	Aarhus Central	Clever positioning

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 clear role of stitching the communities 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 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 in highly advisable. Mixing also improves fast actualization as multiple sub-markets can take up more volume compared less varied volume, and this strengthens positive spiral for development.

When it comes to retail location, in 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 important role in 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.

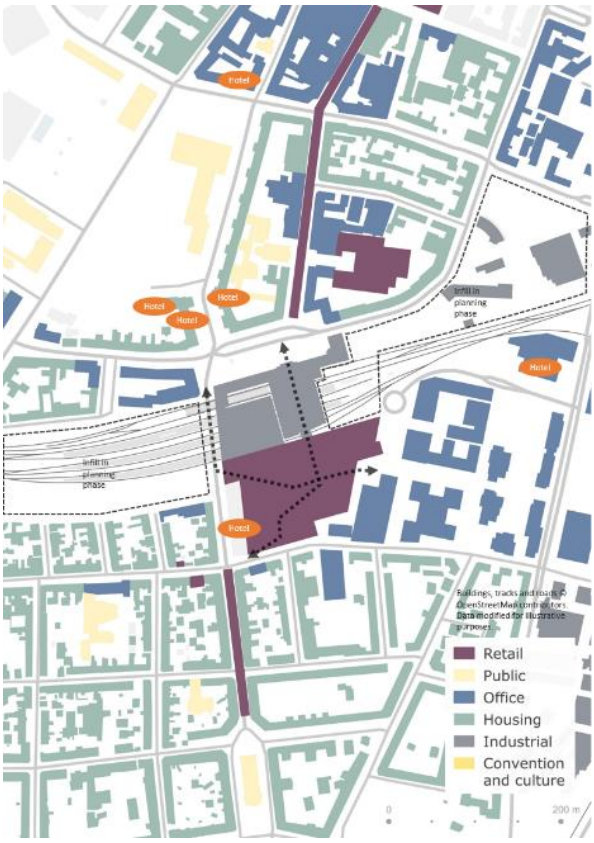


FIGURE 4 LAND-USE DIVERSITY AND POSITIONING AROUND AARHUS STATION (SOURCE: AUTHORS)

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 store 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 locations next to the busy railway station will create possibilities for new major retail and other commercial developments. 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. Unbuild 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 though the buildings and to the other parts of the city centre.

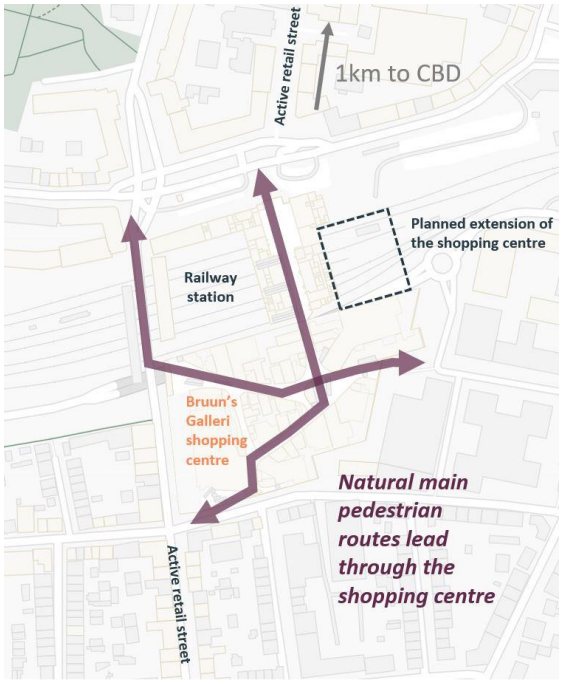


FIGURE 5 SHOPPING CENTRE ATTACHED TO THE AARHUS STATION WORKS AS A NATURAL PART OF THE CITY STRUCTURE AND PEDESTRIAN ROUTE NETWORK (SOURCE: AUTHORS)

A4	Central Station – Functional	Berlin Central station	Generous Flexibility

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 great 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 on upcoming 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.

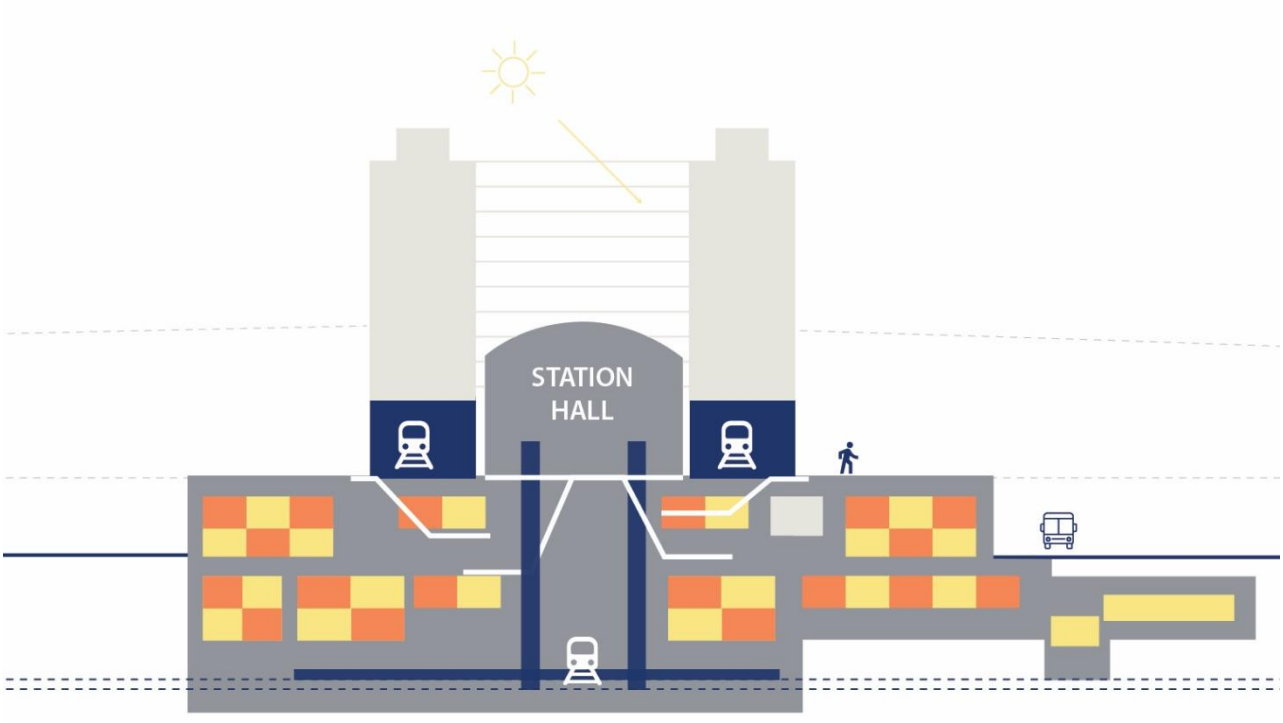


FIGURE 6 AN EFFICIENTLY INTERWOVEN ROOM PROGRAM WITH DIVERSE COMMERCIAL AND LOGISTIC SERVICES PAIRED WITH NATURAL DAYLIGHT CREATE A "GENEROUS" MODERN HUB. ROLE MODEL: BERLIN CENTRAL STATION (SOURCE: AUTHORS)

A5	Central Station–Operational	Berlin Central station	One- hands solution

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 to 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, the 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" were 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 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;

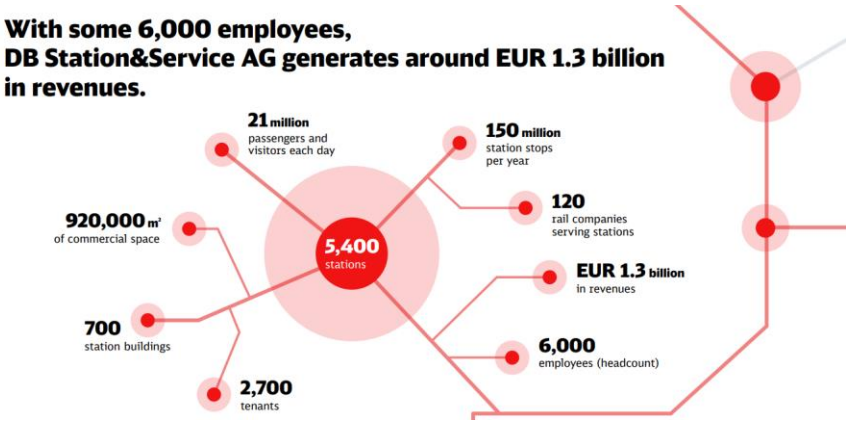


FIGURE 7 OVERVIEW OF THE DB STATION & SERVICE AG STRUCTURE[7]

[7] Source: company brochure DB Netz

A6	Central Station - Mobility	Vienna Central	High integration & full mobility

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, a car parking with 600 spots 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).

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" 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;

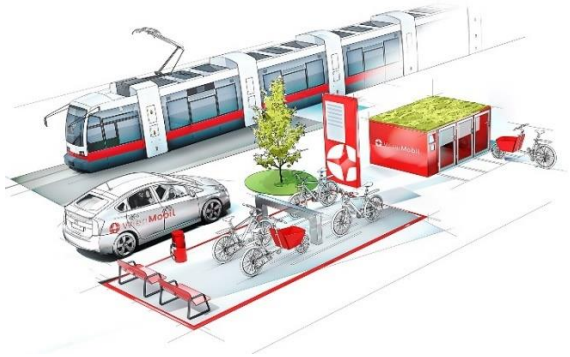


FIGURE 8 MOBILITY HUB DESIGN AND CONCEPT[89]

B1	Airport Station – Architecture	Canary Wharf	Hybrid Density

8 https://www.tandfonline.com/doi/abs/10.1080/10168664.2020.1835451?journalCode=tsei20
[9 9] Source: https://www.smarter-together.eu/news/viennas-first-mobility-station-opens

Even airport stations can benefit from a diverse service spectrum that hosts more than air-rail interchange and break 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.

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 surrounding if an integrated urban planning approach into this direction is targeted.

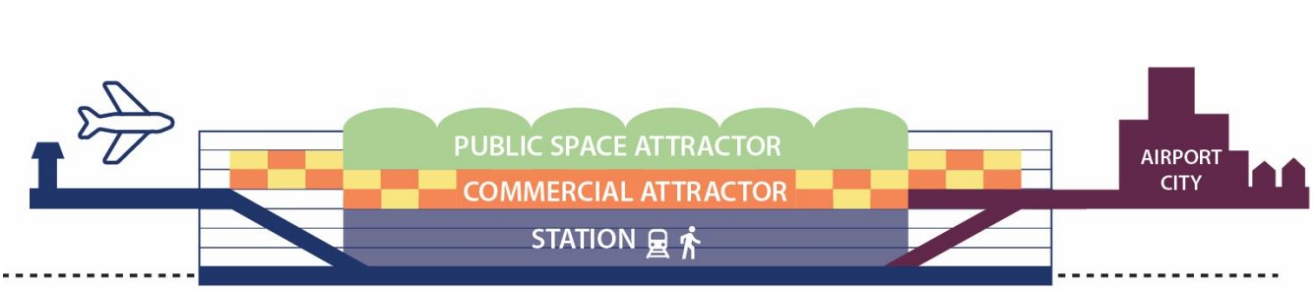


FIGURE 9 AIRPORT RAIL INTERCHANGE AS AN ACTIVE LINK BETWEEN AIR-TRAFFIC AND CITY, ALLOWS CUSTOMER AND FUNCTIONAL MIX. SERVICE SCOPE WIDENS THE BEYOND TRANSPORTATION. ROLE MODEL CANARY WHARF (SOURCE: AUTHORS)

B2	Airport Station – Land-use	Utrecht Central	Airport cities

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 fault 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.

FIGURE 10 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

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/arenas;
- Parking structures;

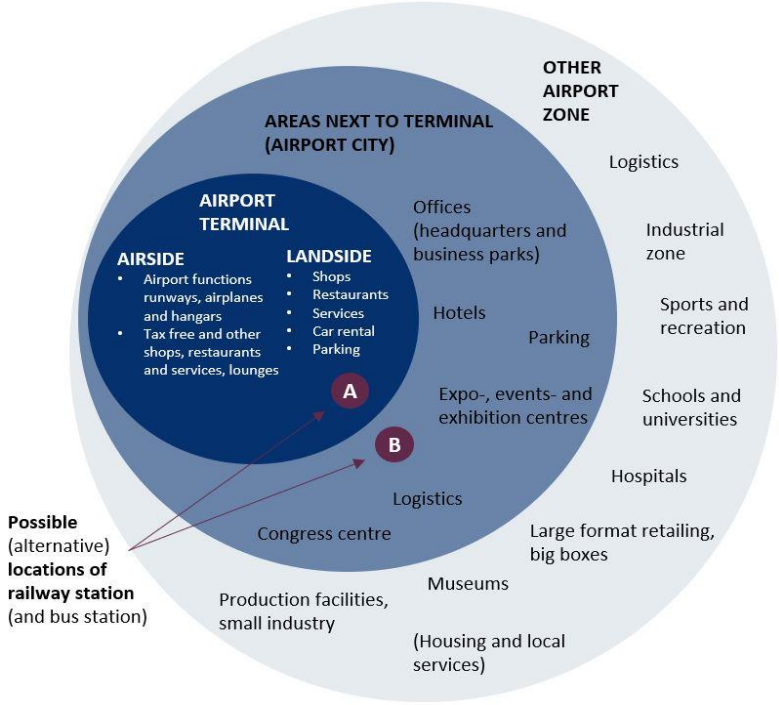


FIGURE 11 POTENTIAL USES IN AIRPORT CITIES (SOURCE: AUTHORS)

B4	Airport Station– Functional	Copenhagen Airport Station	Multi-layered integration

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.

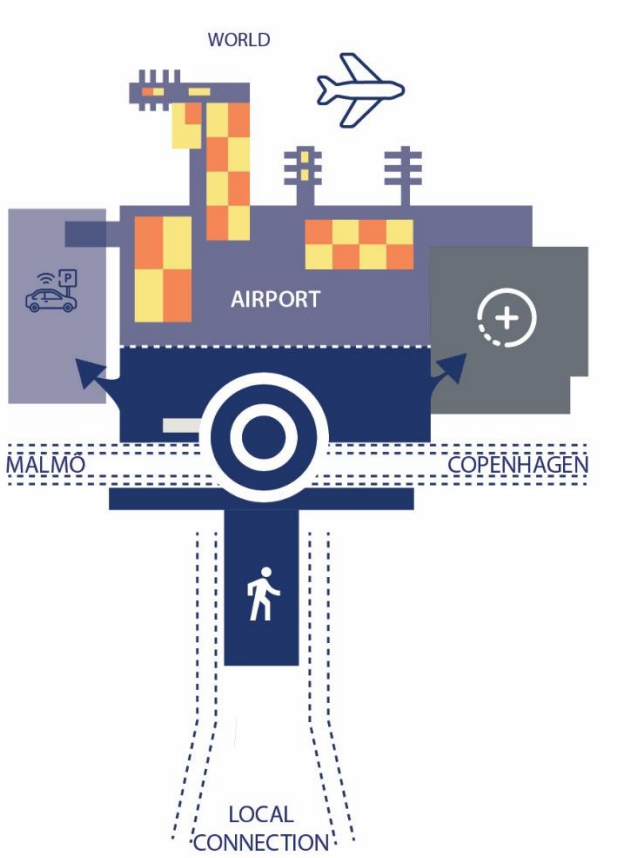


FIGURE 12 THE AIRPORT STATION AS A NODE OF SAFE AIR-RAIL INTERCHANGE AND RELATED PUBLIC MOBILITY WITH POTENTIAL LANDSIDE ACTIVITY. ROLE MODEL: COPENHAGEN AIRPORT STATION (SOURCE: AUTHORS)

B5	Airport Station– Operational	Copenhagen Airport	High operational efficiency

Efficient railway scheduling time and operational model

The Copenhagen airport is the leading aviation in providing the most efficient operation in Europe[10]. 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

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

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.

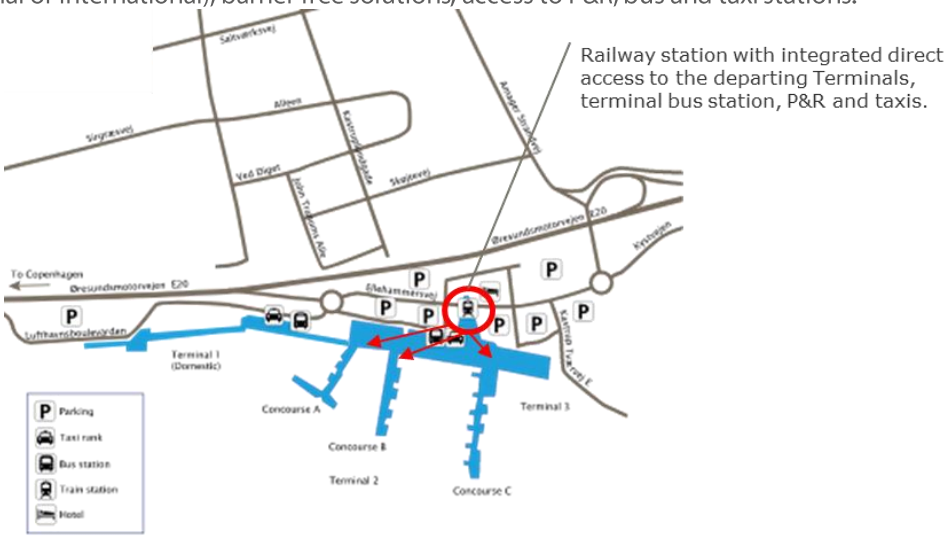


FIGURE 13 CPH RAILWAY STATION (SOURCE: CPH)

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 a 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. 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 CO_2 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.

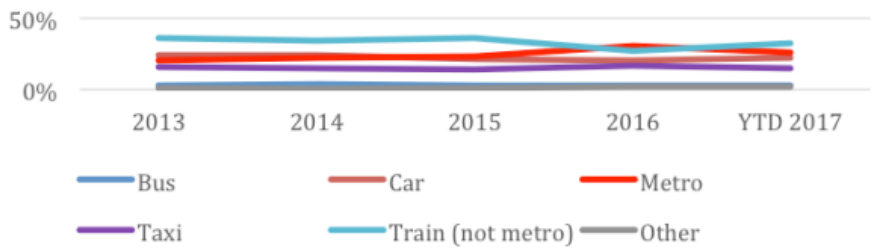


FIGURE 14 MODAL SPLIT OF COPENHAGEN AIRPORT TRANSPORT USE[11]

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

B6	Airport Station – Mobility	Oslo Airport station	Archiving sustainable mobility

Air- Rail links - balancing the negative airport traffic though mobility strategic ideas and high integration of railway station with other 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 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.

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 tits sustainability it was decided to allocate only electric buses.

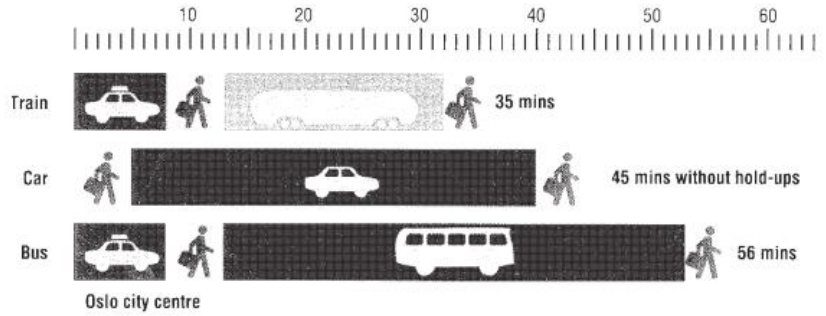


FIGURE 15 DOOR- TO- DOOR MOBILITY FROM THE OSLO RAILWAY STATION[12]

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

C1	Sub-Centre –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.

FIGURE 16 PASILA STATION AS AN INTERWOVEN URBAN DEVELOPMENT WHICH CONNECTS TRANSPORTATION, PUBLIC SPACES AND COMMERCIAL SERVICES WITHIN A NEW CITY BLOCK

(SOURCE: AUTHORS)

C2	Sub-Centre –Land-use	Helsinki Pasila	Amplifying and complementing

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

During master planning phase Pasila as 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 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 to 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.

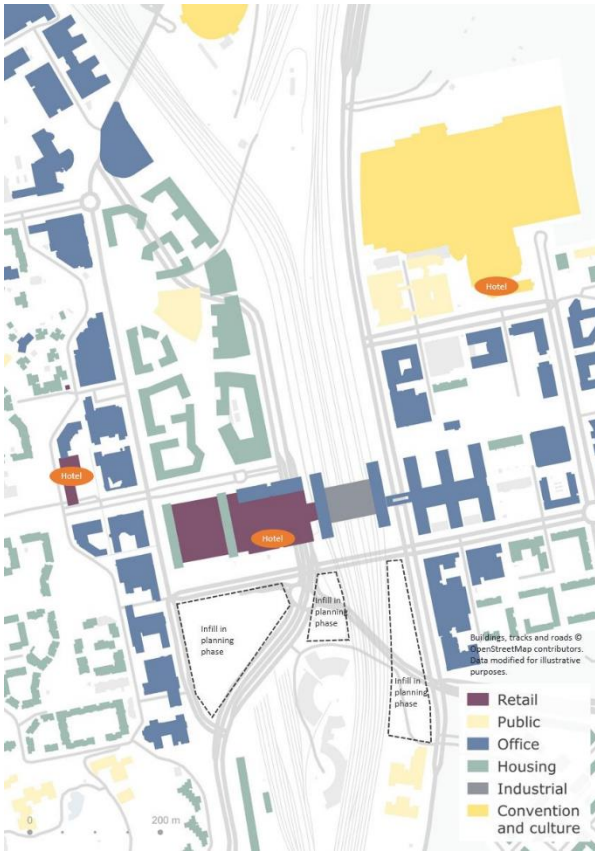


FIGURE 17 LAND-USE SPECTRUM AND POSITIONING AROUND PASILA STATION (SOURCE: AUTHORS)

C3	Sub-Centre – Commercial	Helsinki Pasila	Local and regional services

Developing sub-centres may have hidden potential for large-scales 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 the 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;

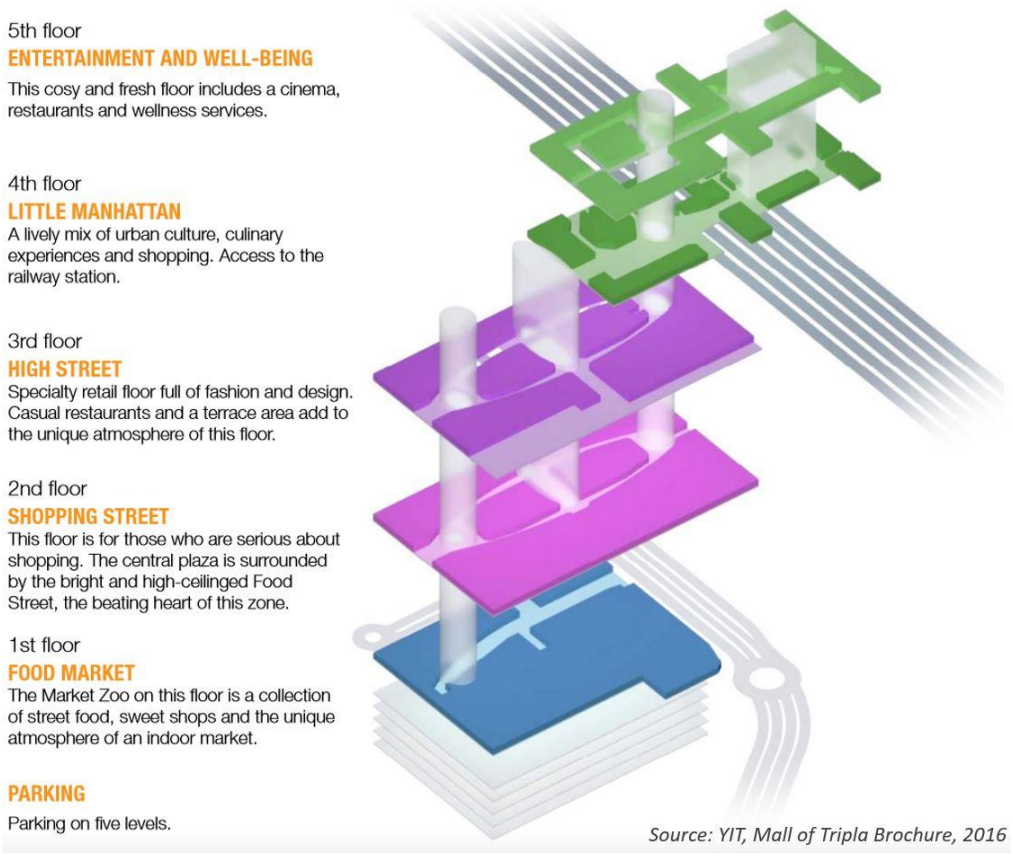


FIGURE 18 SHOPPING MALL SMOOTHLY CONNECTED TO RAILWAY STATION[13]

[13] Source: YIT, mall of Tripla Brochure, 2016

C4	Sub-Centre – Functional	Copenhagen Nørreport	Smart Switch

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.

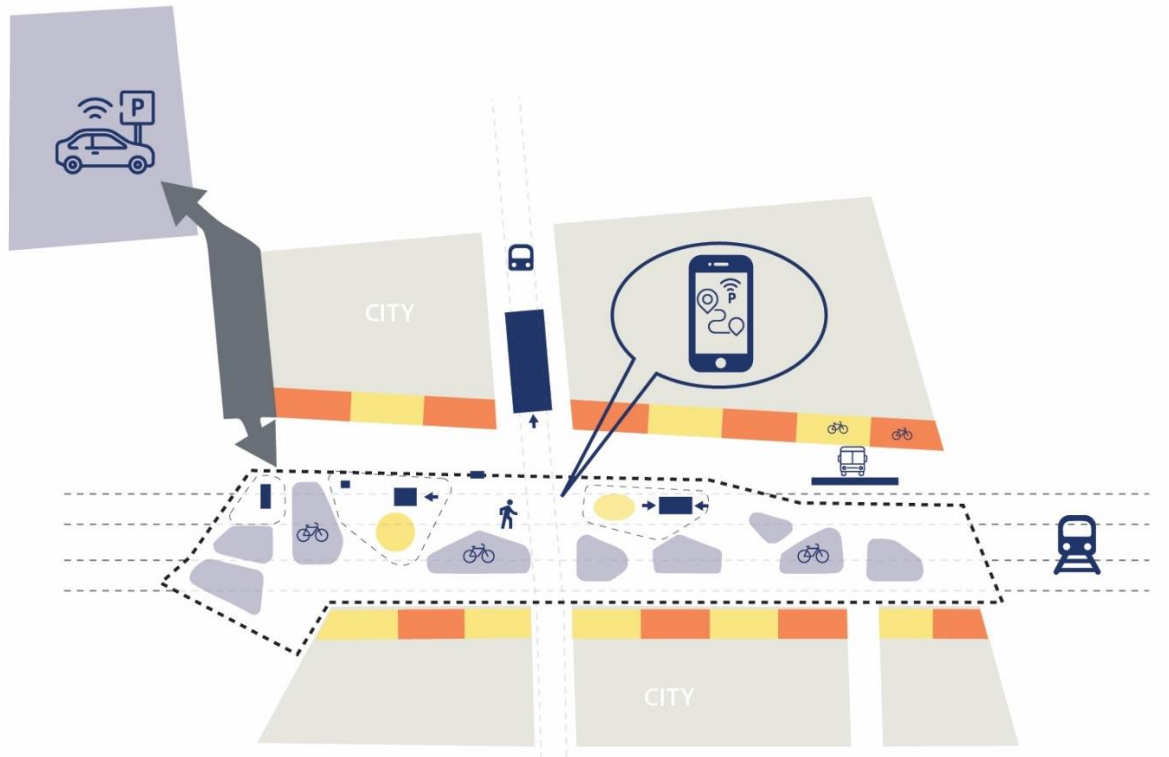


FIGURE 19 URBAN SMART SWITCH SETS ITSELF INBETWEEN PRIVATE AND PUBLIC TRANSPORT MODES AND ENABLES LINKS TO COMMERCIAL FUNCTIONALITIES (SOURCE: AUTHORS)

C5	Sub-Centre –Operational	Køge Nord station	Early public-private collaboration

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 City of Køge. 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 Koge 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.

FIGURE 20 TRANSFER FROM THE BUSIEST MOTORWAY TO RAILWAY TRANSPORTATION (SOURCE: KØGE)

C6	Sub-Center – Mobility	Amsterdam Amstel	Transfer hub between suburban and central city connections

Central suburban transfer point with a strong focus on a last mile complementary service

The railway station play 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 though 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;

2.1.5. Main recommendations for maximization of GVA and catalytic impacts around railway stations

During the development of this study, one of the most recurring learnings is that passenger railway stations should not be considered independent. Instead, they should be developed as a part of an integrated transport strategy. Where surface access to railway station is suitably well developed, stations could be accessed in fast and convenient ways though urban complementary transportation, contributing to the economy in their own right, and creating catalytic effects as well.

While developing a benchmarking the Consultant noticed that best practices quite often show modern or historical architecture design, which could the part of catalytic effects to attract more users, and in some cases construct a station as a part of a touristic attraction. In addition, in order to clearly plan an access and improve station safety, a complementary planning and layouts for bicycle traffic (introducing path and traffic lights at the railway station building), as well a pedestrian plan and access to railway platforms within a railway station building could be introduced. A proper organisation and development of a railway station can bring important transport and mobility-related benefits to urban dwellers. Developed railway station impacts on mobility improvements, combining it with railway urban and suburban transport connections for the wider economically active population and employers. It is important to highlight, that safety, security, being also as a part of accessibility play a crucial role in passenger railway station GVA maximalisation. Planning and improving these characteristics will make a railway station not only attractive for passenger, 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 not only for using a pure railway service, but also, though developing a railway station as a social and urban object, give residents a comfortable place for daily shopping and meeting points. Benchmarking shows that a modern railway station could provide innovating working spaces, sharing offices and conferences, which might especially be attractive for international business travellers and self- employed users. Establishing such a concept for a passenger railway station, modern technological start-ups or large corporates, 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 a small logistics service for private users show a positive catalytic effect. A logistic service in this case is presented by allocating delivering boxes (a parcel lock) directly at a platform or within a railway station, where travellers could have a free access to pick up their boxes in any time they want. For a railway station operator incomes are generated though a cooperation with big delivering companies, like DHL, Green Pin, UPS etc.. The best example of establishing such a service shows Deutsche Bahn in Berlin, who is developing a comprehensive strategy to shift more traffic to rail and develop a smart mobility offering logistics solutions for urban areas or within the railway station.

Based on the exhaustive benchmarking analysis developed during this WP 2, the Consulting team has prepared very specific a list of recommendations to be considered for the maximization of GVA and catalytic impacts around railway stations. These recommendations present the international best practices that have been collected and prepared for this project. Some of these recommendations are drawn from some of the best station design and development that include aspects such as modern design and on-site planning of passenger railway stations which bring important transport and mobility-related benefits to urban dwellers.

In order to give a clear and structural summary of the important catalytic effects for developing a railway station, the Consultant summarised findings and recommendations from the international experiences and contain theoretical and practical applications below:

Architectural

Summary: As observed from the benchmarking process and the distillation of lessons to be taken from best practice stations, an aim to increase GVA should attempt to diversify station services while increasing its spatial relationship to the context in which its inserted.

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 organised within the station, but also how the spatial concept of the station is inserted in a larger context.
- Intersectional densification - the service provision of stations doesn't have to limit itself to the passenger use, rather it ought to frame opportunities of interaction between different users and interest groups. By catering for a wider audience, the spaces of the station can develop beyond their primary transport functions into spaces of public provision, increasing therefore their GVA.
- 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; such as people with reduced mobility (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.

Land- use

Summary: Land-use efficiency and diversity around the station plays the biggest role in maximising GVA and there are several good examples on how the station surroundings have been developed to utilize 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 in form vital city life and successful investments. Both centre and sub-centre 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 centres.

Key recommendations:

- Develop efficient land-use to utilize the important GVA maximization potential that highly accessible railway station areas feature.
- Mix uses, especially retail, offices, accommodation and housing, to enable vital city structure that attracts both citizens 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 with maximum market-led volume 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 railway;
- Study 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 to more efficient form to improve land-availability;
- Study the possibility to develop airport station surroundings especially with offices, hotels and exhibition centres as well as sports and other arenas that require great accessibility.
- Perform a thorough market analysis to find the ambitious but also realistic volumes for different uses;

- Develop a smart mobility offering logistics solutions for urban areas within and nearby railway stations

Commercial use

Summary: Railway passenger flows create natural customer base for retail and while stations provide services for citizens living in nearby, great accessibility creates also potential for expanding the customers base to regional. Thus railway stations can differ significantly from each other by commercial concept and service structure. In the right market environment station's retail concept can be increased from basic services to even shopping mall width, and by doing this the station's role changes to a significant retail hot spot. Most often hidden potential can be found from sub-centre areas. On the other hand, railway stations next to the airports are usually only extensions to the terminal building and don't have that much potential for retailing. Still, good potential exists in other commercial uses like offices and hotels.

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 to the station, if possible and in parallel with land-use planning, in order to utilize the natural pedestrian flows retail needs;
- Create attractive pedestrian routes that combine different city parts and lead them through the commercial hot- spots;
- When possible, widen the customer base and catchment area from local to regional with wider shopping centre or other clustered retail form;
- Retail has limited potential in airport surroundings, 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;

Function

Summary: The selected best practice station present, from a functional perspective, a seamless approach to programme integration. Not only do they incorporate features that

allow a smooth traffic flow, but also an easy- switch between modes, services and their digital and physical interfaces.

Key recommendations:

- Programme integration – a best practice station should aim to maximise the diversity of programmes to expand its functional quality beyond the exclusive transport use. A dense mix of commercial, workplace, public, transport is desirable to produce multi-functionality paired with agile adaptation possibilities
- Easy-switch – it is observed from best practice that 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 travellers to transmit and access the station area. special attention to barrier free entrances and passageways as well as natural connection points to neighbouring functions
- Short distance and clear wayfinding - all series of spaces and transition zones must be developed to minimize walking distance and maximize visual connection between key functions like platforms, entrance, halls, transit zones. The wayfinding concept should include local orientation points and daylight for stress free passenger and customer flow.

Operational

Summary: The best practice exercise shows that station operators that 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. Having the control to understand the potential and guide development is key to maximizing GVA in and around railway stations.

Key recommendations:

- It is important to have an operator that understand the full potential for developing better opportunities to connect logistic and urban, mobility services;
- 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 desirable to have an operator that has In- house knowledge for developing investments programmes, that has knowledge and incentives to develop their own financial strategies;

- Desirable to have a station operator that has the knowledge and ability to lead a transparent and efficient data collection effort, which also helps to have a better and safer station equipment to meet the needs of the target group;
- 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.

Mobility

Summary: Improving and providing increased mobility through the development of a railway station is not only about the ability of people to use other transport modes once they step out from a railway platform. Improving mobility for all goes much beyond intramodality. Improving mobility starts in the planning process and including potential users and other important stakeholder into the planning design and development of the station. Improving mobility is a vehicle to increase accessibility, and in turn accessibility to economic, social and leisure activities generates and maximizes GVA. Furthermore, promoting sustainable transportation (walking, biking, public transport and shared mobility) and having a seamless connection between transportation and public spaces.

Key recommendations:

- Integrate a station planning and design into 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 a sustainable mobility;
- Allocating new sharing mobility service, which could provide flexible using concept and being costly integrated with a railway service;
- Develop optimal parking facilities based on the area needs, offering charging stations for various vehicles;
- Service digitalisation;
- Creating a culture hub and social mobility (diverse group of people) at or around the railway station;

- Connecting reboots in a city;
- Considering TOD as a part of a railway mobility to allow shaping and assessing urban development around a railway station;

Developing driving rail destinations as a touristic point (due to COVID a greater shift from air to rail) providing a sufficient public transportation and mobility at railway stations;

Additionally to the key recommendations per categories, the Consultant would like to notice that a proper railway station development should include clear communication between all actors and setting their respective responsibility (governance part):

- Network governance
- Transport industrialisation
- Legal framework and policy- important to review country/city legal and regulatory frameworks to understand potential barriers for the implementation of gross value-added activities such as commercial and housing development, Land Value Capture schemes and the implementation of Public-Private Partnerships. A land use regulations should allow development of rail megaprojects and its surrounding areas.

The Governance could ensure effective investment, coordinated required measures planning, and development of technological facilitates, as well as successful market uptake (collaboration and developing business models).

3. Project implementation progress

3.1.1.Undertaken activities

In order to follow up on a project progress, or discuss data availability, agree on next steps, the Consultant Project manager and the RB representative carry short weekly- based online meetings/ calls.

At the end of the week 34 of 2021, following the project purposes and deliverables, together with the Rail Baltica Team, the Consultant held the first workshops with stakeholders. The main goal of the online meeting was to present the project, and get in touch with stakeholders involving them, where possible, into the project and inquire them to share available data on specific plans related to the development of the 7 international stations.

The meeting was held shortly after the delivery of WP1 as requested by the contract. The Presentation, agenda, participants contacts data and recordings were stored under the One Drive project folder (RB-GVA-Maximization - 1rst Stakeholder Workshop 27082021 - All Documents (sharepoint.com)). The final presentation and recordings were shared with all stakeholders, as well as with the ones who were invited to the online workshop but could not attend.

FIGURE 21 SCREENSHOT FROM THE ONLINE HELD MS TEAMS MEETING WITH PROJECT STAKEHOLDERS – (APRX. 50 PARTICIPANTS)

In order to follow up on stakeholder's communication and their possible involvement in the project, the Consultant sent to all presented participants a reminder to share with the team existing data and relevant to the project materials (if any). However, only Estonia currently were active and open for a cooperation, sharing numbers of materials for the Tallinn Ülemiste passenger Railway station (status on 13.09.2021).

3.1.2.Managing potential project delays

Currently, the project implementation has no crucial delays or valuable issues. Nevertheless, it is important to note that the data collection process has been complex and has caused some minor delays during the inception report and first interim report stages. The missing materials still cover some important data for the RB stations like: Master plans of the project cities, detailed development plans of all RB stations, cities area structures, land availability and land ownership, real estate reports, commercial analysis within the relevant railway district, among others.

Since the first stakeholder workshop the Consultant is in touch with stakeholders, which participated at the first workshop. However, to collect the missing data and involve interested parties into the project (or any of project support), requires much time investment. The consultant, along with the Client have join forces to ensure such time investments are fruitful and have organized detailed processes to hold specific meetings with project stakeholders and ensure we received the needed data for the development of WP3. The project meeting process can be seen in Figure 22 below.

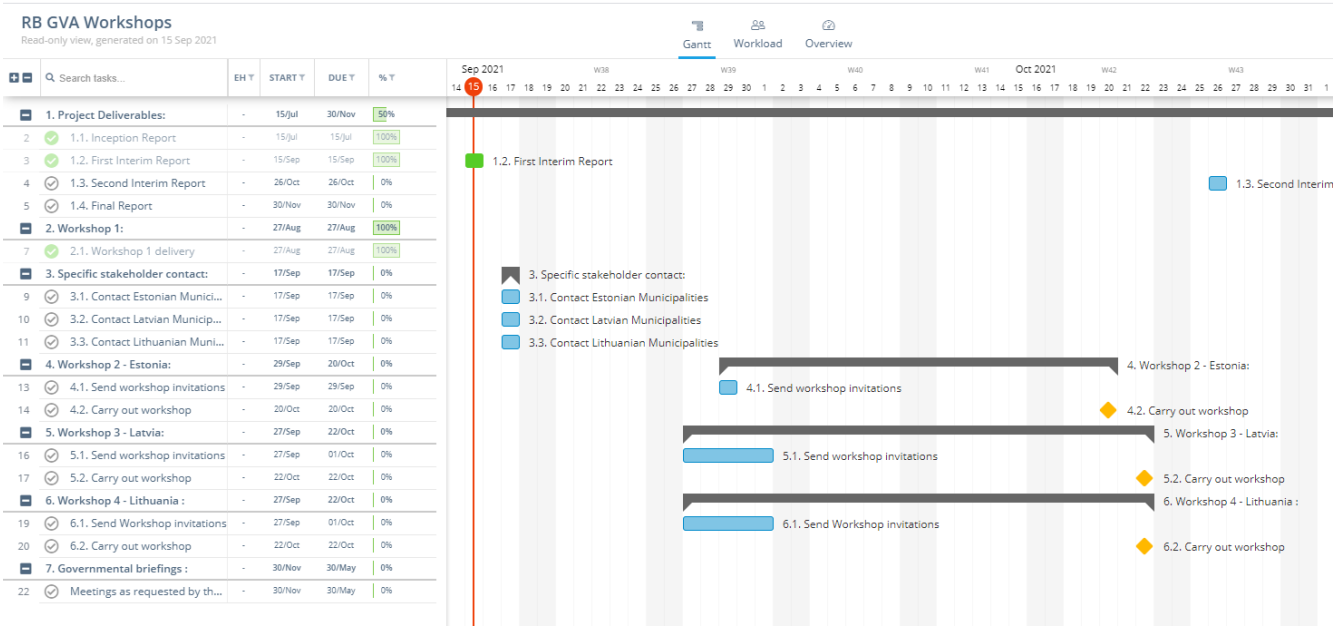


FIGURE 22 – FOLLOW UP MEETINGS WITH STAKEHOLDERS

3.1.3.Next steps

At the end of the week 35, the Consultant held an online meeting with the RB Team to propose/discuss the next steps:

- **Data availability** - currently there are gaps in obtaining all required by the Consultant data (kindly refer to the data overview sheet Project data overview management file.xlsx (sharepoint.com)). Since the timing for delivering of the WP3 is very limited, the Consultant will review only the obtained materials and combine the understanding of the current gaps and developments of each project RB railway stations out of stakeholder feedbacks from two workshops.

- Organising a **second stakeholder workshop** – to meet a deadline for delivering the WP3, the Consultant proposes as latest to hold a second stakeholder workshop at the end of the week 38 (24.09.2021). The date,

however, to be still confirmed by the RB Team. For organising a second stakeholder workshop, the Consultant expects to receive a kind support from the Client.

- **Follow up** with **stakeholders** – the Consultant team communicates important for the project stakeholders in order to close a data gap and collect crucially important materials for the WP 3. The list of stakeholders were discussed with the RB.

- Possible **on- site visits** – the Consultant sees it important to visit railway stations to notice their real current situation, developments, transport connection, railway operation and planning.

From the Consultant point of view, the list of participants for the second stakeholder workshop should be carefully tailored. The Consultant believes, that to obtain information like existing gaps, critical points, and development needs for the RB railway station, only representatives who have a deep understanding of the districts where a station is located, about city developments, architecture, commercial representatives, attached to the railway station transport stakeholder should be the part of the second meeting.

In parallel to the activities described above, the Consultant started to work on preparing the second interim report, which will highlight the crucial content of the project:

- Critical analysis of the development plans prepared for Rail Baltica international passenger stations (referring to the four areas object of the first interim report WPs 2.1-2.4.);

- Developing key recommendations about railway passengers GVA and catalytic effects to Rail Baltica international passenger stations;

Moreover, the second interim report will integrate into recommendations all important outcomes and comments from both stakeholder's workshops.