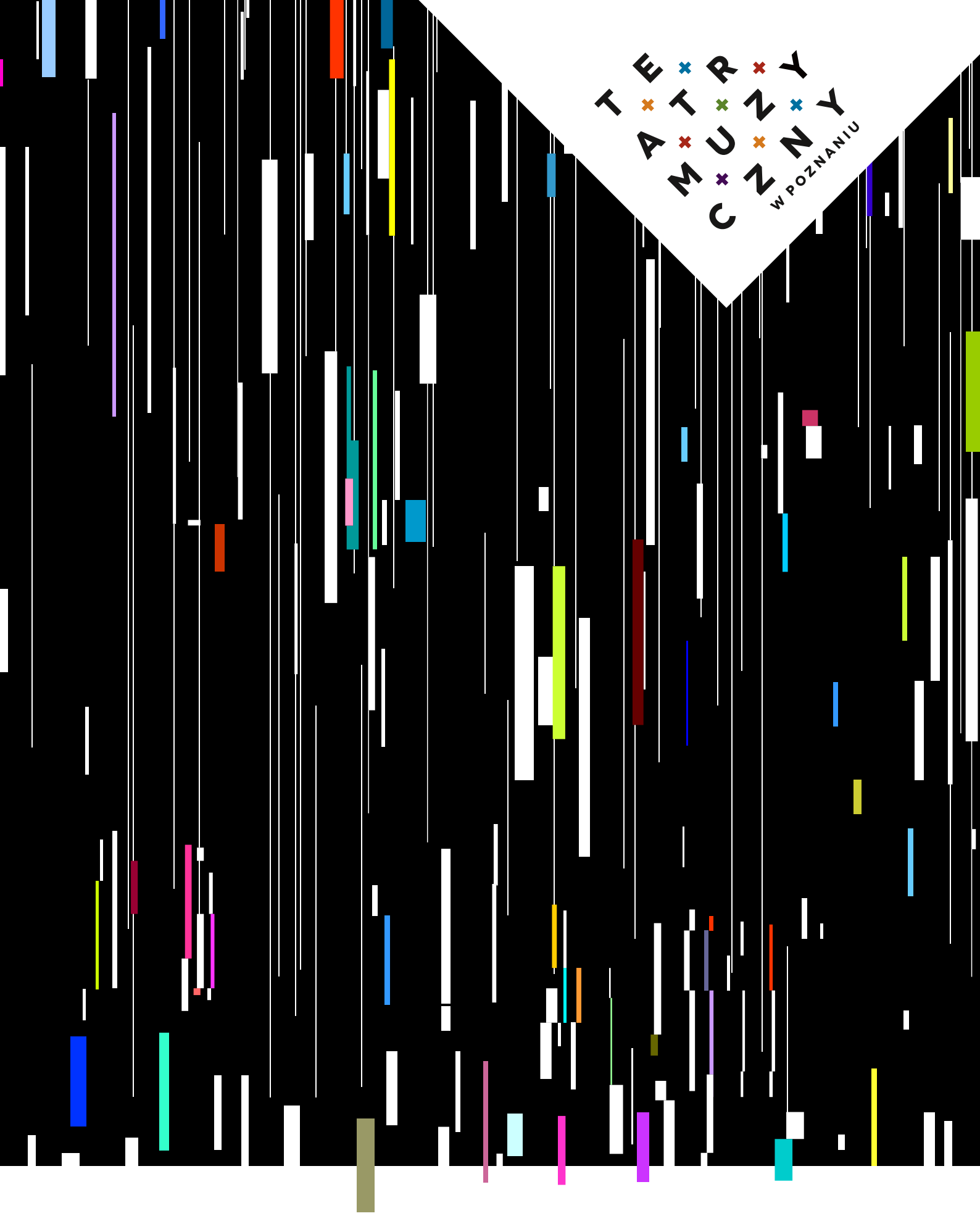



POZnań

MUSICAL THEATRE IN POZNAŃ
ORDERING PARTY'S GUIDELINES

CONTENTS

# APPENDIX NO 12 TO THE REGULATIONS

## MUSICAL THEATRE IN POZNAŃ
## ORDERING PARTY'S GUIDELINES

The Ordering Party expects the competition participants to develop the urban planning conception for the entire area, justifying the solutions adopted for the body of the Theatre building and develop the architectural conception for the new building of the Musical Theatre in Poznań.

## 1. INTRODUCTION

The competition involves the land near one of main streets of the city centre, listed in the register of historical monuments and of great importance to the inhabitants of Poznań.

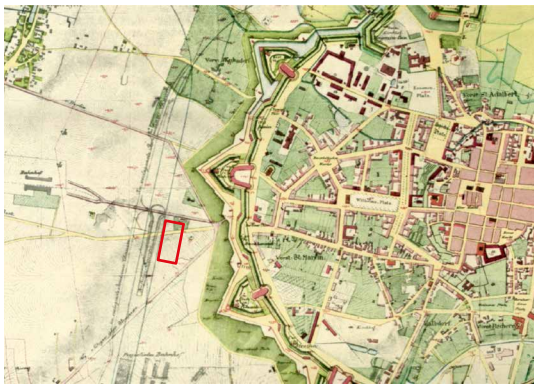
The study area is delimited by: Składowa Street, Dworcowy Bridge, Święty Marcin Street, Skośna Street, the western border of plots No 44/10 and 44/12, Sheet 44, Poznań precinct, whereas the land intended for the location of the seat of the Musical Theatre consists of plots numbered 25 part, 27/10, 26/2 part, 27/11 part, Sheet 44, Poznań precinct – in Św. Marcin Street corner of Skośna Street, being owned by the City of Poznań.

The direct proximity of the future Theatre will consist railway tracks, Św. Marcin Street with high car, tramway and pedestrian traffic intensity and Skośna Street, which will form a new communication link between the city centre and the railway and bus station once it is connected to Składowa Street. The Theatre is neighboured by the Academy of Music and the buildings of the Adam Mickiewicz University with the University Hall, which is also the concert hall of the Poznań Philharmonic. The Great Theatre (Poznań Opera), New Theatre, Polish Theatre, Animation Theatre and the Grand Hall at the Zamek Centre of Culture and the Eighth Day Theatre are situated within 700 m.

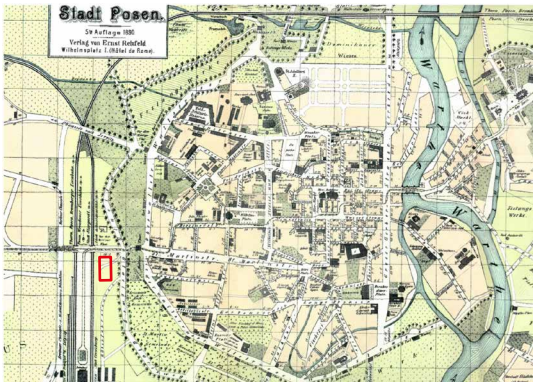
## 2. A BIT OF HISTORY

Skośna Street was once the exit route from Poznań towards Buk (an extension of the modern Bukowska Street), connecting to Św. Marcin Street, and after the construction of the Poznań stronghold fortifications it reached the so-called Berlin Gate. After the construction of the railway tracks towards Toruń and Warsaw, relocation of the railway station from Zwierzyniecka Street to its new location and the construction of the Railway Caponier, Bukowska Street ended at the modern Roosevelt Street. A new street was created, connecting the Berlin Gate with the Railway Caponier and further with Zwierzyniecka Street. The remaining fragment of the route towards Buk owes its name to its slanted orientation in relation to the new street.

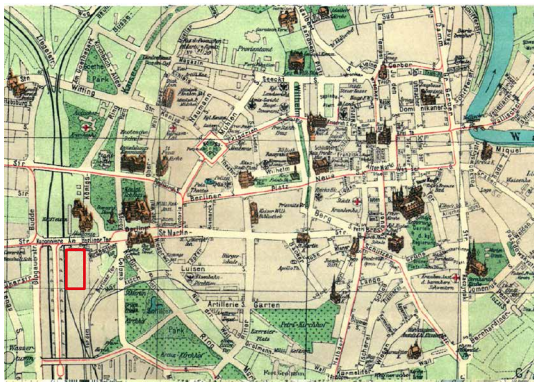
There are protected vantage points and lines of historical city panoramas in Poznań. The most characteristic ones are, e.g., the view of the “castle district” (AMU Collegium Iuridicum, Imperial Castle, Academy of Music).



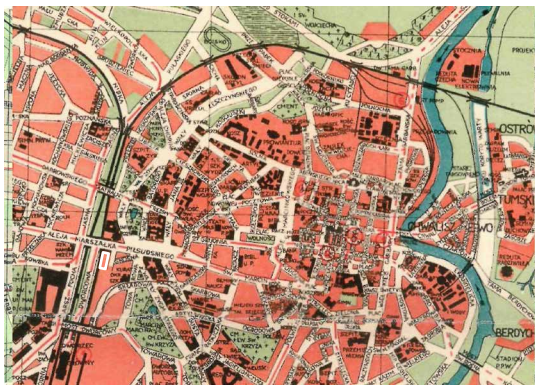
City map from 1841




City map from 1890



City map from 1910



City map from 1937



source: internet

## 3. CONSERVATIONAL GUIDELINES

**(based on the opinion of the Municipal Conservation Officer)**

The area involved in the competition is located within the urban and architectural complex of the city centre entered in the register of historical monuments under No A 231 by decision of 14.03.1980 and in the direct proximity of the Academy of Music building under strict conservation protection by way of an individual entry into the register under No A 275 by decision of 11.01.1985.

The location of the Musical Theatre building should ensure that it blends harmoniously with the existing spatial context formed by, among others, the representative buildings of the Castle District (Collegium Minus, Collegium Iuridicum, Imperial Castle, Academy of Music).

Due to the neighbouring representative buildings of the Castle District, the newly designed building should be characterised by high quality of architecture and materials used.

Particular attention is required to build the proper relation between the Musical Theatre building and the Academy of Music building under strict conservation protection. An additional value of the competition work will be the exposure of the west façade of the historical Academy of Music building, designed as the frontal façade, which is an important component of the panorama of the city centre.

The newly designed buildings cannot be taller than the Academy of Music building, with the exception of architecturally-justified endeavours, e.g. constructing the scene section of the theatre.

The design should strive to provide the Theatre with a façade of high architectural value from any direction, including on the side of the railroad area.

Pursuant to the arrangements with the Department of Archaeological Artefacts Protection of the Archaeological Museum in Poznań, the investor is obligated to commission archaeological, preserving and documentatory archaeological works accompanying the construction earthworks, and obtain a permission for these works from the Municipal Conservation Officer via the Department of Archaeological Artefacts Protection of the Archaeological Museum in Poznań.

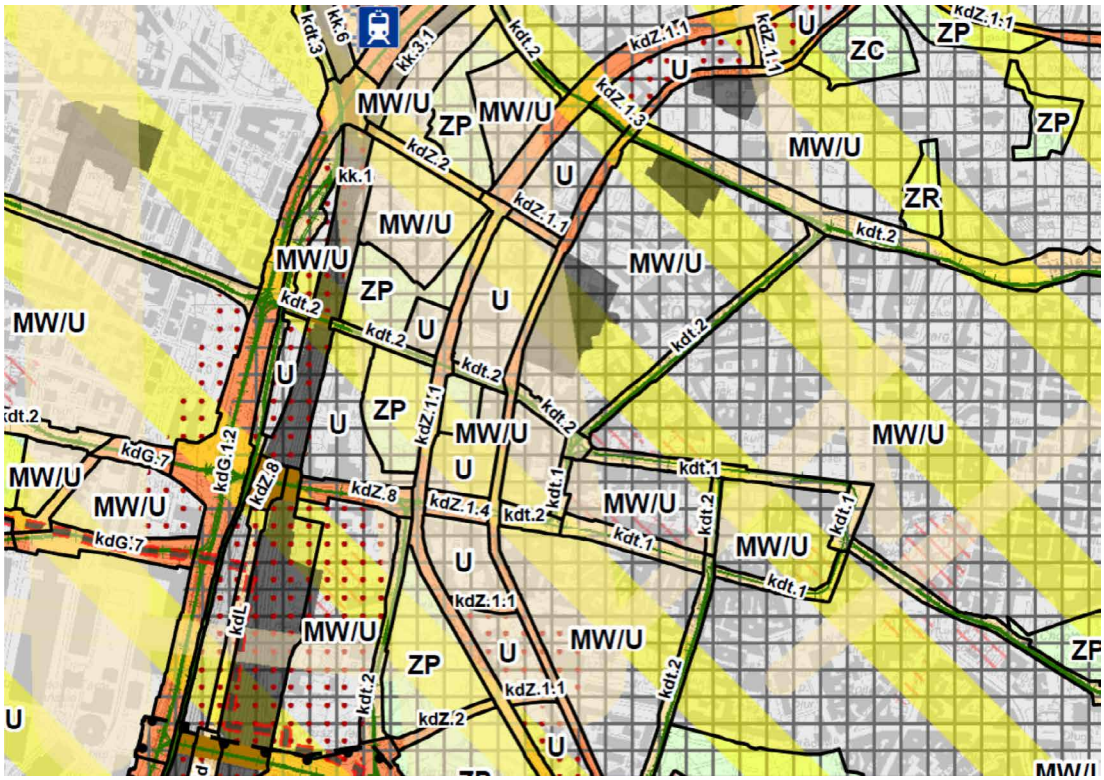
## 4. PLANNING DETERMINANTS

### 4.1 Study of land use conditions and directions.

The land involved in the competition is not included in the local land use plan. According to the Study of land use conditions and directions for the city of Poznań, the land involved in the competition is situated on:

- MW/U land – area of multi-family residential developments or service developments;
- area listed in the register of historical monuments;
- area of the most important public spaces;
- the city area;
- on a closed area - partially;

Detailed provisions of the Study are available on the website of the Municipal Urban Planning Office, www.mpu.pl. The provisions of the Study are not obligatory.



### 4.2 Ławica airport approach area

The land involved in the competition is located within the approach area of the Ławica airport. Building height is limited to 180 m a.s.l.

### 4.3 Energy infrastructure
### (based on the opinion of Enea Operator)

Existing and planned utilities are sufficient for connecting a public utility building – a theatre with the connection power of 1600 kW.

There is an existing electric power network within the area involved in the planned investment. Distance from this network consistent with the current regulations and standards should be maintained during construction works. In case of a collision between the planned buildings/ land development, ENEA Operator sp. z o.o. should be requested to specify the conditions for removing this collision. The collision will be removed at the expense of the party the collision has been caused by.

### 4.4 Water and sewage infrastructure
### (based on the opinion of Aquanet SA)

Supply of utility water for the planned investment may be provided from the 3000 mm in diameter water-pipe network made of cast iron pipes located under Skośna Street, by constructing a water pipe connection.

Sewage discharge from the planned building will be possible following:

- conversion of the 250/350 mm cross-section and 200 mm in diameter combined sewer under Skośna Street made of concrete pipes into a 300 mm in diameter combined sewer (including an increase of its depth), over the distance of around 45 m, between the existing 300 mm in diameter combined sewer located under Skośna Street made of concrete pipes (from the sewer manhole with bottom elevation of 74.27 m a.s.l.) to the height of the connection for the existing 300 mm in diameter rainwater sewer under Skośna Street made of concrete pipes. As part of the conversion of the sewage network mentioned above, the 200 mm in diameter combined sewer connection at Skośna Street made of concrete pipes should be switched over to the newly constructed combined sewer under Skośna Street.
- construction of the sanitary sewage system connection for the planned investment.

Due to the combined nature of the sewer network in this area of the city, if there are sanitary facilities below the ground, a protection against the backflow of sewage from the external sewer network should be provided.

Due to the combined sewer system in this area of the city being overloaded, it will be possible to drain no more than qs=1.5 dm3/s of rainwater and snowmelt from this land to the converted 300 mm in diameter combined sewer under Skośna Street.

The land development plan for the investment site should provide for partial retaining of rainwater and snowmelt sewage within the site, using solutions ensuring the permeation of these waters into the ground or usage of rainwater for household purposes (watering greenery).

If necessary, a storage reservoir can be used in the internal rainwater sewer system on the property site, calculated for the reliable intensity of inflow rain for 15 minutes, with discharge to the combined sewer never exceeding qs = 1.5 dm3/s.

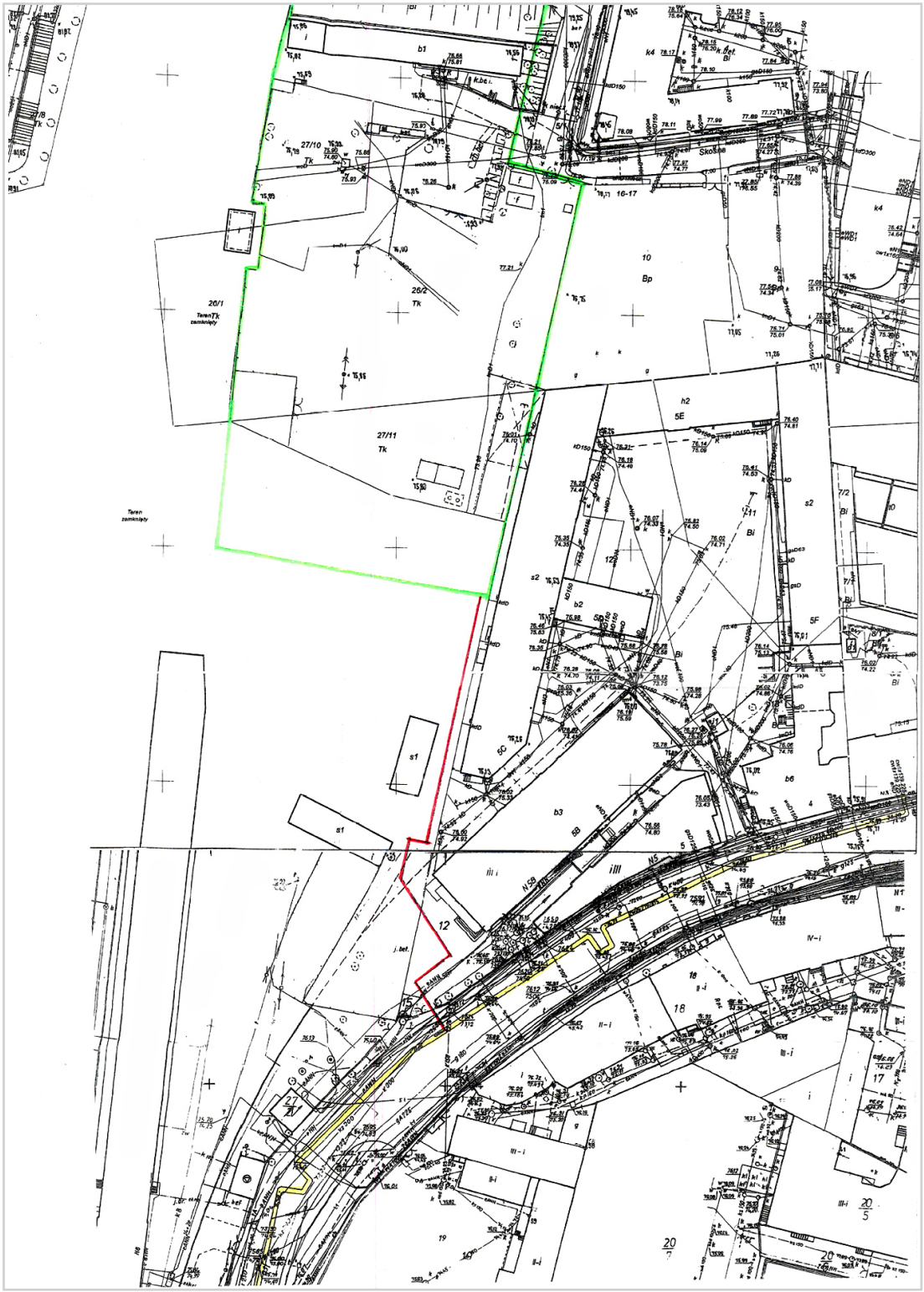
Due to the discharge of sanitary and rainwater sewage to the combined sewer system, their discharge should be provided for by constructing an internal separate sewer system, i.e. separate sanitary and rainwater pipes, and then a joint connection in relation to the combined sewer.

A 450mm-300mm in diameter water main made of cast iron pipe passes through the investment site; it can be removed.

### 4.5 Heating infrastructure
### (based on the opinion of Veolia Energia Poznań)

No active heating network that could limit new developments is located on the land involved in the competition.

In the opinion of Veolia Energia Poznań S.A., it is technically possible to supply thermal energy for the purposes of designing a public utility building. The theatre building can be incorporated into the municipal heating network from the existing pre-insulated 2xDN200 heating network located under Składowa Street. Due to the above, the heating substation rooms should be located on the southern side of the planned investment, best if directly behind the building's external wall at the basement level.



planned route of heating network connection

existing heating network

In order to connect the new building, it will be necessary to run a separate heating network together with connections within the site involved in the competition. Depending on the land development plan for the site, the heating network may run along the walls, close to the buildings; due to the above we present the general rules of development and distances from the heating network:

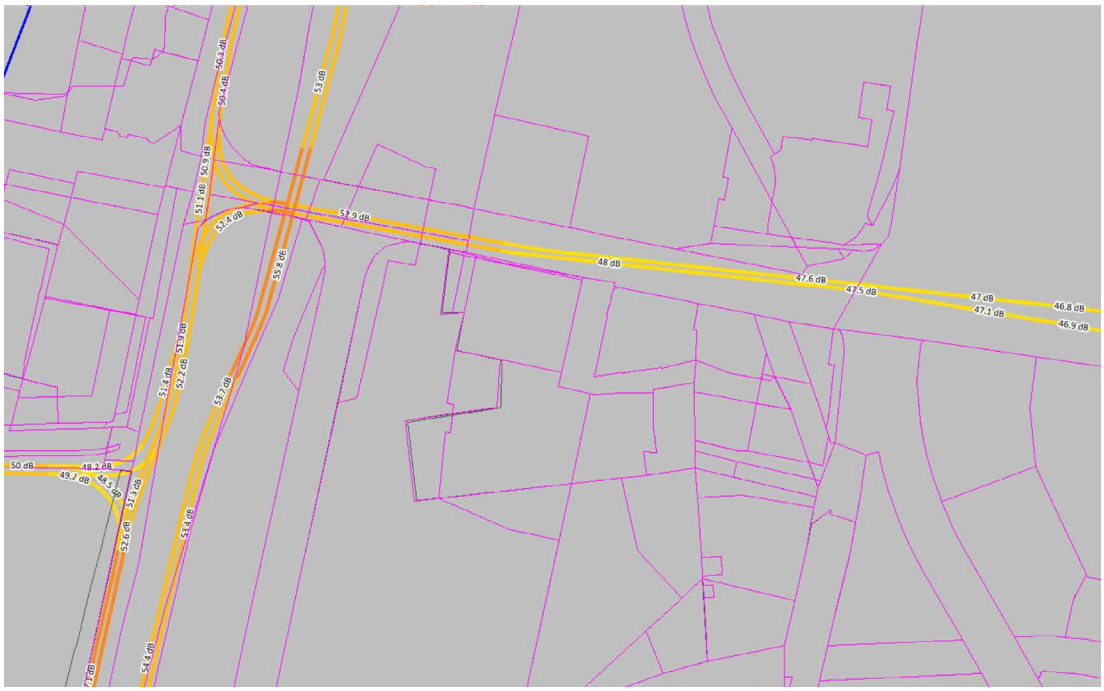
- between the face of the building and the clearance line of a heating network with pipeline diameter up to DN150 – a distance of at least 2.0 m should be observed,
- for pre-insulated underground heating networks, at this depth the building foundations should be deepened below the bottom of the network; the building's structure should be resistant to water at 125 oC temperature and 1.6 MPa pressure; securing the building is the responsibility of the constructor and investor;
- the entire length of the network should be provided with access for Veolia operating crews;
- no small architecture, trees or shrubbery are permitted in the working areas above the heating network.
- If constructing a parking lot, the pavement over the pre-insulated underground heating network should be made of dismantlable materials.

## 4.6 Noise emission

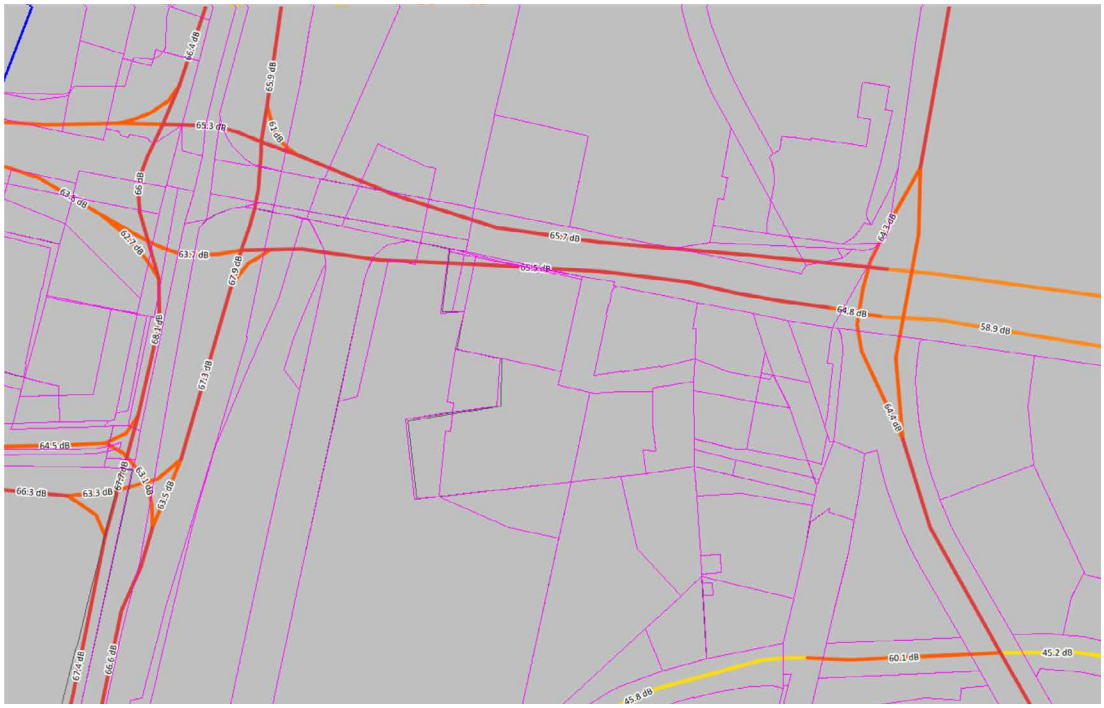
Railway noise emission (LDWN indicator) 2017

Railway noise emission (LN indicator) 2017

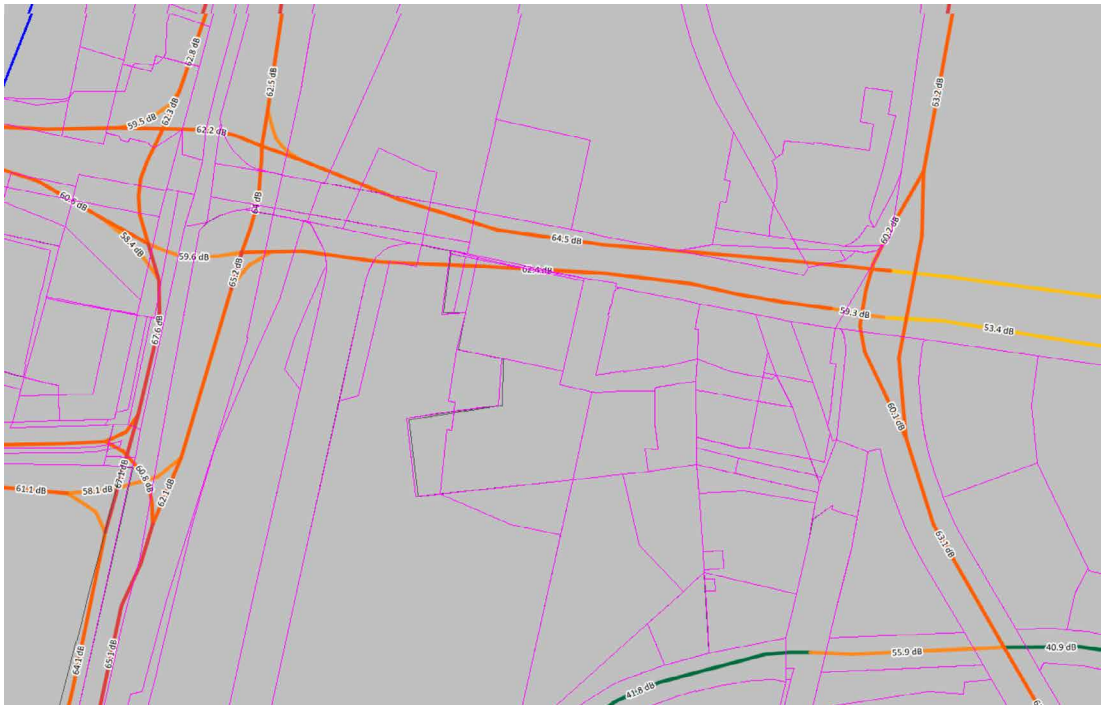

Tramway noise emission (LDWN indicator) 2017




Tramway noise emission (LN indicator) 2017

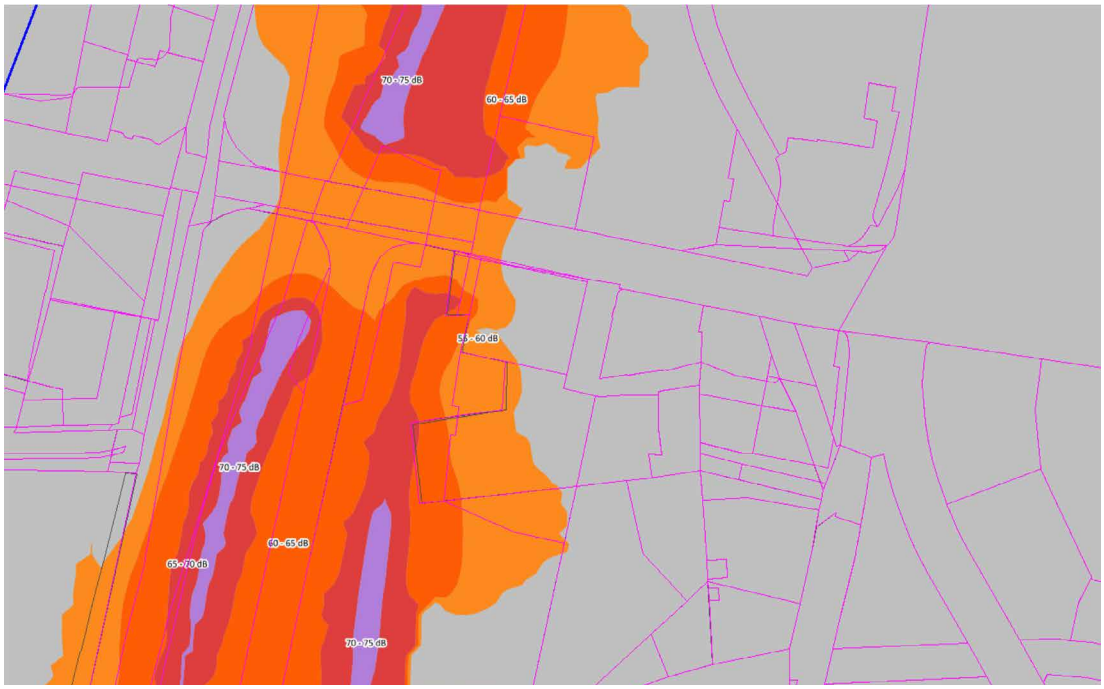



Road traffic noise emission (LDWN indicator) 2017



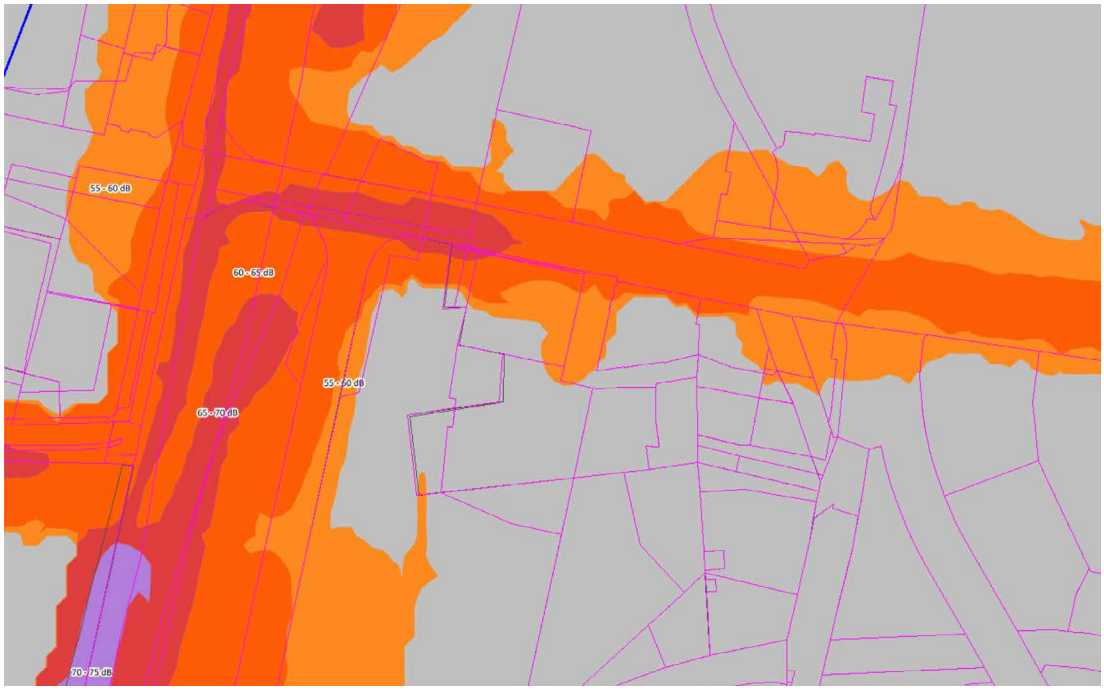

Road traffic noise emission (LN indicator) 2017

## 4.7 Noise immision



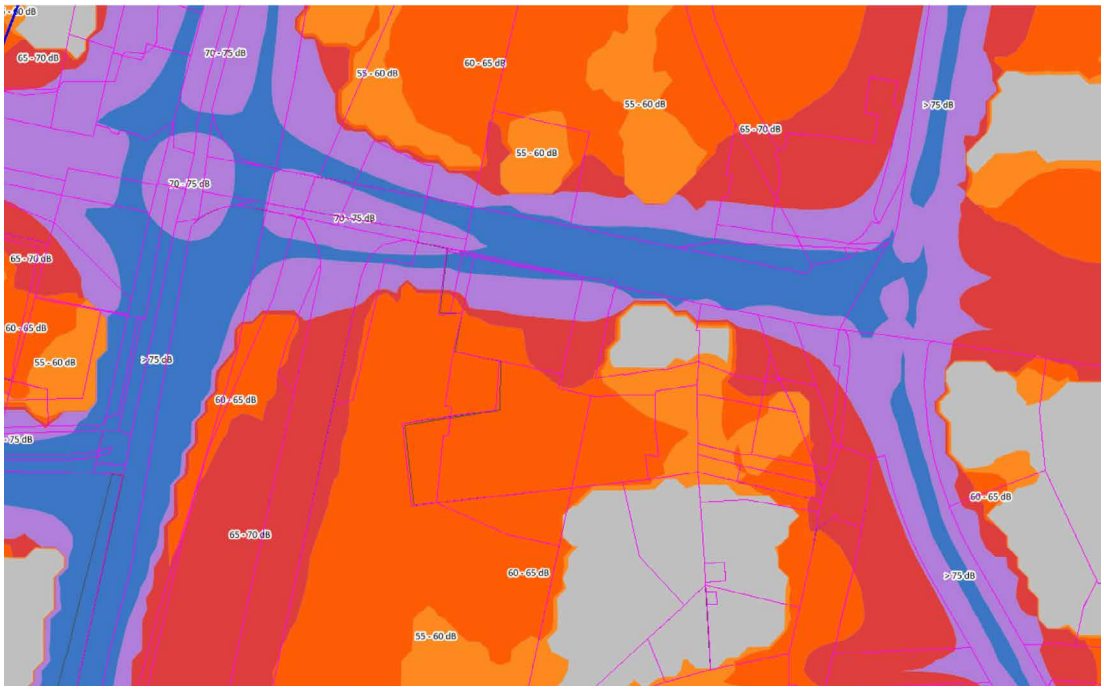

Railway noise immision (LDWN indicator) 2017


Railway noise immision (LN indicator) 2017

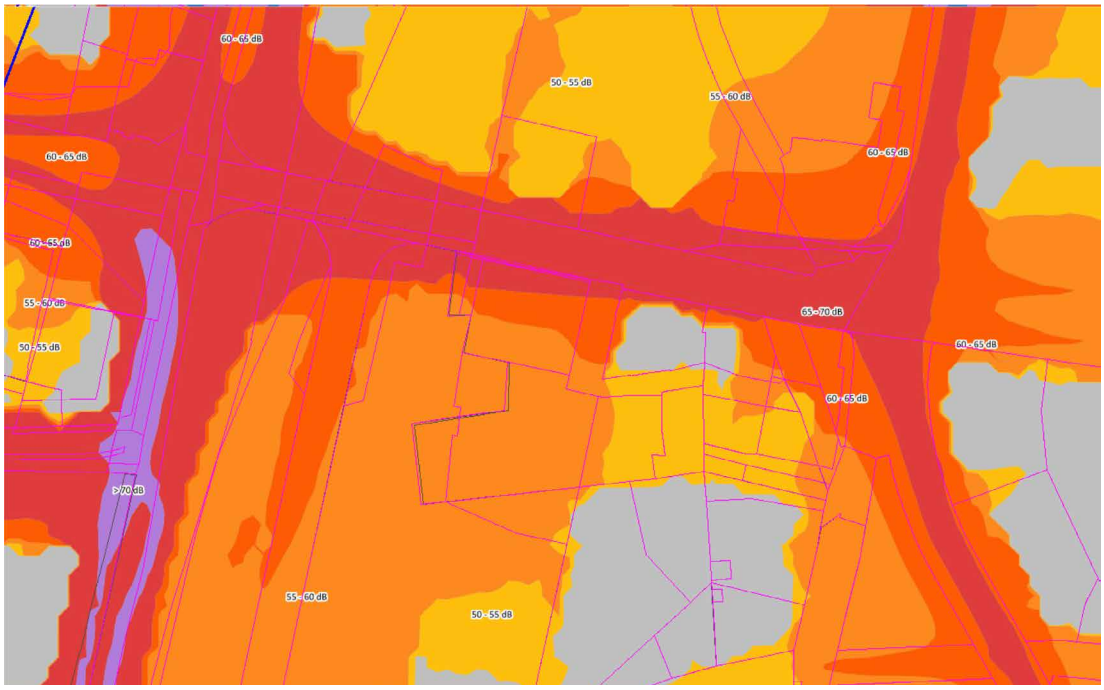



Tramway noise immision (LDWN indicator) 2017


Tramway noise immision (LN indicator) 2017




Road traffic noise immision (LDWN indicator) 2017




Road traffic noise immision (LN indicator) 2017

## 4.8 Determinants stemming from the proximity to the railroad (based on the directives of PKP Polskie Linie Kolejowe S.A.)

The provisions listed below apply in particular to the development of land in the direct proximity of railway lines:

- Act of 28 March 2003 on Railway Transport (i.e. Dz. U. (Polish Journal of Laws) of 2016, Item 1727, as amended)
- Regulation of the Minister of Infrastructure of 12 April 2002 on the technical conditions to be met by buildings and their location (Dz. U. (Polish Journal of Laws) of 2015, Item 1422)
- Act of 7 July 1994 Building Law (i.e. Dz. U. (Polish Journal of Laws) of 2017, Item 1332, as amended)
- Regulation of the Minister of Environment of 14 June 2007 on permissible noise levels in the environment (i.e. Dz. U. (Polish Journal of Laws) of 2014, Item 112, as amended)
- Regulation of the Minister of Infrastructure of 7 August 2008 on the requirements for the distance and conditions enabling the location of trees and shrubs, elements of acoustic protection and earthworks in the vicinity of railway lines, and methods of arranging and maintaining anti-snow curtains and firebreaks (i.e. Dz. U. (Polish Journal of Laws) of 2014, Item 1227, as amended)
- Polish Standard PN-85/B-02170 “Assessment of the harmfulness of vibrations passed by the ground to buildings”
- Polish Standard PN-88/B-02171 “Assessment of the impact of vibrations on people in buildings”

IThe Investor is obligated to employ technical measures ensuring the observance of the Acts and Regulations listed above. If the employed solutions are not sufficient, the Investor may not file claims against the railway line manager related to possible insolvencies (vibrations, noise) arising as a result of railway traffic.

At the same time, we would like to inform you that, according to the provisions of the act of 28 March 2003 on railway transport (i.e. Dz. U. (Polish Journal of Laws) 2016, Item 1727, as amended), structures and buildings may be located no less than 10 m away from the border of the railroad area, whereas this distance from the axis of the outermost railway track cannot be smaller than 20 m. On the other hand, earthworks in the vicinity of the railway

line may be employed at a distance of no less than 4 m away from the border of the railroad area. In particularly justified cases, deviations from the conditions listed above are permitted. Conducting earthworks within 4 to 20 m away from the border of the railroad area should be agreed with the infrastructure manager each time.

For all civil structures that are part of investments implemented on and crossing railroad area (e.g. linear structures), an approval should be obtained prior to their implementation, at the design development stage, from the Design Documentation Approval Team located at the PKP S.A. Property Management Division in Poznań, 8 Niepodległości Avenue, 61-875 Poznań

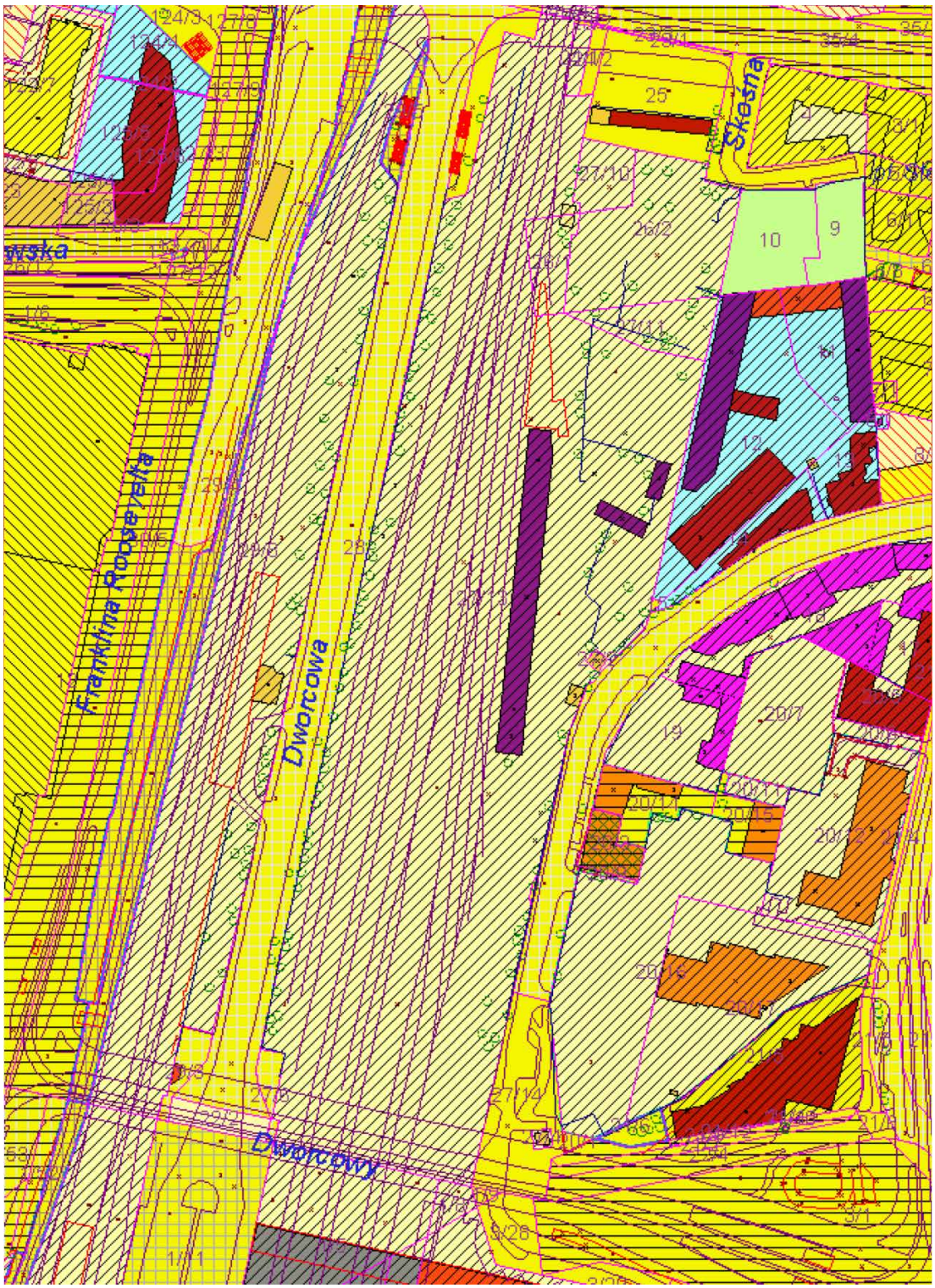
In the case of possible collisions between future investments and the existing civil structures (e.g. linear structures) owned by entities established as a result of PKP restructuring or privatisation, removal of these collisions will be carried out on the terms specified by the owner of the affected building and will not burden railroad entities with the costs.

It is prohibited to discharge rainwater on railroad areas or utilise railroad drainage devices or introduce non-treated and treated household sewage to railroad areas.

It is prohibited to deposit, gather or store waste on railroad areas.

On land located in the vicinity of a railway line, trees and shrubbery may be situated at a distance of no less than 15 m away from the axis of the outermost railway track.owane w odległości nie mniejszej niż 15 m od osi skrajnego toru kolejowego.

4.9 Ownership status



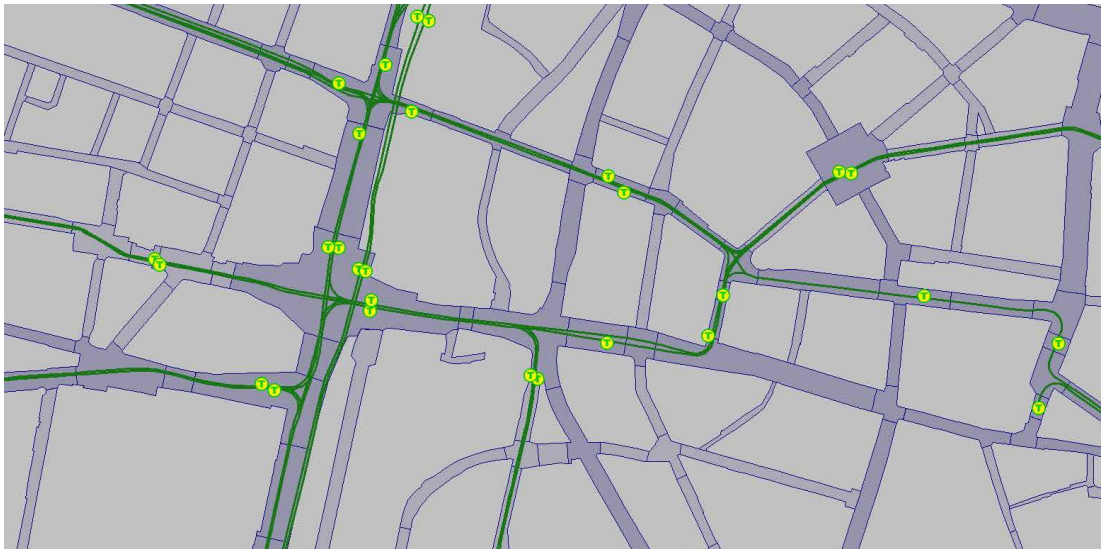
| | | | | | |
|---|---|---|---|---|---|
| 1 |  | City of Poznań | 1 |  | Fraction of property not encumbered with the rights listed in in Items 1, 2, 5 |
| 2 |  | Other local self-governments and local self-government units | 2 |  | Perpetual usufruct |
| 3 |  | State Treasury | 3 |  | Permanent administration |
| 4 |  | State Treasury Units | 4 |  | Administration |
| 5 |  | Churches or religious communities | 5 |  | Use |
| 6 |  | Cooperatives | 6 |  | Other kind of beneficial ownership |
| 7 |  | Other, institutions, enterprises, associations | 7 |  | Type of authorisation: Performance of the tasks of the public road administrator |
| 8 |  | Private property | 8 |  | Type of authorisation: Management of ST land covered in surface water |
| 9 |  | Unidentified owner | 9 |  | Type of authorisation: Performance of State Treasury ownership rights and other rights in rem (e.g. through AWRSP, WAM, AMW) |
| | | | 10 |  | Type of authorisation: Management of a ST property resource and communal, powiat and voivodeship property resources |

| Plot No | Area | Form of ownership | remarks |
|---|---|---|---|
| Poznań precinct 51, Sheet 44 | [ha] | Property City of Poznań | |
| 25 | 0.2500 | Perpetual usufruct City of Poznań | |
| 27/10 | 0.0644 | Perpetual usufruct City of Poznań | |
| 26/2 | 0.3432 | Perpetual usufruct City of Poznań | |
| 27/11 | 0.0981 | Perpetual usufruct City of Poznań | closed area |
| 27/13 | 4.2942 | Perpetual usufruct PKP | |

## 4.10 Communication determinants

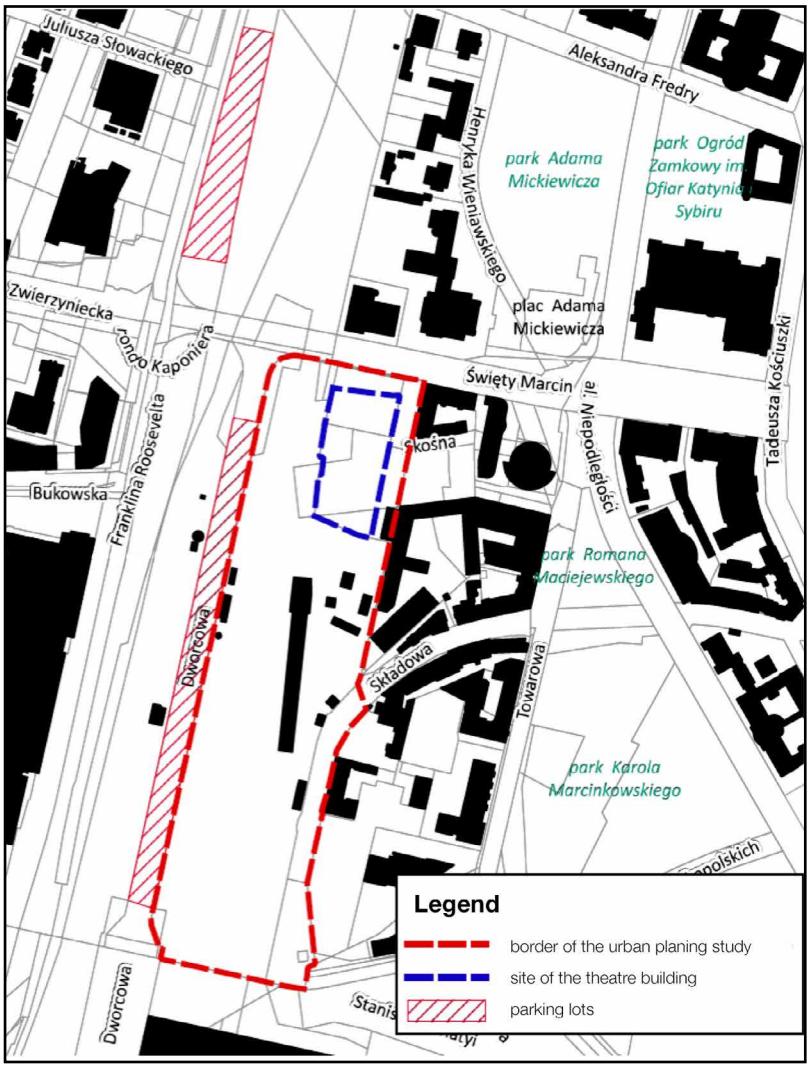
Due to its location in the strict city centre and the City's policy striving towards limiting the number of cars driving into the centre, the Ordering Party is planning to situate around 60 parking spaces in the Theatre building. The audience should be arriving to the performance via public transport, taxis or buses. Parking spaces for buses are planned along Dworcowa Street. Passenger cars will be able to use the underground parking lot located under the Kaponiera roundabout, offering 245 parking spaces.

Bus lines



Tramway lines

Source: ZGiKM GEOPOZ




Parking lot under Kaponiera roundabout- 245 parking spaces
Parking spaces for buses along Dworcowa Street

In order to ensure communication service for the Theatre building, the construction of a new road connecting Skośna Street with Składowa Street is planned. The width of the delimitation lines for the new street was determined within 16.15m-16.40m.

Entry road into the garage and delivery hall should be moved as far away as possible from the intersection of Skośna Street and Św. Marcin Street.

Św. Marcin Street will undergo remodelling starting with 2020. It is permitted to design an entry road/gate allowing for the temporary stoppage of passenger cars carrying the audience to the Theatre in place of the existing land features.

## 5. Guidelines for the Musical Theatre in Poznań

### 5.1 The theatre as an accessible building

The Musical Theatre, as a public utility building, should be designed to allow not only access, but also the freedom of use and participation in performances to all the inhabitants. Aside of persons with motor, sight or hearing disabilities, two more social groups should be considered during the design: children and older persons. The Theatre's repertoire includes performances intended for young audience (preschool children), therefore the building itself, and in particular the bathrooms, should be equipped in facilities allowing children to use the toilets by themselves. The Theatre building should be an answer to the needs of the ageing city community and include facilities for persons with limited movement, failing hearing and sight.

Attention should therefore be paid to the following issues:

- entrance to the building should contrast with the rest of the façade in order to facilitate orientation for visually impaired persons,
- persons on wheelchairs should be able to reach the auditorium without using the lift. An evacuation route should be provided for persons on wheelchairs, enabling them to cross it on their own.
- persons on (electric or active) wheelchairs should be provided with free access to the stage.
- entrances to the building, toilets and the performance hall should be automated (automatic or button-operated opening) and therefore easy to use for persons on wheelchairs.
- gates near the doors to the main stage auditorium situated the closest to the seats for disabled persons should allow for free wheelchair movement.
- auditoriums of both stages and the ticket offices should be equipped in inductive hearing loops facilitating communication for persons with hearing aids.
- row and seat numbers should also be labelled in Braille.
- aside of the toilets suited to the needs of persons on wheelchairs, toilets should also be adapted to the needs of children. The toilets should include toilet bowls, urinals, wash--basins and hand dryers suitable for the height of children.

- an additional strong point of the competition work will be facilities in the form of a mock--up of the building or a nursing room

The principles of universal design are described, among others, in:

- Włącznik projektowanie bez barier (Enabler, designing without barriers), Kamil Kowalski (www.integracja.org/wlacznik)
- Universal design handbook, Wolfgang Preiser, Korydon Smith

### 5.2 Land development guidelines

The construction plans should include lighting for the building and the site, allowing for illuminating the building in a specific colour or shutting the lighting off completely.

The site involved in the competition includes the "Area of ephemeral images" sculpture by prof. Jan Berdyszak – intended for relocation. The Organizer permits integrating the sculpture into the new land development.

The Ordering Party permits changes to the existing greenery (trees, shrubbery) if it is justified by the requirements of the adopted artistic and architectural conception.

The organiser allows for freedom of artistic expression and of the original proposal convention.

### 5.3 General function of the building

The Musical Theatre in Poznań offers a repertoire consisting primarily of entertainment productions for a broad audience. The theatre's audience includes persons of all age groups, including disabled persons.

The following should be provided for in the building:

- Entrance area, which should include a large foyer with cloakrooms for the audience, ticket offices, porter's lodge/security room, bathrooms for the audience, an information point, shop, etc. A reception/buffet hall and café/restaurant should be provided near the lobby, either on the ground floor or the first floor.
- Theatre hall area with facilities, consisting of the stage, proscenium/ orchestra pit, backstage, right wing and left wing, back wing, auditorium with balconies, server room for stage mechanics, prop room, audio switchboard, local lighting storage, thyristor room,

storage for the performance technical service, sound technician room with local storage, sound engineering cabin and light engineering cabin

- Multifunction small hall area consisting of a single room for the stage and auditorium, allowing for various arrangements of the stage and auditorium, sound engineering cabin and light engineering cabin.
- Ballet, orchestra, vocal ensemble rehearsal rooms, solo rehearsal rooms, stage director's rehearsal room.
- Administration area consisting of director and secretariat rooms, a small conference hall with kitchen facilities, the following departments: accounting, personnel, audience service, promotion and marketing office, artistic management, technical, production and purchasing and other departments, together with auxiliary rooms and bathrooms for the administration.
- Artistic division consisting of rooms for the artistic director, choir manager, ballet manager, orchestra manager, artistic work coordinator, tutors and accompanists, bathrooms.
- Artistic facilities – solo dressing rooms with bathrooms, orchestra dressing rooms with bathrooms, choir dressing rooms with bathrooms, ballet dressing rooms with bathrooms, guest dressing rooms functioning as hotel rooms.
- Technical department consisting of rooms for department managers, sound technicians, light technicians, mechanics operators, stage technicians, general building maintenance technician, BMS specialists, electricians.
- Area for storage rooms, workshops, ateliers with service rooms and social rooms.
- Employee buffet for around 100 persons.
- echnical rooms for connections, transformers, switchboards, central ventilation units, boiler rooms/heating substations, hydrophore plants, server rooms, etc.
- Area intended for internal communication, including general horizontal evacuation routes – corridors and staircases. The building should be also equipped in:

  - passenger lifts allowing for convenient pedestrian access to all the storeys, including disabled persons,

  - cargo lift/lifts allowing for transporting scenography components from storage rooms,

workshops to the stage, transport of props, costumes, musical instruments, including grand pianos. Size of the lift should be suited to the adopted architectural and functional assumptions.

Acoustic and technological requirements should be considered during design.

The generally accessible area should be clearly separated from other areas.

The server room for stage mechanics, prop room, audio switchboard and sound technician room together with the storage should be situated in close proximity to the stage.

The stage level should include the lighting storage, thyristor room, storage for the performance service, make-up room, hair-stylist workshop.

The sound engineering cabin and the light engineering cabin (the so-called foch) should be located within the auditorium – last rows of the auditorium.

Provide workshops, ateliers and internal storage rooms with collision-free communication, allowing for changes of scenography without utilising generally accessible (available to the audience) communication.

If possible, it is recommended to design a single kitchen servicing the café/restaurant and the employee buffet.

### 5.4 FOYER

Space for the audience is planned in the form of the so-called foyer with floor area of 1800 - 2000 m2 distributed on two or three storeys. The foyer space should include at least 4 permanent stations for the so-called drink bars with minimal facilities suitable for this type of functionality, at least 1 permanent station for a shop with souvenirs, programs and for an information desk. A sufficient number of toilets should be provided for the audience, situated on each floor or mezzanine floors. The small hall should be provided with independent – separate communication, foyer and drink bar and toilets. A café/restaurant for the theatre audience is planned in direct proximity, but also partial correlation. During the times when the theatre is not playing any performances, the café/restaurant should be open to anyone. The nature of the café/restaurant should tie in with the specifics of the theatre's operation. Independent facilities with electric and ventilation separation should be provided for the restaurant, as well as an independent delivery route. The ticket lobby should be separated from the foyer space, so that it is accessible to the audience at times other than during

performances.

## 5.5 THEATRE HALLS

Two performance halls are planned in the building: the main hall for 900 – 1200 seats and the small hall for 200 – 250 seats.

### MAIN HALL

The main hall auditorium should consist of the ground floor and one or two balconies, so that the distance of the last audience row from the stage portal was no greater than 25 m.

It is important that communication for the audience and performers and the technical service is connected within separate spaces – space for the audience and service space – the backstage. An important element the performance hall's function in the comfortable reception of the musical performance [visibility from any seat, good audibility (acoustic model)], as well as good communication with the theatre foyer, allowing for easy and safe movement of the audience stream. The theatre hall is should be optimised primarily for staging musical performances utilising the electroacoustic system. The varied numbers of performing musicians should be provided for.

The hall will house various other kinds of verbal and musical events, including popular music concerts, popular science shows, congresses with electroacoustic support.

The main hall may also serve the function of a recording studio and therefore the hall should be multifunctional in nature, with the primary intended use as a musical theatre utilising a sound system. The acoustic parameters of the hall should be permanent and suitable for the function performed. The parameters should be suitable for verbal and musical events performed with the support of an electroacoustic sound system (e.g. musical performances, popular music concerts, lectures, etc.). Interior acoustic conditions should be designed as permanent both with an empty and full auditorium. The acoustics of the designed hall should be analysed using the statistical method and the geometrical acoustics method. The statistical method should be used to analyse the reverberation conditions in the hall and selected acoustic parameters, while the geometrical acoustics method should be utilised to analyse echograms in the auditorium, determining the acoustic parameters of the hall based on impulse response of the hall and verifying the parameters obtained with the statistical method. It is assumed that the final design values will be selected at the design stage, once the line and form of the acoustic ceiling and wall lining have already been worked out, and therefore once the final cubic capacity of the auditorium is known.

Summarising the recommendations above, the design reverberation value should be Tm = 0.8 – 1.0 s. Good speech intelligibility (STI : 0.7) should be provided in the hall on 90 percent of the auditorium area. An increase in reverberation time is permissible for low frequencies; a constant value of reverberation time within the described range is required for medium and high frequencies.

Sound clarity in the auditorium with an audience expressed with the C80 parameter should be no less than 6 dB. Unevenness of the sound pressure level in the entire auditorium should not be greater than 3 dB in the entire acoustic range intended for the hall use assumptions.

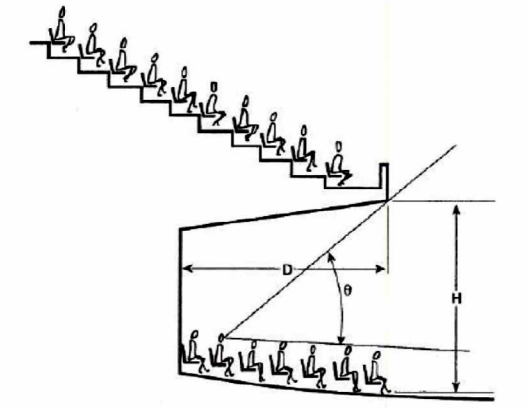
The shape of the acoustic ceiling and the acoustic wall lining should be developed based on 3D geometrical acoustic modelling, taking into account the standard requirements related to energy/direction/time of acoustic reflections reaching the audience in relation to the wave coming in directly from the stage. No early reflections occurring in the hall as a result of the operation of the electroacoustic system are permitted. Architectural components should be designed in a manner eliminating any possible early reflections.

Based on the echogram analysis, the hall geometry should be optimised by the precise selection of the shape of the ceiling and the components having an impact on achieving the required acoustic parameters.

The geometry of components surrounding the proscenium and the auditorium should be optimised based on energy radiated towards the auditorium and towards achieving proper acoustic conditions, among others good mutual audibility of musicians and actors within the stage, orchestra pit and proscenium area.

The design documentation should provide for and describe the procedure for the acoustic tuning of the hall during its construction, in particular in the final phase of finishing works.

WITH RESPECT TO ACOUSTIC PARAMETERS, THE SAME ONES CAN BE ASSUMED FOR BOTH THEATRE HALLS.




It is very important that, when designing the depth of balconies in relation to the lower storey, dimension “D” was not greater than dimension “H”.

Otherwise, the reach of the reproduced sound will be limited and disadvantageous acoustic phenomena – resonances – will occur.

Dwg 1 Indication of the auditorium design algorithm ( Acoustics – Theatres and Concert Halls – Francisco Santiago, 1997 )

In the orchestra pit and on the stage, signal connections should be provided for connecting the orchestra, connecting audio signals for theatre performances and concerts using the sound system, with the ability to record multiple tracks and connect an induction hearing loop for the deaf and hard of hearing.

It is recommended to use per-area adjustable lighting. Controls for the architectural lighting of the hall have to be connected with stage lighting control system, providing the lighting director with full control over the lighting in the hall during performances.

The theatre hall should allow for conducting multimedia presentations, displaying visualisations, etc. using a projector located in the projection room, the sound system installed in the hall and a mobile rostrum placed on the stage as needed.

The following concert hall technology components should be provided:

1. Stations for the sound and light directors inside the sound and light director’s cabins. Furthermore, light and sound director’s stations should be provided for in the auditoriums of both halls. The light director’s station in the cabin can be openable to (connected with) the hall space by, e.g., opening a window. The sound director’s cabin has to be closed and the partitions separating it from the theatre hall have to meet the requirements concerning the minimal sound reduction indices, which will be provided at the construction plans stage. An openable window should be placed in the partition between the sound director’s ca-

bin and the theatre hall, for which requirements concerning the minimal sound reduction indices will also be provided at the design stage.

2. Rooms intended for the central units of technology systems – amplifier room, thyristor room, central video matrix, network switches. It will be necessary to run several electrical circuits to these rooms from the separate secondary switchgears. It will be necessary to reclaim several dozen kW of thermal power from this room. The room should be well-communicated with the director stations and also well acoustically insulated from rooms with qualified acoustics.

3. Storage for musical instruments with temperature and humidity controls, located on the same storey as the stages of the theatre hall and the small hall.

4. Technical ceiling, enabling:

a. access for servicing the hall mechanics equipment,

b. access for servicing the hall lighting,

c. running the ventilation system,

d. running the cabling,

5. Speaker equipment. Due to the multifunctional nature of the hall, the use of a sound system should be assumed. Speaker equipment has to be mounted on special mounts in the technical ceiling in in such a manner that they do not obscure the scene window for any of the seats in the auditorium. Furthermore, a sound system should be provided for, giving the ability to create spatial 3D sound and change the location of the sound source.

6. Signal and power connections allowing for connecting musical instruments, microphones and playback equipment, situated primarily on the stage, in the orchestra pit and on the proscenium and in the sound director's cabin and at the sound engineer's station in the auditorium; they should be made in digital optical fibre technology ensuring lossless transfer of audio signals.

7. System for audio hall monitoring and verbal orders to dressing rooms, rehearsal rooms and to the theatre hall and the small hall.

8. Mounts for stage lighting:

a. mobile - at least 4 electrically powered lighting bridges above the stage,

b. at least 3 lighting slots above the auditorium,

c. mounted permanently to the auditorium side walls.

9. Decorative stage barrels – at least 50 pcs: in the main stage box (at least 40 pcs) + stage barrels in side wings and the backstage (at least 10 pcs)

10. Stage barrel with unfolding or permanently stretched projection screen.

11. Stage barrels allowing for mounting side backdrops or legs.

12. Curtain mechanisms.

### REHEARSAL ROOMS

Rehearsal rooms should be optimised primarily for rehearsals of individual artistic ensembles.

- Orchestra rehearsal room (also serving as a recording studio). Despite the smaller cubic volume, reverberation time correlated with the conditions in the orchestra pit of main hall. The room has to support the individual orchestra sections hearing each other. An option to adjust the reverberation of the orchestra rehearsal room using a passive system (banners), allowing for in-room tuning depending on the orchestra composition, instrumentarium and the repertoire being rehearsed.
- Choir rehearsal room. A room with acoustics supporting the cohesive sound of the choir and, at the same time, enabling the individual choir singers to hear each other.
- Vocal rehearsal rooms allowing for staging vocal rehearsals with grand piano accompaniment and staging rehearsals of individual orchestra sections.
- Ballet rehearsal room, at least as large as the play area on the stage and proscenium of the main hall. The room has to be designed with acoustic adaptation ensuring good control of the measure despite the need to install a large number of mirrors.

The acoustic design of the rehearsal rooms should use the wave and statistical theories and elements of geometrical acoustics.

Wave theory should be used for the modal analysis of the shape and proportions of the rooms and to determine the type, number and locations of low frequency sound absorbing structures.

Statistical theory should be used to determine the type and required number of wide band sound absorbing materials and structures in order to achieve the assumed reverberation conditions.

Geometrical theory should be used for echogram analysis and also for the proper shaping of the internal surfaces of the rooms and covering them with suitable material.

## SOUND AND LIGHT DIRECTOR'S CABINS

Sound and light director's cabins serve the following functions:

- servicing events organised in the main or small hall,
- recording sound materials from the main hall, small hall, orchestra rehearsal room, choir and vocal rehearsal room,
- preliminary quality assessment of the recorded material,
- basic edition and work on the recorded material,
- light engineering for the main hall and the small hall.Connections to the stage manager communication system should be provided on the right and left sides of the portal.

Because of this, the sound director's cabins should allow for the correct assessment of the quality of the sound material and aware work on it.

The acoustic design will use the wave and statistical theories and elements of geometrical acoustics.

Wave theory should be used for the modal analysis of the shape and proportions of the rooms and to determine the type, number and locations of low frequency sound absorbing structures.

Statistical theory should be used to determine the type and required number of wide band sound absorbing materials and structures in order to achieve the assumed reverberation conditions.

Geometrical theory should be used for echogram analysis and also for the proper shaping of the internal surfaces of the rooms and covering them with suitable material.

Proportions of the sound director's cabins should if possible meet the Bolta, Bonello and AES/EBU 1, 1 criteria.

The dimensional proportions and geometry of the cabins should be chosen to minimise sound undertones at low frequencies and prevent adverse acoustic phenomena from occurring.

The acoustic adaptation arrangement should be suitable for correct sound playback in the 5.1 system.

The design value of reverberation time for the sound director's cabins will depend on their resultant cubic volume. At this stage it is assumed that it will fall within 0.2 < Tm < 0.25 s.

Structures absorbing low frequencies and their location on internal surfaces of the cabin will be chosen based on the modal analysis.

Proper selection and arrangement of sound absorbing materials and structures should ensure the required reverberation time characteristics. Using dispersal structures should ensure s lively and natural sound in the cabin.

Multitrack recording and the use of a visual monitoring system are planned. The cabins have to allow for multitrack sound recording from the theatre hall, small hall, orchestra rehearsal room, choir rehearsal room and for high quality video recording.

A digital system based on optical fibre technology and an agreed number of analogue channels should be provided for the transmission of audio signals.

Full and fluid control over the room lighting is required in the cabins.

Control over the sound and lighting system will be implemented using mixer consoles or controllers located in the light and sound director's cabins. Furthermore, it must be possible to stage performances and concerts fully from the engineer stations located in the auditoriums of the main hall and the small hall.

Furthermore, the ability to work on the recorded material is assumed for the sound director's cabin.

### AUDIENCE AND STAGE SERVICE AREAS

For the areas where the following functions are located:

- ticket office,
- restaurant/café/buffet,

- cloakroom,
- foyer,

the possibility of reverberation noise should be first and foremost limited.

Statistical theory should be used in the acoustics design.

Statistical theory should be used to determine the type and required number of wide band sound absorbing materials and structures in order to achieve the assumed reverberation conditions.

The acoustic adaptation of the described areas will allow for minimising the reverberation noise and will have a positive impact on speech intelligibility. Sound absorption class A or B materials should be used in the rooms. Sound absorbing materials should be introduced primarily in the form of a sound absorbing ceiling and wall lining.

TECHNOLOGICAL EQUIPMENT

The need to equip the building in the following systems and stage and studio technology components should be provided for:

- electroacoustic system,
- stage lighting system,
- work lighting on the stages,
- video projection and presentation system,
- comprehensive stage manager system, including:
- two-way cable and wireless communication system,
- public announcement and stage audio monitoring system,
- light-based action confirmation system,
- technical monitoring system,
- intermission bell system,
- synchronised clocks system,
- stage mechanics:
- stage trapdoors,

- stage trapdoors in the orchestra pit,
- rotating stage,
- lighting bridges,
- stage barrels,
- curtains, legs, backdrops,
- information and advertisement system.

## COMMUNICATION

Unconstrained communication should be provided between the main hall with facilities, small hall with facilities, the rehearsal rooms, the sound and light director's cabins, engineer stations in the auditoriums and technical rooms. Listening microphones in the concert hall and announcement speaker equipment situated in each of these rooms are planned for this purpose. Furthermore, an independent cabled and wireless communication system integrated with the stage manager system should be provided.

## ROOMS PROTECTED AGAINST NOISE

- rooms where sound protection is particularly important due to the function they serve, for which the requirements will be specified individually:

- main hall with facilities;
- small hall with facilities;
- sound and light director's cabins;
- rehearsal rooms.

All the rooms listed above should be protected against:

noise originating outside the building,

- interior noise as a result of using the building's rooms according to their intended use,
- noise originating in the building's internal systems.

- room without sound protection.

Rooms protected pursuant to general regulations will also be protected against reverberation noise.