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LA AGUACATALA: INTERMODAL STATION

MASTERS THESIS

PABLO PELÁEZ PÉREZ CZECH TECHNICAL UNIVERSITY IN PRAGUE



FAKULTA ARCHITEKTURY ČVUT V PRAZE

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Where is the project taking place?

CONTEXT

Medellin and the Aburra Valley

Medellin, Colombia is the second biggest city in the country with a population of over 3.5 million people and if put together with the greater metropolitan area of the Aburra Valley its total population rises to over 5.5 million inhabitants.

Located in the middle of the Andes Mountain chain, Medellin serves as the main population center of the greater Aburra Valley Metropolitan area, an administrative organization composed of several municipalities which put their resources together to guide the urban development of the area.

The social and cultural transformation of Medellin since the late 1980s is a remarkable journey from a city plagued by violence and drug-related crime to a model for urban innovation and general development. In the late 1980s and early 1990s, Medellin gained international notoriety for being one of the most dangerous cities in the world, due to the activities of drug cartels and armed conflicts.

However, beginning in the late 1990s, Medellin embarked on a transformative path to change the turbid reality the city had. Local leaders and residents worked together to implement comprehensive social and urban development initiatives. One key aspect of this transformation was the investment in education and cultural programs. The construction of innovative public spaces, libraries, and educational institutions aimed to create opportunities for learning and better community engagement.

The implementation of the Medellin Metro system, starting in 1995, played a pivotal role in fostering social integration and economic development. By connecting different neighborhoods and supplying reliable transportation options, the metro became a catalyst for positive change. The development of cable car systems, such as the Metrocable, further enhanced accessibility to previously marginalized areas in the hills surrounding the city, fostering social inclusion, and breaking down socio-economic barriers. Nowadays the city fosters several social and cultural events of national and international renown as the Festival of Flowers and the Lights Festival, which celebrate the city's cultural heritage and memory. The transformation of Medellin serves as an example of how a city can overcome adversity through innovative urban planning, community engagement, and a collective commitment to building a brighter future. Today, Medellin stands as a testament to resilience and progress, attracting attention for its positive turnaround and serving as an inspiration for conscious urban development.

TERRITORIAL PLANNING TOOLS AND CONCERNING LAWS:

The concerning law frame for the project include all the corresponding building codes such as the NSR-10, the Formulario Unico Nacional (FUN) to be granted a building permit and relevant documents such as the Public Space Design Manual from the city of Medellin which will determine certain characteristics of the projects design.

Territorial Ordinance Plan (POT)

The Plan de Ordenamiento Terrritorial (POT) is the main urban planning tool in any city in Colombia, revised every certain year it defines the main guidance for building projects in the city and where the urban development is heading.

The city of Medellin, the current POT dates from 1999 and can be summed up as "growing to the inside" which aims at creating a more compact city, reducing distances, a healthy mix of diverse uses, renewing the city center into a more attractive area and pushing back against the unplanned informal expansions present at the hillsides while focusing on attracting people towards the main mass transport infrastructure along the Aburra River to ease the ever-growing traffic and create better live quality for everyone involved.

The role of the POT throughout the years of urban renewal the city has undertaken in the last 25 years is fundamental to the 180 degrees turnaround it has had, allowing for better public space infrastructure with initiatives like Library parks, Cable car public transport lines to previously unreachable neighborhoods, development of urban scale infrastructure such as the planetary, Ruta N and recreational tactical developments around the city. The POT has fourteen areas and principles in which it focuses on¹:

- 1. Articulating regional and metropolitan territories.
- 2. A compact city which grows towards the inside and promotes coexistence.
- 3. Limiting peripheral uncontrolled urban growth.
- 4. Ecological structure and inherent risk management.
- 5. Protection and renewal of rural land.
- 6. Protection and revitalization of the city center as a metropolitan centrality.
- 7. Promoting economic development and competitiveness through the territorial model.
- 8. Sustainable transport infrastructure.
- 9. Public Space.
- 10. Urban system of centralities.
- 11. Habitat and housing policies.
- 12. Management and financing instruments.
- 13. Institutional adjustments for better territorial control.
- 14. Participatory management.

The POT functions as the main guideline for any project to be developed in the city and all its principles should be kept in mind, as transport infrastructure is fundamental to urban growth and economic development the expansion of the Metro system and the creation of a transport HUB in the Aguacatala station is coherent with these values and principles as the expansion of public infrastructure such as schools, universities, mixture of uses and encouraging higher housing density along the Aburra river help at making this area of the city more appealing to users and developers.

¹ Plan de Ordenamiento Territorial de Medellin 2014-2027 (2014)



Figure 2 - Plan de Ordenamiento Territorial (2014), Urban growth and occupation model.



Figure 3 - Plan de Ordenamiento Territorial (2014), Scheme showing how the POT purposed public space guidelines align with the principles of growing towards the inside.

In conclusion, the Territorial Ordinance Plan (POT) serves as a vital framework guiding urban development in Medellin. As it put together essential building codes and regulations, the POT, with its focus on urban growth and consolidation along the Rio Aburra and the river corridor, transforms what was once a physical barrier into an opportunity for connection. By adhering to the POT's principles, including a compact city model, sustainable transport infrastructure, and the revitalization of centralities, the city has undergone a significant turnaround in the past 25 years. The POT's emphasis on public space, economic development, and participatory management aligns with the ongoing efforts to expand the Metro system and establish a transport hub at the Aguacatala station. This integration promotes a more appealing urban environment through the expansion of public infrastructure and diverse uses along the Aburra River, contributing to enhanced livability and economic developments for all the existing urban actors.

However, despite the clear guidelines provided by the Territorial Ordinance Plan (POT), navigating the development landscape is not without its challenges. One significant barrier comes up from the need to strike a delicate balance between promoting urban growth and maintaining ecological balance, especially when dealing with the delicate ecological structure and inherent risk management outlined in the POT. Managing perimetral uncontrolled urban growth presents another challenge, as the city seeks to curb informal expansions on the hillsides while fostering a healthy mix of uses and higher housing density. Additionally, the task of articulating regional and metropolitan territories demands coordinated efforts among various stakeholders with their own individual interests, necessitating effective communication and collaboration. The POT's comprehensive nature, while providing a robust framework, requires extra consideration and strategic planning to ensure that each project aligns with its principles and contributes to the overall sustainable development and cohesiveness of the city.





Figure 4 - Daoss, Aguacatala station from the highway

Site Analysis

The Station:

La Aguacatala Station is found towards the lowest part of the commune of El Poblado, the southernmost commune of the city and shares a border with the following municipality of Envigado. Placed along the Aburra River, known locally as Medellin River, it shares the riverbank with the highway system, the sum of the river, the metro system and the highway create both a physical and mental barrier for the inhabitants of the city.

This barrier can be shown not only from anecdotal perceptions from users but from measurable data as you compare statistics from both sides of the river.

Healing this divide is no simple task and after several years of urban planning policies and changing the priorities of the Master plan some advancements can be seen in other areas of the city, from these cases we will try to apply what worked and learn from what didn't. Currently the system handles around 1.536.377 passengers daily on a regular weekday, and even with the high demand it has it has been only 15,7% of daily commutes of urban users. ²

Enhancing the adoption of a comprehensive transportation system stands as a key focal point for future initiatives, with the overarching goal of establishing a more sustainable transportation ecosystem within the city. The municipality is actively pursuing various strategies to achieve this objective. These include the expansion of cable car networks, with several projects currently in discussion and exploratory stages. Additionally, efforts are underway to augment the capacity of existing metro wagons, refurbish the current fleet, and implement the construction of the Light Metro System along the 80th Ave. Moreover, plans are in motion for the development of the future River Train—a proximity railway system linking the city to satellite municipalities along the Rio Aburra. This system will extend both north and south, ultimately connecting industries in Medellin to the coastal freight port in the Uraba region.

Through the implementation of these strategic initiatives, the transportation system aspires to enhance its attractiveness while concurrently discouraging the preference for private modes of transportation, such as cars and motorcycles, among individuals.

While implementing these strategies, it is important to focus on the enhancement and modernization of various transportation nodes. A pivotal aspect of this initiative is the renewal project for the Aguacatala Station, which serves as the inaugural station within the municipality of Medellin connecting existing metro lines, the 80th Ave Light Metro Lines, the River Train, and other urban entities. Situated near the Aburra River, the Aguacatala Station presents a unique opportunity to systematically address both the physical and mental barriers that the river has inadvertently posed in the city's landscape. By strategically intervening this station, not only can it integrate diverse transportation modes, but it can also serve as a transformative catalyst in redefining the city's

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² Metro de Medellin, Sustainability Report (2022).

relationship with the Aburra River, turning what was once perceived as a barrier into a significant opportunity for urban connectivity and cohesion.



enero 1	4.	2024	

		1.9,0	28	
D	0.07	0.15		0.3 mi
		-1		1
n	0.1	0.2		(Alberto)





LAND USES

POT48-2014: General assigned land uses:

Existing Public Space

- Projected Public Space
- Public infrastructure areas
- Low mixture areas with predominant housing character



SOURCE: Alcaldia de Medellin

0.4 km

0.1

0.2



URBAN WATER WAYS SYSTEM



Figure 7 - Alcaldia de Medellin, User generated scheme.



FLOODING RISK BY AREA



Figure 8 - Alcaldia de Medellin, User generated scheme.



TERRITORY ORDINANCE PLAN (POT)

Figure 9 - Alcaldia de Medellin, User generated scheme.



ROAD ARTERIES HIERARCHY

Figure 10 - Alcaldia de Medellin, User generated scheme.

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ADMINISTRATIVE LIMITS

Figure 11 - Alcaldia de Medellin, User generated scheme.

Neighborhoods and administrative areas



SOCIOECONOMIC STRATIFICATION

Site visited on January 14

Socioeconomic Stratification:





The Colombian Estrato system is a social stratification system with six levels (1-6), classifying households based on their neighborhood's socio-economic conditions. It determines the allocation of public services and subsidies, with lower levels receiving more assistance and higher ones contributing more for utilities.

Figure 12 - Alcaldia de Medellin, User generated scheme.



PROJECTED HOUSING DENSITY

Figure 13 - Alcaldia de Medellin, User generated scheme.

44,974 - 58,403



ROAD ARTERIES HIERARCHY



->-- Unified roads

Road Directions

SOURCE: Alcaldia de Medellin

Vehicular restrictions

Double way road



PUBLIC SPACE INFRASTRUCTURE

2



Figure 15 - Alcaldia de Medellin, User generated scheme.



enero 14, 2024



Figure 16 – Alcaldia de Medellin – Aguacatala Station Surrounding áreas.

Project Typology:

TRANSPORT HUBS AND THEIR CHARACTERISTICS:

A multimodal transportation center is a type of building complex in which several transportation modes are present, and passengers are to go from one to the other. They are articulated around heavy railway lines and lesser user-capacity modes of transportation orbit around this. Some other modes of transportation present are:

- Commuter trains
- Metro
- Tram
- Cable car systems
- Pedestrian access
- Bicycle lanes.

The creation of such a building complex makes it easier for commuters to use multiple modes of transportation.

Multimodal transportation centers attract users through design elements such as³:

- Shops and restaurants.
- Adequate and attractive walkways, bike facilities, and vehicle access and parking.
- Appropriate bus facilities.
- Accessible platform areas for rail lines.

In our case the Aguacatala station will become the connection point between the existing metro line, the currently under construction 80th avenue Light Metro system, the existing feeder bus routes and the future proximity railway, sum to this the existing highway system that runs along the site, the need for more bicycle lines and the possibility of

³ TRPC (2016)

expansion for the tram lines along the Poblado Av, and we have a highly relevant and demanding project in our hands.

Program demands:

While seeing the current conditions of the station, future transportation means to be included and the demands of the project typology I present a schematic of the spatial program demands by such project.



Relevance of connecting Transportation Systems:

La Aguacatala Station will become the connecting point for the existing metro system, the currently under construction Light train System of 80th avenue and the planned interurban train system on its first stage, becoming a transport hub for multiple transport systems in the city of Medellin.

Because of this, a relevant project to be developed is updating the existing Aguacatala Station to fulfill the future demands of the upgraded multimodal transport system.

PLANNED RELEVANT TRANSPORT INFRASTRUCTURE:

80TH Avenue Light Metro System

Due to the future developments planned for the city and the importance of La Aguacatala station in the system as the connecting node between the proximity railway, new tram line, existing metro line and non-preferent bus lines we think its relevant to examine where these lines will be connecting, their extension and future expansions that should affect the design outcome.

The city has faced difficulty in developing new metro lines due to the sharp incline of its topography in a longitudinal axis in relation to the Medellin river, because of this it has prioritized cable-car lines that have the ability to reach places that would be unreachable before, dutifully so it has prioritized marginal neighborhoods but now after 28 years of public transport infrastructure development and with 8 cable car lines already built and over 4 more lines planned the city is focusing on expanding the capacity of the network and making it more appealing to the middle to high class population of the city that still prefers cars or motorbikes.

This push to make its means of transport capable of handling higher capacities of passengers in a more efficient way has resulted in looking back at railway-based means of transport, the first tram line was built inside of the city center in the past years and currently the city is focusing its efforts on building the 80th Av Tram which would venture into creating a new connection between La Aguacatala Station and Caribe Station which

currently serve the main metro line. This transport system has changed through the planning faces, going from a traditional tramline, and turning into a light-load metro system. The planning department has given the system priority over car transit and included segregated circulation for it, removing the chances of it sharing space with ongoing traffic, a problem the existing tram line has met.

This separation from existing traffic would only take place on the main intersections of the 80th Avenue and would take advantage of existing bridges that allow for undisturbed transit to car traffic, this will be destined exclusively to the Light Metro line.

The third stage of the new 80th Av Light Metro line will connect with La Aguacatala station, which, in turn, is planned to be the main station for the new proximity railway system.



Figure 17 - Metro de la 80, Planned path.



Figure 18 - Metro de la 80, Visualization of green corridor.



Figure 19 - Metro de la 80, Visualization of green corridor.



Figure 20 - Metro de la 80, Visualization of green corridor.

National railway infrastructure planned for the following years:

The region of Antioquia was an important promoter and builder of railway infrastructure since 1874 as one of the industrial centers of the country, it had a healthy railway infrastructure until the 1950s in which it was sold to the national government and it slowly deteriorated and lost maintenance, investment and in the end became just a touristic route connecting the city of Medellin with the town of Cisneros until 1999 when it ceased service.

With a renewed interest in rebuilding and expanding railway infrastructure as part of a national effort to build more efficient transport infrastructures for goods and passengers, Medellin becomes the center once again for this initiative as it is the city with the more complex system of public infrastructure in the country and still a powerhouse of economic development for the country.

Upcoming Lines:

The railway lines purposed for varied economical, freight, population density and national relevance are the following:

- **Uraba Train:** Connecting Medellin with one of the most important ocean ports of the region.
- **Green Line:** Connecting Medellin with one of the agricultural regions and population centers.
- River Train: Intermunicipal suburban railway system.
- **Train of the Pacific:** Connecting to an isolated rea of the country due to geographical challenges.
- **Train of Coffee:** Connecting to one of the main touristic region destinations of the country.
- Medellin Bogota intercity high speed train line.
- Pan-American intermodal connection.

The importance of public participation in public infrastructure development:

One of the most significant challenges facing the new development of rail infrastructure is effectively communicating and gaining unified political support for the new transport system. This challenge has intensified as economic interests push back, worsened by the physical challenges posed by the drastic topography of the Andes Mountain chain and local security threats stemming from the historical internal conflict the country has endured since the 1960s. Despite these obstacles, it is remarkable that the new expansion initiative has advanced to the point it is now and construction has already begun.

Some of the benefits the new railway infrastructure will bring to the passenger and freight transport landscape of the region and country are unprecedented. It decreases commuter travel times within the city and connects it to the coastal region of Uraba while creating jobs. Additionally, it decreases CO2 emissions by an equivalent of 567,809 tons per year and disincentivizes personal car use, reducing traffic congestion and the mortality on the streets.

Importance of urban scale project in urban growth:

When the Metro system was being developed, the city was going through one of its darkest eras with drug cartels and a deteriorated urban fabric. Even if the project went through, the expected success and adoption by people was in doubt. In light of this, local authorities saw an opportunity to take advantage of a paradigm-altering city-wide change that the new metro system would bring and came up with a solution.

Facing challenges during construction due to security concerns and lack of funding, the construction was halted between 1989-1992. An opportunity was identified in using the new transport infrastructure as a framework to build a new sense of belonging and individual ownership for people towards the Metro System and the city it runs through. A program called "Metro Culture" was created.

Metro Culture is understood as the result of the social, educational, and cultural management model that the Metro as an entity has built, consummated, and delivered to the city. Starting in 1988, the Company set out to generate a new social program targeting

the inhabitants of the Aburrá Valley. first, relationships of trust were established with the future neighbors of the Metro stations, by interacting and talking directly to them, generating a sense of belonging and a feeling of care and preservation towards the transport system. (Metro De Medellin 2024).

"After 1994, the strategy was strengthened with a school car located in the convention center, now known as Plaza Mayor, and even a school-station in the Alpujarra. Deliberate actions of instruction were taken, such as not crossing the yellow line, knowing how to use the red button and the blue lever on the doors, and becoming familiar with the old Edmonson ticket or the door closing whistle" (Ortiz Jimenez, 2018).

By giving people the opportunity to take part in the design, planning and construction process an attachment was created towards it and the project had a smoother adaptation with the public.

This type of strategy is necessary even today to strengthen the feeling of belonging to the upcoming expansion of the system and the connection of multiple transport systems. Throughout their construction process, these systems will inevitably disrupt and alter the daily life of the local inhabitants of Medellin and public support is necessary.

A takeaway from past initiatives and expansions is that the system is both a physical element of the city and a scenario for urban life and human interaction—a place of equal footing for a very unequal society unaccustomed to confronting this harsh truth.

Because of this an ongoing campaign of divulging and sharing the benefits of the project are ideal, here are some of the first infographics used to highlight them:



Figure 22 - Ferrocarril de Antioquia, Infographic of the designed River Train system.



Figure 21 - Ferrocarril de Antioquia, Infographic for the proposed system.



Figure 24 - Ferrocarril de Antioquia, Infographic for the Tren del Rio.



Figure 23 - Ferrocarril de Antioquia, Infographic for the proposed Tren del Rio

Existing transport infrastructure:



Metro system (1995-nowadays):

Medellin, Colombia's second-largest city, stands as an example to the successful evolution of a sophisticated mass transportation system, playing a transformative role in addressing not only the city's transportation needs but also broader societal challenges. Catering to a growing population exceeding 3 million within the metropolitan area, the city's integrated transportation network seamlessly blends diverse transit modes. Ranging from 2 main metro lines, 1 tram line, 6 cable car lines, 3 segregated lanes articulated buses lines and more expansions planned for the system provides plenty of challenges and opportunities for the future.

The birth of the metro lines dates to 1979 when feasibility studies were conducted to prepare what was presented to the national government to get the necessary funding to start building the public transport infrastructure. Starting in 1984 and finishing in 1995 when the first wagon began its service between Niquia and Poblado station, other lines started to be planned and constructed, the first cable car line K started operation on august 7 in 2004 providing service to the areas of the northeast of the city, J line came 4 years after and due to their high efficiency and ideal adaptability to the complex topography faced by the cities location inside of the Aburra Valley they became the preferred type of public transport infrastructure to be built in the following years.

The metro system in Medellin has a transport network with seventy-six stops, encompassing twenty-seven train stops, eleven cable car stations, nine tram stations, and twenty-eight articulated bus stations. Over its 28-year life, the system has expanded its coverage to include six municipalities, fostering proximity connections with neighboring rural towns. Medellin's international acclaim for its advancements in public infrastructure and a thriving tourism industry is a testament to the city's remarkable turnaround from societal and cultural challenges faced in the late 80s and 90s. In a country with a centralized economy based in Bogota, Medellin has appeared as a reference for public transport infrastructure. The city now looks ahead to further expanding and enhancing this transformative system.



Figure 25 - Metro de Medellin - Simplified map of the metro system



Figure 27 - Metro de Medellin, Map of the existing metro system in Medellin.



Figure 26 - Omar Portela - Photography of a Metro wagon taking of at a station.

Lines		B	К	J	L	H	M	P		2	0	τ	TOTAL
Ipo de Sistema System	Férreo Rastroad	Férreo Railroad	Cable aéreo Cable car	Cable aéreo Cable car	Cable aéreo Cable car	Cable aéreo Cable cat	Cable aéreo Cable car	Cable aéreo Cable car	BRT (Bus Rapid Transit)	Padrones Feeding bus	BRT Feeding bus	Férreo Railroad	4 Modos 12 Lineas 4 transportation means 12 lines
Capacidad Capacity	Coche / Car 300 usuarios / users	Coche/Car 300 usuarios/users	Telecabina Gondola 10 8 sentados, 2 de pie 8 setting - 2 standing	Telecabina Gondola 10 8 sentados, 2 de pie 8 sitting - 2 standing	Telecabina Gondola 10 8 sentados, 2 de pie 6 setting - 2 standing	Telecabina Gondola 10 8 sentados, 2 de pie 8 stiing – 2 stancing	Telecabina Gondola 10 8 sentados, 2 de pie 8 siting - 2 standing	Telecabina Gondola 12 10 sentados, 2 de pie 10 sitting - 2 standing	Bus articulado Articulated bus 154 usuarlos / users	Bus padrón Feeding bus 90 usuarios / users	Bus padrón Feeding bus 80 usuarios / users	Tranvia Tranway 300 usuarios / users	N/A
Longitud de las lineas Line length	313.Km	113 km	1422 Kn	1462 Km	HAD Km	1422 Km		14.61Km	0 km	13 km	e un	42 km	85,12 kildenreters 31,3 km Merco 14,62 km Cable adreo 12,5 km Troncal BRT 22,5 km Pretroncal Performations 4,2 km Tranvia Tranvia
Estaciones Stations	21 (8 elevadas) 8 sky stations	6 (5 elevadas) 5 sky stations	3	3	2	2	2	3	20	15 (paraderos) stops	27 (paraderos) stops	3 Estaciones stations 6 Paradas stops	45 45 stations 26 5 paradas 26 5 paradas 42 paraderos 42 42 states
Vehiculos Fleet	8 trenes de three-co 24	0 3 coches ar trains 40 coches 240 cars	93 telecabinas gondolas	119 telecabinas gondolas	55 telecabinas gondolas	44 telecabinas gondolas	49 telecabinas gondolas	138 telecabinas gondolas	30 ^a gas gas 1 eléctrico electric	47 bus p gas 64 bus pac electr	adrones a gas feeding busses Irones eléctricos ic feeding busses	12 vehículos tranviarios tranvway cars	240 roches de tren 498 telecabinas gondolas 31 buses articulados articulated busses 111 feeding busses 12 vehiculos tranviarios
le de Pilonas Number of traffic posts	N/	A	20	31	23	10	11	29	N/A	N/A	N/A	N/A	124
liempo de recorrido N Solo un trayecto Travel time - one	42 minutos	10,5 minutos	9 9	12 minutos		5 minutos			45 minutos	52 minutos	45 minutos	19 minutos	
Velocidad comercial Commercial	(Max)	10 (80 km/h)	18 (km/h)	18 (km/h)	(km/h)	(km/h)	(km/h)	(km/h)	(Máx.60 km/h)	(Máx.60 km/h)	(Máx.60 km/h)	(Máx.70 km/h)	
Frecuencia máxima (Hora pico) Topfrequency - rush	Minutes Segundas minutes - seconds 3:000	Binder Separate Binder Seconds Bi SO	Minister Seguride Minister Seconds	C:12	Minden Separate Infinition - seconds	Minister Separate Minister Seconds	Minutes Seconds	Minutes Separation minutes - seconds	2:45	Hinder Separates minutes-seconds 서:(1	Havier Segnate Minister - Second 5:00	House Separate minutes - seconds Ly: LyLy	
Capacidad Pasjerochora-serrido Capacity per hour and	41.480	16.231	3.000	3.000	1.200	1.800	2.500	4.000	3.270	1.417	800	3.807	82.502
Estación de transferencia Transfer station	 Acevedo San Antonio Hospital Industriales 	• San Antonio • San Javier	• Acevedo • Santo Domingo	- San Javier	• Santo Domingo	• Oriente	• Miraflores	• Acevedo	 Hospital Cisneros Industriales 	• Industriales	• Caribe • Floresta • La Palma	• San Antonio • Miraflores • Oriente	
Inicio operación comercial Commercial operation starting date	30/11/1995	29/02/1996	7/08/2004	3/03/2008	9/02/2010	17/12/2016	28/02/2019	En construcción	22/12/2011	22/04/ 2013	30/11/2019	31/03/2016	l

Figure 28 - Metro de Medellin, Strategic report 2022.





Figure 30 - Metro de Medellin, Breakdown of users by gender.

Figure 29 - Metro de Medellin, Breakdown of trip purposes.



Figure 31 - Metro de Medellin, Breakdown of users age group related to corresponding PTS line.



Figure 32 - Metro de Medellin, Breakdown of user socioeconomic group related to corresponding PTS line.

Medellín's Path to Sustainable Urban Mobility:

Thanks to insights provided The sustainability report (2022) and documents published by Medellín Como Vamos, a public initiative dedicated to monitoring and assessing the city's quality of life and urban development, it is evident that Medellín is committed to creating inclusive, safe, and sustainable urban environments, with a specific emphasis on improving transportation accessibility and quality. The 2017 Origin-Destination Survey (Encuesta Origen-Destino) sheds light on the current transportation landscape and its evolution.

The survey indicates a significant increase in daily trips from 2012 to 2017, with walking, collective transport, and private cars dominating. Despite a rise in metro usage to 12%, achieving a more balanced and sustainable transportation mix is still a challenge.

Zonal preferences highlight the necessity for tailored strategies. In the southern part of the city, specifically around the Aguacatala Station, where private car usage is high, and public transport adoption is low, there's an opportunity to address this imbalance. By modifying Aguacatala Station and integrating it with the 80th Avenue Light Metro System and the planned proximity train by Tren del Rio, we anticipate a significant increase in the adoption of public transportation in this region.

Medellín's pursuit of sustainable urban mobility necessitates a strategic focus on public transport adoption. Addressing regional disparities, expanding metro infrastructure, ensuring accessibility, promoting sustainability, and utilizing data-driven insights are key components of the city's vision for a more sustainable and inclusive transportation future. The proposed modifications and interconnections align with this vision, marking a proactive step towards achieving a comprehensive and interconnected public transport network.



Figure 34 - Medellin Como Vamos, Map showing the origin/destination of trips inside the Aburra valley.



Figure 33 - Medellin Como Vamos, Map showing the origin/destination of trips in the Municipality of Medellin.

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Similar projects:

Poblado Station renewal project:

El Poblado Station, a pivotal hub in Medellin's metro system, faced challenges due to increased economic activity and population growth. To address this, a significant revitalization initiative was undertaken, focusing on the station's main issue—high passenger traffic.

A strategic decision was made to enhance functionality by constructing a new entrance to the south, a new pedestrian bridge and a new bus bay across the highway. These architectural interventions were not only aesthetically pleasing but also aimed at practical purposes. The new entrance efficiently manages increased foot traffic, creating a seamless experience for commuters arriving from previously uncommunicated directions, such as the INEM Public School or Guayabal Av.

The pedestrian bridge, a key part of the revitalization, serves a dual purpose. It facilitates convenient crossing of the Medellin River, connecting different parts of the El Poblado zone, and improves access to nearby academic institutions for students, faculty members and workers.

Moreover, the intervention provides direct access to a strategically located bus bay along the river, streamlining transportation options for the community. This well-thought-out design enhances convenience for residents and commuters.

In essence, the El Poblado Station revitalization is a proactive measure to modernize and optimize transportation hubs, driven by an awareness of the city's evolving needs. The initiative ensures the station remains functional and aligned with contemporary urban demands.



Figure 35 - Doing Ingenieria, Visualization of the El Poblado station before the works took place.



Figure 36 – Doing Ingenieria, Visualization of the El Poblado station before the works took place.







Figure 38 - Ferrocarril de Antioquia, Current conditions of the Aguactala Station, where the upcoming river train will go through.



Figure 39 - Ferrocarril de Antioquia - Visualization of the Tren del Rio along the river.



Figure 40 – Metro de Medellin, Intermodal transportation hub in La Estrella isometric.

Intermodal Station in La Estrella:

La Estrella will host the first intermodal station within the metropolitan area of the Aburra Valley. The proposed design, recipient of the prestigious Leopoldo Rother Prize for Architecture and Urbanism in the Urban and Regional Ordinance category, envisions a facility that addresses the demands of proximity rail lines within the metropolitan area of the Aburra Valley.

Drawing parallels with the proposed intermodal Aguacatala Station, La Estrella faces comparable challenges. These challenges include integrating Tren del Rio trains into the existing station, accommodating increased passenger traffic, revitalizing the station surroundings, and effectively integrating into the greater mass transport system of the Aburra Valley.

The proposed design incorporates various elements to overcome these challenges. It introduces multiuse adaptable spaces and employs multilevel spatial configurations to optimize the use of available space. Greenery and vegetation are strategically integrated to serve as sound buffers, mitigating noise pollution. Additionally, the incorporation of vegetation aids in enhancing thermal control, thereby contributing to a reduction in the overall environmental impact of the project. These design features collectively aim to create a comprehensive and efficient intermodal station that aligns with the specific environmental and transport needs of the Aburra Valley.

As this is the first architectural intervention to existing stations to address the upcoming integration of the Tren del Rio to the Metro system is the most relevant reference to identify where the system is trying to go. Utilizing the Metro system as a catalyst of urban revitalization and development by integrating the stations into the urban fabric, making the surrounding area more attractive for housing and commercial developments and decreasing the presence of industrial uses within the city.



Figure 41 – Metro de Medellin, Intermodal transportation hub in La Estrella visualization.



Figure 42 – Metro de Medellin, Intermodal transportation hub in La Estrella infographic.



Figure 43 – Metro de Medellin, Intermodal transportation hub in La Estrella visualization.



Figure 44 - Henning Larsen, Visualization of the Hlavni Nadrazi proposal.

Prague Hlavni Nadrazi

By: Heninng Larsen Architecture

Year: 2023

Location: Prague, Czechia

Site Size : 103,000m2

Building size : 24,400m2

"Driven by the introduction of a new tram line and an anticipated 200% increase in the number of visitors, the new future mobility hub signifies a transformative milestone in Prague's urban development. Seamlessly connecting three transit hubs into one unified and inviting destination with optimized pedestrian flows." Heninng Larsen Architecture (2023)

An intervention on an existing transport infrastructure as the main train station of the city, this project is an interesting reference to look at as it incorporates existing design cues from prior stages and integrates them with sustainable construction methods,

contemporary design styles and keeps in mind what the importance among the general population and current users have in mind when they think of the station.

By working on different levels, an underground subway system, the above ground level train station and the midlevel entrance for users to avoid crossing an existing highway and allowing for a new tramline stop incorporated to the building it's an amalgamation of correct design solutions to mass transport infrastructure put into one single project.

More than looking at this project as a singular solution, I see it as a representation of the series of correct solution the whole Prague public transport infrastructure has and how they can be applied together, seamless interaction for users and prioritizing pedestrian movement and quality public spaces, Prague provides one reference for any public transport infrastructure worldwide.

The main goal for the public transport in Medellín is to become as easily integrated into the urban landscape as Prague has achieved it. The sight of trams going around town, metro stations and proximity trains working together to ease the life of weekday commuters, easily accessible and attractive for users. Aware of there being room to grow and improve Prague's public transport infrastructure is admirable.



Figure 45 - Heninng Larse, Visualization for the Hlavni Nadrazi proposal.



Figure 47 - Heninng Larse, Section drawings for the Hlavni Nadrazi proposal.



Figure 46 - Heninng Larsen, Plan drawing for the Hlavni Nadrazi proposal.



Figure 50 - Heninng Larsen, Hlavni Nadrazi proposal schemes.



Figure 49- Heninng Larsen, Hlavni Nadrazi proposal schemes.

Figure 48- Heninng Larsen, Hlavni Nadrazi proposal schemes.



Figure 51 - SOM, Photography of the Union station.

Union Station, Denver:

"A 14-block scar in the city's urban fabric, the rail yards, track sidings, and service areas of Denver's historic Union Station were underutilized for decades. In 2004 voters approved a tax increase to fund a regional transit plan with Union Station as the hub of the system. The redevelopment plan for the former rail yards involved master planning, urban design, and architectural design work to knit together light rail, commuter and intercity rail, regional and local buses, downtown shuttle buses, taxis, shuttles, vans, limousines, bicycle routes and pedestrian networks into an intermodal transportation hub and urban transit district." SOM.

Union station was transformed from an underutilized railway park and was converted into a neighborhood defining urban reference building. While the main canopy with its openair atmosphere claims the stage the other aspects of how it integrates underground access to connecting buses, a pedestrian driven plaza across the railway that connects it to the river and the hierarchy of transport systems being interconnected are the interesting aspects to be taken away from the project.

Utilizing a mix of multilevel public spaces and new/old building interaction with future developments in mind the Union Station in Denver has a lot of things that can be applied to the Transport Hub in La Aguacatala.



Figure 53 - SOM, Photography of Union Station.



Figure 52 - SOM, Photography of Union Station showcasing how pedestrians and passengers go from one building to the other in order to transfer from different means of transport.



Figure 55 - SOM, Scheme showing the promenade connecting the railway with proposed public space.



Figure 54 - SOM, Scheme showing the connection between the covered bus system, new promenade, and the rail station.

Union Station is an interesting reference at it uses a single intervention to the existing railway infrastructure and existing passenger station and uses adjacent interventions to interconnect different buildings for pedestrians and passengers to follow, creating a new self-sustaining destination for resident and allowing for a better experience to all the involved actors. It is conscious about future urban growth and prepares itself for it allowing future expansions, while the scale may be bigger the type of interventions and design decisions taken for it apply to the Aguacatala Station.

Why this should happen:

After identifying pertinent legal frameworks, examining comparable references, and conducting a thorough analysis of the site, it can be argued that the La Aguacatala intermodal station has the potential to evolve into a crucial transportation hub for the city of Medellín. This development could play a pivotal role in the ongoing initiative to boost public transport usage, thereby reducing dependence on private cars and motorcycles in the southern region of the Aburra Valley and Medellin. The examination of similar successful projects underscores the importance of effective integration of various modes of transportation.

By fostering a seamless and efficient integration of diverse transportation options, the La Aguacatala intermodal station has the opportunity to contribute significantly to the expansion of the metro system in Medellín. This, in turn, aligns with the broader objective of promoting healthy urban growth within the city. As urban areas continue to grapple with congestion and environmental concerns associated with individual vehicular transport, an intermodal station stands out as a strategic solution.

Furthermore, the station's strategic location can serve as a catalyst for encouraging the populace to embrace public transportation. Offering a convenient and interconnected network of transit options can potentially entice commuters to opt for public transport over private vehicles, thereby reducing traffic congestion, carbon emissions, and promoting a more sustainable urban environment.

In conclusion, the transformation of the La Aguacatala intermodal station into a central transportation node holds promise for Medellín's urban development goals. By prioritizing an integrated and user driven approach, this initiative not only supports the growth of the metro system but also contributes to a paradigm shift towards sustainable and efficient urban transportation.

Resources:

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MAPS:

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