Charles De Leuw Travel Award

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Destination: Republic of Korea

University of Illinois at Urbana-Champaign
Department of Civil and Environmental Engineering

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Acknowledgement

First and foremost, I would like to express my gratitude to the Department of Civil at Environmental Engineering and to the Transportation Department for awarding me the Charles DeLeuw Fellowship award. I would like to sincerely thank Dr. Rahim F. Benekohal for helping me plan out the travel plan. This has been an invaluable experience as an alumni from the most prestigious engineering university in Illinois.

Introduction

I started my journey on the morning of Thursday, June 26th to July 15th. I prioritized my visit to Seoul, Incheon, and Gyeonggi since more than 51% of the South Korean population live in this major metropolitan area. The metropolitan area of South Korea has the best public transportation system in the nation. Various trains, subways, buses, and shuttles connect major tourist destinations. Seoul is a major hub for various transportation modes making the city crucial for passengers commuting to and from various places in South Korea. All KTX/SRT high-speed train lines converge to Seoul. Passengers can board the KTX at Seoul or Yongsan Station and SRT and Suseo Station and can go to any major city to the South. Both Incheon and Gyeonggi Provinces are experiencing a huge influx of population. New transit lines are being built to facilitate transportation of the commuters. Incheon is widely-known for having the biggest international airport in South Korea. Korean Air dominates the airport serving passengers to many destinations from South Korea. The airport express A'REX connects Seoul Station to Incheon and Gimpo International Airports respectively. The all-stop train makes all stops along the line and the express train only stops at Seoul and Incheon International Terminals 1 and 2 stations.

Figure 1. Entire map of the Seoul Metropolitan Area Subway Network.

Figure 2. Concourse of Incheon International Airport Terminal 2 Transit Center.

Figure 3. Ticket area of Incheon International Airport Terminal 2 Transit Center.

Figure 4. Bus Platforms at Incheon International Airport Terminal 2 Transit Center.

Figure 5. All-stop Airport Express (A'REX) Train at Geomam Station.

Transit Tour

On the first day of travel, I decided to go to the center of Seoul. Seoul Station is the biggest train station in the Korean Peninsula. Not only can passengers take trains to all over South Korea, but the vicinity has many hotels, restaurants, department stores, and even some markets. Seoul Station is the terminus for all KTX high-speed trains, ITX-Maum, ITX-Saemaul, Mugunghwa, and Nuriro lines. Passengers can transfer to GTX-A (high-speed subway), metro line 1, line 4, and the Gyeonggui-Jungang line. All subway platforms are equipped with platform screen doors for safety. Another nice thing about subway stations in South Korea is that they all have bathrooms and convenient stores for passengers. Elevators and escalators are installed at each subway station because many platforms are built deep underground.

Figure 6. A typical bus stop in Seoul and a blue electric bus.

Figure 7. Former overpass converted into pedestrian walkway.

Figure 8. Market near the Seoul Station Overpass.

Figure 9. Aerial view of the main Seoul Station Terminal Building.

Figure 10. Aerial view of Seoul Station and Bus Transit Center.

Figure 11. Green Electric Bus at Seoul Station Bus Platforms.

The intermodal bus platforms in Seoul Station were convenient and very well designed. Bus platforms have direct access to both the main terminal entrance and the subway station entrances. Passengers who get on and off at Seoul Station take buses which connect to many areas of Gyeonggi and Incheon. I also got to see many electric buses at Seoul Station.

Figure 12. Entrance to GTX-A, Lines 1 and 4 at Seoul Station.

Figure 13. Inside the wide train car of the GTX-A Line.

Figure 14. GTX-A running at speed of 177 km/hr.

Figure 15. Samsung Train Arrival and Departure Information.

I also took the GTX-A line from Seoul Station to Daegok Station, a major rail transit hub in Goyang, South Korea. GTX-A Line is the first ever high-speed subway line built in South Korea capable of traveling up to speeds of 180 km/hr. Additional high-speed subway lines are being planned to be built in the upcoming years. Daegok Station is a major transit hub because passengers can transfer to the GTX-A line, Seoul metro line 3, Gyeonggui-Jungang Line, Seohae Line, and Gyoeoe conventional Line. KTX-EUM is expected to commence its operations at Daegok Station starting in early 2026. The iconic overpass over Seoul Station was closed to make way for a pedestrian walkway. The overpass which was converted

into a pedestrian overpass became very successful. It connects both the east and the west wing of the big Seoul Station to major hotels, office buildings and to major department stores like Shinsegae and Lotte Department Stores and the Seoul Namsan Tower. More urban redevelopment is taking place in the west wing of the main station building.

On the second day, I took the fully autonomous subway train called the Shinbundang Line to Gwanggyojungang Station where Ajou University is located. Gwanggyojungang Station was designed to be an integrated subway-bus intermodal terminal. The train station has a multi-modal bus terminal for local and express buses on the mezzanine floor between the first floor and the ground floor. A lot of transit-oriented development has taken place in Gwanggyojungang Station. Multiple new apartment complexes, a mall, and a new municipal complex was built in front of the subway station. Ajou University has a strong program in transportation engineering so I thought it would be worth visiting the vicinity of the college campus and the train station. On my way back, I also stopped by at Gangnam Station. Both the Shinbundang Line and Line 2 stop at Gangnam Station. Line 2 is unique because the line is in a circle with two branch lines connecting major universities, tourist attractions and business districts

effectively. The inbound train moves in a clockwise direction while the outbound train moves in a counter-clockwise direction. I also took a notoriously crowded line 9 as well. Line 9 has an all-stop train that makes every single stop along the line, and an express train that only makes stops at transfer stations or major tourist destinations. The line is overall effective since commuters can either choose between express and all-stop trains. However, express trains always get extremely crowded leaving little to no room for passengers. The Seoul Express Bus Terminal subway station which is a major transfer point for lines 3, 7, and 9 got an award for its architectural design and the construction method implemented by Ssangyong Construction. The roof of the platforms for line 9 and the floor of the platforms for line 3 are separated by only 15 cm.

Figure 16. Front of the Autonomous Shinbundang Line.

Figure 17. Bus terminal at Gwanggyojungang Station.

Figure 18. Gyeonggi Province Office near Gwanggyojungang Station.

Figure 19. More buildings in front of Gwanggyojungang Station.

Figure 20. Route of the circular Line 2 with transfer station lines.

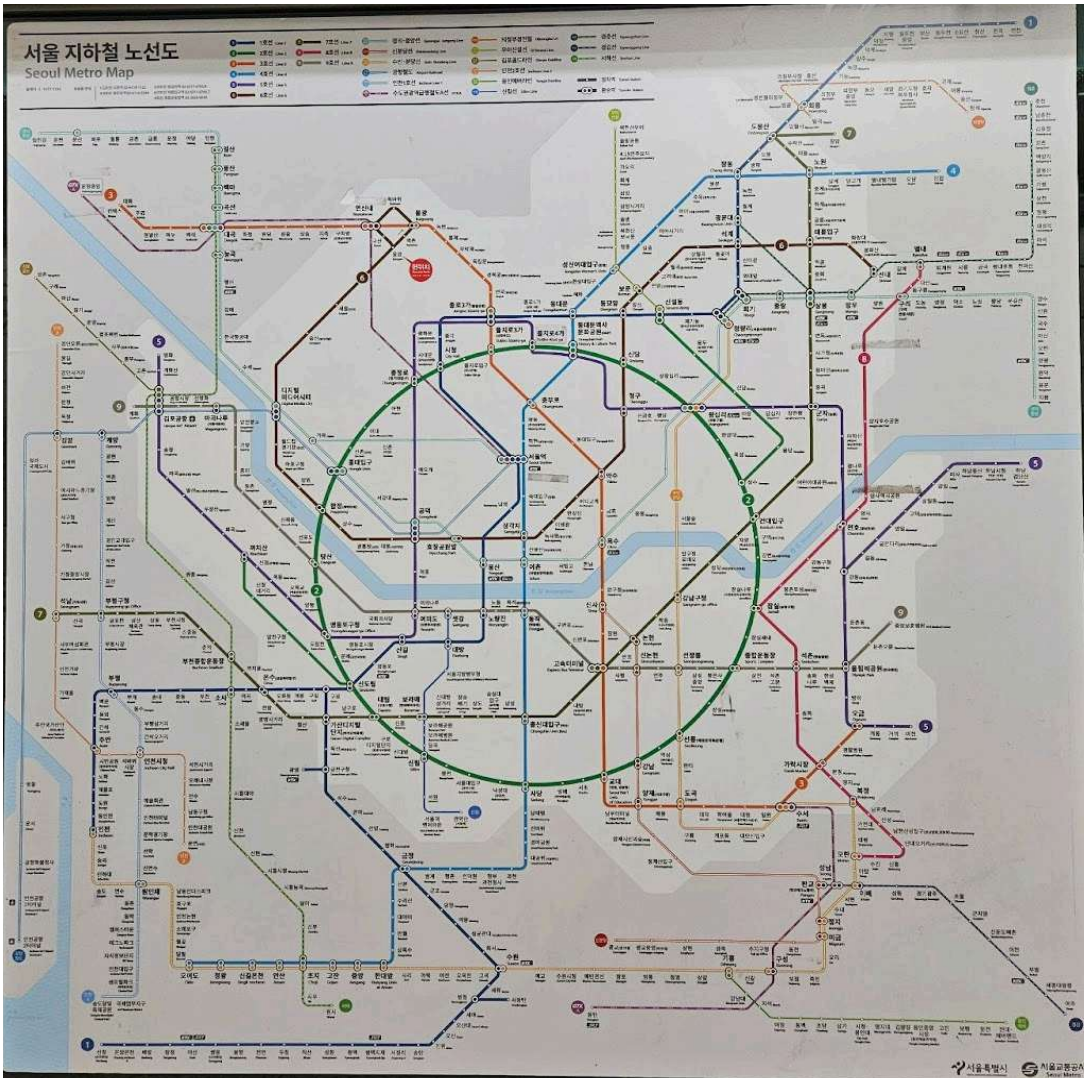

Figure 21. Map of the circular Line 2 route depicted in dark green.

Figure 22. Line 9 Dangsan Station where red is for the express train.

Figure 23. Real-time train arrival systems for line 9 where red represents express trains and yellow represents local trains.

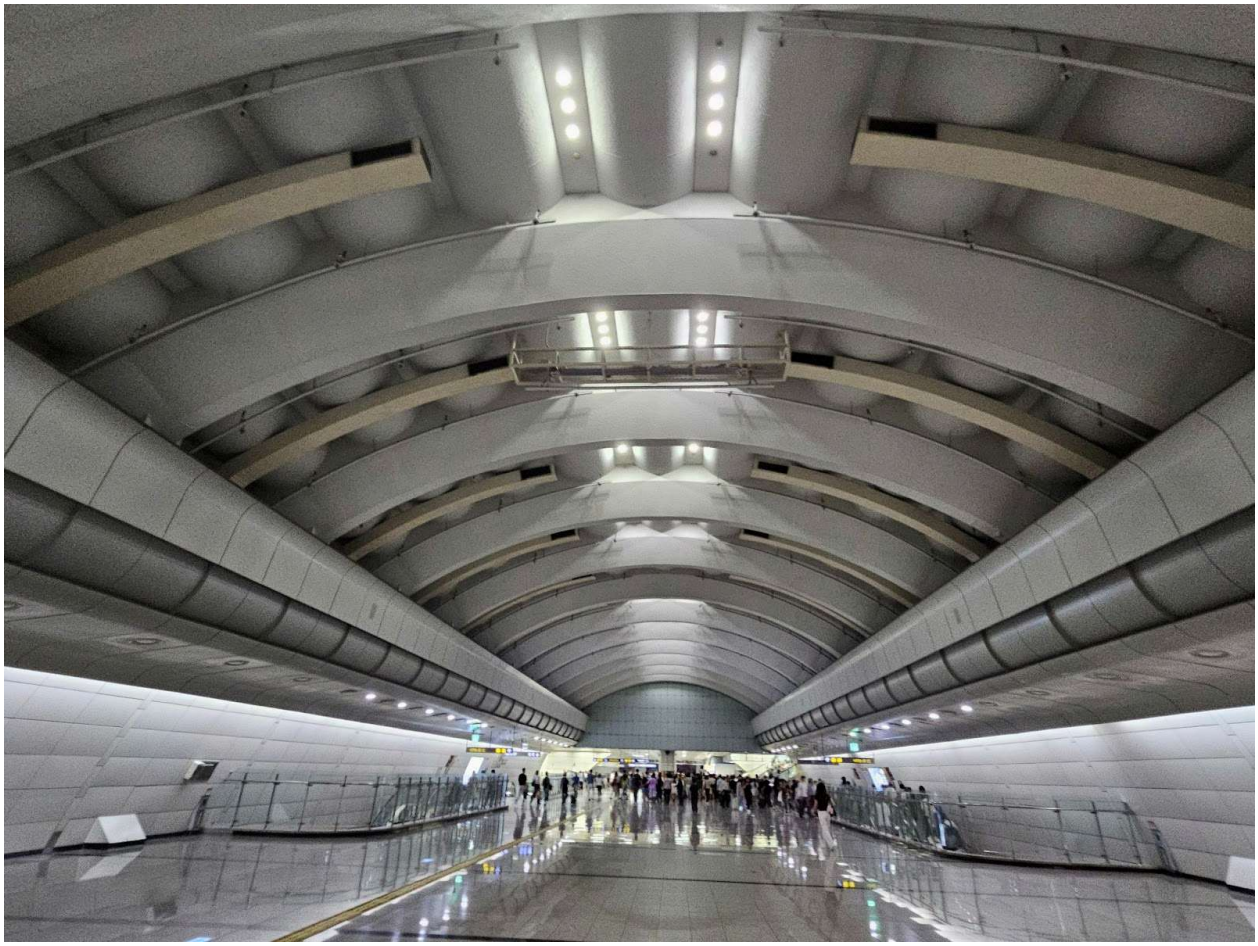

Figure 24. Line 9 accessway at Seoul Express Bus Terminal Station.

The third day, I decided to go to Geomdan New City because it was the opening day for the Incheon Subway Line 1 extension. Incheon is experiencing a big population growth and the new urban complex being built in Geomdan is one of the main reasons. I got off at Singeomdanjungang Station and noticed a lot of new apartment complexes around the subway station. I also took a short portion of the autonomous train Incheon metro line 2. I also decided to take the airport express as well to Incheon International Airport Terminals 1 and 2. Terminal 2 has a major multi-model transportation facility where a building has access to the train platform and the bus platforms making efficient transit access.

Figure 25. Geomdan New City in front of Singeomdanjungang Station.

Figure 26. Small park in front of Singeomdanjungang Station.

Figure 27. Autonomous Incheon Metro Line 2 at Geomam Station.

I decided to take the Silim Line, one of the newest autonomous subway systems in Seoul. It's intriguing how South Korea is investing in autonomous subways. The subway terminates in Gwanaksan (Seoul National University). Once I got off, I took a bus to tour around Seoul National University Campus. The extensive bus network facilitates students and faculty moving around the big college campus. Buses vary from electric, hydrogen, and diesel buses.

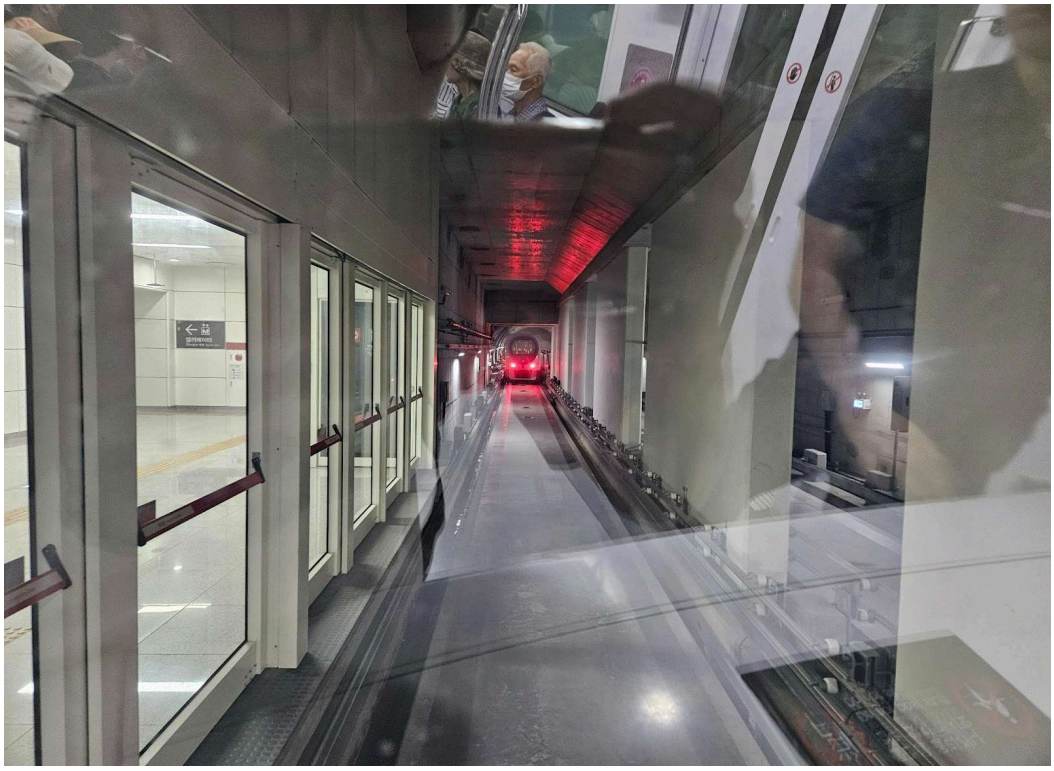

Figure 28. Front cab view of the autonomous Silim Line.

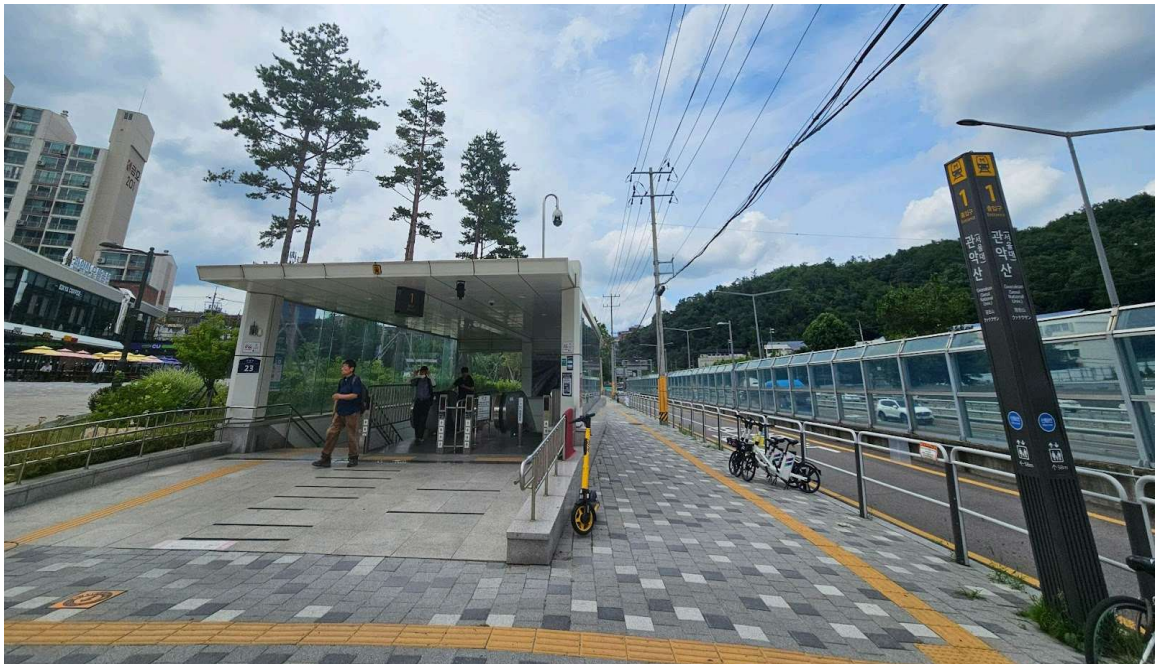

Figure 29. Entrance to Gwanaksan (Seoul National University) Station.

Figure 30. Electric Bus at Gwanaksan (Seoul National University) Station.

I also visited Gwanghwamun Plaza which is a quintessential example of reducing the number of car lanes to convert to a pedestrian-friendly environment. It used to be a wide roadway but the city removed many car lanes to create recreational spaces for people. I realized how important removing car lanes and creating urban recreational space fosters entertainment and tourism. I even got to see the entire plaza decorated with games that appear from a popular Korean Netflix show Squid Game. The plaza is right in front of Cheonggyecheon where the entire freeway was demolished to restore a river and a pedestrian walkway.

Figure 31. Gwanghwamun Plaza with recreational activities.

I traveled to a high-speed rail train station which proved how successful transit-oriented development is. I took the Seoul Metropolitan Subway Line 1 from Seoul Station to Cheonan-Asan Station. Line 1 also has a local service making all stops along the line and an express service making stops at major stations only. I also got a chance to ride a local electric bus at Cheonan. Cheonan-Asan Station serves the twin cities of Cheonan and Asan in South Chungcheong Province. The high-speed train station had multiple apartment complexes and cafes making it a very good place for

passengers who need to go on a business trip to Seoul. The journey from Cheonan-Asan to Seoul by KTX took only around 40 minutes. Along the way, I saw the construction of a junction linking the planned KTX Suwon line and the SRT HSR near Pyeongtaek-Jije Station. South Korea has been continuously investing in expanding their high-speed rail network.

Figure 32. Local electric bus at Cheonan.

Figure 33. Urban area near the vicinity of Cheonan-Asan Station.

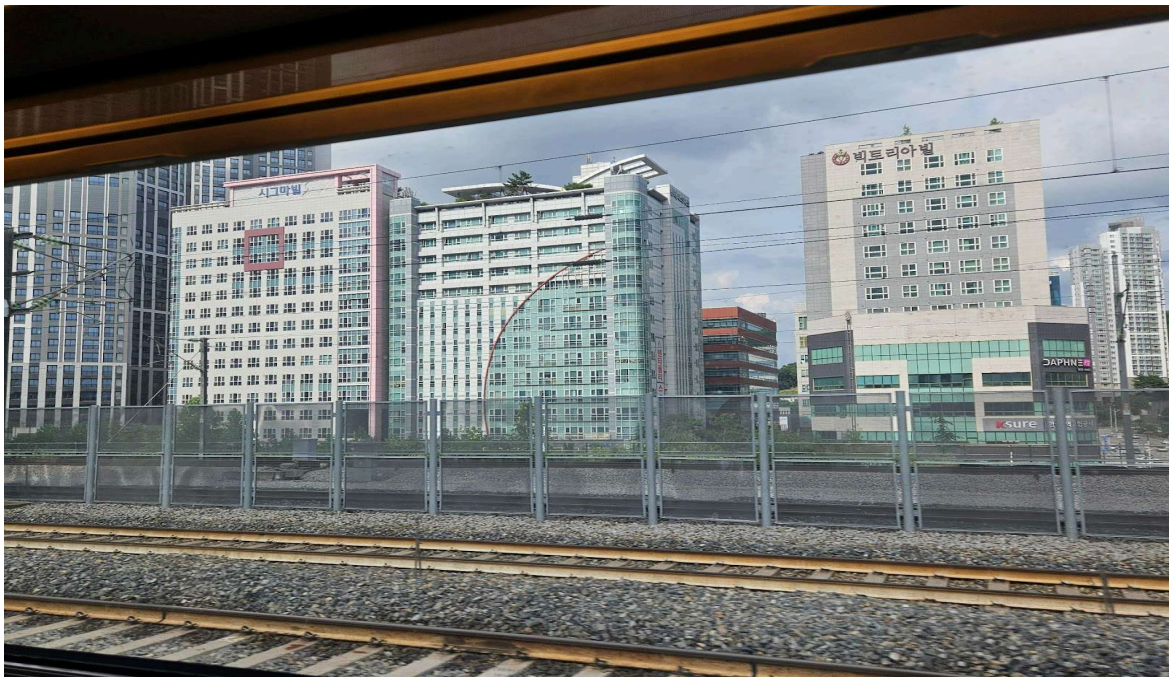

Figure 34. Urban complex around Cheonan-Asan Station.

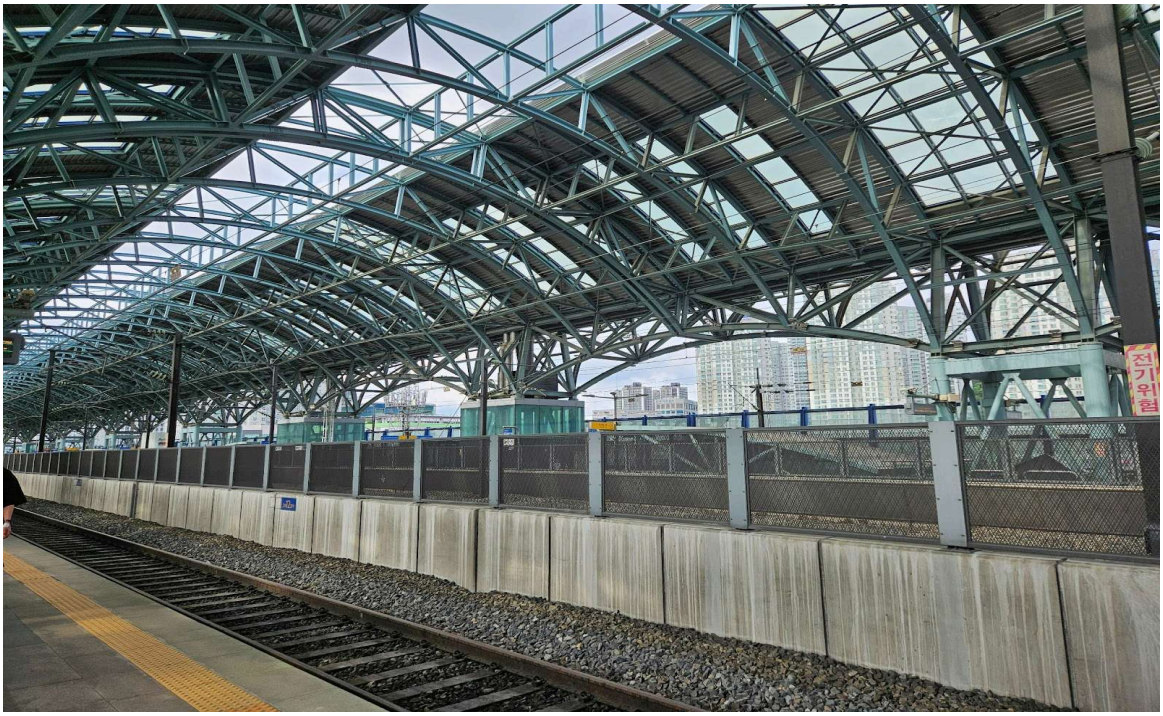

Figure 35. High-speed Rail Platform at Cheonan-Asan Station.

Figure 36. SRT bound for Suseo at Cheonan-Asan Station.

Figure 37. Multiple KTX trains at Seoul Station platforms.

Figure 38. KTX-Sancheon at a platform in Seoul Station.

Figure 39. Semi high-speed train KTX-EUM at Seoul Station.

On the last day of my journey, I took an express bus from Seoul to Tongyeong and Geojae. The Seoul Express Bus Terminal was extremely well organized and platforms were clearly marked. There were many restaurants, cafes, and lounges inside the multi-modal facility. Seoul subway lines 3, 7, and 9 all stop at the terminal making the facility more accessible by passengers. However, the situation in Tongyeong and Geoje were very different. Both cities are very auto-centric, meaning that you need to have a car to travel around Tongyeong and Geoje. Although the KTX/SRT Nambunaeryuk Line is planned to pass through Tongyeong and Geoje by 2030, construction has not begun yet. Due to lack of accessibility

to public transit in these rural areas, traveling around was difficult and I had to travel by car. South Korea has a major urban-rural divide where 51% of the entire population lives in either Seoul, Incheon, or Gyeonggi. Due to the clustering of the metropolitan area, infrastructure projects are given priority to the metropolitan area rather than the rural areas in South Korea.

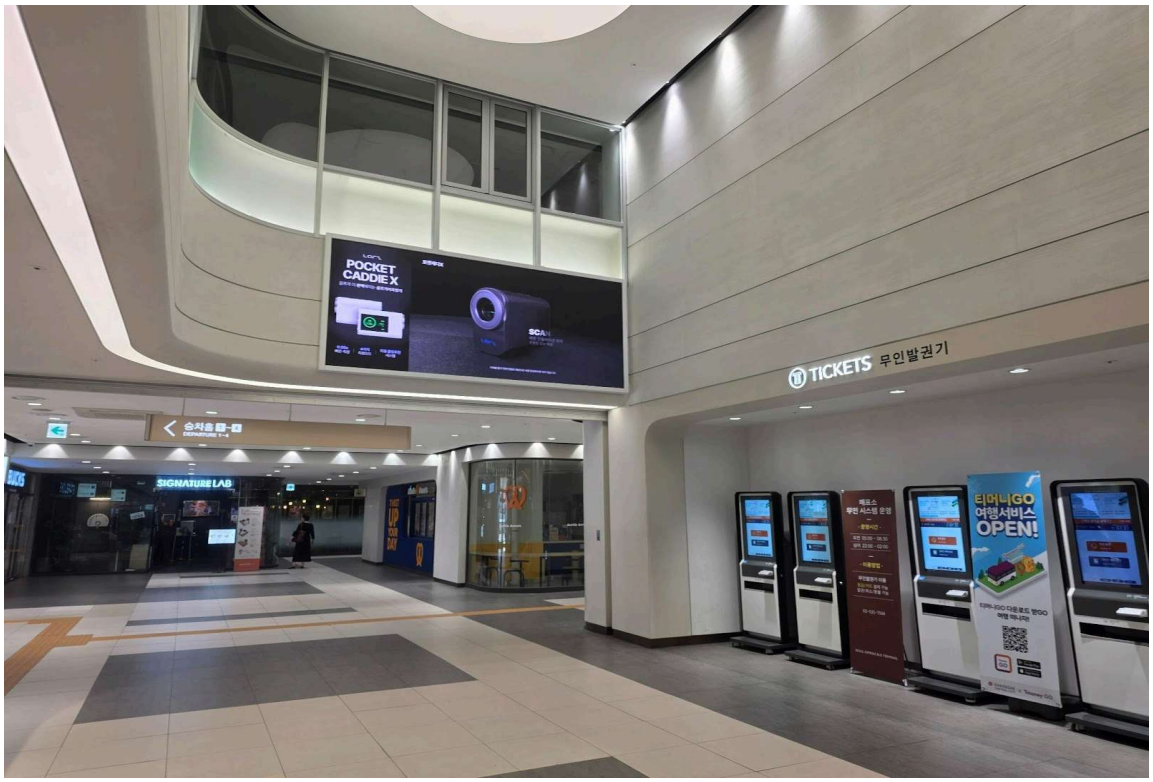

Figure 40. Seoul Express Bus Terminal Kiosk at the main terminal.

Figure 41. Multiple express buses parked at a rest area.

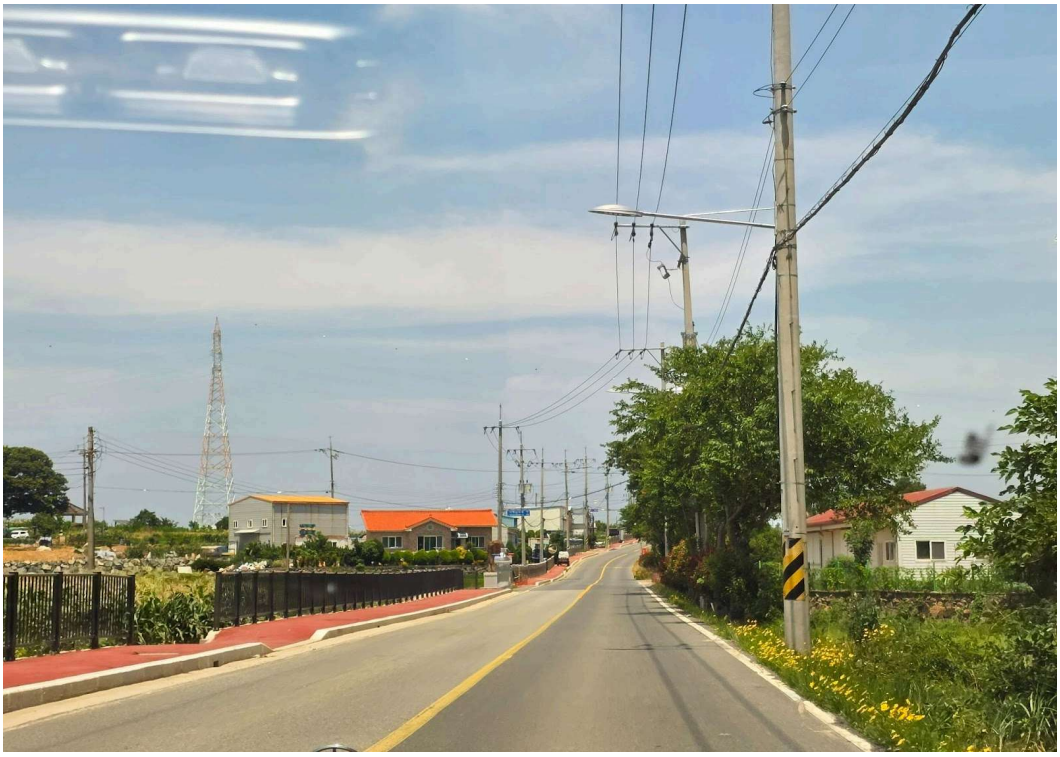

Figure 42. Rural road in Geoje, South Korea.

Conclusion

South Korea's extensive public transportation network greatly enhances traveling between major cities and tourist destinations. The metropolitan region encompassing Seoul, Gyeonggi and Incheon has extensive subway networks, while high-speed rail services such as KTX and SRT connect from Seoul to other major cities traveling at a speed between 250 km/hr to 300 km/hr with additional lines being built. The bus network is very efficient and it was interesting to see many electric buses on the road showing that South Korea is putting efforts to make transit environmentally-friendly. This trip gave me valuable insights on how expanding public transportation can promote transit-oriented development, reduce inter-city travel times, bolster the economy and reduce car dependency.