Community-led Urban Strategies in Historic Towns (COMUS)

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Community-led Urban Strategies in Historic Towns (COMUS)

Transportation system and station for greater Goris town

Preliminary Technical Assessment

Contents

Executive Summary

Goris is the second largest city of Syunik Marz, located in Southern Armenia. It has an urban population of 20,400 inhabitants and a rural population of 20,500 inhabitants as of the census of 2016. Goris is located at approximately 1,400 m above sea level and is 235 km from the capital of Armenia, Yerevan. The most populated city of Syunik Marz, Kapan, is located 67 km south of Goris. Although 50% of the population lives in rural areas, they make very few trips and most of the transportation activity takes place within Goris city proper.

Goris has a grid plan street network with 3 arterial roads (1 main and 2 minor) that serve the north-south axis. Syunik Street, the main arterial road, is also a regional road and connects the city to the rest of the country but also to Nagorno-Karabakh Republic and Iran. The city has three transit routes operating in a loop fashion at an average frequency of 30 minute intervals from Monday to Saturday and at a reduced frequency on Sundays. The routes operate at seated capacity during the morning peak hour and are sufficient in satisfying the demand.

Information to users is provided solely by signs that are on the windows of the vehicles and describe the route textually, without any visual information and only in Armenian.

Figure I - Goris Transit Network

The majority of dense residential areas are located in the north of the city near Verishen village and the main trip attractors and generators (educational institutions and commercials areas) are located to the south of the city and to the east.

As regards connectivity with surroundings villages recently incorporated into Goris, most are located between 5 and 15 km (of 2 lane winding mountain roads) away (except for Akner and Verishen which are to the north of Goris and directly connected to it). The road conditions are

very bad in all the villages. The villages barely generate any trips with the biggest trip generators being the schools and in some cases community halls for gatherings.

Currently, cycling is not a common form of transportation in Goris. However, the low volumes of traffic in the city present an opportunity to introduce cycling as a mode of transportation. The main challenges to introducing cycling in Goris are the heavy vehicles on the narrow Syunik Street, the elevation changes and ensuing visibility issues within a small city, poor road conditions in some places, the roadside stormwater management system, the lack of street lighting, and the great distances and elevation changes separating Goris city proper from the surrounding villages.

In the context of pedestrian facilities, the majority of the streets have proper pavements and intersections have marked crosswalks. The major hindrance to pedestrians is having to cross the stormwater gutters while crossing the street. One area that needs improvement is the link that connects Goris city to Old Goris city. Currently, there is no way-finding signage to guide pedestrians to the old city and the route becomes very confusing after crossing the Vararak River.

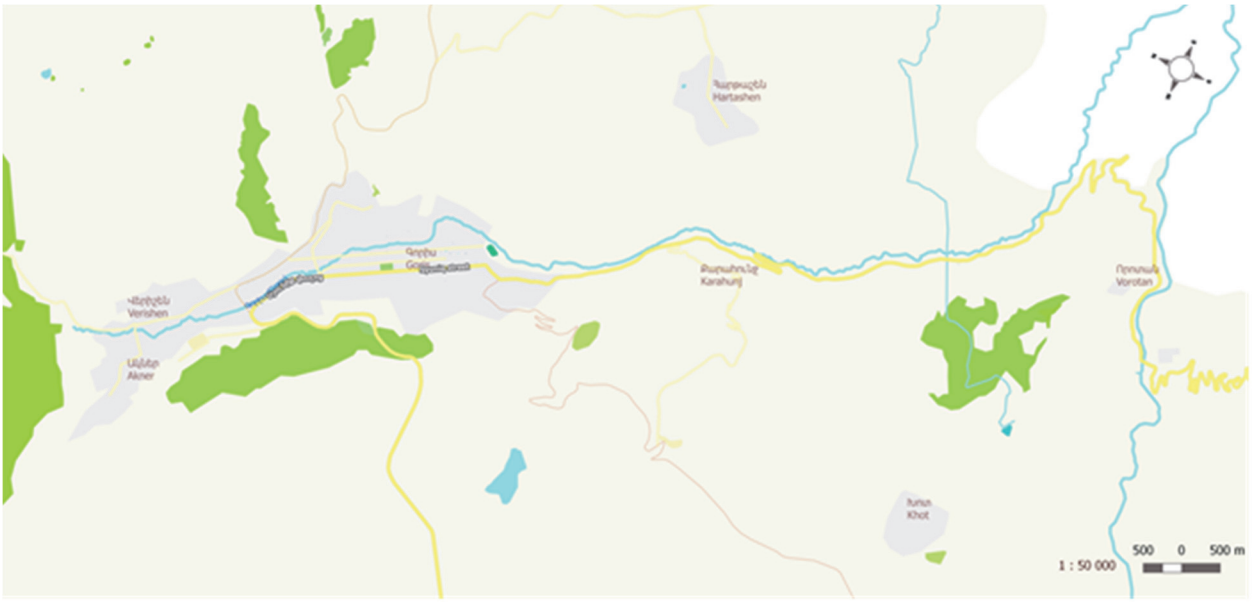


Figure II - Goris and surrounding villages

Report

1. Goris Background Information

Goris is the second largest city of Syunik Marz located in Southern Armenia. It has an urban population of 20,400 inhabitants and a rural population of 20500 inhabitants as of 2016 census.[1] Goris is located at approximately 1,400 m above sea level and is 235 km from the capital of Armenia, Yerevan. The most populated city of Syunik Marz, Kapan, is located 67 km south of Goris.[2] Although 50% of the population lives in rural areas, the rural areas make very few trips and most of the transportation activity takes place within Goris city proper.

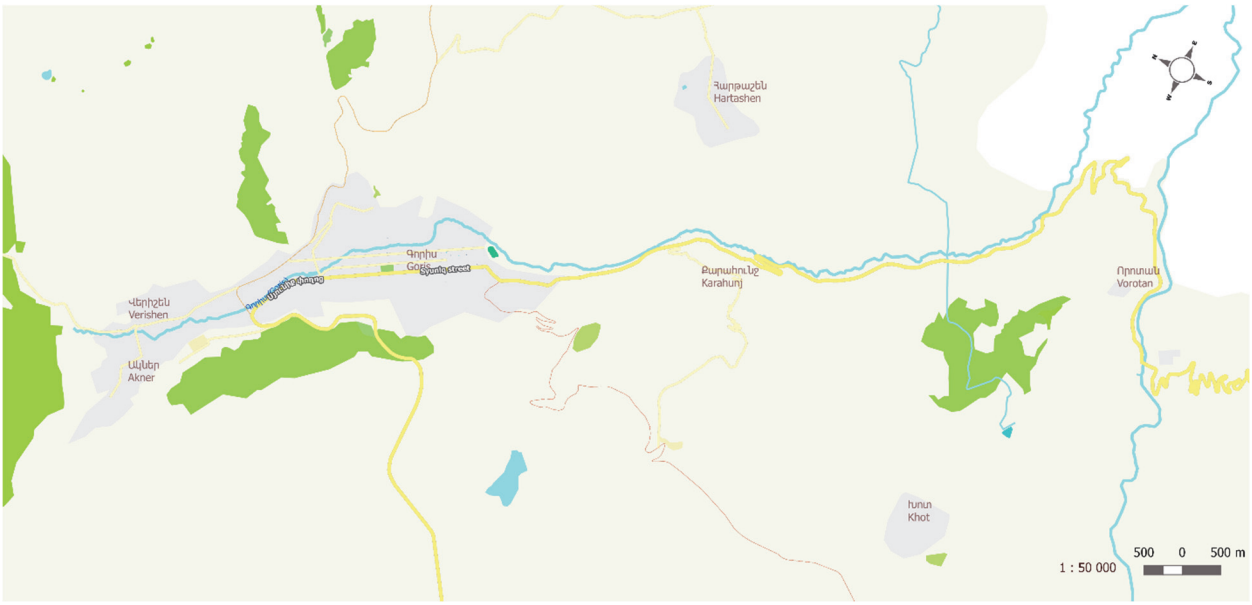


Figure 1 : Goris and surrounding villages

[1] Armenian Statistical Service of Republic of Armenia, www.armstat.am
[2] Goris Urban Development Strategy for 2013-2016

2. The Goris Road Network

The city has a grid plan street network with 3 arterial roads (1 main and 2 minor) that serve the north-south axis. Syunik Street, the main arterial road, is also a regional road and connects the city to the rest of the country but also to Nagorno-Karabakh Republic and Iran. One of the most notable traits of Goris is its stormwater collection network. This uncovered system of canals that lines many of the streets in the city creates a significant barrier when accessing buildings and pavements when crossing the street. Wooden ramps are used to provide access to the sidewalk for delivery purposes and similar tasks. The canals are also subject to clogging during autumn due to leaves.

There are approximately 8,000 registered vehicles in Goris.[3] In 2015, a total of 49 traffic accidents were recorded; 85 vehicles with PDO (property damage only), 71 injuries, and 10 fatalities. In 2016, there were 36 recorded traffic accidents; 90 vehicles with PDO, 48 injuries, and 5 fatalities. The streets are not illuminated and become very dark at night. Approximately 40 freight lorries pass through Goris (Syunik Street) per day. Despite being such an important road, Syunik Street is a two-lane undivided roadway with some visibility issues at certain intersections because of changes in elevation.

Figure 2 : Goris Road Network

[3] Information obtained during interviews with municipality

Figure 3 - Stormwater collection system

3. Methodology

The methodology used for this project was the following:

- a series of interviews conducted with a various municipality members to record and obtain as much information as possible to compliment data collection activities. Interviews were conducted with the chief architect, the transportation department, and other members of municipality;
- transit data collected by riding the transport vehicles. Using a GPS receiver connected to a smartphone, the bus routes were tracked, bus stops marked, and passengers counted. Data related to the transit network was collected on Friday November 4 2016 by riding each route once between 9 and 11 am. The data was then integrated with GIS software;
- walk around town and all surrounding villages to make observations;
- geocode textual information received from municipality about trip generators;
- basemap data for all maps was obtained from OpenStreetMap database (www.openstreetmap.org); the most complete and usable dataset available.

4. Goris Transportation Demand

Figure 4 shows the main trip generating areas of the city and the main attractors of transportation. The majority of dense residential areas are located in the north of the city near Verishen village and the main trip attractors are located to the south and to the east. The next figures show the transportation routes and provide a visual assessment of how the routes satisfy the transportation demand in the city. The commercial zone crossing Syunik Street in Figure 4 is considered to be the centre of the city. It is also the starting point of all three bus routes that serve the city.

As regards connections with surroundings villages recently incorporated into Goris, within 5 and 15 km (except for Akner and Verishen which are to the north of Goris and are directly connected to it; see Figure 1); the two-lane winding mountain roads are in very bad condition in all the villages. Villagers barely generate any trips; the biggest trip generators are the schools and in some cases community halls for gatherings but for the purpose of this analysis the size and population of the villages are not significant.

Figure 4 - Goris Transportation Generators

5. The Goris Transit Network

The city is serviced by 3 transit routes (lines 1, 2, and 3) that operate in a loop fashion servicing primarily north-south corridors of the city and three additional transit routes that service Verishen, Khndzoresk, and Karahunj villages. According to information obtained from the municipality, there are four bus routes serving the city but after asking around several locals, it was clear that the forth is no longer operational. The table below details each route. The bus fare for routes within the city (Lines 1, 2, and 3) is 50 AMD (0.1 EUR) and for the routes to the villages is 100 AMD (0.2 EUR).

Line 1 is an informal (people demand a stop anywhere) microbus route that services the city's north-south corridor, from edge to edge, using Syunik Street (the arterial that is also an important regional road). Line 2 is a midi-bus (medium sized bus) route that also services a north-south corridor using the second arterial road (Ankakhutyan Street) and also part of the third arterial road (Mashtots Street). Line 3 is a midibus route that uses the third arterial route but spans to the east and west parts of the city as well.

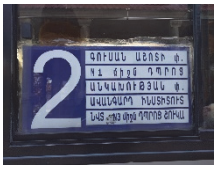
Route No	Vehicle Type	Photo Describing Route	Capacity	Stops
1	Microbus		Seated: 14 Standing: 5 (uncomfortably because the ceiling of the vehicle is low)	Mostly informal (demanded anywhere).
2	Midibus		Seated: 14 Standing: 8-10	Mostly planned but some signs are missing. Occasional stopping outside of planned stops to pick up passengers.
3	Midibus		Seated: 14 Standing: 8-10	Mostly planned but some signs are missing. Occasional stopping outside of planned stops to pick up passengers.

Table 1 – Route Characteristics

Figure 5 – Microbus (Line 1)


Figure 6 – Midibus (Lines 2 and 3) and a typical bus stop in Goris

The only information riders have about the routes are the signs that are found on a window of the right side of the vehicles that textually describe the route (Table 1). This method of providing information to users is common to the rest of the country. For locals, especially in small settlements such as Goris, it is effective but not welcoming and difficult to understand for tourists and other types of infrequent travellers.

The villages that have transit service typically have a single stop where the microbus drops off and picks up passengers. The bus stop at Karahunj village is shown below. It is located near the entrance to the village.

Figure 7 - Bus stop at Karahunj village

The figures below show the results of the bus tracking and passenger counts.

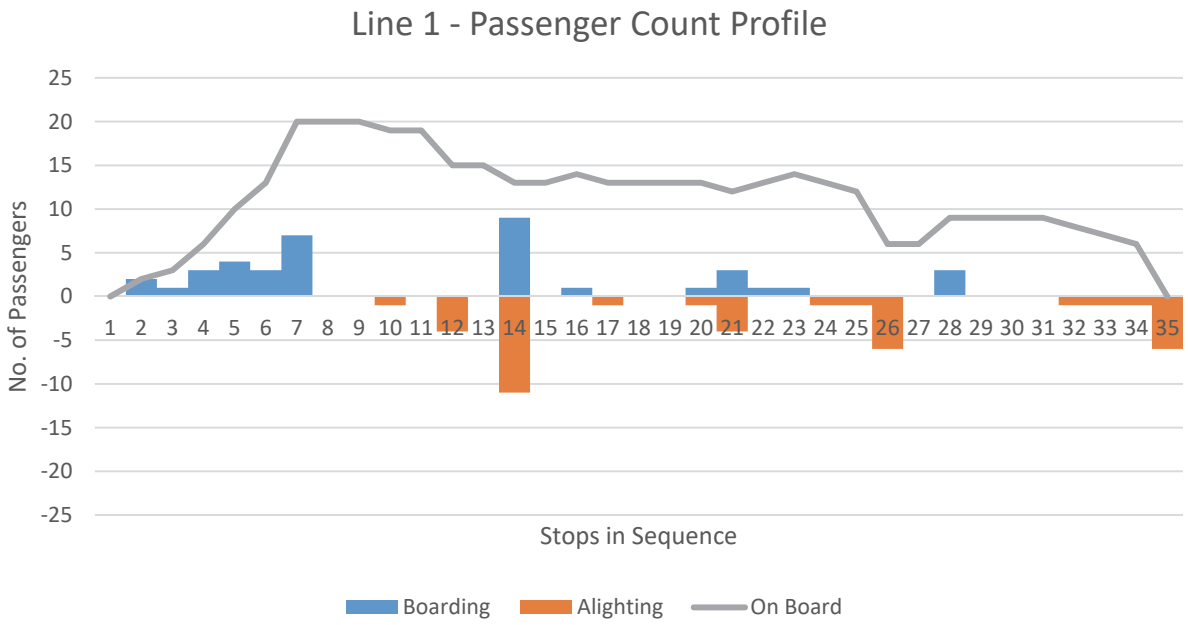


Figure 8 – Line 1 Passenger Count Profile

From the graph, we can see that it is a busy route. Looking at the graph and map simultaneously, we see that the route proceeds to the south of the city and loops back to the city centre where the maximum number of passengers get off and maximum number of passengers board the bus before finally proceeding to the north of the city. The microbus operated at capacity for the first loop back to the city centre and remained at seated capacity for the majority of the rest of the trip.

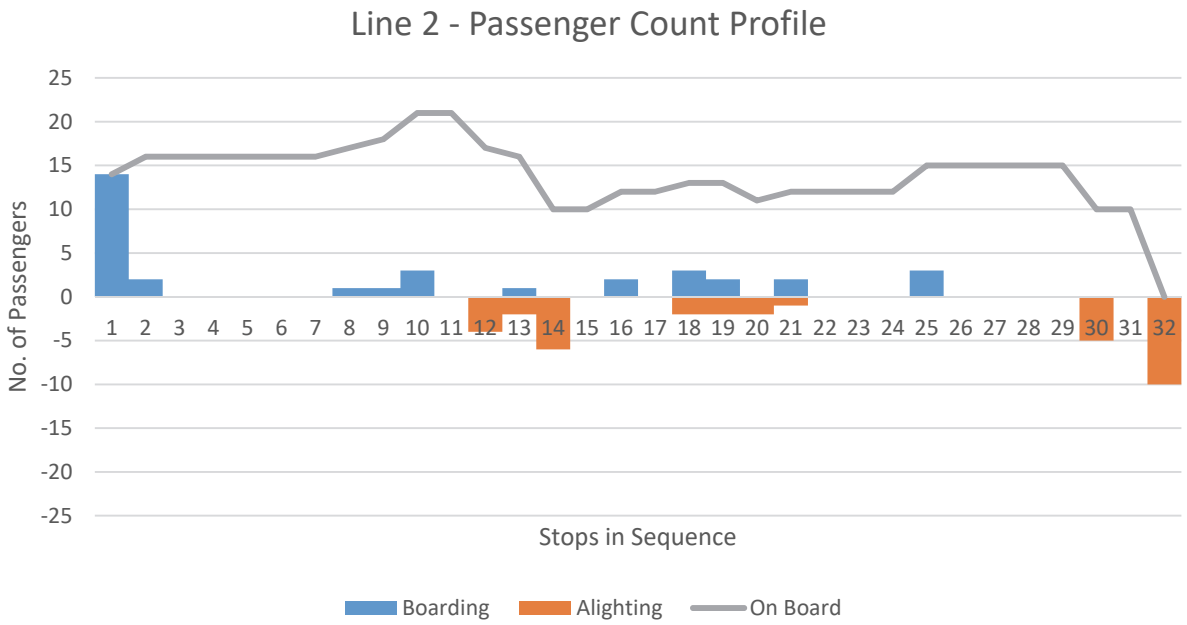


Figure 9 - Line 2 Passenger Count Profile

Looking at Line 2 (Figure 9), the first and last stops have the most passengers boarding and alighting. We can also observe that very few passengers board and alight in areas where there are no trip generators. The bus operates at seating capacity for the duration of the route and gets crowded at the tenth stop and a lot of passengers get off near the educational institutions clustered around stop 14.

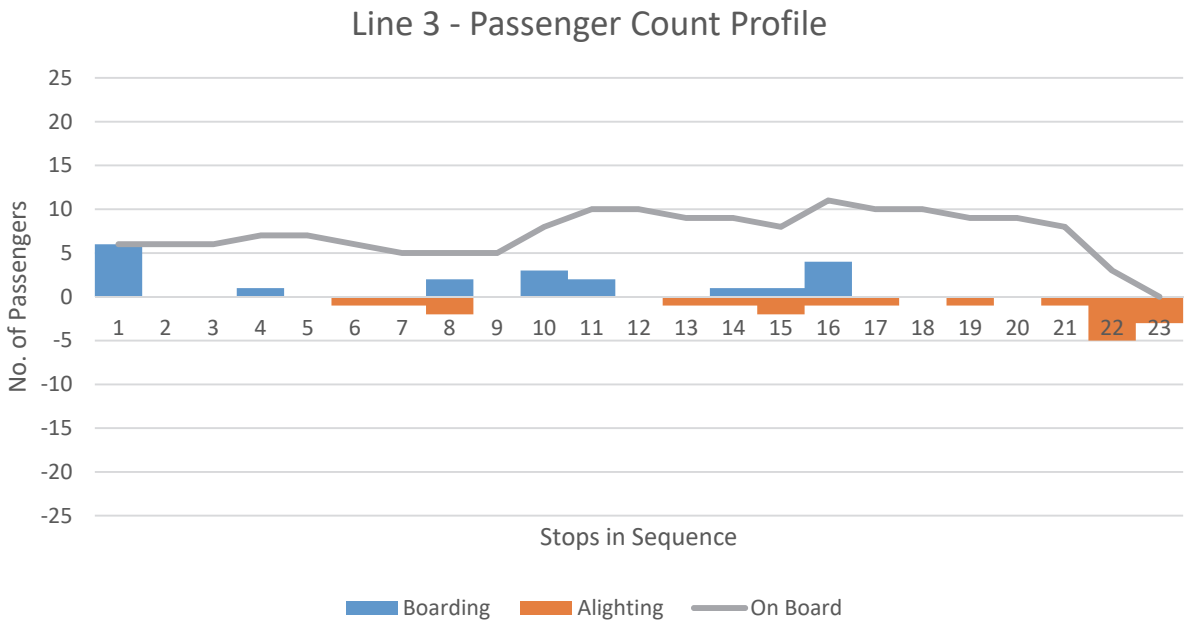


Figure 10 - Line 3 Passenger Count Profile

Line 3 has less passengers than the two other lines and operates under capacity for the duration of the route. Line 3 was the last route to be counted (nearing end of peak hour) which may explain the lower ridership. Also, the boarding and alighting pattern was more uniform than the other 2 lines suggesting that the route was more complimentary in its role.

All three routes have a high number of passengers boarding and alighting at the first and last stops suggesting that the city centre not only attracts trips but also produces them during the morning peak hours. On average, the routes operate on a 30-minute interval frequency from Monday to Saturday and a reduced frequency on Sundays.

Route	**Length (km)***	**Duration (min)***	**Schedule****
Line 1	10.06	38	**Monday to Saturday** 7:50 – 13:00, 25-35 min intervals 15:00 – 19:00, 25-35 min intervals 1 trip at 20:00 1 trip at 21:00 **Sunday** 2 trips, 11:30 and 12:30
Line 2	8.70	38	**Monday to Saturday** 8:00 – 15:00, 32 min intervals 16:00 – 18:40, 32 min intervals 1 trip at 20:00 1 trip at 21:00 **Sunday**

			8:00 – 10:00, 1 hour intervals 12:00 – 16:00, 1 hour intervals 1 trip at 18:00 1 trip at 19:00
Line 3	5.15	23	**Monday to Saturday** 8:00 – 11:30, 30 min intervals 13:00 – 19:00, 30 min intervals 1 trip at 20:00 1 trip at 21:00 **Sunday** 8:00 – 11:00, 1 hour intervals 13:00 – 15:00, 1 hour intervals 17:00 – 19:00, 1 hour intervals

Table 2 – Route Lengths, Durations, and Frequencies
*Estimated from collected data
**Obtained from official source

6. Active Transportation in Goris

Currently, cycling is not a common form of transportation in Goris. However, the low volumes of traffic in the city present an opportunity to introduce cycling as a mode of transportation. The main challenges to introducing cycling in Goris are the heavy lorries using the narrow Syunik Street, the elevation changes with a small city (majority of slopes 5% and higher – obtained from SRTM Digital Elevation Model), the poor conditions of the roads in places, the stormwater management system, the lack of street lighting, and the great distances and elevation changes separating Goris city proper from the surrounding villages.

In the context of pedestrian facilities, the majority of the streets have proper pavements (many are substandard or poor condition) and intersections have marked crossing points. The major hindrance to pedestrians is having to cross the stormwater gutters while crossing the street. One area that needs improvement is the link that connects Goris city to Old Goris city. Currently, there is no way-finding signage to guide pedestrians to the old city and the route becomes very confusing after crossing the Vararak River.

Figure 11 - Road leading to Old Goris (lack of information and signage)

7. Appendix

Observations from villages

Village	Observations
Vorotan	Very small. Has a small hydroelectric plant. Roads are unpaved and in bad condition.
Karahunj	High altitude. Extreme and sudden elevation changes and winding roads. Great touristic potential.
Verishen, Akner	Linked by bridge. Unpaved roads. Dairy factory in Akner.
Khndzoresk	Biggest village. Wide streets.
Hartashen	Very poor road conditions. Flat land surrounded by mountains, very beautiful but windy. Village access road in good condition, winding road on flat land, great potential to promote cycling.

Villagers go to Goris for administrative reasons, such as going to the bank.