ENCLOSE

ENERGY EFFICIENCY IN CITY LOGISTICS SERVICES FOR SMALL AND MID-SIZED EUROPEAN HISTORIC TOWNS

Co-funded by the Intelligent Energy Europe Programme of the European Union

ALBA IULIA

SUSTAINABLE URBAN LOGISTICS PLAN

ENCLOSE project
Deliverable 3.6
SULP "Sustainable Urban Logistics Plan"
WP3 - T3.3 Local assessment of mobility and energy benefits: development of Sustainable Urban Logistics Plans in the 9 ENCLOSE towns

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Circulation
Public

Date
30.10.2014

PRIMARIA
MUNICIPIULUI
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SUSTAINABLE URBAN LOGISTICS PLAN

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AIM OF THE STUDY WITHIN THE PRESENT CONTEXT

The aim of the present study – **the Sustainable Urban Logistics Plan (SULP)** of Alba Iulia is to identify feasible solutions for the local implementation of sustainable logistics and energy efficiency measures.

The Sustainable Urban Logistics Plan (SULP) is part of the **ENCLOSE** project (ENergy efficiency in City LOgistics Services for small and mid-sized European Historic Towns). ENCLOSE is a pilot project funded by the European Commission under the Intelligent Energy– Europe (IEE) program.

ENCLOSE aims to raise awareness about the challenges of energy efficient and sustainable urban logistics in European Small and Mid-Sized Historic Towns (SMHTs) and about the concrete opportunities to achieve highly significant improvements and benefits by implementing and operating suitable and effective measures, schemes and framework approaches specifically targeted to such specific urban environments.

There are successful innovating practices and mechanisms across Europe providing convincing proofs as to the feasibility and benefits of the proposed approach. Starting from and multiplying these practices, ENCLOSE will contribute to bridge the gaps and to exchange knowledge of feasible solutions for the high number of SMHTs, to investigate and prove the transferability of solutions and the opening of dissemination channels and the implementing of energy-efficiency and sustainable urban logistics solutions in as many European SMHTs as possible.

Freight transport and city goods distribution are widely known factors of energy consumption and environmental degradation in European urban centres and increasing efforts have been undertaken in EU countries to improve operations and reduce their negative impacts. Based on gathered evidence, there is today a considerably growing consensus on the view that more sustainable urban freight operations and significant benefits in terms of energy efficiency can be achieved by an appropriate mix of different measures such as, for instance: Urban Consolidation Centres, optimised urban freight transport and delivery plans, clean vehicles and low emission technologies, restrictions and public incentive policies, last mile and value added services, integration of city logistics processes within the overall management of urban mobility.

Whilst efforts and city logistics innovation projects have been undertaken in most European capitals and major cities (like e.g. Barcelona, Berlin, London, Paris, Stockholm, etc.), Small and Mid-Sized Historic Towns (SMHTs) particularly those involving historic centres, are somehow lagging behind, as they have to face and overcome several barriers (related to e.g. shortage of resources, competences, organisational structures, institutional backing, etc.) to be able to effectively embrace innovation, adopt and implement appropriate plans and measures towards sustainable city logistics. They also have additional constraints and challenges related to their specific territorial, social and economic characteristics (e.g. difficult mobility and significant freight distribution flows, higher impacts of environmental pollution on citizens and quality of life, etc.) and yet show increasing demand of effective measures as well as large potentials for improvements of energy efficiency and sustainability of city logistics operations.

The ENCLOSE project aims to raise awareness about the challenges of energy efficient and sustainable urban logistics in European SMHTs and about the concrete opportunities to achieve highly significant improvements and benefits by implementing and operating suitable and effective measures, schemes and framework approaches specifically targeted to such specific urban environments.

The ENCLOSE project will support the development of Sustainable Urban Logistics Plans in 9 SMHT involving partners from 13 European countries – Austria, Bulgaria, Greece, Ireland, Italy, Norway, Poland, Romania, Portugal, Spain, Sweden, The Netherlands and the UK – with a very high potential of achieving a much wider reach thanks to participation of European and worldwide City Associations and networks.

Starting from urban logistics infrastructures, systems and services already in place and operational, the Forerunner towns of Lucca (Italy), Trondheim (Norway) and s'Hertogenbosch (the Netherlands) will play a motivational role and provide tangible and measurable demonstrations of the possible solutions and benefits that can be attained. Pilot operations will allow investigating all key aspects of interest for less experienced Follower towns, including organisational issues, operational schemes, enabling technologies, underlying service chains and business models, supporting public policies and institutional frameworks, etc. The demonstrations will provide a coherent set of usable town logistics design criteria and evaluation parameters, which will be then adapted against the specific goals, requirements and characteristics of the ENCLOSE Follower towns in order to develop local Sustainable Urban Logistics Plan (SULP) and the evaluation of energy efficiency and impacts.

Forerunner towns:

- Lucca (Italy)
- Posten Norge, Trondheim (Norway)
- s'Hertogenbosch (the Netherlands)

Follower towns:

- Plan Strategico Association, Burgos (Spain)
- Almada (Portugal)
- Dundee (UK)
- **Alba Iulia (Romania)**
- Serres (Greece)
- Balchik (Bulgaria)

Partners:

- EATHR, the European Association of Towns and Historical Regions
- M&C Marketing & Communication (Italy)
- Energi Kontor Sydost (Sweden)
- Tipperary Energy (Ireland)
- Austria Tech (Austria)
- ILIM (Poland)

The ENCLOSE project, based on the real applications carried out by the forerunner towns and on the consolidated experiences of some partners, aims to provide and disseminate viable solutions for urban energy-efficient transport by:

- addressing specific needs, requirements, options and priorities of European SMHTs, demonstrating and assessing feasible and sustainable solutions and releasing a specific SULP (Sustainable Urban Logistics Plan);
- qualifying the demand of European SMHTs for sustainable, energy-efficient urban logistics and freight distribution solutions, generating and spreading the knowledge about good practices and suitable strategies for effective integration logistics schemes in the overall urban mobility and, more generally, town governance policies (SUMP);
- investigating and assessing the operation of "green vehicles" (FEVs, PHEVs, Biogas) and fleets in urban distribution and other logistics schemes from the point of view of the needs and requirements of in SMHTs.

The concept of Sustainable Urban Mobility Plan (SUMP) was developed in the last years by different EU documents (e.g. Action Plan on Urban Mobility - COM(2009)490 final or White Paper Roadmap - COM(2011)0144 final) and carried out by different EU (and in particular in IEE) projects. Updated and detailed information on SUMP and related approaches are available at www.mobilityplans.eu, developed by the IEE Eltisplus project (2010) where, among the others, it is possible to find guidelines for setting up a SUMP and explanation/details on the proposed methodology.

SUMPs can be partially assimilated to the former Mobility or Transport Plans that many towns/cities (with defined dimensions and characteristics) have developed during the last years to face the transport and mobility problems.

The ENCLOSE Project therefore considers the Sustainable Urban Logistics Plans (SULPs) as one of the essential parts of the town mobility plan (SUMP) and aims to address the development of the SULP in each of the ENCLOSE towns, considering its relation with the SUMP.

ENCLOSE aims to have a general and visible impact on promoting the adoption of good urban logistics practices in European SMHTs, by implementing concrete demonstration actions and rising the awareness of the involved local authorities and stakeholders through a number of local dissemination events and media involvement directly in 13 EU member states and, via the participating multipliers association of European historic towns, indirectly in all EU27 countries.

Within the project lifecycle, ENCLOSE expects to achieve over 50 toe/year primary energy savings and a reduction of greenhouse gas emissions of about 900 tCO2e/year. In the longer term (2020 objectives) the impact of ENCLOSE is estimated to amount to total primary energy savings of 2.600 toe/year and over 55.000 tCO2e/year reduction of GHG emissions.

Overall, ENCLOSE will have the following results:

- Assess the applicability and benefits of energy-efficient and sustainable urban logistics measures specifically targeted to European small-/mid-size historic towns, by implementation of (1) pilot operations in 3 urban centres in Italy, Norway and The Netherlands and (2) feasibility and transferability analysis and the implementation of soft measures carried out in 6 historic towns in Bulgaria, Greece, Portugal, Romania, Spain and UK.
- Development of Sustainable Urban Logistics Plans (SULPs) in the 9 ENCLOSE forerunner and learner cities building up a suitable framework for the definition of SULPs for Small-/Mid-size historic towns.
- Promoting the networking of European SMHTs on the themes of sustainable and energy-efficient logistics, to facilitate the exchange of experiences, promoting the adoption of SULPs and investigating policy-level issues to define a strategy to ensure long-term sustainability of the designed framework for SULPs for SMHTs.

Freight transport is vital to the structure of modern society and absolutely essential for supporting a "modern" lifestyle. This provides the circuit goods from production to distribution sites, making them accessible to consumers. Freight transport is even more vital for cities because cities, by definition, are places where almost none of primary goods are produced. In contrast, cities represent the greatest demand for consumables, due to the large number of people who live there.

Europe has in time registered an increase in urban population and its growth is expected from 72% in 2006 to 84% of the total population in 2050. Therefore, it is increasingly important to create an efficient freight transport system for the future.

Freight transport efficiency is based on the term "logistics", which refers to "planning, organization, management, execution and control of freight transport" (European Commission, 2010). The concept of "urban logistics" can be defined as "the total optimization of logistics and transport operations by private companies with the support of advanced information systems in urban areas taking into account traffic congestion, the environmental factor, energy consumption, road safety and energy savings within the context of the market economy."

Currently, the continued growth of freight transport (especially road transport) worsens its impact on the environment and society. In cities, people live and work close to the road network, being exposed to the negative effects of traffic. They are identified by the "UK Round Table on Sustainable Development" (1996) and are summarized in *Table 1.*

Economic impacts	Traffic Congestion Resource waste
Ecological impacts	Greenhouse Gases Cause Climate Change The use of non-renewable fossil fuel The effects of waste products such as tires and oil Ecosystem destruction and species extinction
Social impacts	Negative public health impacts of pollution Crop destruction Injuries and deaths resulting from traffic accidents Noise Visual intrusion Congestion deterring passenger travel Loss of Greenfield sites and open spaces Deterioration of Buildings/Infrastructure

Table1. Impacts of the logistics system

Since the early 90s, there has been a growing interest in reducing the negative impact of logistics and desire to make it more environmentally-friendly.
However, at the level of cities, there is the following difficulty: cities are often too small for proper planning of freight as freight in a given urban area is only part of a chain of distribution between it and other cities or even countries. Therefore, freight infrastructure planning in a particular city should be harmonized with that of other cities.
The present SULP is aimed at presenting solutions for the improvement of logistics in Alba Iulia and also at presenting solutions for future lines of action, in agreement with European policies and based on the experience of similar European towns.

1. GENERAL CONTEXT OF THE TOWN

1.1. The town and the study area

1.1.1. POSITION

Alba Iulia is a natural crossing point and crossroads that organically bound it to the surrounding areas rich in deposits of precious metals, salt and famous vineyards that have spurred the development of its population, as well as its urban and economic development.

The town encompasses 10,365 hectares of land, arable land, pastures, meadows, vineyards, orchards and tree nurseries. *(Appendix I.1 - Alba Iulia – Administrative territory)*

Alba Iulia is located in the centre of the Transylvanian Plateau, 460°5' north and 210°15' east, with an altitude of 330 m, at the meeting point between the hills descending from the Trascăului Mountains and the plains of the valley along the middle course of the Mureş River.

The town itself is located on the first terrace of the Mureş, forming an 8-10 km long and 2-4 km wide plain to the east. The western part of the town is surrounded by the wooded heights of the Metaliferi Mountains with the Mamut Peak (630m). To the east, across Mureş, are the reddish clay hills of the Transylvanian plateau, eroded by the rivers Mureş, Sebeş and Secaş. To the south are the Sebeşului Mountain peaks with Surianul Peak (2245 m) and Pătru's peak (2130 m). The town is crossed by the road E81, which connects the cities of Sibiu and Cluj Napoca.

(Appendix I.2 - Alba Iulia's position on the map)

The area is very rich in historical monuments, works of architecture and art, a proof of its long history. It is also an attractive tourist area rich in natural sights. Alba Iulia has been, since old times, a hearth of human civilization. Nowadays, traditional Romanian customs and rituals are very much alive and they are ready to receive tourists from all over the world.

Alba Iulia is also the symbolic capital of the Romanian people, a symbol of unity of the nation and of the spirit. Here, on 1 December 1918, the Union of Transylvania and mother country Romania took place and thus, the Modern Romanian National State was born.

A representative image of the municipality is the bastion-type Vauban-style fortress of Alba Carolina, built after the establishment of Habsburg domination in Transylvania (1715-1738). It is the most representative bastion-type Vauban-style fortress in the country. Built by the architect Giovanni Morando Visconti under General Stephen of Steinville (1663-1736), commander of the imperial troops in Transylvania, the fortress has seven bastions (Eugene of Savoy, St. Stephen, St. Michael, St. Charles, St. Elisabeth, Trinitarians and St. Capistrano) and all the fortification elements adapted to the military technology of that time - tenaille, ravelins, anterior walls, scarp, counterscarp and glacis organized on the principle of mutual defence and of remote defence.

Access inside the fortress is possible through seven gates, decorated with statues and reliefs by a team of sculptors led by Johann König. The fortress reunites the most significant collection of baroque figurative art works in Transylvania.

The main tourist attractions located within the fortress are: the Route of the Three Fortresses, the 7 gates of Alba Carolina, the Orthodox Cathedral of National Reunification, the St. Michael's Catholic Cathedral, the Museum and the Union Hall, the Bathyaneum Library, the cell where Horea, Closca and Crisan, leaders of the peasant serfs' revolt were imprisoned, and which is located inside the architectural ensemble of the third gate, the Apor Palace, the Princes' Palace, the Palace of the Roman Catholic Archdiocese, the obelisk erected in the memory of Horea, Closca and Crisan, the Roman Encampment gate, the Lossenau monument, the Custozza monument and the statue of Michael the Brave.

The Alba Carolina Fortress, with all its inside and outside areas with its bastions and ravelins is listed as Heritage Monument in Romania and is part of the UNESCO Cul-

tural World Heritage. The Alba Carolina Fortress is a bridge between centuries of history, culture and successive European civilizations, preserving between its walls the vitality and the legacy of successive generations that lived on the site of present day Alba Iulia.

1.1.2. POPULATION

According to the 2011 census, the population of Alba Iulia is of 63,536 residents, lower than at the previous census in 2002, when there were 66,406 residents. Most residents are Romanian (87.62%). The main minorities are the Romany (1.76%) and Hungarians (1.59%). For 8.64% of the population, ethnicity is not known. From the religious point of view, most of the inhabitants are Orthodox (81.31%), but there are minorities such as Pentecostal (2.15%), Greek Catholics (1.93%), Roman Catholics (1.88%) and Baptists (1.51%). 8.85% of the residents did not declare their religious confession.

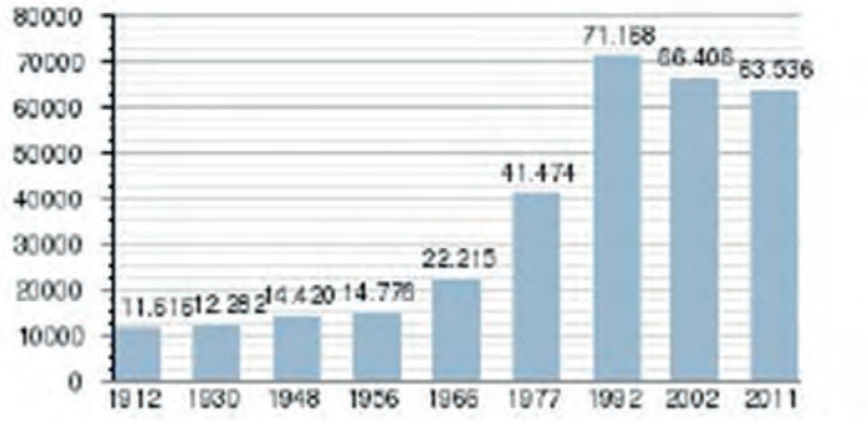


Fig.I.2. Demographic evolution at census

1.1.3. THE ECONOMY AND PUBLIC SERVICES

Alba Iulia is the administrative centre of the Centru Development Region including the counties of Alba, Brasov, Sibiu, Harghita, Covasna and Mures.

Alba Iulia is twinned with:

- Arnsberg-Germany since 1974; there is currently a non-for-profit company called "Pro Alba Iulia" in Arnsberg which aims to enhance bilateral friendship cooperation between the two towns;
- Szekesfehervar - Hungary, with which there are numerous economic and cultural exchanges;
- Nazareth- Illit - Israel, since 1994;
- Aeghio - Greece - since 2001
- Duzce - Turkey - since 2001;
- San Benedetto del Tronto- Italy – since 2001;
- Alcala de Henares - Spain – since 2002;
- Sliven - Bulgaria - since 2002;
- Varese - Italy - since 2003; administrative relations;
- Alessandria-Italy - since 2008; administrative relations and a signed Cooperation Protocol for the development of a renewable energy project;
- Lanzhou - P.R. China - a twinning Agreement was signed and a twinning Protocol is yet to be signed.

Alba Iulia cooperates with cities in Austria, Belgium and the United States of America.

The built-up area within Alba Iulia is divided according to the Urban Plans in force into the following functional areas:

Town centre and public facilities
Residential area
Green areas
Transportation areas
Industrial area
Public utilities, facilities and transportation area
Urban planning and public utility networks
Special area

Economic life is dominated by a few famous enterprises whose production is exported all over the globe. Thus, IPEC SA and Porțelanul SA produce a wide range of chinaware of great finesse and beauty that has brought them international notoriety. Also, Incov SA produces Persian carpets satisfying the most sophisticated orders. Saturn produces iron castings and Rekord SA manufactures a wide range of footwear.

The total number of companies in Alba Iulia is 3,079 of which: owned by the state – 81, private - 2998, with foreign capital – 27, Romanian-foreign joint venture - 150, state companies – 9, cooperative organizations -17, sole traders - 335 family associations.

Schools in Alba Iulia own 484 classrooms, 60 laboratories and 35 school workshops. The town and its outskirts (Barabant, Partoș, Micești, Oarda and Pâclișa) has 12 public elementary schools, 8 public high schools: "Horea, Cloșca și Crișan" Theoreti-

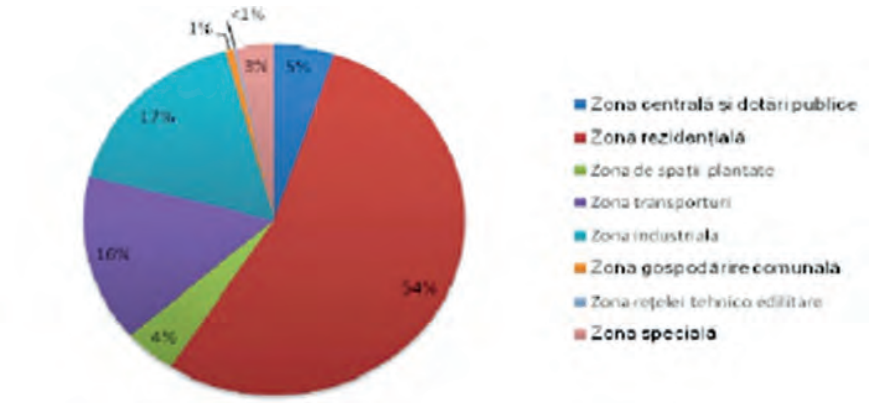


Fig.I.1.The functional breakdown of land inside the built-up area – "The urban dynamics of Alba Iulia"

cal High School, "Mihai Viteazul" Military High School, Music and Arts High School, "D.P.Marțian" Economic High School, Sports High School, "Dorin Pavel" Technical High School, "Al. Domşa" Technical High School and "Apulum" Technical High School; two seminaries: the Orthodox Theological Seminary and the Catholic Seminary, one public institution of higher education "1 Decembrie 1918" University of Alba Iulia which includes the Faculty of History and Philology, the Faculty of Sciences, the Faculty of Law and Social Sciences and the Faculty of Orthodox Theology. Pre-school education takes place in 21 kindergartens of which 17 are public.

In Alba Iulia there are 36 places of worship for the following confessions: Orthodox, Roman- Catholic, and Franciscan, Greek Catholic, Reformed, Unitarian, Baptists, Protestants, Mosaic and others. The town has one Cultural Centre, one Students' Cultural Centre, one puppet theatre, one museum, 30 libraries, of which the most important are the Batthyaneum Library, the County Library and the "1 Decembrie 1918" University Library. Alba Iulia also has one Children's and Pupils' Club (Palatul Copiilor). In health care, there are 3 hospitals and 23 medical clinics, an orphanage and a recovery complex for children with disabilities "Arnsberg."

Alba Iulia also has recreational areas such as: the Schit sports and leisure area, an Olympic Pool, the Recreational Area Ampoi II, the Sports Complex Victoria Cetate, the Leisure area Winner's Club Țălnar, Unirii Park, Unirii Square, I.L. Caragiale Park, Maria Park, Sfânta Ecaterina Park, the Arboretum and the Zavoi Park Micești.

1.1.4. THE STUDY AREA – TRANSILVANIEI BOULEVARD

In Alba Iulia, there are many public areas for pedestrian traffic (open promenades, parks, squares). By far the most crowded is the Transilvaniei Boulevard, located on the upper side of the town, on Romanilor Plateau in the Cetate district and it makes the connection between the upper town and the downtown area through the Alba Carolina Fortress.

(Appendix I.3. Transilvaniei Boulevard– position on the map)

In 2007, the Transilvaniei Boulevard was one of the objectives of a major project run by Alba Iulia City Hall and called "Re-functionalisation of the area surrounding the blocks of flats located on the Romanilor Plateau in Alba Iulia" (the area between the two streets - Closca and Vasile Goldis). The project included upgrading and changing the functionality of the area by solving problems related to road infrastructure, public utilities, public lighting, landscaping and street furniture. Also, at the same time, the underground infrastructure was rehabilitated through the Environment Programme included in the NDP (National Development Plan).

After the completion of this project in 2009 and with the significant increase of businesses and trade, Transilvaniei Boulevard became the busiest pedestrian street in the town.

For this reason, Transilvaniei Boulevard was identified by the ENCLOSE project as the area in which logistics measures would be extremely useful and would have an impact for the municipality of Alba Iulia.

After the implementation and completion of the modernisation and re-functionalisation area, pedestrian access and car road geometry and traffic flow on Transilvaniei Boulevard have changed. Recent years have seen an increase in traffic flow on Transilvaniei Boulevard, due to both tourism and the emergence of new businesses operating in the area (shops, restaurants, cafes, street vending, etc.). Thus, we identified approximately 100 trade and related activities over a distance of about 1km, taking into account only the activities with direct access to the boulevard.

Freight transport by traders on the boulevard is made extremely difficult because of its interference with the pedestrian area and with the narrow alleys leading to the boulevard.

Currently, there are no regulations that concern the reduction of freight traffic pollution in the area.

Traffic is extremely heavy throughout the year, as Transilvaniei Boulevard is the route that connects the upper town (Cetate district) to the city centre (downtown), through the Alba Carolina fortress. In summer, traffic increases significantly due to the terraces and temporary trade activities - various types of street vending.

The present SULP for Alba Iulia considers data collected from the ENCLOSE study area - Transilvaniei Boulevard in an attempt to identify logistic measures applicable in various areas of interest to the town.

I.2. The town's strategic urban mobility plan (SUMP)

Alba Iulia has got a development strategy that aims to use urban mechanisms as a positive force in improving standards of living, sustainable standards and socio-economic development by observing the sustainable development principles.

The SUMP of Alba Iulia plans to solve traffic problems by improving the quality of public pedestrian and car traffic spaces and to improve accessibility in the Alba Carolina Fortress. All existing and future strategic plans are developed starting from the General Urban Development Plan (GUDP) and from existing town-planning regulations (Zonal Urban Plan - ZUP and Detailed Urban Plans - DUP).

The present SULP of Alba Iulia starts from the premises established by the Town's Development Strategy and it considers the provisions of the General Urban Development Plan (GUDP). These documents are the grounds for finding solutions to improve logistics in Alba Iulia.

1.2.1. THE DEVELOPMENT STRATEGY OF ALBA IULIA MUNICIPALITY (2005)

The Development Strategy of Alba Iulia underlies sustainable development of the local economy and of improving the quality of citizens' life. Drawn up at the initiative

of the Alba Iulia Town Hall, the strategy was developed with the support of the recommendations proposed by citizens, Town Hall employees, businesses, institutions and local organizations during workshops, surveys and public debates organized by the Consultant. It is permanently updated, as key indicators change their values in time.

This strategy aims to substantiate the process towards the sustainable development of the local economy and improving the lives of citizens. It is based on the following premises:

- Improving quality of life;
- Competitiveness and attracting investments;
- Good local governance through the elected bodies and effective management;
- Getting citizens' support and involvement;
- Flexibility of approach for better adaptability to future changes.

The strategy puts forward three important approaches for Alba Iulia:

- "Alba Iulia of the residents" - improving quality of life;
- "Alba Iulia of the tourists" - cultural tourism development and advertisement of the town's brand;
- "Alba Iulia of the investors"- promoting businesses.

The Development Strategy includes several components, one of which is the "traffic".

The Alba Iulia street network consists of 274 streets with a total length of 193km, of which 117 km of streets (61 %) are modernised.

As results from the traffic analysis drawn up in 2000, traffic in Alba Iulia must be reorganized in several problematic areas (temporary jams, inconsistency in the spatial organization or in terms of signs, etc.), which could lead to even bigger problems as a result of an increasing number of vehicles. As concerns heavy and transit traffic, priority is given to bypass roads which could provide relief for the urban road network. The current bypass road on the east side of the town partially eases heavy/transit traffic as it links Alba Iulia and Sebes and Alba Iulia and Cluj. Heavy traffic to the Apuseni Mountains is picked up by several major arteries in the town thus overlapping local traffic.

As the living standard of the population of Alba Iulia improves, the number of vehicles in the town is expected to rise significantly. In some parts of the town, there is already a high demand for parking lots, as they are not enough and people park on sidewalks and green areas. Traffic planning in Alba Iulia should estimate and find solutions to the ever-increasing demand for parking spaces and better traffic conditions.

Several actors should be involved in solving traffic problems in Alba Iulia: the public sector (the Town Hall's services responsible for traffic planning, organization and administration of parking areas, transportation licensing), the public transport company, the residents and the private sector (store owners, transport operators). All these actors are interested in a better organization and operation of traffic in Alba Iulia, but they may have different interests in favour of a particular solution. Therefore, a general concept of Alba Iulia traffic is needed, from which more particular solutions can follow.

The following traffic problems were identified by the strategy:

- Lack of a traffic plan, part of the General Urban Development Plan;
- Lack of bypass ring roads to the north, west and south of the town;
- Ad-hoc parking on high traffic roads with negative effects on traffic safety and on the town's image;
- Lack of a buffer land reserve in the town centre which could provide parking areas for future developments coming from increased business and tourism;
- Inadequate state of the road and increased risk of accidents due to a low level of traffic safety on the bypass road.

In order to find solutions to these problems, the Development Strategy suggests policies, projects and programmes such as:

1.2.2. THE GENERAL URBAN DEVELOPMENT PLAN (GUDP)

The General Urban Development Plan is both directive and regulatory and it is the main operational planning tool and the legal basis for the implementation of development programmes and actions.

GUDP includes provisions:

- on a short term, for the entire administrative and territorial unit (the municipality) regarding:

Policies	Programmes	Projects
Policy 1: Improve traffic conditions in Alba Iulia	**Programme 1.1.** Create and implement an improved general concept for Alba Iulia **Programme 1.2.** Regulate heavy and transit traffic in Alba Iulia	**Project 1.1.1.** Update the traffic study **Project 1.2.1.** Build the western belt and the connection rings of the major street network with the existing belt.
Policy 2: Regulate traffic in the historical area	**Programme 2.1.** Regulate access inside the historical fortress **Programme 2.2.** Regulate parking conditions in the historical area.	**Project 2.1.1.** Implement an IT system for car access control in the historical area **Project 2.2.1.** Ways to manage parking places inside and in the vicinity of the historical area.

Table.1. Traffic Policies, Programmes and Projects included in the Development Strategy

a) land within the built-up area, as established and defined in relation to the administrative territory;
b) the use of land within the built-up area;
c) functional zoning in conjunction with the traffic network organisation;
d) delimitation of areas for public use;
e) modernisation and development of the urban technical infrastructure;
f) protected areas and protected historical monuments and archaeological sites; areas for which the law has established special protection;
g) forms of ownership and legal circulation of land;
h) requirements for the location and conformity of constructions, landscapes and planted areas.
i) natural risk areas identified and declared so by law, as well as specific measures for prevention and mitigation of risks, land use and construction of buildings in these areas.
j) risk areas due to historical storage of waste.

- on a medium and long term regarding:
  a) the future development of the town
  b) functional development directions on the town's premises;
  c) routes of traffic corridors and equipment as planned nationally, regionally or locally

GUDP highlights the main strengths and weaknesses as regards the current status of traffic roads inside the town:

- Strengths
  - a future motorway Pan-European Corridor IV, future railroad Pan-European Corridor IV and future Sebeş - Turda motorway crossing Alba Iulia, a satisfactory state of streets in the town and a recently modernised public transportation system.
- Weaknesses
  - transit traffic going through the town (DN 1, DN 74) partially crossing residential areas;
  - improper configuration of street profiles
  - risky areas for pedestrians;
  - problematic street junctions;
  - improperly sized river and railroad crossings;
  - not enough parking places, especially near blocks of flats and public institutions;
  - few bike lanes;
  - poor quality of buildings by the street and of urban public areas;

Priorities for traffic roads as set up by GUDP:

- Completion of the ring road Revoluției Boulevard- Ion Lăncrăjan street– Partoș area;
- Completion of the ring road Republicii Boulevard - T. Vladimirescu street- Bypass road;
- Creation of the bypass road to Zlatna – from the national road at the town entrance from Cluj and connected to the Sebeş – Turda motorway;
- Finding appropriate locations for underground or multi-floor parking areas;
- Reserving the necessary corridor for the future Sebeş – Turda motorway;
- Creation of bike lanes inside the town and around the town (biking trails) alongside the Ampoi and Mures rivers;
- Resizing the main junctions in the town by building roundabouts.

All traffic roads provisions of GUDP are included in the *Appendix I.4. GUDP provisions – Traffic roads*

1.2.3. THE SUSTAINABLE ENERGY ACTION PLAN (SEAP)

Alba Iulia Municipality decided in 2010 to join the initiative "The Covenant of Mayors" promoted by the European Commission, taking a unilateral commitment to reduce CO2 emissions in its territory by more than 20 % by 2020.

This commitment of the local government is its response in terms of energy and environment aimed at countering the challenges brought by the development of the Municipality during its recent decades, and namely: environment pollution caused by an accelerated development, management of an increasing traffic, explosion of the built-up area, urban waste management, the need for public utility services of decent quality.

Within this context, a coherent approach to municipal actions is required to reduce the environmental impact of urban activities and increase the quality of public utilities and also economic competitiveness.

The Sustainable Energy Action Plan (SEAP), developed together with Alba Local Energy Agency is the key document defining the energy policies of the local government for the next 10 years in order to reduce CO2 emissions throughout the town. This plan includes a number of short and medium -term measures to increase the energy efficiency of public buildings, rational use of energy in homes and buildings in the tertiary sector, sustainable urban transport system, the modernisation of public lighting, producing a significant portion of necessary energy from renewable sources.

The Sustainable Energy Action Plan is integrated into the strategic perspectives established by the "Development Strategy of Alba Iulia" developed in 2005 and valid until 2020.

Work packages in the following key areas have been identified:

- The built environment where the potential for reducing consumption is the highest;
- **Urban transport where a sustainable urban mobility plan is needed;**
- Production of a significant percentage of the used energy from renewable sources;
- Urban planning, sustainable development measures included in the new General Urban Development Plan;
- Raising awareness of citizens in sustainable energy issues and their involvement in sustained actions to reduce energy consumption;

Urban transportation, the second area in which energy savings/cuts could occur, requires resolute action from the municipality to turn it into a modern, cleaner system, which ensures mobility in European terms.

This sector is actually the subject of an integrated package of measures launched by "The Integrated Urban Development Plan" for 2009-2015.
SEAP's actions identified in the "Transport" sector are:

- Municipal Fleet:
  - Purchasing new means of transport with low consumption and high comfort;
  - Municipal fleet rationalisation;
- Public transport:
  - Setting up an intercommunity public transportation system in the area managed by the Intercommunity Development Association Alba Iulia (AIDA);
  - Setting up an intercommunity public transportation system in the area managed by the Intercommunity Development Association Alba Iulia (AIDA), including a single bus stop system, furniture, fee-charging and guiding to avoid crowding the town by public transport means;
  - Exemptions or discounts for public transport fares for pensioners and students;
  - A new passenger fleet, with low consumption and high comfort and promoting green technologies in transport;
- Private and commercial transport:
  - Implementing a differentiated tariff plan to discourage driving in the town centre;
  - ntroducing an electronic system for managing car access and payment in parking lots;
  - Optimal connection of Alba Iulia with the express road and the bypass road;
  - An optimized and secure management of urban and transit traffic;
  - A proper arrangement of the main junctions in relation to the composition and volume of traffic ;
  - Organising proper parking areas, creating new spaces in residential areas and along the 4-lane arteries.
- Other:
  - Implementation of a project of urban mobility by using bikes in the historic area;
  - Implementation of a project of biking-tourism in the Arboretum area – *Mamut* Hill;

The above-mentioned activities presented in the SEAP were identified by means of analyses of the basic emissions' inventory or of energy consumptions for the reference year 2008. They tried to cover all areas of importance in energy consumption/ emissions and by estimating the effects of their implementation, they are meant to lead to energy savings and thus to reduce emissions by 24 % by 2020 within the town.
SEAP implementation will not be easy as technical solutions and funding sources need to be identified, while keeping the political decision to carry out all the activities, as planned.
A constant monitoring of the implementation of SEAP activities and of results obtained is required. Every two years, an evaluation and implementation report will be presented to the European Commission - the Office of the Covenant of Mayors.
The periodic evaluation will perhaps determine changes in certain activities and thus, to the update of SEAP. What should remain unchanged is the decision of the public authorities to carry out the commitment, and thus contribute to the sustainable development of Alba Iulia.

1.3. Main aspects of mobility laws

the following environmental and traffic legislation is in force:

- Law 363/2006 on the approval of the national land management plan – Section I – Transportation networks;
- Law 215/2001 on local government, republished;
- Government Ordinance 43 / 1997 on the regime of roads with subsequent changes;
- Government Ordinance 27/2011 on road transportation with changes brought by G.O. 11/2013;
- Government Decision no. 1373 of 28/10/2008 regarding the regulation of the supply and transportation of divisible goods on Romanian public roads;
- Order No. 407/991 from 26 July 1999/26 August 1999 for the approval of Norms on the authorization and carrying out of heavy road transportation or of sizes exceeding maximum limits set by Government Ordinance no. 43/1997 on the roads' regime;
- Joint order of the Ministry of Public Works, Transportation and Housing no. 6/2003 and of the Ministry of Public Administration no. 193/2003 regarding measures for observing discipline in urban planning and land management for the purpose of ensuring a more fluid traffic and road safety on public roads;
- Technical norms on the design and building of constructions near the roads and on the sizing of road systems;
- Directive 1996/53/CE
- Law 350 on land management and town planning with subsequent changes and additions;
- Law 422 on the protection of historical monuments, republished;
- Emergency Ordinance 195/2005 on environment protection and subsequent changes;
- The national environment protection strategy
- The Integrated Urban Development Plan of Alba Iulia 2009-2015 approved by Local Council Decision no. 126/27.03.2009.

In Alba Iulia, besides the legislation in force, the provisions of Local Council Decision 26/2003 with subsequent changes and additions apply as regards the transportation of food and non-food commodities in the town.

1.4. Urban Mobility Technologies (Parking Area Management System, Access Control, Etc.)

Currently, Alba Iulia does not have a public parking office, but there is a Local Council

Decision (LCD) no. 45/2009, amended subsequently, which approved the "Regulation on organization and operation of public residence parking lots located in Alba Iulia municipality". The Regulation is currently applied through the care of the Public Office for Local Patrimony Management (LPM).

Also, L.C.D. 16/2003 established the rules for issuing special permits for access in restricted areas. This responsibility belongs to the Office for the Administration and Monitoring of Public Utilities (AMPU) of the Technical-Development Division of Alba Iulia Town Hall that ensures the implementation of legal measures on road safety (signage, signs and road markings, crash barriers, traffic lights, etc.) on public roads in the town of Alba Iulia.

For the time being, there is no intelligent management system for access control implemented in the town, but the municipality's development plans include projects of access control and monitoring of protected and densely populated areas as well as activities concerning ease of traffic flow and decongestion (roundabouts, one-way streets, rehabilitation and expansion of transport infrastructure by upgrading roads, alleys, boulevards, sidewalks, etc.)

2. THE GENERAL CONTEXT OF LOGISTICS

2.1. General aspects

Alba Iulia has a good accessibility, with a higher density of communication channels than the national average. The city is crossed by the European road E81 and it is located near the railway node of Vinţu de Jos. Alba Iulia is at a distance of 70 km from the Sibiu International Airport and 100 km from the Cluj International Airport, which makes it easily accessible to tourists.

Alba Iulia, in spite of its almost central geographical position on the Romanian map, is close only to one county capital (Sibiu) from which it can be reached in less than an hour. It is reached in less than 2 hours for 3 county capitals (Cluj- Napoca, Deva, Targu Mures) and in less than 3 hours for 3 county capitals (Ramnicu Valcea, Târgu Jiu and Zalău). 12 other county capitals are available within 4 hours of travelling and other 5 within a time span of 4-5 hours. Bucharest is about 5 hours by car far from Alba Iulia, through the quickest route (Pitesti). Capitals of the 10 counties in eastern and southern Romania require over 6 hours of travel by car (actual time). The longest drive is to the county capitals by the Black Sea, Tulcea and Constanta requiring more than 8 hours of driving.

The average time of access from the 40 county capitals and Bucharest is 4 hours and 27 minutes. At the completion of the motorway network, the average access time to Alba Iulia could decrease by 50 minutes on average and by 33 hours in total (about 20%). The most spectacular decreases in travel time could be obtained for the county capitals in the northeast and southeast: over 2 hours to Constanta, Botosani and Suceava and over 1 hour to Braila, Buzau, Calarasi, Galati, Giurgiu and Slobozia. When traveling from Bucharest and Ploiesti, Alba Iulia could be approx. 1.5 hours closer. There would not be any significant changes for access from Miercurea Ciuc, Vaslui, Drobeta-Turnu Severin, Reşiţa, Bistriţa, Baia Mare, Satu Mare, Craiova.

Regarding the access to/from the closest European capitals, we can notice the easy access from/to Budapest (6 hours and 37 minutes) and Belgrade (6 hours and 22 minutes). Within 10 hours of travel (actual time) Bratislava and Vienna are available to the west, Sofia and Skopje to the south, and Chisinau to the east. The most favourable access from the west is by Arad and for the south through Craiova, an access which can be improved by the construction of the road and railway bridge at Calafat - Vidin.

The creation of the motorway network as foreseen by Section I of the National Land Management Plan will result in a better accessibility, which will also favour Alba Iulia, due to its central location. Travel to the west capital cities will be reduced by at least an hour, so Budapest will be less than 6 hours away and Bratislava and Vienna less than 8 hours (which is the current driving distance between Alba Iulia and Constanta).

There is a traffic study conducted in 2000 in Alba Iulia. The factors included in the study are the grounds for all logistics projects proposed or accomplished in the city, some of which have already been completed (one-way streets, four new

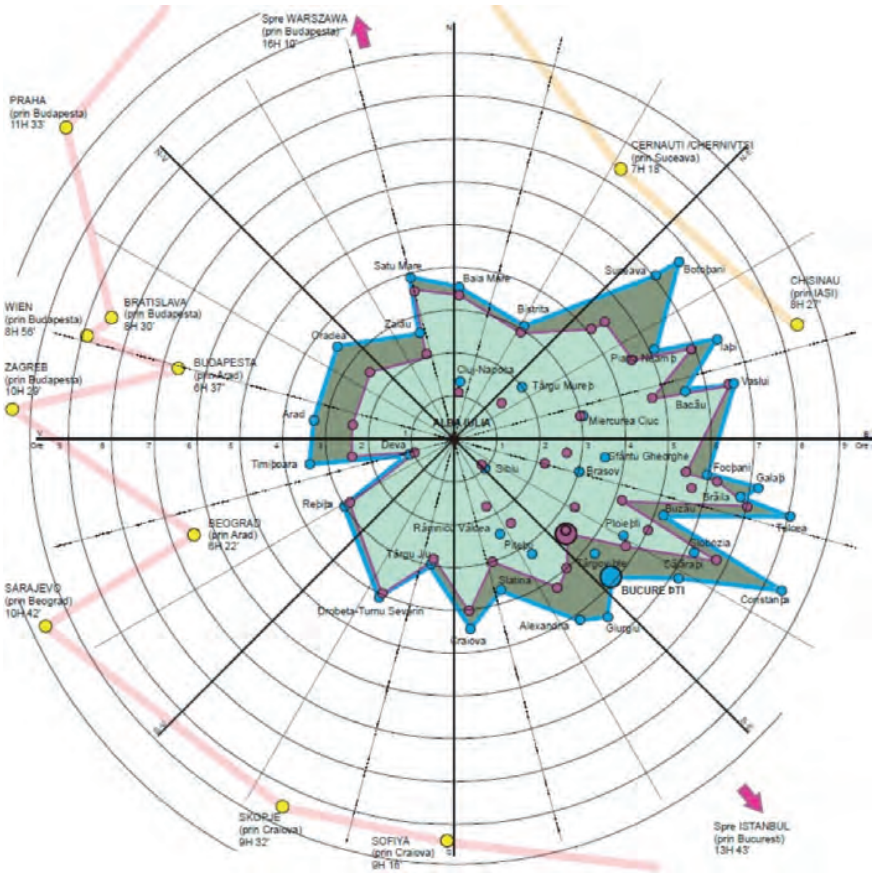


Fig. 2.1. – Accessibility of Alba Iulia by the current roads

roundabouts, expansion of Al.I. Cuza to 4 lanes and expansion of Motilor and Zlatnei streets to 3 lanes, rehabilitation of passages on National Road 1, etc.)

For the traffic study, the traffic relations between different points of traffic polarization in Alba Iulia were identified. This was done through surveys of town-entry arteries from origin to destination. Another stage of in the setup of the traffic model was that of zoning. This involved grouping various centres of attraction - generating traffic within the modelled traffic areas. For each traffic area, significant parameters were established, namely:

- Number of passenger vehicles;
- Number of freight vehicles;
- Employed population;
- Number of jobs;
- Number of trading companies and their activity profile.

In order to generate transit and town-entry traffic, the study picked areas located on the outskirts and on the five entry arteries. The road traffic area distribution (*Appendix II.1*) adopted within the traffic study in Alba Iulia contains an overall of 49 traffic areas of which:

44 inner areas;

5 outer areas: 45, 46, 47, 48, 49. They include the cities, towns and villages connected to Alba Iulia by the following roads:

- area 45 – NR 1 – to Sebeş;
- area 46 – County Road 107 – to Ciugud;
- area 47 – NR 1 – to Cluj;
- area 48 – NR 74 – to Zlatna;
- area 49 – NR 107A – to Pîclişa.

These areas form the major street network of Alba Iulia. *Appendix II.2 presents the classification of streets.*

Figure 2.2. presents the traffic distribution per type of vehicles, as an average of the 49 census points.

Type of vehicle:

- bicycle, motorcycle
- Cars with or without a trailer, motorcycle with a sidecar
- Bus
- Minibus, van, small truck
- 2-axle truck; tractor
- 3-axle truck
- Hinged vehicles, tow trucks with trailer Lorry and tractor trailers

No. of physical vehicles

Equivalence coefficient

Reference no. of vehicles

% of total

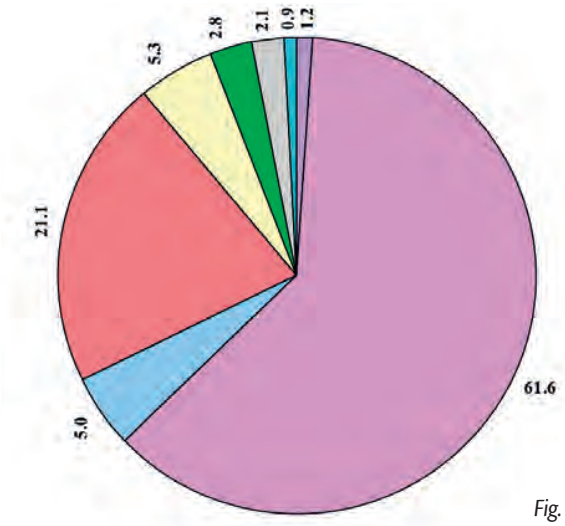


Fig. 2.2. – Traffic distribution LEGEND:

Tip vehicul	Vehicule fizice	Coef. de echivalare	Vehicule etalon turism, vet	% din total
Bicicleta; motocicleta	156	0.5	78	1.2
Autoturism cu sau fara atas, motocicleta cu atas	3963	1.0	3963	61.6
Autobuz; autocar	93	3.5	325	5.0
Microbuz, furgoneta, camioneta	1129	1.2	1355	21.1
Camion cu 2 osii; tractor	98	3.5	343	5.3
Camion cu 3 osii	52	3.5	182	2.8
Autovehicule articulate, remorchere cu trailer	33	4.0	132	2.1
Remorci la camioane, tractoare	38	1.5	57	0.9
Total:	5562	1.148	6435	100.0

The traffic study must be updated due to the following reasons: (1) the road network is expanding by including the development areas from the neighbouring districts (Oarda, Pâclişa, Bărăbanţ, Miceşti); (2) the construction of the Sebeş – Turda motorway, a major objective of the NLMP section I – Transportation networks, namely motorways.

2.2. Specific regulations for freight transportation

Currently, Alba Iulia applies to vehicles carrying food and non-food commodities in Alba Iulia, the provisions established by Decision no. 16/2003, supplemented with further restrictions on weight. The same decision contains the fees for special access permits.

The fee for a special access permit to restricted areas is updated annually by local council decision on local taxes and dues. (Appendix II.3 - Traffic regulations in Alba Iulia)

To ensure a smooth and safe road and pedestrian traffic and to avoid and prevent degradation of monument buildings and road in Alba Iulia, the following restrictions apply for heavy vehicles carrying food supplies and non-food items:

- **Unrestricted roads inside and from Alba Iulia:**
  - Regimentul V Vânători street – the whole street;
  - Ferdinand I Blvd– between the rail-

road crossing and the junction with Încoronării Blvd (Railways Station area);
- Take Ionescu street– the whole street;
- Încoronării Blvd– the whole street;
- 1 Decembrie 1918 Blvd– the whole street;
- Horea Blvd– the whole street;
- Calea Moților – between Horea Blvd and Zlatnei street;
- Republicii Blvd – the whole street;
- Zlatnei street– the whole street;
- Republicii Blvd - the whole street;
- Tudor Vladimirescu street between Republicii Blvd and Al. I. Cuza street;
- Alexandru Ioan Cuza street - the whole street;
- Unpaved service road between Al.I. Cuza and Turnătoriei street;
- Turnătoriei street from the service road to SC Saturn SA;
- Viilor street - between Ferdinand I Blvd (railroad crossing) until SC Apulum SA;
- The Alba Iulia bypass road;
- Carpenului street – between the junction with Iasomiei street and the limit towards the village of Vurpar;

- **Restricted streets 20 tonnes – maximum allowed weight:**
  - Cloşca street– the whole street;
  - Vasile Goldiş street – the whole street;
  - Livezii street– between Alba Mall and Tudor Vladimirescu street;
  - Petru Dobra street– the whole street;
- **Restricted streets to 10 tonnes – maximum allowed weight:**
  - Revolutiei 1989 Blvd the whole street;
  - Gheorghe Pop de Basești - the whole street;
  - Mureşului street - the whole street ;
  - Turnătoriei street between Mureşului street and ER 850;
  - Brandușei street - the whole street;
  - Siretului street - the whole street;
  - Aurel Vlaicu street - the whole street;
  - Gemina street - the whole street;
  - Apulum street - the whole street:
  - All the streets without other restrictions;
- **Restricted streets to 5 tonnes – maximum allowed weight:**
  - Ferdinand I Blvd between the traffic light junction by the Railway Station and I.I.C. Brătianu street;
  - I.I.C. Brătianu street - the whole street;
  - București street between I.I.C.Brătianu street and the scrapyard;
  - Mărăşeşti street - the whole street;
  - Ardealului street - the whole street;
  - T. Vladimirescu street between Calea Moților and Republicii Blvd;
  - I. Maniu street - the whole street;
  - Trandafirilor street - the whole street;
  - Teilor street - the whole street;
  - Călăraşilor street - the whole street;
  - Mihai Viteazul street between Națiunii square and O. Goga street;
  - Națiunii square;
  - Frederic Mistral street - the whole street;
  - Primăverii street - the whole street;
  - Florilor street - the whole street;
  - Iaşilor street - the whole street;
  - Olteniei street - the whole street;
  - Henri Coandă street - the whole street;
  - Doinei street - the whole street;
  - Plevnei street - the whole street;
  - Ion Arion street - the whole street;
  - Păcii street - the whole street;
  - Muzeului street - the whole street;
  - Mitr. Andrei Şaguna street - the whole street;
  - Mitr. Alex. Şterca Suluțiu street - the whole street;
  - Militari street - the whole street;
  - Gabriel Bethlen street - the whole street;
  - Tricolorului Square;
  - Unirii street - the whole street;
  - M. Viteazul street inside the fortress;
- **Streets with no access for any transportation means:**
  - Transilvaniei Blvd between 1 Decembrie 1918 Blvd and Revolutiei Blvd;
  - Mihai Viteazul street between O. Goga street and the 3rd Fortress Gate.

For freight transport vehicles, Alba Iulia Municipality can issue special permits for these streets. The fees are approved by local council decisions, each year.

In Alba Iulia, delivery is restricted to the hours 6.00-12.00 and 17.00-21.00.

According to the same local council decision, vehicles belonging to individuals and businesses that have a parking place in one of these restricted areas and travel to or from the parking place, without cargo, are not subject to a special permit.

In Alba Iulia, there are speed restrictions in areas with high pedestrian traffic or near children's play parks, schools and kindergartens as follows:

- **Speed limit of 30 km/h on the following thoroughfares:**
  - All of N. Bălcescu street;
  - All of Mărăşeşti street;
  - All of Turnătoriei street;
- **Different speed limit depending on the type of vehicle- 50 km/h for cars, 30 km/h freight vehicles:**
  - 1 Decembrie 1918 Blvd. between Brândușei and Cloşca streets;
- **The residential area inside the Fortress, with a recommended speed limit of 20 Km/h:**
  - Păcii street;
  - Muzeului street;
  - Mitr. Andrei Şaguna street;
  - Mitr. Alex. Şterca Suluțiu street;
  - Militari street;
  - Gabriel Bethlen street;
  - Tricolorului square;
  - Unirii street;
  - M. Viteazul street;

Currently, there is no charge for public car parking in Alba Iulia.

In residential areas, the parking places are rented according to LCD 45/2009 with subsequent amendments.

It must however be noted that, in Alba Iulia, the system of penalties for breaching the law or local regulations is not rigorously applied, and parking violations are frequent (on road lanes, on sidewalks, alleys and green areas), issues that generate discomfort, disturbance and frequent traffic and freight jams.

2.3. Characteristics of the main types of Urban Logistics Flows

In Alba Iulia, freight traffic can be divided

into:

- Transit traffic
- Entry traffic
- Local traffic

The local freight traffic overlaps transit traffic and town entry traffic from Sebes towards Cluj-Napoca through the ring road or from Sebes towards Zlatna or from Cluj-Napoca towards Zlatna. *Appendix II.4. Road transit and entry traffic in Alba Iulia* contains graphic information extracted from the Traffic study.

Tables 2.1. and 2.2 present the local traffic composition by type of vehicle, of passenger and cargo vehicle flows, on streets with different traffic regimes.

Table 2.1 presents the average composition of flows for passenger vehicles on streets with different traffic regimes (in percentage of reference freight vehicle flows/14h) and Table 2.2 presents the average composition of the flows of freight vehicles on streets with different traffic regimes (in percentage of reference freight vehicle flows/14h).

Tip de vehicul	Coef. de echiv.	Regim de circulatie				
		Centura	Strazi fara restrictii de tonaj	Strazi cu tonaje admise <7,5t	Strazi cu tonaje admise <3,5t	Strazi cu tonaje admise <1,5t si cu T.C.
Biciclete, motocicleta	0.50	0.5	1.0	1.5	1.5	1.5
Autoturisme, motociclete cu atas	1.00	66.5	75.0	60.0	78.0	68.0
Autobuze, autocare	3.50	7.0	6.0	9.5	7.5	6.5
Microbuze	1.20	26.0	18.0	29.0	13.0	24.0
TOTAL FLUX VEH. CALATORI	[vet]	100	100	100	100	100

Table 2.1

Type of vehicle (bicycles, motorcycles, cars, motorcycles with a sidecar, buses, coaches, minibuses)

Equivalence coefficient

Traffic regime (bypass, streets without weight restrictions, streets with weight restrictions <7.5 t, streets with weight restrictions <3.5 t, streets with weight restrictions <1.5 t and TC

TOTAL PASSENGER VEHICLE FLOWS

Type of vehicle (2-axle truck; tractor:3-axle truck, Hinged vehicles, tow trucks with trailer, Lorry and tractor trailers)

Equivalence coefficient

Tip de vehicul	Coef. de echiv.	Regim de circulatie				
		Centura	Strazi fara restrictii de tonaj	Strazi cu tonaje admise <7,5t	Strazi cu tonaje admise <3,5t	Strazi cu tonaje admise <1,5t si cu T.C.
Autocamioane cu 2 osii: tractoare	3.50	50	31	56	60	59
Autocamioane cu 3 osii	3.50	15	43	19	10	7
Autoveh. articulate, remorchere	4.00	27	21	18	7	6
Remorci la camioane, tractoare	1.50	8	5	7	23	28
TOTAL FLUX VEH. MARFA	[vet]	100	100	100	100	100

Table2.2

Traffic regime (bypass, streets without weight restrictions, streets with weight restrictions <7.5 t, streets with weight restrictions <3.5 t, streets with weight restrictions <1.5 t and TC

TOTAL FREIGHT VEHICLE FLOWS

Appendix 2.5. presents *the current road traffic flow in Alba Iulia*

In Alba Iulia, the urban logistics flow is divided into several categories, depending on the type of activity that it covers. A classification of these types of activities and services in different areas on the municipality can be done as follows:

- Trade:
  - Trade in textiles, clothes, footwear: Alba Mall (Tudor Vladimirescu street), Transilvaniei Blvd., Revoluției 1989 Blvd., Iuliu Maniu square, Vasile Goldiş street, Cloşca street, Zlatnei street (Kaufland hypermarket), etc.
  - Trade in food commodities - supermarkets, markets, neighbourhood shops, etc. - Transilvaniei Blvd., Revoluției 1989 Blvd., Iuliu Maniu square, Vasile Goldiş street, Cloşca street, Zlatnei street (Kaufland hypermarket, Profi hypermarket), the Railway station area (Penny hypermarket), Cetate market, Centru market, Biruinței street in Oarda, etc.
  - Trade in electronics and appliances – Transilvaniei Blvd., Revoluției 1989 Blvd., Vasile Goldiş blvd., Zlatnei street (Kaufland hypermarket), Alba Mall (Tudor Vladimirescu street), etc.
  - Trade in furniture - the Railway station area (Mobexpert), Calea Moților and Al. I. Cuza street;
  - Trade in hardware: - construction materials and interior design stores- Republicii Blvd.(such as Dedeman), NR1 on the exit to Cluj-Napoca (Ambient), Vasile Goldiş street, the Railway Station area and the Bypass road (construction materials and installations) etc.
  - HORECA activities– hotels, B&Bs, restaurants, cafes, seasonal terraces, etc. – everywhere in the town, more numerous on Transilvaniei Blvd, inside the Alba Carolina Fortress, in the downtown area (Iuliu Maniu square), on Calea Moților, Lalelelor and Arieşului streets.
- Production:
  - S.C. SUPREMIA S.A. - food ingredients and VCST Automotive Production - car parts - The development area by the town bypass road;
  - S.C. IPEC S.A. on NR1 - Entry from Cluj-Napoca, S.C. Porțelanul S.A. - Viilor street and S.C. Axa Porcelaine - Fântânele street - chinaware;

- S.C. REKORD - footware on NR1 - entry from Cluj-Napoca;
- S.C. SEWS – electric wiring on NR1 - entry from Cluj-Napoca;
- S.C. House of Art - Lalelelor street and S.C. Kosmos-Tre –Transilvaniei Blvd. – textiles; NR1 – entry from Cluj-Napoca;
- "SATURN" metal foundry - in Bărăbanț;
- S.C. INCOV S.A. - carpets on Gh. Şincai street;
- S.C. Agra's and S.C. Mercado – meat products and by-products on Biruinței street, Oarda and Livezii street;
- Milling and bakery – the Railway station area and Calea Moților;
- Furniture and carpentry – Al.I. Cuza street, Calea Moților, Fântânele street, Olteniei street, etc.

• Public services:
- Alba County Hospital - Revoluției 1989 Blvd.;
- AVICENA medical centre - str. Mărăşti;
- TERRA ASTER medical centre - Calea Moților and Revoluției 1989 Blvd.;
- CLINIMED medical centre - Revoluției 1989 Blvd.;
- The day centre for the elderly - Libertății street;
- The Nursing Home for the Elderly - Lalelelor street;
- "1 Decembrie 1918" University - N. Iorga street inside the Alba Carolina Fortress;
- Local public supplies operators: SC Apa CTTA SA, FDEE "Electrica Distribuție Transilvania Sud" SA, E.ON Gaz , Romtelecom, RDS, Vodafone, Orange, etc.
- Waste management and parks and green areas maintenance– S.C. Salprest, S.C. Garden, S.C. Luxor LTD, etc.
- Post and express couriers: the Romanian Post Service with offices in the Railway station area, on Transilvaniei Blvd., in Iuliu Maniu square, Urgent Curier on Crişanei street, Cargus in the Railway station area, Fan Curier on Bucureşti street, etc.

There are also notable companies in the constructions field with a significant number of transport operations connected to their activity in the area, such as: SC Florea SA , SC Instalatorul SA, SC Alba Cons SA, DPL, NewAmport, etc.

All these areas and activities are highlighted in *Appendix 2.6. Areas of trade, industry and public services in Alba Iulia.*

2.4. Infrastructures and facilities for Urban Logistics and for the existing distribution network

2.4.1. THE ROAD INFRASTRUCTURE

In the past five years, the town of Alba Iulia has implemented a number of major projects that have enhanced or improved the capacity of streets in major thoroughfares of the town, thus ensuring safety measures and proper infrastructure for carrying freight traffic satisfactorily

Such projects are:

- Rehabilitation of Încoronării Blvd.– 1 Decembrie 1918 – Horea;
- Rehabilitation of the road and public utility infrastructure on approx. 24km in the downtown area (the old town settlement), ensuring connections between the Bypass road and downtown – the rehabilitated area is between NR1 (Tudor Vladimirescu street – Ferdinand boulevard) and the Bypass Road, including the streets leading to Octavian Goga street and the 1st Gate of the historical Fortress;
- Rehabilitation of Regiment V Vânători street (Partoş district), including Railroad Passage on NR1 km378 + 0.20;
- Rehabilitation of NR 1 to Cluj-Napoca on 2.8km, including artwork– Bridge over the Ampoi river and railroad crossing – on-going;
- Rehabilitation of NR74 to Zlatna on 3.3km – on-going;

In order to ensure traffic flow, a number of 6 roundabouts were put in place in the junctions where traffic was problematic and where several accidents occurred:

- The junction between Horea street and Calea Moților;
- The junction between Octavian Goga street and Calea Moților;
- The junction between Revoluției 1989 Blvd and Cetate market;
- The junction between Republicii street and Gh. Şincai street–Dedeman store;
- The junction between Vasile Alecsandri street – Doinei - Oborului;
- The junction between Al.I.Cuza street and the Bypass road.

These traffic flow activities are ongoing and the GUDP also mentions other roundabouts to be put in place in all major junctions in the town:

- The junction between Încoronării Blvd. and Ferdinand Blvd. (Railway station area);
- The junction between Calea Moților and Tudor Vladimirescu street (Unirea store);
- The junction between Calea Moților and Revoluției 1989 Blvd.– the Stadium area;
- The junction between Republicii Blvd and Tudor Vladimirescu street;

Also, the GUDP mentions several ring roads, which would considerably improve traffic flow and traffic quality in Alba Iulia *(see Appendix I.4. GUDP provisions – Traffic roads).*

In order to increase traffic flow inside the town, the following streets have been made one-way *(see Appendix II.3. Car traffic regulations in Alba Iulia)*:

- Take Ionescu street- from Ferdinand I Blvd to Încoronării Blvd and O. Goga street;
- Încoronării Blvd between O. Goga street and Ferdinand I Blvd;
- V. Goldiş street from 1 Decembrie 1918 Blvd to Revolutiei 1989 Blvd;
- Ghe. Pop de Băseşti street between Revoluției 1989 Blvd and 1 Decembrie 1918 Blvd;
- Banatului street from Iaşilor street to Ferdinand I Blvd;
- Dobrogei street from Ferdinand I Blvd

to Iaşilor street;
- Moldovei street on the section between Iaşilor street and Ferdinand I Blvd;
- Munteniei street from O. Goga to Traian street and from Traian to Ferdinand I Blvd;
- D. Cantemir street on the section from Traian street to Ferdinand I Blvd.;
- Traian street on the section between Naţiunii square and Basarabiei street;
- Avram Iancu street on the section from T. Vladimirescu Blvd. to Calaraşi street;
- Calaraşi street from Teilor street to Petru Dobra street;
- S. Severus street from M. Aurelius street to the roundabout on Calea Moţilor;
- Toporaşilor street on the section between Revoluţiei 1989 Blvd to M. cel Bătrân Blvd;
- Energiei street on the section between Cloşca and Toporaşilor streets;
- Ştefan cel Mare street on the section between Toporaşilor and Cloşca streets;
- Mircea Eliade street on the section between Toporaşilor street and Transilvaniei Blvd;
- Ioan Alexandru street on the section between Toporaşilor and Vânătorilor streets;
- Liviu Rebreanu from Vânătorilor street to Toporaşilor street;

3.4.2. URBAN LOGISTICS FACILITIES

At present, Alba Iulia has no infrastructure specifically designed to address the needs of logistics in the town, which has recently developed very dynamically due to increased rate of investments, and of privatization and liberalization in the area.

Currently, Alba Iulia has three terminals (platforms) for loading and unloading cargo, serving several operators, and they are private property managed by private investors, namely:

- on NR1 - "ICRA" Platform - intended for food products;
- In the Railway station area - "IPROCOOP" Platform - various types of food and non -food commodities, other than constructions;
- On the bypass road area – only for construction materials.

There are also other platforms in the town created by other private investors but they are only used to supply their own stores. Such examples are:

- Alba Mall – the only trading centre in the town where one can find in the same place clothes stores, footwear stores, electrical products and appliances stores, restaurant, coffee shops;
- Kaufland – the largest hypermarket in the town;
- Mercur network – food stores and restaurants;
- Dedeman, Ambient – hardware stores.

It is understood that cargo unloading platforms and freight management systems in these locations have been specifically designed to strictly serve their owner's needs, so we have to find solutions for the other traders which generally own small neighbourhood shops and do not have the room to provide such facilities.

We have identified a small number of property, land or buildings with a potential to serve storage activities owned by the local government and which could be subject to public- private partnerships, associations or sale to the benefit of these operators. They are located inside the Development Area (near the bypass road) or in the former industrial area of the city (former SUT), with access from T.Vladimirescu street or from Republicii Blvd.

We can also name several buildings or land which are private property and which could be re-functionalised to serve these purposes, such as the former brick factory "Refractara" and the former plant "Utilajul" located on NR1- Al.I.Cuza street or the former "INTERTRANS" on Tudor Vladimirescu street.

2.4.3. URBAN LOGISTICS INFRASTRUCTURE AND FACILITIES IN THE STUDY AREA – TRANSILVANIEI BOULEVARD

The "Enclose" study and reference area - Transylvania Blvd and all adjacent communication roads were the subject of a comprehensive project of Alba Iulia Town Hall called "Re-functionalisation of the area around the blocks of flats on the Romans' Plateau in Alba Iulia", between 2007 and 2009. The following indicators have been met after rehabilitation of the area between Closca street - Vasile Goldis street- 1 Decembrie 1918 Blvd:

- Area V.Goldiş street – Transilvaniei Blvd:
  - Streets: 16.748.sq. m;
  - Sidewalks: 12.092 sq m;
  - Parking lots: 12.890 sq.m;
- Area Cloşca street – Transilvaniei Blvd:
  - Streets: 18.294.sq.m;
  - Sidewalks: 8.111 - sq.m.;
  - Parking lots: 12.034 sq.m.;
- Transilvaniei Blvd.:
  - Streets: 6.357.sq.m.;
  - Pedestrian alleys: 15.726 sq.m.;
  - Parking lots: 4.061 sq.m.;
  - Bicycle lanes: 1060 sq.m.

This is a pedestrian only street and street trading is present alongside many shops.

The current configuration of the area is presented in *Appendix II.7. The "ENCLOSE" area of Transilvaniei Boulevard– modernised.*

Transylvania Blvd runs a large number of commercial and related activities (considering only those activities with direct access from the Boulevard, we have identified approximately 100 commercial and related activities on a street which is approx. 1 km long), namely:

- 25 clothing stores - most with less than 22sq.m./shop;
- 5 lottery, gambling stores, etc.
- 2 tailor's shops;
- 1 florist's;
- 4 stationeries;
- 3 bars;
- 9 bars with provisional terraces in summer;
- 5 grocery stores;
- 4 banks;
- 9 footwear stores;
- 3 mobile phone stores;
- 4 greengroceries;
- 1 Post Office;

- 2 jewellery stores;
- 1 commercial gallery;
- 2 beauty shops;
- 4 pastry shops;
- other shops.

Closely related to the nature of these activities, on Transylvania Blvd, the types of freight flows can be structured as follows:

- Foodstuff – 25%;
- Clothes and sportswear – 45%;
- Furniture and carpets – 4%;
- Electrical products and appliances – 10%;
- Pharmaceutical products and medical equipment – 6%;
- Other products – 10%.

Given the configuration of the public space and the density of buildings in this area, freight distribution is difficult on the narrow adjacent streets (between 2.5 m to 5m wide) interfering with pedestrian areas and crowded residential area.

Regarding storage areas, the majority of operators in the area do not have adequate storage space, thus resorting to unconventional methods of storage such as storage inside the shops or in improper annexes built on the street.

As in many commercial areas, about 30 % of traders use their own vehicles for transportation of goods, the others being served by courier companies or by transport operators.

On average, approx. 50 commercial vehicles per day have access to the supply of Transylvania Blvd. and about 60 % of freight pickup and deliveries take place between 8.00 and 9.00, causing discomfort to pedestrians and local residents. The vast majority of freight transportation is by vans (3.5 tonnes) and studies show that the average vehicle load is 30 % of the storage capacity of the vehicle.

This causes great loss of time, space and fuel, showing a low efficiency in the organization of deliveries.

Although, as noted above, significant public investments were made in road and pedestrian infrastructure as well as private investments in shops or services, the present freight transportation and distribution in the reference area do not meet the requirements for energy efficiency.

Air pollution in these streets is proportional to the degree of fossil fuels burnt by cars and other transportation means.

Therefore, it is necessary to identify and adopt measures to improve urban mobility and air quality and to find logistics solutions in the area.

3. IDENTIFYING MEASURES TO IMPROVE LOGISTICS

3.1. Eu measures to improve logistics

in the last few years, Europe has tried to develop a common working basis to identify the best solutions for optimizing freight transport, taking into account as many relevant issues that could have an impact on freight transportation.

We have identified several types of actions, research and activities that could directly or indirectly affect urban freight transport. These actions are private, public or public-private strategies, measures or activities with a significant contribution to improving urban freight transport and ideally lead to benefits for all stakeholders.

A proposal for the classification of solutions (measures) concerning urban logistics and possible results could be:

- Measures related to "material" infrastructure
  - linear measures - which refer to connections from the urban transportation network
  - surface measures-regarding areas of freight transportation and storage operations
- Measures related to "immaterial" infrastructure
  - Telematics or Intelligent Transportation Systems (e.g. traffic information systems, route optimization services, etc.).
- Measures related to "equipment"
  - Cargo loading units
  - Transportation units (e.g. Vehicles using alternative fuelling solutions)

There are several alternate approaches available in order to reach some objectives, as summarized in *Table 3.1.*

Also, the "green" logistics solutions presented below *(Table III.2.)* can be divided into the following action fields:

Objectives	Possible approach
Obtaining support for strategies and initiatives in freight transport for the freight industry	Freight transportation partnerships
Improving travel time of vehicles transporting goods	Telematics for urban transportation of goods Traffic signs Information and maps for freight transport Road fees Allowing night delivery Special lanes for trucks
Assistance of truck and van drivers and thus reducing the number of kilometres travelled	Telematics for urban transportation of goods Traffic signs Special lanes for trucks Simplification and harmonisation of weight, size and building regulations Information and maps for freight transport Urban consolidation centres
Assistance of freight transport companies at the delivery and loading points	Loading points on street Proximity delivery areas (ELP) Urban consolidation centres
Reducing the environmental impact and the risk of accidents involving freight vehicles	Standard regulations on vehicle size, weight and GHG emissions Time regulations for access and loading of goods for vans and trucks carrying goods Allowing night time delivery "Green" areas Special lanes for trucks Improving infrastructure Encouraging the use of green vehicles

Table 3.1.

Action fields	Measure
Distribution strategies	Freight platforms – Urban Consolidation Centres (UCC)
Institutional solutions	Public-Private Partnerships - proximity delivery areas - foodstuff quality partnerships
Programme management solutions	Night time deliveries
Taxation strategies	"Road tax" implementation systems
Technological solutions	Technological solutions - smart transport systems - green vehicles

Table 3.2.

3.1.1. FREIGHT PLATFORMS - URBAN CONSOLIDATION CENTRES

Freight platforms have been designed to reduce urban freight traffic. The first platforms were introduced in Paris in the mid-1960s in response to urban congestion. Many countries have adopted this solution, and Italy was the first country to include the development of freight platforms in a national programme in 1990. Germany was next in 1992 and France followed in 1993. Currently, this "trend" has diminished because of the inability of several of such projects to achieve their objectives. However, Urban Consolidation and Distribution Centres remain without doubt one of the very efficient solutions when properly and realistically designed.

Freight platforms can be found in a wide variety of shapes and construction projects because they are not standardised. Each platform of this kind is designed to serve the specific needs of a given area with different purposes and stakeholders. They can also be found under different names, such as "Freight platform", "Urban Consolidation Centre", "Public distribution warehouse", "Logistics Centre", etc. .

Freight platforms are areas where various companies with activities related to the transport of goods (logistics service providers, carriers) work. They are transshipment areas where at least two types of transport ideally meet (e.g. road and rail transport)

A more dedicated term is that of "Urban Consolidation Centre".

3.1.2. PUBLIC-PRIVATE PARTNERSHIPS

There isn't any general definition for public-private partnerships. They can be considered only as a sort of informal communication between members of government and private enterprises or exclusive contractual arrangements between the two parties to the supply of goods or services that are normally provided by the public sector (a notion similar to that of privatization). Therefore, the term public-private partnership is a term covering several forms of cooperation between public and private institutions. All these forms of partnerships share the same idea, namely that public and private actors are different. Each of these actors has advantages in different aspects, be they material, the "know -how", financial, or other. Within the partnership (which can be seen as a form of division of labour), each of the partners does what it does best, leading to a win-win situation for each party.

Public - private partnerships can be classified into three categories:

- informal cooperation
- contractual cooperation/agreements
- joint venture with partners/shareholders in the public and private sectors.

Such partnerships regarding freight have been set up in various forms across Europe. ***They were formed to finance or construct various infrastructure projects and also to negotiate and determine the conditions and agreements necessary to create a working environment between the public and private sectors.***

3.1.2.1. Proximity delivery areas

To facilitate the delivery of goods in the city centre of Bordeaux, a system was developed for the first time that included the creation of so-called "Proximity delivery areas" (Espaces de livraison de proximite –ELP).This approach includes the setup of urban transshipment platforms, where, especially designated staff provides assistance in the last mile delivery of products (e.g. to the city centres). Goods are unloaded from the carriers and loaded into trolleys, electric vehicles, bicycles, etc. And this is how goods get through the last section of delivery. This can also be used in activities such as home delivery, short term storage, etc.

At Bordeaux, this type of public-private partnership began as a collaboration between the association of freight carriers, the Chamber of Commerce and the Municipality to design solutions to deliver goods in the central area during infrastructure works that were carried out at that time and that made the delivery of goods to retailers impossible. The first big success of this partnership process was to include the three main carriers associations.

The objective of any project of this kind is not only to facilitate the delivery of goods in city centres, but also to reduce traffic jams, noise and pollution associated to cargo delivery operations.

3.1.2.2. Freight quality partnerships

A more comprehensive approach to public-private partnerships has been developed in the UK. This approach included document which highlighted the Government's determination to identify problems caused by freight and also the problems faced by freight. Local authorities were encouraged to pay more attention to urban freight and include consideration of urban distribution and sustainability in local transport plans to establish freight quality partnerships.

Freight quality partnerships are partnerships between the freight transport industry, the local government, local businesses, local community, environmental groups and other stakeholders to enable them to work together and to address various problems specific to freight. ***Their purpose is to understand the problems in this area and promote constructive solutions which reconcile the need for access to goods and services with environmental and social issues.***

3.1.3. NIGHT DELIVERY

Night delivery is delivering goods to retailers and stores in city centres at night when the city is usually quiet and inactive. The usual night delivery hours in the European Union is between 10 pm and 6 am. This practice has been successful in several European cities since it replaces a large number of vehicles operating during the day with a smaller number of vehicles operating at night.

If companies are allowed to make deliveries at night, they can improve the efficiency of operations and to increase their sales. ***Unrestricted access to the loading/unloading facilities without interfering with traf-***

fic during the day ensures a faster delivery and minimizes the effect of freight transport on traffic congestion. Also, night delivery schedules promote the use of more environmentally friendly and quieter vehicles (e.g. vehicles with engines that run on compressed natural gas).

3.1.4. ROAD TAX

Road tax can be defined as "all measures imposing direct taxes to carriers for urban road use which could influence urban transport". These include taxation measures for urban roads, be it freight or passengers. On the other hand, the term excludes tax for extra- urban roads, motorway and parking charges, fuel or vehicle tax.

Road tax can have two main purposes: traffic funding or traffic management.

The need for funding is most common when choosing this measure. Tax money can be used to improve infrastructure, public transport and other sectors of the transportation industry.

The tax money for management purposes can be used in environmental projects or accessibility projects. Also, such tax may be used to reduce greenhouse gas emissions and traffic noise and to protect a certain area (e.g. the historical centre of a city).

3.1.5. TECHNOLOGICAL SOLUTIONS

3.1.5.1. Intelligent transportation systems

The "Intelligent Transportation System" or "Telematics" is a term used to describe the combined application of information and communication technologies, its infrastructure and legislative framework related to optimization of operational efficiency and future sustainability of transport.

The development of these systems in freight transport is based on multiple systems and technologies developed that collect a large number of data (on the current status of the transport operation and operations planning parameters), which shall be submitted in one form or another to various transport control centres or authorities' databases, to carriers or to various intermediaries.

These systems can be defined as advanced information and communication technologies which aim to simplify and automate freight transport operations both at the operational level and at the institutional level.

3.1.5.2. Green vehicles

Currently, the introduction of clean vehicles in urban transport is very common in Western countries, Sweden being one of the leading countries in implementing this solution.

Public authorities provide resources and financial support to encourage innovative solutions for freight transport and logistics, including the use of clean vehicles in urban areas.

The use of vehicles with low emissions can help towns and cities deal with environmental and noise pollution caused by traffic.

3.1.6. LOCAL REGULATIONS

The establishment of local regulations on freight transport is a priority in any European city experiencing its negative impact. These rules may apply to certain key areas in cities or they can be general and of several kinds:

- Establish specific delivery hours;
- Apply restrictions to freight vehicles;
- Introduce penalties, fines for operators who do not comply with the rules, etc.

In order for these regulations to be established, it is necessary to involve the municipality and to establish a legal framework so that they can be applied.

The purpose of such regulations is to increase the safety and comfort of city and town residents.

This study does not aim to make a complete record of all possible measures that have been used in the European Union to reduce the negative impacts of freight transport. However, along with a series of measures related to road infrastructure, the above measures may prove reliable and could be adapted to freight traffic in Alba Iulia.

3.2. Possible measures to improve logistics in alba iulia

In Alba Iulia, in the "Enclose" area, we have identified several needs of the actors that play a role in the development of logistics processes in the town. These needs are the foundation of measures to improve logistics processes in the town:

- Technological needs:
  - For Alba Iulia :
    - Ability to generate statistical reports about the logistics processes;
    - Real-time traffic and route planning information system;
    - Using modern technologies to optimize and issue permits for vehicles to access the central distribution centre and loading/unloading areas;
    - An online system for booking loading and unloading areas;
  - For local and national carriers :
    - Interfaces with other data or information sharing systems;
    - Using logistic optimization technologies to increase the load factor for transport trucks ;
    - An online system for booking loading and unloading areas;
- Operational needs :
  - For local and national carriers :
    - Removal of regulated restrictions on the delivery hours for delivery of goods to customers ;
    - The ability of carriers to handle peak loads;
    - Harmonisation of access restrictions (weight - length) between different municipalities;
  - For distributors and distributors' associations:
    - Ability to contact and contract different carriers by creating a transportation "fair";
    - Minimize delivery time and easy storage;
- Commercial needs:
  - For Alba Iulia:

- Generate benefits for participants (Prices, delivery time/quality ratios) to optimize logistics measures;
- Optimize the distribution system to traders;

- For distributors and distributors' associations:
- Minimize transport costs in the urban area;

- For local and national carriers:
- Keep goods transportation prices at a competitive level;

• Socio-economic needs;

- For Alba Iulia:
- Strengthen local economic development;
- Increase employment opportunities;
- Increase the number of on foot guided tours for residents and tourists;
- Lower the impact of traffic congestions;
- Decrease the no. of km travelled to distribute goods;

- For residents and tourists:
- Increase the number of on foot guided tours for residents and tourists;

For a correct identification of measures that are feasible for Alba Iulia, it is necessary to take into account the correlation between traffic flows and socio-economic parameters in traffic areas, thus enabling a high-fidelity simulation of the manner of generation, distribution and network distribution of traffic.

To highlight the factors that disturb the smooth flow of traffic, traffic flows and traffic capacity of streets were compared. The level of flows entering junctions in relation to the traffic signs and traffic lights and to their distribution was analysed. From this analysis, taking into account the overall configuration of the road network and the traffic objectives, the main causes of traffic difficulties were identified:

- Businesses in the southeast area of the town located next to the railway have no other access possibilities than the streets that go through the residential area of the old town and lead to the centre of the town;
- Businesses in the southern part of the town do not have direct access to the bypass road because of the disposition of the railroad crossing;
- The street network in old town, with a rectangular structure, has many discontinuities, which is why there is no smooth route to serve this area and to double the main road in the centre through east; for the same reason, this area cannot be satisfactorily served by public transport means;
- Transit traffic on Zlatna-Cluj relations and especially Zlatna - Sebes affect the city street network because there is no detour route on the west;
- Some junctions are not sufficiently arranged in terms of geometry; the main weakness is the lack of additional bands to channel flows ;
- The number of junctions with traffic lights is smaller than needed and in many cases the existing lights are placed so as to provide better visibility;
- At the junctions between major thoroughfares and secondary streets, there are no turning left restrictions, leading to fragmentation of the major thoroughfare and thus to decrease of its traffic capacity;
- There are no heavy weight restrictions on certain streets crossing residential or protected areas such as streets O.Goga, N. Bălcescu, 1 Decembrie 1918 – Horia.

Some of the shortcomings identified, related to the structure of the road network, cannot be rectified except by investment works that require longer production time and substantial funds. However, the measures identified below are an attempt to resolve these problems as well as others and to contribute significantly to improving logistics in Alba Iulia.

3.2.1. RE-SIZING TRAFFIC AREAS IN ALBA IULIA

This type of approach is difficult to address due to factors such as:

- The urban regulations in force;
- The legal status of properties;
- High costs of expropriation actions, decommissioning, demolition of property - buildings or land;
- Little free space between built areas;
- Recent intervention on certain areas such as the Romans' Plateau, the town entrances from Cluj - Napoca and Sebes, which cannot be resized.

All these factors limit the actions that can be taken in Alba Iulia to restructure the traffic spaces. However, such measures may be adopted in areas such as development areas of the town by completion of ring roads, by building the western bypass road, by resizing street network in the town centre (the junction between Streets T. Vladimirescu, Henri Coanda, Ardealului, Council of Europe square, IC Bratianu square) by consolidating the existing road network , etc. .

3.2.2. MEASURES TO IMPROVE ROAD TRAFFIC CONDITIONS

We can identify the following measures to help increase the traffic capacity of the street network in Alba Iulia, as follows:

- Introduction of weight restrictions;
- Directing transit traffic to different routes derived from the implementation of weight restrictions;
- Increase the traffic capacity of junctions based on the inside traffic flow and on their current planning by re-designing geometries, appropriate sings and street marking;
- Speed limits in residential neighbourhoods;
- Prohibition of left turns in certain junctions;
- Regulation of one-way traffic for better traffic organization and increase of vehicle stopping capacity;
- Increase the level of services on the eastern bypass road;
- Increase the number of parking spaces;

3.2.3. SETTING UP LOCAL FREIGHT DISTRIBUTION CENTRES

3.2.3.1. Local distribution centres

This measure has the immediate effect of reducing urban freight traffic and reducing urban congestion. Creating Urban Consolidation and Distribution Centres is one of the very effective solutions when properly and realistically designed to serve the specific needs of a given area with different purposes and stakeholders. According to their definition, these platforms are transshipment areas where at least two types of transport ideally meet (e.g. road and rail transport).

In Alba Iulia, there are certain areas where such platforms already exist and which could be modernized and extended. There are also areas where such new platforms could be created, such as:

- "ICRA" Platform - with the possibility of expansion and modernization;
- The former Refractara factory;
- The former "Utilajul" plant;
- In Cetate district, in the area of the ammunitions warehouse;
- In the development area along the existing bypass road;
- In the development area of the exit to Sebeş, on the right side, before the area known as "Three bridges".

All these platforms would benefit from excellent railway links to the main traffic routes and to the existing NR1 and NR74 as well as those planned in the near future - the Sebes - Turda motorway or the western bypass road proposed by GUDP currently under approval.

3.2.3.2. Proximity delivery centres

On the same principle of Consolidation and Distribution Centres, but at a smaller level, such small platforms can be created to serve only limited areas of the perimeter of the town, such as crowded areas (Transilvania Blvd, Iuliu Maniu square, Revolutiei 1989 Blvd, and so on). These platforms could receive the goods from carriers so that the last mile to the shops and service providers can be travelled by small vehicles, environmentally friendly, such as carts or bicycles specifically designed for the small consignments of goods. This would significantly reduce the flow of logistics in residential, administrative or business areas in the town.

3.2.4. NIGHT DELIVERIES

A regulation that would set specific delivery hours for businesses is a measure that significantly reduces freight traffic in the urban area during the day when the town is active.

Regulations in Alba Iulia provide time frames for supply, but nevertheless, most companies that supply goods and most businesses do not comply with this time frame.

Therefore, a regulation is needed to provide and especially to impose fines for operators who do not comply with these rules.

Another measure that would make a substantial contribution to reducing the logistics flows in the town during the day is the regulation and implementation of a night-time delivery system of goods to traders.

3.2.5. TECHNOLOGICAL SOLUTIONS

3.2.5.1. Modernisation of the freight distribution fleet

This measure is difficult to implement in Alba Iulia in the current traffic conditions, as carriers are not forced to take the decision to modernize their current fleet.

However, by implementing the measures set out above (introduction of weight and speed restrictions, the introduction of one-way traffic, deliveries at night, maximum allowed noise limits in the town, creating distribution centres that would automatically attract the usage of low weight vehicles in the urban area, etc.) would contribute decisively to modernize the fleet of carriers through the use of low-weight, greener, with low emissions and low noise vehicles.

3.2.5.2. It systems for traffic monitoring, taxation or access control

This type of systems completes the measures to improve logistics systems in Alba Iulia and it plays several roles such as:

- The protection of historical sites and buildings;
- The proper management of road and pedestrian infrastructure ;
- The prevention and suppression of traffic indiscipline and avoiding traffic accidents;
- The increase in the degree of civilization of traffic participants and of urban comfort ;

The local authority – the Municipality of Alba Iulia - has approved a study on the deployment of monitoring, taxation and access control systems to be extended to major junctions and town entry/exit areas.

Also, to increase awareness of all stakeholders of urban logistics (carriers, store owners, residents in the areas in question, etc.) and to encourage the adoption of green logistics solutions to reduce the negative impact of freight distribution on the environment and on overall quality of life, local awareness raising campaigns must be organized.

4. THE ANALYSIS OF MEASURES TO IMPROVE LOGISTICS

4.1. Re-sizing road traffic areas in Alba Iulia

This type of measures can be adopted in areas such as development areas of the town, by completing the ring roads and the western bypass road according to the GUDP. Another objective for the old town is resizing and functionalizing traffic roads according to the ZUP for the Town Centre Area, etc.
The following principles underlie the measures:

- A growing need for car travels;
- Overcrowding of new buildings and shops on the major thoroughfares of the town;
- Unbalanced development of the town, focused on the northwest side;
- Failures in the traffic related to the current road network structure ;
- Road and pedestrian infrastructure projects in recent years ;
- Proposals for development of the road network contained by the GUDP.

The analysis of these items revealed that, in order to ensure good traffic conditions in Alba Iulia in the future, the following road works are required (see *Appendix IV.1. Proposals to extend the street network, Appendix I.4 GUDP provisions – Traffic roads and Appendix IV.2. ZUP provisions in the Town Centre*):

- Extension of the Republicii Blvd. by a break-through of the junction with T. Vladimirescu Blvd. Up to the railroad and connection to the bypass road through a crossing over the railroad;
- Building a new street along the railroad (on its west side) connecting the above-mentioned road to the Railway Station; connecting this street to the following streets: Gh Doja, Mărăşeşti, Bucureşti, Ion Arion, Olteniei and Iaşilor; at one end, the street will cross the Ampoi river through a bridge and it will be connected to Al. I. Cuza street (NR1);
- Connecting Viilor street and the bypass road through a crossing over the railroad, under the current railroad bridge;
- Creating the street network in the south side of the town by extending the built-up area and by connecting it to the street network on Revoluției 1989, County Road 107A towards Pâclişa and Viilor street;
- Extension of the bridge over Mureş River in Partoş district to four lanes;
- Completion of the ring road Revoluției Blvd- Ion Lăncrăjan str. – Partoş – NR1;
- Completion of the ring road Republicii Blvd- T. Vladimirescu street- Bypass Road;
- Construction of the deviation route to Zlatna – from the national road at the town entry from Cluj and connected with the Sebeş – Turda Motorway;
- Construction of connection streets from the western bypass road to Bărăbanț district to the industrial areas in the north-west, Cetate district and the new district in the south;
- Reconfiguration of traffic in the town centre over and area of approx. 7.4 hectares divided into three separate areas (according to the ZUP Town Centre) defined as follows**:**

- Area 1 encompasses Consiliului Europei sq. between Ardealului str. and Decebal Str. In this area, the main problem to be solved is the car parks, which are insufficient. That is why, under Consiliului Europei square, an underground parking for public facilities and the blocks of flats in the area will be designed for 150 parking places. Access to the underground parking will be from Ardealului and from Decebal streets, the two major traffic routes in the area, and also from Bucovinei street. Nicolae Titulescu Street will provide access to the housing units and businesses on Ardealului Street. Overground parking lots will also be designed with 30 places for public facilities with access from Ardealului Street, with 33 parking places for the blocks of flats with access from N. Bălcescu Street and with 21 parking places for the blocks of flats on Bucovinei Street. Pedestrian traffic is proposed along Ardealului Street and from it to Decebal Street by two pedestrian squares, one on Ardealului Street and one over the underground parking.
- Area 2 encompasses IC Brătianu square between Ardealului Street and Mihai Viteazul Street. In this area, a widening of Ardealului Street is intended at the corner of Traian street to make room for a parking lot with 35 places for public facilities and 9 places for the blocks of flats along the street on the side with the County Prefect's Office.
- Area 3 encompasses Tudor Vladimirescu Street between Calea Moților and Henri Coanda str. In this area, the current parking places along Vladimirescu street are insufficient and block one traffic lane. The suggestion is to move the street centreline to increase the angle of the curve in the junction between Henri Coanda and Vladimirescu streets, to move the sidewalk and the green area to the built street front, thus resulting in a 14 metre-wide road with 4 lanes. These measures lead to 49 new parking places which can be created at 45 degrees on the west side of the road. Parking can also be arranged on the eastern side of the street, along the existing houses. A new building in the area can increase the number of parking places by the street and also, a 60-place underground parking can be designed. Access to houses and businesses will be from Tudor Vladimirescu Street on alleys for partial car traffic and sidewalks. (*see IV.1.1.1. A case study – re-functionalization of the town centre area of Alba Iulia – Tudor Vladimirescu street)*

- Finding locations for underground or overground multi-tier public parking lots:
  - An underground and/or multi-tier parking lot around Platoul Romanilor to serve public facilities and blocks of flats for approx. 50 parking places;
  - An underground parking lot in Iuliu Maniu square;
- Reservation of the necessary corridor for the future Sebeș – Turda Motorway;

4.1.1. MEASURE ANALYSIS

In order to implement these measures, substantial funding is required and also, a total involvement of the Public Administration in order to attract these funds. These are medium and long-term measures, which, if implemented, will significantly contribute to improve traffic conditions in Alba Iulia and hence, to improve logistics in Alba Iulia.

4.1.2. A CASE STUDY – CHANGING FUNCTIONALITY OF THE TOWN CENTRE OF ALBA IULIA – TUDOR VLADIMIRESCU STREET

a) The current status of the investment project:

The study has been conducted on three road sections:

SECTION 1 – west of Tudor Vladimirescu street from Unirea store to B.C.R.Bank;

SECTION 2 – the roundabout designed for the junction between Tudor Vladimirescu str. and Oborului str. and the sidewalk on the east side of Tudor Vladimirescu street from the above-mentioned junction to the entry into the residential complex designed by the company Madini Investiții;

SECTION 3 - the roundabout designed for the junction between Tudor Vladimirescu street and Calea Moților and the sidewalk on the east side of Tudor Vladimirescu street from the entry into the residential complex designed by the company Madini Investiții up to the junction with Calea Moților and part of the sidewalk on Avram Iancu street;

The investment project should be divided into two stages, namely stage 1 = section 1 and section 2; stage 2 = section 3.

a.1.) Current technical status:

SECTION 1: Pavement of the pedestrian area (mosaic cast) on the west side of the street is in poor condition. The sidewalk measuring 5145 sq.m will be replaced. The existing green area of 2371 square meters will be changed in shape. *In this area, the current parking lots along the Tudor Vladimirescu street are insufficient and block one traffic lane*.

SECTION 2: *Traffic in the junction between Tudor Vladimirescu Street and Oborului street does not work well in peak hours. The existing area of 45 square meters will be replaced by a roundabout.* The sidewalk on the east side of Tudor Vladimirescu Street measuring 604 sq m is in a bad shape.

SECTION 3: *The current junction between Calea Moților and Tudor Vladimirescu street has got traffic lights, which will be replaced by a roundabout.* The existing area measuring 97 sq.m of pavement and a green area of 65 sq m will be modernised. The bus stop will be moved in order to make place for the roundabout. The existing sidewalk surface of 772 sq m is in a bad shape and must be replaced.

b) Technical data of the investment project – Description of basic works:

- **SECTION 1:**

The west side of the street will contain a parking lot for 94 cars at 45 degrees, with access through a separate car alley. This will be done by moving the sidewalk and the green area to the built front. Access to parking will be by barriers, an input and an output post and one ticketing post. Thirteen parking lots will be built near Unirea general store and 7 near the BCR Bank. The street will have a width of 14 m with four lanes. The parking area will be separated from the street by a green area where trees will be planted.

The project includes an upgrading of the pedestrian area, green areas with small and big trees, new street furniture.

The area in front of the Unirea store will be modernised, as well as the sidewalk and the green area behind the store.

Two taxi ranks for 15 cars will be created. The existing bus stop will be modernised and the current hoardings will be eliminated.

The new indicators will be:

- Sidewalks and alleys with access to the parking lots paved with cobble stone=1806 sq m;
- Sidewalks paved with large concrete slabs = 3350 sq m;
- Parking area with grassed flagstones = 1371 sq m;
- Bus stops and taxi ranks with concrete block paving = 278 sq m;
- Green areas = 2013 sq m ;

- **SECTION 2:**

A roundabout will be built at the junction between Tudor Vladimirescu and Oborului Streets. The central island will consist of vibro-pressed concrete blocks. The expansion lane around the central island will consist of vibro-pressed concrete slabs. The splitter islands separating traffic flows into and out of the roundabout will be framed with vibro-pressed concrete kerbs and the inner area will be landscaped as a green area.

The access straps to and from the roundabout will undergo road centreline corrections that will require new kerbs to be mounted. The new areas will be covered with slabs (widening sidewalks) or, if the case, remain as green areas.

The widening of the roadway for this purpose will be carried out in a "box" system

The new indicators will be:

- Roundabout area = 103sqm
- Sidewalks in the CEC Bank area = 647sqm;
- Parking lots in the CEC Bank area = 284sqm.

- **SECTION 3:**

A roundabout will be built at the junction between Tudor Vladimirescu and Oborului Streets. The central island will consist of vibro-pressed concrete blocks. The expansion lane around the central island will consist of vibro-pressed concrete slabs. The splitter is-

lands separating traffic flows into and out of the roundabout will be framed with vibro-pressed concrete kerbs and the inner area will be landscaped as a green area.
The access straps to and from the roundabout will undergo road centreline corrections that will require new kerbs to be mounted. The new areas will be covered with slabs (widening sidewalks) or, if the case, remain as green areas.
The widening of the roadway for this purpose will be carried out in a "box" system
The new indicators will be:

- Roundabout area = 103sqm
- Area of sidewalks around the Synagogue = 966sqm;
- Bus stop and parking lots area = 245sqm.

d) Economic data of the investment project:

d.1.) Prior measurements – the quantity assessment of works and investment costs on each sector:

SECTION 1

Lucrari	UM	canti tate	pret unitar	pret/catego rie lucrari	eu
Amenajare teren					
Demontat borduri	m	1514	2,5	3785	
Spargere beton/asfalt	mc	800	101	80800	
Desfacere pavaj	mc	320	4	1280	
Defrisare arbori existenti si scoatere radacini	buc	22	50	1100	
				86965,0	**19542,7**
Protectia mediului				0	
				0	
Umplutura pamant vegetal in spatiile verzi si locuri de odihna	mc	956	28	26754	
Insamantare cu iarba spatii verzi	mp	1911	0,5	955,5	
arbori - tei	buc	48	40	1920	
arbusti - ienupar tarator, bucsus	buc	302	60	18120	
				47749,5	**10730,2**
Terasamente				0	
Sapatura pentru sist rutier trotuare, alei pietonale	mc	1267	25	31672,5	
Sapatura pentru sist rutier alei auto si parcari	mc	1640	25	40998,75	
Sapatura pT fundatii ziduri ornamentale mecanizat si manual	mc	37	50	1850	
Taiere asfalt	m	200	10	2000	
				76521,25	**17195,8**
Alei pietonale, trotuare	mp	4223		0	
balast compactat in strat de fundare(20 cm)	mc	845	72	60811,2	
inbracaminte piatra cubica granit - 10x10x10(incl nisip/beton)	mp	873	155	135315	
imbracaminte din pavele din beton vibropresat 40x40x6 cm suprafata "spalata" (inclusiv nisip)	mp	3350	90	301500	
Confectie lemn banci si prinderi metalice	mc	3	1000	3000	
blocuri de zid ornamentale cu fata cu aspect de piatra despicata	buc	2045	35	71575	
beton(C8/10 in fundatia ziduriilor ornamentale)	mc	229	250	57250	
				629451,2	**141450**
Alei auto si parcari	mp	2523		0	
strat filtrant din nisip (nisip - 7 cm)	mc	177	87	15365,07	
balast compactat (30 cm)	mc	757	72	54496,8	
piatra sparta(20 cm)	mc	505	130	65598	
bordura beton vibropresat12x25 cm (inc fundatia din beton)	m	80	48	3840	
bordura beton vibropresat 20x25 cm (incl fundatia din beton)	m	1060	57	60420	
imbracaminte pavele beton vibropresat autoblocante- 10 cm	mp	278	75	20850	
inbracaminte piatra cubica, granit - 10x10x10(incl nisip/beton)	mp	934	155	144770	
imbracami pavele beton vibropresat tip grila si delimitari-10 cm		1371	60	82260	
aducere camine la cota	buc	34	900	30600	
guri de scurgere	buc	16	1010	16160	
semne de circulatie	buc	14	200	2800	
sistem de parcare automata	buc	1	200000	200000	
				697159,870	**156665**

Table 4.1. Quantity assessment of works and of investment costs on Section 1

SECTION 2

Lucrari	UM	cantitate	pret unitar	pret/categorie lucrari	eu
Amenajare teren					
Demontat borduri	m	498	2,5	1245	
Spargere beton/asfalt	mc	91	101	9191	
Desfacere pavaj	mp	1489	4	5956	
				16392,0	**3683,6**
Protectia mediului				0	
Strat de pamant vegetal in insule separatoare- 30 cm	mp	40	28	1120	
Strat de pamant vegetal in insula centrala70 cm	mp	55	28	1540	
geotextil- strat de separare	mp	27	3	81	
Insamantare cu iarba	mp	95	0,5	47,5	
				2788,5	**626,6**
Terasamente				0	
Sapatura pentru sist rutier trotuare	mc	20	25	500	
Taiere asfalt	m	178	10	1780	
				2280	**512,4**
Alei pietonale, trotuare	mp	1415		0	
balast compactat in strat de fundare(20 cm)	mc	283	70	19810	
bordura 20x25 cm (inclusiv fundatia din beton)	m	441	57	25137	
imbracaminte din pavele din beton vibropresat 40x40x6 cm suprafata "spalata" (inclusiv nisip)	mp	1415	90	127350	
Imbracaminte din pavele din beton vibropresat gri, 6 cm (inclusiv nisip)	mp	0	57	0	
				172297,0	**38718,4**
Alei auto, giratoriu si parcari					
casete	mp	76			
strat filtrant (nisip - 7 cm)	mc	5,32	87	462,84	
balast compactat (30 cm)	mc	22,8	72	1641,6	
piatra sparta(25 cm)	mc	19	130	2470	
strat de asfalt Ba16 - 4 cm	mp	76	36	2736	
strat de BAD 25- 6 cm	to	11	270	2970	
geocompozit antifisura la contactul casetelor cu sistemul existent.	mp	30	25	750	
bordura din beton vibropresat12x25 cm (inclusiv fundatia din beton)	m	36	48	1728	
imbracaminte pavele beton vibropresat rosu10x10x8 cm (inclusiv nisip)	mp	47	70	3290	
imbracaminte din pavele din beton vibropresat autoblocante - grosime 10 cm(inclusiv nisip)	mp	283	75	21225	
zid din blocuri modulare din beton vibropresat - blocheti	mp	22	510	11220	
capace din beton vibropresat pentru coronament	m	27	120	3240	
piatra sparta in dren	mc	9	120	1080	
geotextil	mp	25	5	125	
aducere camine la cota	buc	7	900	6300	
guri de scurgere	buc	8	1010	8080	
marcaje rutiere vobsea bicomponent, alba	mp	300	21	6300	
semne de circulatie	buc	24	200	4800	
				78418,44	**17622,1**

Table 4.2. Quantity assessment of works and of investment costs on Section 2

SECTION 3

Lucrari	UM	cantitate	pret unitar	pret/categorie lucrari	EU
Amenajare teren					
Demontat borduri	m	567	2,5	1417,5	
Spargere beton/asfalt	mc	23	101	2323	
Desfacere pavaj	mp	982	4	3928	
Demontare stalpi semafoare	buc	4	2000	8000	
				15668,5	**3521,01**
Protectia mediului				0	
Strat de pamant vegetal in insulele de separatie- 30 cm	mc	12	28	336	
Strat de pamant vegetal in insula centrala 70 cm	mc	44,8	28	1254,4	
geotextil	mp	25	3	75	
Insamantare cu iarba	mp	105	0,5	52,5	
				1717,9	**386,045**
Terasamente				0	
Sapatura pentru sistem rutier trotuare	mc	78	25	1950	
Taiere asfalt		330	10	3300	
				5250	**1179,78**
Alei pietonale, trotuare	mp	1335		0	
balast compactat(10 cm)	mc	267	70	18690	
ordura din beton vibropresat 20x25 cm (inclusiv fundatia din beton)	m	710	57	40470	
imbracaminte din pavele din beton vibropresat 40x40x6 cm suprafata "spalata" (inclusiv nisip)	mp	1240	90	111600	
Imbracaminte din pavele din beton vibropresat gri, 6 cm (inclusiv nisip)	mp	95	57	5415	
				176175	**39589,9**
Alei auto si giratoriu				0	
casete	mp	327		0	
strat filtrant (nisip - 7 cm)	mc	22,89	87	1991,43	
balast compactat (30 cm)	mc	98,1	72	7063,2	
piatra sparta(25 cm)	mc	81,75	130	10627,5	
strat de asfalt Ba16 - 4 cm	mp	80	36	2880	
strat de BAD 25- 6 cm	to	12	270	3240	
geocompozit antifisura la contactul casetelor cu sistemul existent.	mp	40	25	1000	
bordura din beton vibropresat 12x25 cm (inclusiv fundatia din beton)	m	38	48	1824	
imbracaminte pavele beton vibropresat 10x10x8 cm (inclusiv nisip)	mp	50	70	3500	
imbracaminte pavele beton vibropresat autoblocante - 10 cm	mp	245	75	18375	
zid din blocuri modulare din beton vibropresat - blocheti	mp	24	510	12240	
capace din beton vibropresat pentru coronament	m	29	120	3480	
piatra sparta in dren	mc	11	120	1320	
geotextil filtrant	mp	25	5	125	
aducere camine la cota	buc	7	900	6300	
guri de scurgere	buc	6	1010	6060	
marcaje rutiere vobsea bicomponent, alba	mp	300	21	6300	
semne de circulatie	buc	26	200	5200	
				91526,1	**20567,7**

Table 4.3. Quantity assessment of works and of investment costs on Section 3

Structure of the three tables:

Works / MU / Qty / Price / Price/Category / Price in Euros

Land development - Environment protection - Earthwork - Pedestrianized alleys, sidewalks - Car alleys and parking lots

Notations: mc = cubic metre, mp = sqm, buc. = piece

d.2.) General estimate of the cost of the investment, on expenditure heads:

GENERAL ESTIMATE
of expenses needed to complete the project
RE-FUNCTIONALISATION OF THE CENTRAL AREA
TUDOR VLADIMIRESCU STREET

Nr. crt.	Denumirea capitolelor şi subcapitolelor de cheltuieli	Valoare (fără TVA)		TVA	Valoare (inclusiv TVA)	
		Mii lei	Mii euro	Mii lei	Mii lei	Mii euro
1	2	3	4	5	6	7
CAPITOLUL 1						
Cheltuieli pentru obţinerea şi amenajarea terenului						
1.1	Obţinerea terenului	0,000	*0,000*	0,000	0,000	0,000
1.2	**Amenajarea terenuiui**	**173,550**	**39,000**	**41,652**	**215,202**	**48,360**
1.2.1.	Amenajarea terenului TRONSON 1	87,220	*19,600*	20,933	108,153	24,304
1.2.2.	Amenajarea terenului- TRONSON 2	16,465	*3,700*	3,952	20,417	4,588
1.2.3.	Amenajarea terenului- TRONSON 3	69,865	*15,700*	16,768	86,633	19,468
1.3	**Amenajări pentru protecţia mediului**	**52,955**	*11,900*	12,709	65,664	14,756
1.3.1.	SPATII VERZI TRONSON 1	47,838	*10,750*	11,481	59,319	13,330
1.3.2.	SPATII VERZI- TRONSON 2	2,893	*0,650*	0,694	3,587	0,806
1.33.	SPATII VERZI- TRONSON 3	2,225	*0,500*	0,534	2,759	0,620
TOTAL CAPITOL 1		**226,505**	**50,900**	**54,361**	**280,866**	**63,116**
CAPITOLUL 2						
2.1 Cheltuieli pentru asigurarea utilităţilor necesare obiectivului						
2.1.1	**Alimentare cu apă**	281,774	**63,320**	67,626	349,400	78,517
2.1.1.1	Alimentare cu apă TRONSON 1	110,894	24,920	26,615	137,509	30,901
2.1.1.1a	SISTEM DE IRIGARE TRONSON 1	60,965	13,700	14,632	75,597	16,988
2.1.1.2	Alimentare cu apă TRONSON 3	109,915	24,700	26,380	136,295	30,628
2.1.2	**Canalizare**	**57,405**	**12,900**	**13,777**	**71,182**	**15,996**
2.1.2.1	Canalizare PLUVIALA TRONSON 1	57,405	12,900	13,777	71,182	15,996
2.1.3	**Alimentare energie electrică**	**623,000**	**140,000**	**149,520**	**772,520**	**173,600**
2.1.3	ILUMINAT STRADAL TRONSON 1	600,750	135,000	144,180	744,930	167,400
	ILUMINAT STRADAL TRONSON 3	22,250	5,000	5,340	27,590	6,200
2.1.4	Alimentare cu agent termic	0,000	*0,000*	0,000	0,000	0,000
2.1.5	Alimentare cu gaze naturale	0,000	*0,000*	0,000	0,000	0,000
2.1.6	Telefonie	0,000	*0,000*	0,000	0,000	0,000
2.1.7	Radio-TV	0,000	*0,000*	0,000	0,000	0,000
TOTAL 2.1		962,179	216,220	230,923	1193,102	268,113
2.2.	***Montaj utilaje tehnologice***					
TOTAL 2.2		0,000	0,000	0,000	0,000	0,000
2.3.	*Utilaje, echipamente tehnologice şi funcţionale cu montaj*					
TOTAL 2.3		0,000	0,000	0,000	0,000	0,000
TOTAL CAPITOL 2		962,179	216,220	51,893	1014,072	227,881

CAPITOLUL 3						
Cheltuieli pentru proiectare şi asistenţă tehnică						
3.1	**Studii de teren**					
TOTAL 3.1		**4,450**	**1,000**	**1,068**	**5,518**	**1,240**
3.2	**Taxe pentru obţinere de avize, acorduri şi autorizaţii**					
3.2.1	Certificat de Urbanism	0,000	0,000	0,000	0,000	0,000
3.2.2	Obţinerea autorizaţiei de construire	31,818	7,150	7,636	39,454	8,866
3.2.3	Avize şi acorduri furnizori de utilităţi	2,225	0,500	0,534	2,759	0,620
TOTAL 3.2		**34,043**	**7,650**	**8,170**	**42,213**	**9,486**
3.3	**Proiectare şi inginerie**					
3.3,1.	**Proiectare**	87,799	*19,730*	21,072	108,870	24,465
TOTAL 3.3		**87,799**	**19,730**	**21,072**	**108,870**	**24,465**
3.4	Organizarea procedurilor de achiziţie					
TOTAL 3.4		**0,000**	***0,000***	**0,000**	**0,000**	**0,000**
3.5	**consultanta**					
3.5.1	cererea de finantare	2,225	*0,500*	0,534	2,759	0,620
3.5.2	Managementinvestiţiei, administrare contractul execuţie	2,225	*0,500*	0,534	2,759	0,620
TOTAL 3.5		**4,450**	**1,000**	**1,068**	**5,518**	**1,240**
3.6	Asistenţă tehnică					
3.6.1	Proiectant	4,450	*1,000*	1,068	5,518	1,240
3.6.2	Inspector de şantier	21,360	*4,800*	5,126	26,486	5,952
TOTAL 3.6		**25,810**	**5,800**	**6,194**	**32,004**	**7,192**
TOTAL CAPITOL 3		**156,551**	**35,180**	**37,572**	**194,123**	**43,623**
CAPITOLUL 4						
Cheltuieli pentru investiţia de bază						
4.1	***Construcţii şi instalaţii***					
4.1.1.	CIRCULATII +AMENAJARI URBANE TRONSON 1	1404,29	315,57	337,03	1741,32	391,31
4.1.2.	SENS GIRATORIU BCR +TROTUAR VEST	253,69	57,01	60,89	314,58	70,69
4.1.3.	SENS GIRATORIU UNIREA +TROTUARE	273,23	61,40	65,58	338,81	76,14
TOTAL 4.1		**1931,21**	**433,98**	**463,49**	**2394,70**	**538,14**
4.2	***Montaj utilaje tehnologice***					
TOTAL 4.2		**0,000**	**0,000**	**0,000**	**0,000**	**0,000**
4.3	***Utilaje, echipamente tehnologice şi funcţionale cu***					
	CIRCULATII +AMENAJARI URBANE TRONSON 1	200,25	45,00	48,06	248,31	55,80
	4.3.2.	0,00	0,00	0,00	0,00	0,00
	4.3.3.	0,00	0,00	0,00	0,00	0,00
TOTAL		**200,25**	**45,00**	**0,00**	**200,25**	**45,00**
4.4	***Utilaje fără montaj şi echipamente de transport***					
	Cheltuieli pentru procurarea utilajelor şi echipamentelor	0,00	*0,00*	0,00	0,00	0,00
TOTAL		**0,00**	**0,00**	**0,00**	**0,00**	0,00
4.5	***Dotări***					
TOTAL		**0,00**	**0,00**	**0,00**	0,00	0,00
4.6	***Active necorporale***					
	TOTAL 4.6	0,00	**0,00**	**0,00**	**0,00**	0,00
	TOTAL CAPITOL 4	**2131,46**	**478,98**	**511,55**	**2643,01**	**593,94**
	CAPITOLUL 5					
Alte						
5.1	***Organizare de şantier***					
	5.1.1. Lucrări de construcţii	59,28	*13,32*	14,23	73,50	16,52
	5.1.2. Cheltuieli conexe organizării şantierului	3,12	*0,70*	0,75	3,87	0,87
	TOTAL 5,1	**62,40**	**14,02**	**14,98**	**77,37**	**17,39**
5.2	***Comisioane, cote, taxe, costul creditului***					
	5.2.1Comision banca finanţatoare	0,00	*0,00*	0,00	0,00	0,00
	5.2.2.Comision ICPLUAT (0,1% + 0,7%+0,5%)	41,37	*9,30*	0,00	41,37	9,30
TOTAL		**41,37**	**9,30**	**0,00**	**41,37**	**9,30**
5.3	***Cheltuieli diverse şi neprevăzute***					
	TOTAL 5.3	**347,67**	78,13	83,44	431,11	96,88
	TOTAL CAPITOL 5	**451,44**	**101,45**	**108,34**	**559,78**	**125,79**

	CAPITOLUL 6					
Cheltuie						
6.1	Pregătirea personalului de exploatare	0,000	0,000	0,000	0,000	0,000
6.2	Probe tehnologice şi teste	0,000	0,000	0,000	0,000	0,000
	TOTAL CAPITOL 6	0,000	0,000	0,000	0,000	0,000
	TOTAL GENERAL	3928,13	882,73	932,82	4860,96	1092,35
	DIN CARE C + M	3182,29	715,12	753,82	3936,11	884,52

Table 4.4. General estimate of re-functionalisation works in the Central Area – Tudor Vladimirescu street.

Table structure:
No. Expense head Value without VAT VAT Value with VAT (thou. RON) (thou. Euro) (Thou. RON) (thou. RON) (thou. Euro)
Head 1 Land development
Head 2 Utilities
Head 3 Technical Designs and Assistance
Head 4 Basic investment (construction, installations)
Head 5 Construction Site management
Head 6 Training of personnel, tests and technological examinations
Notations: TRONSON-SECTION
SPATII VERZI – GREEN AREAS
TOTAL GENERAL-GRAND TOTAL

4.2. Measures to improve road traffic conditions

Although the existing street network will not change in the next 3-5 years through the measures described above, there are less costly measures to be proposed to the municipality to help increase the traffic capacity of the street network and of traffic flow, such as:

APPENDIX 4.3. Measures to improve road traffic conditions

- Introduction of weight restrictions:
  - Without weight restrictions - on the following streets: Al. I. Cuza , Mureşului (partly), Turnătoriei, Republicii, Gh. Şincai (from Republicii to the exit), NR74 (to the exit from the junction with Republicii), NR1 from the entry from Sebeş to the junction with Încoronării Blvd., Încoronării from the junction with Ferdinand I Blvd to the Railway Station, Viilor.
  - More than 7 tonnes – only on the following streets: Încoronării, Pop de Băseşti, Lalelelor, Revoluţiei 1989, Gh. Şincai partly, H.Coandă, T. Vladimirescu Blvd (between H.Coandă and Republicii), Mărăşeşti (route CR107), Livezii partly, Mureşului partly, Petreşti and Măceşului.
  - More than 2.7 tonnes – only on the following streets: Calea Moţilor, Horea, 1 Decembrie 1918, Doinei, T. Vladimirescu (between Henri Coandă and Moţilor), Ardealului, Brâncoveanu, Ferdinand I, the route Olteniei – Ion Arion – Bucureşti until CR107.
  - On the rest of the streets, including the historical area, access should be allowed for vehicles less than 1.5 tonnes.
- Transit traffic direction (through properly set up traffic signs) on the above-mentioned street network and with the observance of weight restrictions as follows:
  - Sebeş - Cluj-Napoca: directed only to the bypass road;
  - Sebeş – Zlatna:
    - For passenger vehicles: NR1 through Partoş – Încoronării – 1 Decembrie 1918 – Horea – Moţilor – Zlatnei – NR74 exit;
    - For freight vehicles more than 7 tonnes: NR1 through Partoş – Bypass Road – Al.I.Cuza – Republicii - Zlatnei – NR74 exit;
    - For freight vehicles less than 7 tonnes: NR1 through Partoş – Încoronării – Pop de Băseşti – Revoluţiei 1989 - Zlatnei – NR74 exit;
  - Zlatna – Cluj: directed only to NR74 – Zlatnei – Republicii – Al. I. Cuza – NR1 town exit;
  - Ciugud - Sebeş and Cluj directed only to the bypass road;
  - Ciugud - Zlatna:
    - For passenger and freight vehicles less than 7 tonnes: Mărăşeşti – T. Vladimirescu – Republicii – Zlatnei - NR74 to exit;
    - For freight vehicles more than 7 tone: Bypass road – Al. I. Cuza - Republicii – Zlatnei - NR74 exit;

- To increase traffic capacity of junctions depending on the level of traffic flows and their landscaping, the following measures are suggested:
  - Correcting of geometry to channel traffic flows in the following junctions:
    - Al. I. Cuza – Orizontului;
    - Al. I. Cuza – Livezii;
    - Al. I. Cuza – Mureşului;
    - Republicii – Arieşul;
    - Republicii – Emil Racoviță;
    - Republicii – V.Alecsandri;
    - Revoluției 1989 – Pop de Băseşti;
    - Revoluției 1989 – Cloşca;
    - V.Alecsandri – H. Coandă;
    - Calea Moților – Ştefan cel Mare;
    - Dr. Ion Rațiu – Petru Rareş – C. Brâncoveanu;
  - Geometry correction and the construction of roundabouts and traffic lights:
    - Încoronării – O.Goga;
    - Calea Moților – T. Vladimirescu;
    - T. Vladimirescu – Oborului;
    - Ardealului – P-ța Iuliu Maniu;
    - 1 Decembrie 1918 – Pop de Băseşti;
    - 1 Decembrie 1918 – Vasile Goldiş;
    - Horea – Cloşca – 1 Decembrie 1918;
    - Revoluției 1989 – V. Goldiş
    - Revoluției 1989 – Cloşca;
    - Revoluției 1989 – Alexandru cel Bun;
    - Încoronării – B-dul Ferdinand I (Railway station).
  - Geometry corrections and green light traffic lights (until the above-mentioned roundabouts are built) of the following junctions:
    - Ferdinand I – Moldovei;
    - Ferdinand I – Munteniei;
    - Ferdinand I – Olteniei;
    - Ferdinand I – Bucureşti;
    - I.C.Brătianu – Pța Națiunii;
    - I.C.Brătianu – Rubin Patiția;
    - Ardealului – Iului Maniu;
    - Ardealului – Calea Moților;
    - Ardealului – H. Coandă;
    - T. Vladimirescu – Mărăşeşti;
    - T. Vladimirescu – Republicii
  - Re-designing the road marking along the streets Ferdinand I – IC Brătianu - Ardealului –T Vladimirescu from Încoronării to Republicii Blvd. so as to create along the green light traffic sector a continuous lane in each direction for the forward direction and additional lanes to channel flows in all junctions on route by removing existing parking places along the streets. This would create conditions for increasing capacity on this route in both directions. On the roadway not used by traffic, markings shall be arranged as appropriate, for public transportation, taxi racks or stops.
- A speed limit of 30 km/h in densely built areas in the Cetate district;
- To increase the flow and safety on the streets of the major network, it is recommended to ban left turns at the following junctions:
  - Ferdinand - Banatului;
  - T. Vladimirescu – Târgului;
  - T. Vladimirescu – Emil Racoviță;
  - B-dul Republicii – Craivei;
  - Calea Moților - A.Vlaicu;
  - Calea Moților - I.Micu Klein;
  - Calea Moților - T.Cipariu;
  - Calea Moților - Şt. Cel Mare;
  - Calea Moților - Septimius Severus;
  - B-dul Horea - Ion Agârbiceanu;
  - B-dul Horea - Dr. Ion Rațiu;
- One-way traffic should be introduced on the following streets for a better traffic management and to increase traffic or stopping capacity:
  - Pop de Băseşti;
  - Lalelelor;
  - Petru Rareş;
  - C-tin Brâncoveanu;
  - Ion Antonescu;
  - Şt. Cel Mare between Cloşca and Petru Rareş;
  - Mircea cel Bătrân;
  - Dr. Ion Rațiu between Cloşca and Petru Rareş;
  - Alexandru cel Bun;
  - Lucian Blaga;
  - Traian between Munteniei – Luminii - Pța Națiunii;
- Increase the level of services on the (existing) Eastern belt in collaboration with CNADR to attract transit traffic on the route Sebes - Cluj (in its entirety) and most of the town entry traffic in these two directions by better maintenance of the roadway and of the roadside, by ensuring horizontal and vertical signage and by installing lights all along the road.
- Increase the number of parking places to reduce stationary traffic on the roadway which seriously affects the traffic capacity of several streets. Their implementation, however, is virtually impossible in most areas for lack of space (most existing vacancies have already been designed for this purpose). For this reason, it is recommended to discourage stopping in central areas and of general interest so as to increase traffic flow. This objective can be achieved by introducing a system of limiting and charging stops around and inside the historical fortress and along the following streets: Regiment V Vânători, Regele Ferdinand I, I.C.Brătianu, Ardealului, T. Vladimirescu, Al.I.Cuza, Republicii, Revoluției 1989, 1 Decembrie 1918, Horea and Calea Moților. It can also be achieved by the use of access fees for motorized transportation means to certain areas of the town and by traffic calming plans.

4.2.1. Measure analysis

By integrating the above proposed measures in the current road network, new traffic flows result. Compared to the current state of flow, we can emphasize the effects of the proposed measures on the distribution of the traffic on the street network.

The total flow on the following sectors is expected to increase:

- Revoluției 1989 Blvd between Moților and Cloşca by approx. 19%;
- Revoluției 1989 Blvd between Cloşca and Vasile Goldiş by approx. 60%;
- Revoluției 1989 Blvd between Vasile Goldiş and Pop de Băseşti by approx. 2.6 times;
- The Bypass Road by 31%.

These increases are mainly due to freight vehicle traffic from 2.7 to 7 tonnes that

have imposed severe restrictions on the rest of the network. Also, a flow increase by 40% on the route V.Alecsandri – Gh. Şincai is expected by streamlining the two junctions at the ends of the route.
On the other hand, the thoroughfares that cross the protected and residential areas can witness a decrease of flows on certain sections, such as:

- Cloşca street by approx. 20%;
- V.Goldiş street by approx. 30%;

1 Decembrie 1918 (between Pop de Băşeşti and V. Goldiş) by approx. 40%;

- 1 Decembrie 1918 (between Cloşca and V. Goldiş) by approx. 25%;
- Horea by approx. 18%;
- O.Goga street by approx. 27%;
- N.Bălcescu by approx. 19%;
- Calea Moţilor (between Horea and Republicii) by approx. 34%.

In central areas proposed for green light traffic, the total traffic would increase only slightly on Ardealului Street by approx. 3% as between Bucuresti Street and Iuliu Maniu square, while between Iuliu Maniu and Calea Moţilor by approx. 7%. On T. Vladimirescu Blvd a decrease in traffic by about 12% can be expected between H.Coandă and Mărăşeşti and by 7% between Mărăşeşti and Republicii Blvd.
From the analysis of the technical and economic indicators of the existing network and of the proposed option, the proposed option ensures greater traffic flow which is reflected in increased speed. The total distance travelled is longer in the proposed option, which is mainly due to restrictions for freight vehicles and one-way streets. However, due to increases in the average travel speed, total fuel consumption as proposed is somewhat smaller, achieving savings and reducing the total cost of travel.
By analysing the effects of the measures at town level, we can draw the following conclusions:

- The degree of urban comfort level and especially of traffic participants and pedestrians increases significantly ;
- A significant decrease in emissions and noise levels in residential areas is achieved;
- Freight operators benefit from more fluent routes, thus reducing the cost of transport operations ;

Also see *Appendix IV.4. Prognosis for road traffic flow in Alba Iulia*;

4.3. SEtting up local freight distribution centres

4.3.1. LOCAL DISTRIBUTION CENTRES

This measure has the immediate effect of reducing urban freight traffic and reducing urban congestion. According to their definition, these platforms are transshipment areas where at least two types of transport ideally meet (e.g. road and rail transport).
The setup of such Distribution Centres (Distribution Platforms) provides logistics companies with scheduled deliveries in urban areas the opportunity to transfer the load to the distribution centre, thus avoiding access to the overcrowded urban area. The Centre's operators sort cargoes from a larger number of carriers and deliver them in the urban area by a schedule, often using environmentally friendly vehicles.
In Alba Iulia, there are certain areas where such platforms already exist and which could be modernised and extended. There are also areas where such new platforms could be created, such as:

- The "ICRA" Platform - with the possibility of expansion and modernisation and numerous advantages given by its location, namely:
  - Direct access to Al. I. Cuza street (NR1);
  - Access to the bypass road, main railway, the future Sebeş – Turda motorway and the future west bypass road in less than 500m.
- The former "Refractara" factory with many advantages given by its extent and location, namely:
  - Direct access to Al. I. Cuza street (NR1);
  - Access to the bypass road, main railway, the future Sebeş – Turda motorway and the future west bypass road in less than 1000m.
- The former "Utilajul" plant with many advantages given by its location, namely:
  - Direct access to Al. I. Cuza street (NR1);
  - Direct access to the railroad;
  - Access to the Bypass road, main railway, the future Sebeş – Turda motorway and the future western bypass road in less than 1000m.
- In Cetate district, in the area of the ammunitions warehouse;
- On Brânduşei street (to Pâclişa) in direct connection to CR107A and a distance of less than 2 km. from the railroad;
- In the development area along the existing bypass road, which has many advantages due to its location, namely:
  - Direct access to the Bypass Road;
  - Between 100m and 2000m from NR1, the main railway, the future Sebeş – Turda motorway and the future western bypass road.
- In the development area of the exit to Sebeş, on the right side, before the area known as "Three bridges" which has many advantages due to its location, namely:
  - Direct access to the NR1;
  - Between 200m and 2500m distance from the main railway, the future Sebeş – Turda motorway and the eastern bypass road.

4.3.1.1. Measure analysis

The strengths and weaknesses of this measure are:

- Strengths:
  - Social and environmental benefits arising from more efficient and less invasive transport in the central areas of the town;
  - Better planning and implementation of logistics operations ;
  - Better control of inventory;
  - Theoretical cost benefits by excluding last mile delivery;
  - Benefits to participants as regards PR, etc.
- Weaknesses:
  - High cost of building the necessary infrastructure;

- Difficulty of a single centre to manage a too broad variety of goods due to the diversity of vehicles involved in transporting each type of goods;
- Contractual and organizational issues,
- Loss of direct contact between customer and provider.

However, the above proposals may prove feasible if the funding source is identified (private investment or public and private) and if they are designed realistically. All these platforms would benefit from excellent connections with the railroad, the main traffic routes, existing and future (Sebes - Turda Motorway) or proposed (GUDP - Western Ring Road and connecting rings) providing optimal access to carriers and connections in all directions. (*Appendix IV.5. Areas identified for the possible location of distribution centres*)

The implementation of the measure also attracts numerous benefits to all stakeholders, such as:

- Benefits for local authorities and residents of the town:
  - Local roads' decongestion;
  - Low emissions limiting the environmental impact of freight transport;
  - Fewer trips which lowers the risk of accidents;
  - Better quality of life for the inhabitants by noise reduction, reducing freight vehicle access through the districts and lowering the risk of accidents;
- Benefits for investors and contractors:
  - Reducing delivery costs and increasing safety ;
  - Safe deliveries resulting in a continuous process without interruptions;
  - Time saved
  - The opportunity to belong to a corporation with a responsible schedule which ensures compliance with health and safety regulations;
- Benefits for freight operators:
  - Legally defined spaces for loading-unloading operations – meaning a low risk of fines
  - Reduction of fuel consumption by safe deliveries;
  - Certainty of delivery leads in time to fleet productivity;
  - Fewer travels and a lower risk of accidents.

4.3.1.2. The cost assessment for a local distribution centre

Given the complexity of setting up such a centre in Alba Iulia and without a well-established site and a technical project, the project value described below has been determined in accordance with Government Decision 363/14.03.2010 "List of standards cost for investments financed from public funds" for the basic investment project. A General Estimate has also been prepared according to GD 28/2008. The cost standard is a reference document with a leading role in promoting investment projects financed from public funds. The cost assessment has taken into account a 5.000sqm site in the Town Development Area, adjacent to the major road network of Alba Iulia.

- The technical data of the investment project are:
  - built-up area: 1,628.00 sqm;
  - deployed built-up area: 1,780.00 sqm.
  - metal support structure (pillars and space trusses);
  - three-layer panels (steel sheet 0.5 mm + fireproofed polyurethane foam + steel sheet 0.5 mm), mounted on the bearing structure;
  - thermo-insulated roof;
  - PVC joinery with thermal-insulating windows.
- In determining the total cost, the following were taken into account:
  - For overheads and profit: 10 % and 5 %;

For an efficient spending of public funds, in the following expenditure Heads/subheads expense not included in cost standard, the following maximum levels of expenditure were considered, as a percentage:

a) Design and engineering: 3.0 % of the basic investment project value;
b) Consulting: 1.0 % of the basic investment project value;
c) Technical assistance: 1.5 % of the basic investment project value;
d) Site management: 2.5 %;
e) Contingency expenses: 10.0 %.

The expenditure referred to at d) and e) is consistent with the provisions of Appendix 4 "Methodology for planning a general estimate for investment and intervention projects" to the Government Decision no. 28/2008.

GENERAL ESTIMATE

regarding necessary expenses for

A LOCAL DISTRIBUTION CENTRE IN ALBA IULIA

In thousands RON / thousands Euro at an exchange rate of 4.45 RON/Euro

Cr. No.	Expense Heads and Sub-heads	Value (without VAT)		VAT	Value (including VAT.)	
		Thou. RON	Thou. Euro	Thou. RON	Thou. RON	Thou. Euro
0	1	2	3	4	5	6
HEAD 1.						
Expenses with buying the land and with land development						
1.1.	Buying the land	378.25	85.00	90.78	469.03	105,4
1.2.	Land development	55.18	12.4	13.24	68.42	15,37
1.3.	Developments for environment protection and return to initial state. Planting in the near vicinity	13.79	3.09	3.31	17.10	3,84
TOTAL HEAD 1.		***447.22***	***100.49***	***107.33***	***554.55***	***124.61***
HEAD 2.						
Expenses with utilities						
TOTAL HEAD 2.		***0.00***	***0.00***	***0.00***	***0.00***	***0.00***
HEAD 3.						
Expenses for technical design and assistance						
3.1.	On site studies	0.00	0.00	0.00	0.00	0,00
3.2.	Tax for permits, clearances, agreements	0.00	0.00	0.00	0.00	0,00
3.3.	Design and engineering 3.00 %	82.77	18.60	19.86	102.63	23,06
3.4.	Organization of procurement procedures	0.00	0.00	0.00	0.00	0,00
3.5.	Consultancy 1.00 %	27.59	6.20	6.62	34.21	7,68
3.6.	Technical assistance of the designer..... 1.50 %	41.38	9.30	9.93	51.31	11,52
3.7.	Site supervision	0.00	0.00	0.00	0.00	0,00
TOTAL HEAD 3.		***151.74***	***34.09***	***36.41***	***188.15***	***42.28***
HEAD 4.						
Expenses for the basic investment project						
4.1.	Constructions and installations	2646.50	594.71	635.16	3281.66	737,45
4.2.	Machinery assembly	44.59	10.02	10.70	55.29	12,42
4.3.	Machinery and equipment assembly	67.99	15.28	16.32	84.31	18,95
4.4.	Machinery without assembly and transport equipment	0.00	0.00	0.00	0.00	0,00
4.5.	Amenities	0.00	0.00	0.00	0.00	0,00
4.6.	Intangible assets	0.00	0.00	0.00	0.00	0,00
TOTAL HEAD 4.		***2759.08***	***620.02***	***662.17***	***3421.25***	***768.82***
HEAD 5.						
Other expenses						
	Site management 2.50 %					
5.1.	5.1.1. construction work	68.98	15.50	16.55	85.53	19,22
	5.1.2. related expenses					
5.2.	Commissions, tax, quotas, cost of loan	0.00	0.00	0.00	0.00	0,00
5.3.	Contingency expenses 10 %	275.08	62.00	66.21	342.12	76,88
TOTAL HEAD 5.		***344.06***	***77.50***	***82.76***	***427.65***	***96.10***
HEAD 6.						
Commissioning expenses						
6.1.	Training of staff	0.00	0.00	0.00	0.00	0,00
6.2.	Technological tests	0.00	0.00	0.00	0.00	0,00
TOTAL HEAD 6.		***0.00***	***0.00***	***0.00***	***0.00***	***0.00***
GRAND TOTAL		***3702.10***	***831.93***	***888.50***	***4590.60***	***1031.59***

4.3.2. PROXIMITY DELIVERY CENTRES (ELP)

On the same principle of Consolidation and Distribution Centres, but at a smaller level, such small platforms can be created to serve only limited areas of the perimeter of the town, such as crowded areas (Transilvania Blvd, Iuliu Maniu square, Revolutiei 1989 Blvd, the historical area, and so on, where deliveries are difficult).

These platforms could receive the goods from carriers so that the last mile to the shops and service providers can be travelled by small vehicles, environmentally friendly, such as carts or bicycles specifically designed for the small consignments of goods.

The specific area can be controlled by two operators who can help carriers and assist them in delivering to recipients using trolleys. This type of platform can serve between 3 and 5 vehicles with a width of 30m. For its operating schedule, time periods overlapping normal working hours could be arranged (i.e. from Monday to Friday from 09.00 to 17.00 and on Saturdays between 09.00 and 13.00).

For example, in Alba Iulia, in the central area, an ideal location to establish an ELP would be the underground parking intended to be built under Consiliului Europei square with access to the underground parking from the Ardealului, Decebal and Bucovinei streets. This could serve the entire central area and could have ideal connections to the major road in the area.

For the busiest area, namely Transilvaniei Blvd., such a location could be the site of the current parking adjacent to the boulevard (behind the "Albina" block of flats) with direct access from Closca Street, which could be re-designed for both parking and storage. *(see Appendix IV.5. Areas identified for the possible location of distribution centres)*

4.3.2.1. Measure analysis

To implement this measure, it is necessary to involve the local authorities and support the establishment of public-private partnerships between investors or owners of locations matching size and location requirements.

The benefits of such a partnership are:

- Benefits for the local authorities:
  - A better quality of life for the residents by noise reduction, reducing freight vehicle access through districts and lower the risk of accidents;
  - Local road decongestion ;
- Benefits for investors:
  - Publicity benefits by working with the authorities;
  - A continuous flow of carriers and therefore of deliveries;
  - A contact with traders in the area and the possibility of attracting more customers.
- Benefits for carriers:
  - Guarantee the existence of a safe unloading area near the commercial area and the town centre;
  - Reduced delivery times and lower fuel consumption by eliminating travel to areas with poor access.

Implementation of this measure would significantly reduce logistics flow in residential, administrative or business areas in the town. Proximity platforms make delivery of goods to central and business areas easier and they reduce congestion, noise and pollution associated with the supply of goods and they reduce transportation costs.

4.4. Night deliveries

A regulation that would set specific delivery hours for businesses is a measure that significantly reduces freight traffic in the urban area during the day when the town is active.

Regulations in Alba Iulia provide time frames for supply, but nevertheless, most companies that supply goods and most businesses do not comply with this time frame.

Therefore, a regulation is needed to provide and especially to impose fines for operators who do not comply with these rules.

Another measure that would make a substantial contribution to reducing the logistics flows in the town during the day is the regulation and implementation of a nighttime delivery system of goods to traders.

This measure involves the delivery of goods to traders, shops, etc. at night when the town is usually quiet and inactive. Such a range would be between 22.00 and 06.00. This operation would reduce the large number of vehicles that supply goods during the day. Regulations can be of several types:

- Regulations on deliveries and collections to/from a certain company (shop, office or factory);
- Regulations on the delivery of goods to traders all over town or from a specific area.

4.4.1. MEASURE ANALYSIS

This measure attracts a number of benefits such as:

- Reducing delays caused by heavy traffic during the day by using free traffic at night;
- Reducing emissions and fuel consumption by avoiding traffic congestion and the possibility of direct access to stores;
- Reducing the cost of delivery;
- Increased efficiency of the logistics process;
- Increasing road safety.

On the other hand, if the carriers do not allow deliveries at night, they can face a number of consequences:

- A need for larger vehicles during a smaller time window in which day delivery is allowed (ranges covered by the decision of the local council) ;
- The delivery of goods is done in a much more crowded time frame, increasing fuel consumption and reducing vehicle and driver efficiency;
- Delivery times could be delayed ;
- The supply chain may be less effective;
- The cost of delivery is increased.

On the other hand, by allowing deliveries at night, companies can increase their efficiency and sales. Unlimited access to delivery and collection spaces without interfering with traffic throughout the day ensures faster delivery and minimizes the effect of freight

transport on traffic congestion. Also, night delivery schedules encourage the use of much more ecological and quieter vehicles.
The most important issue raised by this type of measurement is noise. It is created by vehicles, their engines and manoeuvring for loading and unloading, opening doors, etc. To avoid this drawback so that the people living in these residential areas accept this type of delivery, allowable noise levels at night in the town must be regulated. Also, operators need to train and educate their staff to properly manage this delicate issue.
Another critical part of this measure is increased exposure to theft, both for the vehicle and driver and for the goods.

4.5. TECHNOLOGICAL SOLUTIONS

4.5.1. MODERNISATION OF THE FREIGHT DISTRIBUTION FLEET

To implement this measure, the involvement of public authorities is crucial for the allocation of resources and financial support through a mix of incentives and regulations to encourage innovative freight logistics and new concepts (including environmentally friendly vehicles and technologies) in urban areas. Low emission vehicles help cities by increasing air quality and reduce traffic noise.
Green vehicles can be of several types:

- Vehicles that operate on alternative fuels such as biofuels and hydrogen fuels. These types of fuels and related technology exist, but the availability on the market of such vehicles is not at a sufficient level;
- Vehicles operating on diesel fuel or gasoline. Standard "Euro" emissions for freight motor vehicles significantly reduce emissions. Also, vehicles may be equipped with mechanisms such as particle traps that can be mounted on vehicles to capture particles before their entry into the atmosphere;
- Electric and hybrid vehicles. The use of electric vehicles is particularly suitable to reduce exhaust emissions and noise.

The actors and key players involved in schemes to introduce green vehicles on the market are:

- Local authorities by initiating a strategy and policies on the use of ecological vehicles;
- Politicians by political support for strategies involving the introduction of clean vehicles and especially tax incentives, both locally and at regional or national level;
- Fuel distributors diversify the products they sell ;
- Automotive manufacturers by manufacturing several models of vehicles of this type.

Initiatives are therefore needed for the use of green vehicles, which can take many forms, such as:

- Informal partnerships: establishing sustainable solutions based on the desire to create an environmentally friendly transport system by bringing together local authorities, transport operators and local businesses ;
- Tax reductions and benefits to users of environmentally friendly vehicles, alternative fuel traders and for using modern filtering technology for diesel vehicles;
- Use of environmentally friendly vehicles by operators to perform deliveries in urban areas;
- Facilities and access permits in urban areas of vehicles that meet certain emission standards;
- Road Toll Schemes with discounts for users of environmentally friendly vehicles;
- Funding innovative research projects and studies in the field of urban freight transport.

4.5.1.1. Measure analysis

This measure is difficult to implement in Alba Iulia in the current traffic, as carriers are not under pressure to take the decision to modernize its current fleet. Also, there is no special infrastructure for alternative fuel powered vehicles in Alba Iulia.
Finding solutions for the implementation of this measure is complex, and local authorities cannot be the only players involved. Through their cooperation with various interest groups such as carriers, they can try to integrate green vehicles into the policies regarding urban freight transport.
However, private operators tend to use the measure to change the fleet only if:

- There is a financial benefit for the company;
- There is an adequate network of alternative fuel stations;
- There are marketing benefits to the Company;
- The company has a strong policy of protecting the environment;
- Such vehicles are available on the market.

Success in promoting the use of such vehicles depends on framework conditions such as:

- Regulations on environment and emissions standards
- Incentives such as tax cuts;
- The existence of a network of filling stations for alternative fuels;

However, by implementing the measures set out above (introduction of weight restrictions or one-way streets, deliveries at night, distribution centres which automatically imply the use of smaller vehicles in the urban perimeter, etc.) Alba Iulia would contribute significantly to the modernization of the fleet carriers by encouraging them to use smaller vehicles, environmentally friendly with low emissions, low noise, etc. These measures underlie long-term policies to help introduce clean vehicles in urban and freight transport within the context of the implementation of European Commission Directive 2009/28/EC on the promotion and use of energy from renewable sources.

4.5.2. IT SYSTEMS FOR TRAFFIC MONITORING, TAXATION OR ACCESS CONTROL

The local authority - Alba Iulia Municipality- has got an approved study on the im-

plementation of a monitoring system for the Alba Carolina Fortress. A professional monitoring system is proposed for both outside and inside the fortress (a system consisting of approx. 60 video cameras). The system ensures the monitoring on three areas as follows:

- Area 1 - will monitor access ways into the Fortress and to the outer routes: North, East, South and West;
- Area 2 - will monitor all tourist routes in the outer ditches of the Vauban Fortress;
- Area 3 - will be all streets located within the town and all the objectives of national and local heritage;

The Centre for image monitoring and recording is proposed to be set up in the local police headquarters or somewhere else in the town, to reduce travel and intervention time.

Regarding local traffic and heavy traffic in Alba Iulia, this type of monitoring should be expanded to all major intersections and areas of entry/exit from the town, such as:

- On the Bypass Road: at the railroad crossing in Partoş; at the junction with Mărăşeşti (DJ 107); Junction with NR1 at the exit to Cluj;
- Junction Ferdinand Blvd and Incoronării Blvd;
- Ion I.C.Brătianu square and Iuliu Maniu square;
- Junctions Calea Motilor and Ardealului – T.Vladimirescu, Doinei, Horea and Revoluției 1989;
- Încoronării Blvd. with O.Goga and Take Ionescu streets;
- Junctions of 1 Decembrie 1918 Blvd. with the following streets: Brânduşei, Pop de Băseşti, V.Goldiş and Cloşca;
- Junctions of Revoluției 1989 Blvd and the following streets: V.Goldiş, Transilvaniei Blvd., Cloşca, Petru Rareş and Vănătorilor;
- Junctions of Republicii Blvd and the streets Gh.Şincai, Emil Racoviță, Arieşului and Tudor Vladimirescu;
- Junction T.Vladimirescu Blvd. and Livezii street;
- Junction of Al.I.Cuza with Mureşului.

In addition to monitoring systems, the Municipality should take further measures to regulate traffic by creating an access control system into the Alba Carolina Fortress at the entry on Nicolae Iorga Street, where there is already the infrastructure to install a card-based system and on the other sides (North and South sides) where there are wide areas for parking buses and cars.

We also believe that, as a result of reconfigurations of the street network and increase of parking places, Alba Iulia needs a Traffic and Parking Management Department which could apply the parking fees approved locally and ensure maintenance of specific infrastructure across Alba Iulia.

4.5.2.1. Measure analysis

This type of measures improves the whole system of logistics on the territory of Alba Iulia and plays multiple roles such as

- The protection of historical sites and buildings;
- The proper management of road and pedestrian infrastructure;
- The prevention and suppression of traffic indiscipline and avoiding traffic accidents;
- The increase in the degree of civilization of participants in urban traffic and increase of urban comfort;
- Fighting problems caused by urban traffic, etc.

In addition to the measures discussed above, it is also necessary to involve the municipality, the media and the non -governmental sector in local awareness campaigns to address carriers, shop owners and residents. .

This type of campaign can be made on various themes related to urban logistics, where they will raise the awareness of all actors involved in the urban logistics (transporters, store owners, residents in the affected areas, etc.) and encourage the adoption of green logistics solutions to reduce the negative impact of freight distribution on the environment and overall quality of life.

4.5.2.2. A Case Study – The introduction of road traffic monitoring systems in Alba Iulia

The following represents the needs and the costs for introducing a system of video monitoring at the major junctions in the town and in the key points on the main roads in the town (e.g. pedestrian crossings). These are:

- Junction Ferdinand Blvd- Incoronarii Blvd- Take Ionescu street;
- Junction Iuliu Maniu square- Calea Motilor - Tudor Vladimirescu Blvd;
- Junction Revolutiei 1989 Blvd - Republicii Blvd - Calea Motilor;
- Junction Republicii Blvd - Tudor Vladimirescu Blvd;
- Junction 1 Decembrie 1918 Blvd - V. Goldis street- Mihai Viteazu street;
- Junction 1 Decembrie 1918 Blvd - Closca street- Horea Blvd;
- Junction Revolutiei Blvd – Closca street;
- Regimentul V Vanatori street (between buildings180 and1; no. 128 and no.125);
- Ferdinand I Blvd. (between buildings no. 28 and 35);
- Tudor Vladimirescu Blvd.(near Dorin Pavel and Alexandru Domsa high schools);
- Republicii Blvd. (between blocks 27 and 44);
- Calea Motilor (at building no. 81);
- Zlatnei street (between buildings no. 68 and 71);

(Appendix IV.6. Areas identified for introducing traffic monitoring systems in Alba Iulia)

For this system to be operational, the following works are required:

- Electrical wiring (replacement of kerbs, trenches in the sidewalk and roadway, pillars, manhole chimneys, etc.):

SUMMARY OF ELECTRICAL WIRING

Nr. crt.	Denumire	U.M.	Cant.	P.U. total (RON)	Valoare (RON)
0	1	2	3	4	5
1	Desfacere si inlocuire borduri	ml	**19**	47,25	897,75
2	Canalizatie in carosabil -sapatura si refacere	ml	**110**	509,26	56.018,16
3	Canalizatie in trotuar -sapatura si refacere	ml	**388**	270,04	104.775,13
4	Canalizatie in spatiu verde -sapatura si refacere	ml	**385**	126,04	48.524,63
6	Locatie - priza de pamant PP tip C in trotuar ; sapatura + refacere	buc	**0**	0,00	0,00
7	Camere de tragere CT 64	buc	**0**	0,00	0,00
8	Camere de tragere CT 40	buc	**65**	463,50	30.127,50
9	Stalp propriu cu consola tip AN - Fundatie + Procurare si Montaj	buc	**41**	7.795,41	319.611,81
10	Soclu cabinet Fundatie + Procurare si Montaj	buc	**0**	0,00	0,00
11	Procurare si montare in sant teava d 90	ml	**0**	0,00	0,00
12	Procurare si pozare in sant teava d 50	ml	**1104**	16,51	18.218,50
13	Procurare si pozare aparent pe stalp teava d 50	ml	**15**	39,00	585,00

TOTAL = 578,758.48 RON WITHOUT VAT

ELECTRICAL INSTALLATIONS

Nr. crt.	Denumire	U.M.	Cant.	P.U. total (RON)	Valoare (RON)
0	1	2	3	4	5
	Dispecerat				
1	Instalare statie de lucru	buc	1	432,00	432,00
2	Instalare videorecorder	buc	2	324,00	648,00
3	Instalare switch	buc	1	108,00	108,00
4	Instalare si configurare router	buc	1	216,00	216,00
5	Montare Media Converter	buc	1	72,00	72,00
6	Configurare + Incercare sistem ; PIF	buc	1	1.080,00	1.080,00
	Intersectii				
1	Montarea pe stalpi - existenti cu consola - a	buc	41	620,71	25.449,19
2	Cutie de joctiune - procurare si montare	buc	41	58,50	2.398,50
3	Electrod priza de pamant (1,5) - procurare si montare	buc	0	0,00	0,00
4	Conducta metalica pt legarea la pamant OL Zn 40 x 4	ml	0	0,00	0,00
5	Executie priza de pamant	buc	15	579,00	8.685,00
6	Cablu FY 6 tras prin tub - procurare si montare	ml	2326	6,97	16.218,62
7	Cablu de legatura FTP - UTP de legare a camera	ml	2495	7,42	18.504,77
8	Executie conexiuni electrice - incercare	buc	164	11,35	1.861,73
9	Media Convertor - montare in cabinet si incercare -	buc	15	72,00	1.080,00
10	Router - montare in cabinet si incercare (adaptor	buc	15	216,00	3.240,00
11	Modul alimentare - camera de detectie video -	buc	15	36,00	540,00
12	Montaj cabinet (500x600x210) propriu pe stalp -	buc	15	678,06	10.170,90

TOTAL = 90,704.71 RON WITHOUT VAT

Machinery and technological equipment, amenities:

MACHINERY AND TECHNOLOGICAL EQUIPMENT, AMENITIES

Nr. crt.	Denumirea	U.M.	Cant.	Preţul unitar RON/U.M.	Valoarea (exclusiv T.V.A.) - RON -
0	1	2	3	4	5
	Dispecerat				
1	Statie de lucru Dell Optiplex 790 MT	buc	1	3.579,58	3.579,58
2	Network Video Recorder Qnap VS-8024	buc	2	18.984,48	37.968,96
3	Monitor Monitor LED Samsung 24"	buc	2	1.014,59	2.029,18
4	Ethernet Media Converter: TP-LINK MC111CS cu Atenuator Optic *	buc	1	286,80	286,80
5	Switch MikroTik 250GS	buc	1	181,25	181,25
6	Router MikroTik 450	buc	1	339,72	339,72
7	Hard disk intern Western Digital WD2003FYYS (2TB)	buc	8	1.500,71	12.005,66
8	Software Nuuo SCB-IP +64	buc	1	23.992,75	23.992,75
9	Sursa MikroTik 24V	buc	2	33,63	67,26
	Intersectii				
1	Camera videosupraveghere IP SONY SNC-CH160	buc	41	5.471,85	224.345,92
2	PoE Injector 900002010G	buc	41	223,92	9.180,67
3	JetCon 3401G-Industrial Media Converter cu Atenuator Optic *	buc	15	1.226,28	18.394,15
4	Router MikroTik 450	buc	15	339,72	5.095,80
5	Sursa MikroTik 24V	buc	30	33,63	1.008,90

TOTAL = 338,476.59 RON WITHOUT VAT

SUMMARY

Nr. crt.	Denumire	U.M.	Cant.	P.U.	Valoare
1	Lucrari - Canalizatii electrice	set	1	578.758,48	578.758,48
2	Lucrari - Instalatii electrice	set	1	90.704,71	90.704,71
3	Procurare echipamente	set	1	338.476,59	338.476,59

GRAND TOTAL = 1,007,939.78 RON WITHOUT VAT

1. Works – electrical wiring
2. Works – electrical installations
3. Equipment purchasing

5. THE ENVIRONMENTAL IMPACT OF THE PROPOSED MEASURES

Freight and goods distribution are widely known as the factors of energy consumption and environmental degradation in European urban centres. The present study has tried to identify measures to significantly improve logistics operations whose implementation would reduce their carbon footprint.

In what follows, we will briefly mention the positive environmental consequences of implementing the proposed measures.

The measure of resizing traffic spaces in Alba Iulia has the effect of a double positive impact on the environment by reducing the number of small vehicles that run through heavily populated central areas and by removing heavy traffic and a large number of freight cars outside heavily populated areas.

Also, adjacent to resizing traffic spaces, the building of underground car parks in densely populated areas provides considerable improvement in environmental issues by:

- Reducing vehicle noise during the day and night;
- Reduction of air pollutants in the vicinity of residential areas by closing down parking areas too close to buildings;
- Making room for green areas and children's playgrounds to be built.

Green areas are not only the lungs of the city or a pleasant environment, but they are the green curtain that significantly reduces noise, dust and other pollutants produced by cars.

Heavy traffic generates high levels of noise and vibration, which can lead to stress, sometimes with major consequences on the general health of the population.

Noise from traffic affects people in different ways:

- Noise causes discomfort as well as health problems for the inhabitants;
- Higher risk of cardiovascular disease;
- Psychiatric disorders and high levels of stress, sleep disorders, congenital problems, understanding and focus problems in children, hearing problems.

Traffic exhaust gases contribute to atmosphere acidification and tropospheric ozone formation by direct or indirect effects on all components of the environment (vegetation, fauna, soil, water). Heavy metals in the exhaust gases have an impact on human health, water and soil quality.

By creating proximity distribution centres and area distribution centres at the outskirts of Alba Iulia (diversion of freight traffic and prohibiting access of this type of vehicle in heavily populated areas of the city) and by implementing the measure of night deliveries (reducing freight traffic and supply during the day) there will be a significant decrease in GHG emissions in densely populated areas, and they will be better spread.

Also, by encouraging large carriers to renew their fleet, we could comply with the limit of 120 g / km of CO_2 required by European legislation and emission values would fall between the allowed European levels.

Modernization of the current fleet leads to significant reduction in emissions from the traffic affected residential area. Cars fitted with Euro IV and V that use diesel fuel Euro IV and V have catalytic convectors that do not pollute the atmosphere.

By the measures proposed in this study, the carbon footprint is reduced to a minimum by:

- Reducing traffic congestion;
- Improving car traffic flow in densely populated areas;
- Reducing waiting time at junctions;
- Equal distribution of the car traffic on all thoroughfares;
- Speed limits;

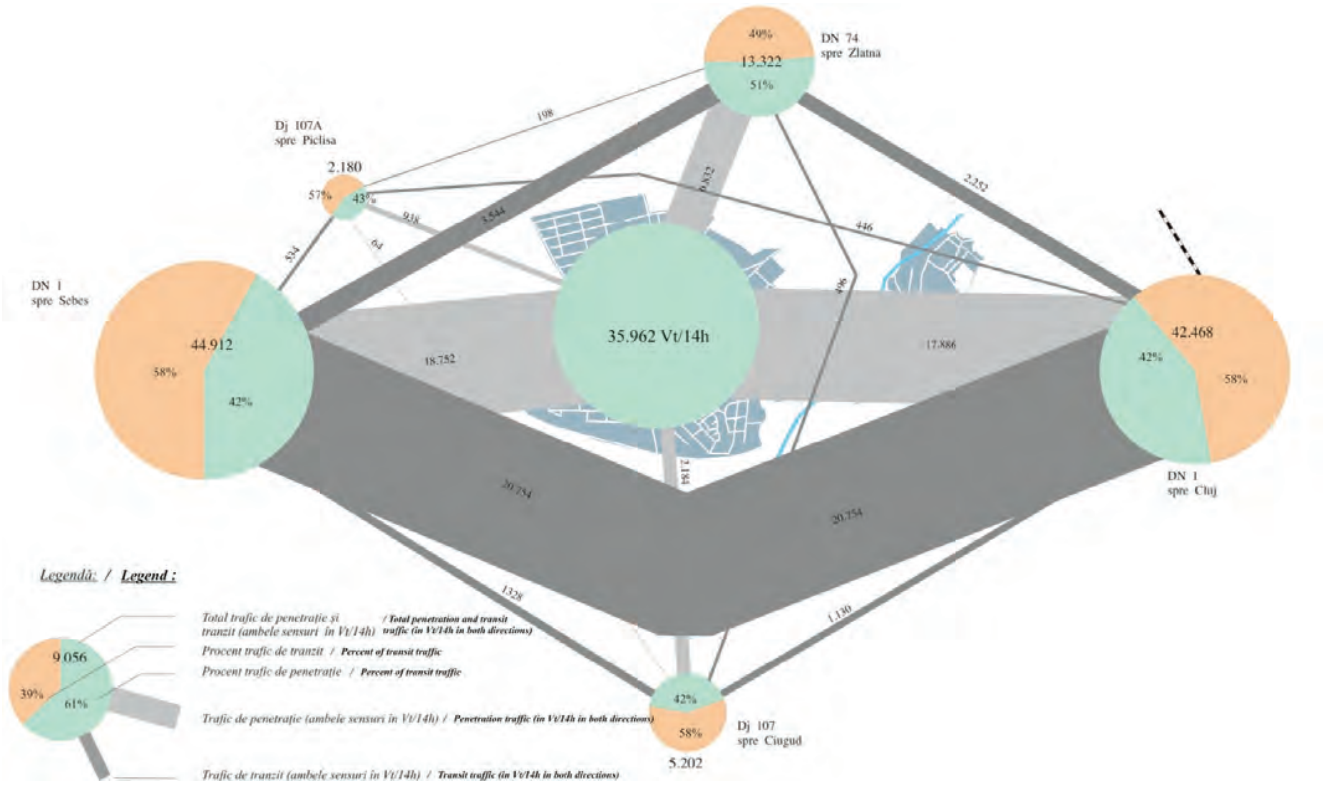
These measures lead to an improvement of the environment by reducing emissions in densely populated areas because less fuel is used and polluting means are replaced with cleaner means.

The positive impact on the environment of the measures proposed in this study is summarized in the following table:

The following chart gives an image of the

Economic impact	•Traffic decongestion •Reduce resource waste
Environmental impact	•Reduce the impact of GHG emissions •Use of bio fuels •Reduce the negative impact of product waste (tyres, oil)
Social impact	•Important decrease of pollution and of its impact on public health •Decrease the number of traffic accidents •Reduce noise in highly populated areas •Improve visual impact •Traffic decongestion encourages the use of public transportation •Increase of green areas and open spaces •An end to infrastructure/buildings deterioration by directing heavy traffic outside of the residential areas

estimated entry and transit traffic as a result of the measures implemented in the present study. It also helps us to measure the GHG emissions in three key places in Alba Iulia: the city entry, the city centre and the city exit, by dividing the traffic volume to the vehicle tonnage and considering the standard emissions for that type of vehicle. The Sustainable Urban Logistics Plan for



Example: a vehicle of 3.5 tonnes running on petrol

Location	Vt/14h	No. veh. 3.5to/14h
City entry	44.912	12.832
City centre	35.962	10.274
City exit	42.468	12.134

Emission factors for light vehicles (< 3.5 tonnes) - petrol

Emission type	NOx	CH4	VOC	CO	N2O	CO2
Medium control, a fuel consumption of 13.7 l/100 km						
g/kg petrol	28.7	0.80	47.4	356.0	0.059	3183

Also, the study of technical and economic indicators for the proposed measures shows that the proposed option leads to a smoother car traffic, as testified by an increase in the average traffic speed from 35.94 km/h to 37.76 km/h. The overall distance is longer and it is due to cargo vehicle restrictions and to one-way streets. However, because of the increase in the average traffic speed, **the total fuel consumption will decrease with annual savings of approx. 45 tonnes**, thus lowering traffic costs and the carbon footprint.

Based on this fuel saving, we can calculate the decrease of GHG at the city level, using as an example a small vehicle running on petrol, as follows:

Example: one vehicle, petrol fuel

Emission factors for vehicles – petrol engine

Emission type	NOx	CH4	VOC	CO	N2O	CO2
Medium catalysis, a fuel consumption of 7.3 l/100 km						
Total g/km	0.67	0.005	0.19	0.71	0.010	190.0
g/kg petrol	11.0	0.083	3.08	11.7	0.165	3138.0
g/ tonnes petrol	11000.0	83	3080.0	11700.0	165.0	313800.0

The decrease of yearly emissions matching a saving of 45 tonnes of petrol per year in the city for one vehicle:

Emission type	NOx	CH4	VOC	CO	N2O	CO2
g/45 tonnes petrol	495000.0	3735.0	138600.0	526500.00	7425.0	14121000.0

If implemented, the proposed measures will not cause additional negative impacts on the soil, water drain, microclimate, surface waters, vegetation, fauna or from the point of view of noise and landscape.

If implemented, the effects of measures defined by the present Sustainable Urban Logistics Plan include a healthy and unpolluted environment in which both human life and economy can thrive.

FINAL CONSIDERATIONS

Alba Iulia proposed in this study cannot be implemented by itself as such, without a comprehensive local development policy designed to determine beneficial changes in the infrastructure of Alba Iulia, thus strengthening the role of the town as catalyst in the development of adjacent cities and of Alba County. The cost of measures and actions mentioned here will be the subject of separate feasibility studies at the time of set up of the framework of their application.

We believe that the SULP satisfies the local policies to improve the conditions of access and transit in Alba Iulia and also, that the investments required to implement the proposed measures are intended to contribute to the balanced development of technical and utilities infrastructure throughout the municipality, with an impact on quality of life, the environment and economic development in the area.

COMMUNICATION AND DISSEMINATION PLAN FOR THE SULP

The Communication and Dissemination Plan for the SULP describes the main guidelines of the communication dissemination and promotion strategy, in order to make known the activities and results of the plan. The Sustainable Urban Logistics Plan of Alba Iulia is a public document, meant to raise all stakeholders' awareness on the challenges of energy efficiency and sustainable urban logistics, as well as on the existing opportunities for improvement and for significant benefits through the implementation and operation of appropriate and effective measures, mechanisms and specific framework approaches focused on this type of urban environments.

One of the key activities of the ENCLOSE project is promoting the solutions described in the present SULP of Alba Iulia and the results obtained during the implementation phase.

The target audience for the presentation of its contents and of future activities consists of:

- carriers, business and shop owners in the town;
- inhabitants of Alba Iulia.

In order to achieve this, the municipality will elaborate a workpackage with updated information on the contents of this plan, so as to increase the visibility of the project.

Mainly, these activities are:

- together with the local media and NGOs, the municipality will be involved in awareness raising campaigns to address carriers as well as shop owners and residents;
- issuing a press release;
- publication of SULP on the official website of the Municipality of Alba Iulia (www.apulum.ro);
- publication of SULP on the Facebook page of the ENCLOSE project Alba Iulia;
- sending the SULP by e-mail to 30 collaborators from Alba county;

Furthermore, given its contents aimed at providing solutions to improve logistics in Alba Iulia and at presenting suggestions for future lines of action consistent with European policies and based on the experience of other cities in Europe, the Sustainable Urban Logistics Plan for Alba Iulia will be recognized as an official planning document of the Municipality through its approval in a Local Council meeting.