

# **Sustainable transportation planning in the context of a socioeconomically disadvantaged urban community**

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**Abstract.** The San Jose neighbourhood of Albuquerque, New Mexico, U.S.A., is one of the most socioeconomically disadvantaged neighbourhoods in the nation. As is typical of such areas, it is subjected to a disproportionate share of the costs of the city's transportation system, while receiving very few of the system's benefits. This paper examines the major obstacles to the development of an environmentally and socioeconomically sustainable transportation plan for the neighbourhood. It then outlines a planning process that can assist the community to overcome these obstacles.

**Keywords:** *Sustainable transportation, transportation planning, land use planning, environmental justice.*

## **1. Introduction**

A key component in the pursuit of sustainability is sustainable transportation. Globally, the transportation sector directly accounts for a significant share of carbon emissions: 7,7 Gt of a total of 36,3 Gt CO<sub>2</sub> (21.2%) of energy-related emissions. [1] In addition, transportation contributes a significant proportion of air and water pollutants, and transportation infrastructure causes major disruptions to natural and built environments. [2] In the U.S.A., adverse environmental, social, and economic impacts from transportation projects have historically fallen disproportionately on socioeconomically disadvantaged communities, especially those of racial and ethnic minority status. [3][4][5][6] The fundamental tenets of sustainability require that transportation planning take into account both environmental and socioeconomic impacts and strive for an equitable distribution of positive as well as negative outcomes. [7]

Recognizing the need to pursue equity in the outcomes of governmental planning processes, environmental justice (EJ) was formalized as an important policy objective by Executive Order 12898, which was issued by the Office of the President of the United States of America on February 16, 1994. This policy was incorporated in the guidance for transportation project planning by the U.S. Department of Transportation (DOT):

DOT incorporates EJ and equity principles into all transportation planning and decision-making processes and project-specific environmental reviews.

The Department's guiding EJ principles are briefly summarized as follows:

- To ensure the full and fair participation by all potentially affected communities in the transportation decision-making process;

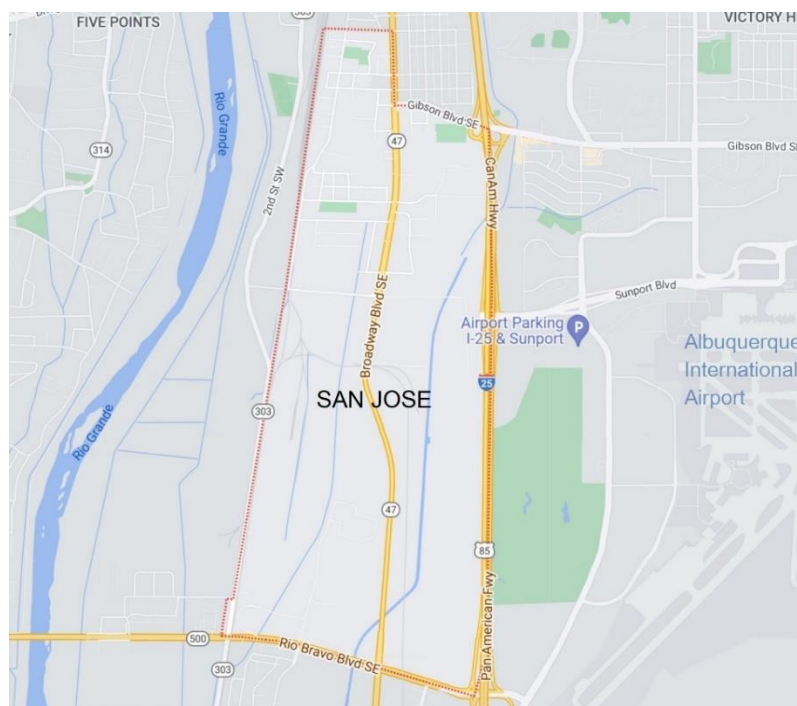
- To avoid, minimize, or mitigate disproportionately high and adverse human health and environmental effects, including social and economic effects, on minority or low-income populations; and
- To prevent the denial of, reduction in, or significant delay in the receipt of benefits by minority or low-income populations. [8]

However, even though environmental justice has been a broad policy objective of the U.S. government and a specific objective of the Department of Transportation for close to thirty years, ensuring EJ compliance has been challenging. [9]

This paper discusses the transportation challenges faced by an urban, socioeconomically disadvantaged community

## **2. Characteristics of the San Jose neighbourhood in Albuquerque, New Mexico**

The San Jose neighbourhood is located in Albuquerque's southeast quadrant. Its boundaries are defined by major transportation corridors: it is bounded to the east by Interstate 25, to the west by the tracks of the Burlington Northern and Santa Fe (BNSF) railroad tracks, to the south by Rio Bravo Boulevard, and to the north by Gibson and Broadway Boulevards and Kathryn Avenue (Figure 1). The northern half of the neighbourhood is primarily residential, while the southern portion features largely industrial uses (the areas adjacent to the residential areas are zoned for heavy industry).



**Figure 1.** San Jose neighbourhood, Albuquerque, New Mexico

San Jose was settled in the late 1830s or early 1840s by Hispanic farmers and existed as a self-governing village through World War II, after which it was absorbed by the city of Albuquerque. After the railroad reached Albuquerque in 1880, an increasing number of its residents were employed by the Santa Fe Railway, primarily at the shops which were located just north of the community. [10] The decline of the railroad industry in the 1950s and 1960s caused job losses and population loss. Since then, San Jose has continued to be populated predominantly by minority residents with low incomes, leading to a marginalized population without a voice to oppose the heavy industry encroaching onto its borders. The heavy industry and close proximity to the interstate contribute to high levels of heavy vehicle traffic and visual blight, resulting in many sources of air, water and noise pollution. [11]

### 2.1 Socioeconomic characteristics

According to the 2020 census, the San Jose neighbourhood has a population of 2,843. A significant proportion of the residents (21,8%) are immigrants, primarily from Mexico. The neighbourhood's median income of \$28,912 is well below that of the State of New Mexico (\$51,243), and of the U.S.A. as a whole (\$67,521). In fact, San Jose is one of the lowest income areas in the U.S.A., ranking below 90,3% of the nation's neighbourhoods. With 46,4% of children living below the federal poverty line, San Jose has a childhood poverty rate that is worse than 91,9% of U.S. neighbourhoods. [12]

Most of the residents are employed in lower wage occupations. Almost 45% of the working population is employed in retail sales and the service sector. About 22% are in manufacturing and manual labour, and 16,5% are in clerical and technical support occupations. [12] The unemployment rate is close to 8%, which is significantly worse than the New Mexico (4,4%) and national (3,7%) rates. [13]

The U.S. Census Bureau maintains a web-based mapping and reporting application known as OnTheMap, which uses the Bureau's Longitudinal Employer-Household Dynamics data to show where employers work and live. This tool shows that almost 98% of employed residents work outside their neighbourhood. In fact, over 10% of employed residents work more than 10 miles away. Over 90% of employed residents report that owning a car is essential for getting to work and, therefore, for remaining employed. [14]

### 2.2 Challenges posed by the transportation infrastructure

The railroad that marks the west boundary of San Jose attracts a high concentration of heavy industrial activity. Rail car movements at the freight rail yard towards the south edge of the neighbourhood at the at-grade road crossing often blocks traffic on Woodward Road for up to 20 minutes according to residents. Both trains and semi-trucks idle for extended periods of time at the rail yard and elsewhere in the neighbourhood, subjecting residents to unpleasant noise and harmful exhaust fumes.

Although the railroad tracks running along the west side of the neighbourhood serve the Rail Runner (heavy rail) commuter line, the line has only one stop, at the southwestern limit of the neighbourhood (Figure 2). This stop, on Rio Bravo Boulevard, serves only commercial and industrial properties, as it is quite far from the neighbourhood's residential areas (which are concentrated on its northern part).



**Figure 2.** Public transit system in the vicinity of San Jose neighbourhood

In addition, only a single bus route, No. 16 (see Figure 2) is adjacent to the neighbourhood. This route has a few stops on the streets that form San Jose's northern boundary: Broadway Boulevard and Kathryn Avenue. These stops are too far from most of the neighbourhood's residential properties to be accessible by foot, though they may be accessible by bicycle. Albuquerque's bus rapid transit system runs east-to-west along Central Avenue and, at its closest, is 3 km away so it also is of no benefit to the residents of San Jose.

Albuquerque Sunport (Albuquerque's International Airport) is essentially adjacent to San Jose, as it is directly east of Interstate 24 where that freeway forms the neighbourhood's eastern boundary. However, there are not public transportation means for San Jose residents to access either the airport or the freeway. The airport, and Kirtland Airforce Base, which is essentially an eastward continuation of the airport, have had very large negative impacts on the community, primarily through fuel storage facilities that serve them. Leakages from these facilities that went on for decades, have contaminated the area's groundwater. Clean-up and remediation of this contamination has been very difficult. Remediation activities have been going on for more than 30 years and have been funded largely through the U.S. federal government's Superfund law. [15] The airport and freeway are also major sources of noise, air, and surface water and soil pollution (through surface runoff).

To compound these existing problems, Bernalillo County is planning a roadway and intersection modification to extend Sunport Boulevard, which currently terminates at Interstate 25, to connect to the eastern end of Woodward Road. To relieve congestion at two interstate freeway off-ramps, Bernalillo County officials are in the process of extending Sunport Boulevard through the San Jose Neighbourhood. The extension would also provide additional means of accessing the Albuquerque International Airport (Sunport) for those living on the southwest side of town. The neighbourhood residents are concerned about the impact of increased traffic through their residential area, which is expected to climb from 6,000 vehicles per day to over 21,000.

The proponents of the extension project claim that connecting Sunport Boulevard to Broadway Boulevard facilitates access to the airport from the West Side of Albuquerque and eases traffic for the Gibson Boulevard and Sunport Boulevard interchanges at I-25. They consider the extension as a necessary response to Albuquerque's growing population. The community, however, has many concerns about this project. Some critics worry that it will adversely impact existing toxic waste clean-up sites and air quality in the area. The project is scheduled to disrupt six wells that are being used for clean-up and monitoring activities relating to the toxic contaminants of the aquifer on which many of the residents rely for drinking water supply. This may cause significant delays in the clean-up process. [15] In addition, neighbourhood residents who live on Williams Street are worried that their street will become a cut-through for truck traffic when trains block the at-grade rail crossing.

### **3. Alternative transportation strategies and policies**

#### *3.1 Walking and bicycling*

Research on transportation alternatives to single-occupancy vehicle travel has documented the benefits of walking and bicycling both on human health and on the environment. The U.S. Federal Highway Administration (FHWA) recognizes the following as primary measurements quantifying the benefits of bicycling and walking:

- Reduced fossil fuel use
- Lower emissions of carbon dioxide (CO<sub>2</sub>), carbon monoxide (CO), nitrogen oxides (NO<sub>x</sub>), and volatile organic compounds (VOCs)
- Lightened roadway congestion at peak travel times
- Fewer VMT (vehicle miles traveled)
- Lower body mass index and increased physical activity

Encouraging bicycling and walking requires ensuring that adequate walking and bicycle facilities exist. For walking, this includes sidewalks, public spaces, street lighting and safe street crossings. For bicycling, this includes relatively wide curb lanes, on-street bike lanes or off-street bike paths, bicycle parking and traffic calming. Factors such as an area's socioeconomics, the character of the built environment, and personal preferences and attitudes can affect the amount of bicycling and walking in a community.

Analysis of bicycling facilities shows those cities with a greater supply of bike paths and lanes have higher bike commute levels. Furthermore, research on environmental factors associated with walking shows the aesthetic nature of the local environment, the convenience of facilities for walking (footpaths, trails), accessibility of places to walk to (shops and recreation and employment centres), and traffic volume on roads have all been found to be associated with walking for particular purposes.

Implementation would require not only significant funding but also considerable coordination with other aspects of comprehensive planning such as land use, public transit, and policy. Land use strategies would define access needs for an area—as an example, a grocery store or retail establishment would require pedestrian access. Similarly public transit strategies would define the bus routes which may in turn influence designing the walking and bicycling networks.

### *3.2 Public transit*

Buses are the most widely used form of mass transit in America due mainly to their cost effectiveness compared to that of other forms of public transportation such as light rail, commuter rail, and heavy rail systems. [16] Bus systems move people effectively while addressing issues of congestion and air quality due to high volumes of auto and truck traffic. Public transit can be more economical than vehicle ownership and less stressful than driving. It reduces the demand for parking and increasing roadway capacity and provides access and mobility to individuals who do not have access to a car. [17][18]

Light rail is a mode of urban transport using fixed guide ways often but not always in dedicated right of ways separated from other transportation. Unlike freight rail, light rail is designed to handle passengers rather than freight, and as a result can deliver high mobility to its users. The rail system can provide point-specific development options given the dedicated access for retail, residential, and business commuters. Light rail benefits from locating transit stops at high-density points that concentrate travel destinations such as downtown centres or business centres within residential communities.

Commuter and heavy rail differ from light rail in that these rail systems are high-capacity, high-speed systems. Both commuter and heavy rail systems use the same gauge of tracks due to the availability of equipment for construction and maintenance of the infrastructure, and the flexibility of using the same rail infrastructure for both passengers and freight. Trains vary in size from three to twelve cars dependent upon route length, frequency and volume. Commuter rail best serves regional systems, which connect multiple municipalities

Bus Rapid Transit (BRT) emulates the look and feel of light rail while maintaining the flexibility and lower cost of operating on any paved road. Most BRT systems provide dedicated lanes for buses to avoid conflict and delays associated with sharing right of way with other vehicles. Buses are often larger, articulated buses, which stop less frequently than local bus lines and run more frequently. Other features associated with BRT include improved stations, off-vehicle fare collection, near-level boarding (which facilitates the boarding of persons with disabilities), peak headways of 15 minutes or less, and unique branding. [19]

### *3.3 Policy options*

In economic theory and analysis, traffic congestion is the result of a market failure. Driving on a congested roadway generates costs to the driver, as well as to the environment, the road infrastructure, and other drivers. However, these costs are diluted among all roadway users. The marginal cost to a single driver is minimal compared to the perceived benefits of using even a congested roadway.

Neoclassical economic theory posits that congestion pricing policies would monetize the cost of driving and, consequently, internalize that cost to each individual driver. Properly calculated congestion

pricing would increase the overall efficiency of the transportation system. This would be achieved by charging car drivers as many as possible of the negative externalities that result directly from that person's vehicle use, including air pollution, water polluted by road runoff, degradation of soil, and adverse health impacts resulting from vehicle emissions. Placing a direct cost on the full spectrum of costs from driving not only dissuades drivers from taking nonessential trips during peak hours, it also generates revenue that can be used fund key transportation improvement projects such as remediating environmental impacts or improving alternative transportation infrastructure. [20]

The Complete Streets initiative incorporates these economic proposals in ways that are designed to accommodate all users, including bicyclists, pedestrians, public transit users, and private car users. By adopting a Complete Streets policy communities direct their transportation planners and engineers to routinely design and operate the entire right of way to enable safe access for all users, regardless of age, ability, or mode of transportation. This means that every transportation project should make the street network better and safer for drivers, transit users, pedestrians, and bicyclists, improving safety and quality of life. An ideal Complete Streets policy:

- Includes a vision for how and why the community wants to complete its streets.
- Specifies that 'all users' includes pedestrians, bicyclists and transit passengers of all ages and abilities, as well as trucks, buses and automobiles.
- Applies to both new and retrofit projects, including design, planning, maintenance, and operations, for the entire right of way.
- Makes any exceptions specific and sets a clear procedure that requires high level approval of exceptions. [21]

## **4. Implementation**

### *4.1 Creation of a community planning and action group*

San Jose is among the oldest and most culturally diverse but also most socioeconomically disadvantaged neighbourhoods of Albuquerque. Because almost all of its housing is surrounded by major transportation infrastructure and mostly light but also some heavy industry, its residents have been subject to serious adverse environmental impacts. The neighbourhood is a prime example of environmental injustice. Both general federal government and specific U.S. Department of Transportation policies to promote environmental justice should be applied to this community.

An important requirement of these policies is engaging the community in all transportation project planning and implementation processes. [8] To promote effective community engagement, a committee comprised of residents and property owners should be established to identify the community's transportation and land use planning issues, to represent the community to the city and county, and to engage with local, state, and federal planning agencies. The committee should serve several functions, among them:

- Create and promote a "Neighbourhood Vision for Sustainable Transportation."
- Collect community concerns and ideas in land use and transportation.
- Collaborate with the city, county, and MPO in planning workshops, outreach efforts, and public hearings.
- Provide feedback to the community, and education, on public planning processes, available options, timelines, and related trade-offs.

### *4.2 Establish truck routes and weight restrictions*

With the exception of the Big Bear Petroleum-Honstein Oil activity on Commercial Street, heavy trucks have no need to enter or travel through the San Jose neighbourhood. If the community employs a weight restriction on the residential streets, it would effectively limit heavy vehicles to clearly established truck routes outside the perimeter of the neighbourhood. The truck routes would circumnavigate the community on Bridge Boulevard-Avenida Cesar Chavez, Broadway Boulevard, Woodward Road, and

2nd Street. Trucks would be explicitly prohibited from Williams Street and all other cross-streets from Stadium Boulevard to Bethel Avenue.

In order to guarantee truck compliance and restrict cut-through, Williams Street and all residential/community roads connecting to Broadway should be clearly marked with “no trucks” and/or “weight restriction” signage (recommend 5-ton limit) and the installation of engineering controls (physical barriers to trucks) such as traffic circles, at all neighbourhood entrances. As traffic circles are often perceived as inconvenient to motorists, the community planning committee must educate residents on the needs and benefits of the circles to garner support.

#### *4.3 Engage in comprehensive land use planning and zoning efforts*

The extension of Sunport Boulevard into the community will create pressure for development of vacant land in the area where the ramp from the bridge over I-25 will bring the extension to ground level. This will be close to the geographic centre of the community and, therefore close to the residential areas. In order to protect the residents from additional adverse impacts from vehicle traffic, it should be emphasised in planning processes that the San Jose neighbourhood has greater potential than simple industrial expansion. Development of vacant land should not result in increased heavy truck traffic and industrial growth so close to residential areas should be prohibited. The Sunport Extension should be used as a foundation for a new land use vision for the neighbourhood. Zoning policies should be utilized to guide this change. Rather than continued industrial development, vacant land should be rezoned for hotels, restaurants, light commercial, and other uses that will support both the airport and the community.

Zoning efforts can be used to establish light commercial buffer zones between residential and industrial areas. Community involvement in local zoning should focus on efforts that encourage the types of enterprises and economic activities in which residents are currently employed. The location of retail sale establishments, restaurants, hotels, etc. starting in the parts of the neighbourhood that will become directly connected to the airport and the freeway will make it possible for community residents to work much closer to home. This will reduce their need to use private automobile transportation and will shorten or eliminate their commutes, resulting in a much more sustainable transportation system for the neighbourhood. In addition, such development will form a buffer area and prevent encroachment by industry. Zoning should focus on selectively promoting optimal (given local conditions) mixed-use solutions that incorporate residential, commercial, and other uses where compatible. It has been shown that mixed land use with deliberate design and planning has been effective at encouraging walking, cycling and transit ridership, while at the same time reducing dependency on the personal automobile. [22][23]

#### *4.4 Clean air initiatives*

Clean Air initiatives and anti-idling legislation combined with effective enforcement are successful at reducing diesel particulate matter (DPM) and improving local air quality. Parked trucks, those waiting at intersections, idling locomotives, and old outdated diesel engines all contribute significantly to poor air quality. Any measure to reduce or eliminate these pollution sources will improve air quality (and reduce noise and vibration) in the San Jose community. Several courses of action are available, and all will require extensive effort and coordination.

The long term solution to idling and clean air issues is to engage state legislators in the issue and highlight the merits of a statewide Clean Air Campaign as a proactive measure to prevent New Mexico from incurring EPA’s Air Quality nonattainment status. The use of alternative fuels (natural gas, bio-fuels, etc) and hybrid technologies have shown progress in controlling emissions and improving air quality. The identification of major equipment operators in the area, and their fleet conversion to cleaner technologies could have measurable results to local air quality. Again, incentives and legislative mandates serve as encouragement for companies to make the necessary investments in equipment renewal.

## **5. Conclusions**

### *5.1 Summary of findings*

Albuquerque's San Jose neighbourhood faces many social, economic, and environmental challenges. The neighbourhood already suffers from the impacts of heavy industry and a transportation system that meets very few of the community's needs. The Sunport Boulevard extension project has the potential to add to and intensify the existing transportation-related problems. The purpose of this paper is to address the most critical of these problems and provide the community with recommendations for planning processes that can lead to an environmentally and socially sustainable transportation system for San Jose.

The creation of a community planning and action group is an essential step for the residents to claim agency and be able to control the process of transportation planning for their community. The existence of such a group also has the potential to improve communication between community members and the city, as it is a setting within which information, ideas, and concerns of both sides can be presented and discussed. A good relationship between stakeholders allows honest and direct conversation, enabling solutions that benefit both sides. Community input can, for example, steer development from the Sunport Boulevard extension project in a direction that will benefit community residents as well as the city's economy.

### *5.2 Limitations and recommendations for future research*

The purpose of this research is to identify the main obstacles to a sustainable transportation system for the San Jose neighbourhood of Albuquerque, New Mexico, and to offer the outlines of a planning process that is capable of overcoming these obstacles. It is not possible for us to develop any specific recommendations regarding transportation planning, such as bus routes, bicycle and pedestrian pathways, or roadway improvements. We also cannot offer specific recommendations regarding land development, such as what types of zoning would be most appropriate for specific locations or on what land parcels specific types of businesses, such as hotels, restaurants, or retail are most appropriately placed.

Such specific recommendations would require quantitative assessments such as models of travel demand, traffic congestion, air pollutant emission and dispersion, economic impacts of development projects, etc. These assessments would produce data that would be utilized by the transportation planning process which would be set up to address the community's multiple problems.

As the Sunport Boulevard extension project is about to begin, the San Jose neighbourhood is at the threshold of a major change in its transportation system. This is a significant challenge but also an important opportunity. We hope that this research will motivate the multiple and varied quantitative assessments that are needed in order to determine the costs and benefits of different transportation and land use options and set the stage for the development of a sustainable transportation system for San Jose.

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