# International Sustainable Transportation Engagement Program (I-STEP)

## Summary Report

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Source material from the students of I-STEP 2017

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# Introduction: Building Momentum for Change

There is a growing need to re-envision our roads. Over the last 75 or so years, American transportation planners have designed roads to maximize the speed and flow of traffic. Our metrics of success were the number of cars that could be pushed through the system and the speed of those vehicles at peak hours. This mobility culture has resulted in 37,461 transportation-related fatalities in 2016, sprawling landscapes with large infrastructure costs, and transportation-related pollution that accounts for 27% of all greenhouse gas emissions in the U.S. (National Highway Traffic Safety Administration 2017: American Society of Civil Engineers 2017: United States Environmental Protection Agency 2017). Communities around the United States are seeking new transportation policies that support safe, livable communities.

The International Sustainable Transportation Engagement Program (I-STEP) aims to provide a platform for reenvisioning how transportation can work to help shape healthy, vital communities. I-STEP is a project of the Texas State University's Public Administration program, and is designed to link partners from around the world to best practice sustainable transportation policies. I-STEP has worked with partners in the Netherlands and Romania over the last few years to create a collaborative network of stakeholders working to improve opportunities for knowledge-sharing between partners.

We have learned much from our partners. From our Romanian partners, we have learned how to preserve and reposition centuries-old transportation systems to work in a 21st century system. From the Dutch, we have learned about how to create a safe and sustainable transportation system that could be a model for communities around the world. The Dutch system focuses on slow speed local streets linked into a multi-modal network designed to create livable neighborhoods and access to regional destinations. The way this works is through intentional connection of low-speed neighborhood streets with interconnected transit and physically separated cycle paths that link to a network of train lines that run throughout the country.

Our reports from previous years highlight our work. For more information, see our 2015 report on our Romanian work here: http://gato-docs.its.txstate.edu/jcr:cf5f4ed4-6a9d-47b2-9e97-d93e2d55e9ee/ISTEPsummaryreportFINAL.pdf. Our 2016 project included a student study abroad project in the Netherlands. The report can be found here: http://gato-docs.its.txstate.edu/jcr:d94b102f-66b5-4894-b070-a58629c23919/istep-summer-2016-report_web.1.pdf.

In 2017, I-STEP returned to the Netherlands to better understand key transportation policies with the goal of improve knowledge sharing to U.S. communities. The 2017 I-STEP report focuses on the three key policy components that can help to create more livable, vital communities. These are :

1. The Dutch Sustainable Safety System, a road design system similar to the Swedish Vision Zero system, helps to provide the backbone of a safe, interconnected transportation system.
2. The heart of the Sustainable Safety System is designing contextual roads that have slow speeds in neighborhood areas
3. Finally, students found that the transportation system helped create engaging public spaces where people felt comfortable and were, well, happier.

These three themes are analyzed below. This is followed by a student data analysis of the Delft transportation system.

# Dutch Sustainable Safety Background

*Figure 1: Dutch Students Biking in the Netherlands*

In the Netherlands, overall, 26% of all daily trips are taken by bike. For children, 49% of elementary school children bike to school (Pucher and Buehler 2012). Visit any city in the Netherlands and you will witness an intricately designed network of roads and cycle tracks specifically meant to encourage cycling. This network provides freedom and accessibility for people from 8 to 80.

Some people argue that cycling must be built into the Dutch culture, however, car use skyrocketed in the 1960s and '70s as bicycle facilities were abandoned for wider roadways (Hembrow 2011). By 1972, 3,264 people were killed on roads in the Netherlands. The next year, 450 children were killed on Dutch roadways (Hembrow 2011). The Dutch people refused to accept car fatalities as a norm, resulting in "Stop de Kindermoord" campaign (Hembrow 2011). This campaign began a process of transformation to turn theNetherlands into one of the biking capitals of the world.

Sustainable Safety is the catalyst for making the Netherlands the biking capitol of the world. The Dutch system is similar to Sweden's Vision Zero . Both Vision Zero and Sustainable Safety focus on the safety of vulnerable road users through street design that reduces speed on roadways and provides disincentives to use the personal car.

Sustainable Safety focuses on the safety of vulnerable road users through street design. The design of Dutch roads is built to reduce speed in urban areas and improve road design to protect humans (Wegman 1998). The five tenants of Sustainable Safety are:

1. Functionality of roads.
2. Homogeneity of speed and direction.
3. Predictability of road course and road user behavior through recognizable road design.
4. Forgiveness in the environment and of road users.
5. Awareness of the road by road user.

Sustainable Safety categorizes residential roadways as roads that have a living, shopping, or work function. Sustainable Safety discourages cut through traffic in neighborhood zones, reduces speeds to 30 km/h on residential streets (18.6 mph), and uses speed reducing measures like speedbumps, chicanes, or bollards. This street design policy resulted in an approximate 30% decrease in road injuries between 1998 and 2007 (National Scientific Institute for Road Safety in the Netherlands).

*Figure 2: Cycle paths along dijks in Zwolle, Netherlands*

# Sustainable Safety Design

The 2017 I-STEP class visited historical neighborhoods in the urban cores of Amsterdam, Rotterdam, Zwole, and Delft. Students utilized multiple modes of transportation and conducted transportation counting projects to better understand how the system works.

Streets in the Netherlands are designed with pedestrians and cyclists in mind. For example, "woonerf's" or living streets are narrow, curving roads with textured pavement that encourage active transportation. The creation of the woonerf began when local Dutch residents felt their streets were unsafe. Through collaborative action, the community installed gardens, speed bumps, and other traffic calming techniques establishing a living street that serves as the resident's front yard.

Figure 3 provides an example of the world's first woonerf in Delft. The street is design is very simple and cost-effective and limits car speed through chicanes, street furniture, and traffic calming. This allows for cyclists and pedestrians to feel safe on the street and, simultaneously, allows local car traffic to utilize the space.

This focus on road safety for vulnerable road users creates a safe environment that Dutch citizens utilize in multiple ways. One student mentioned how this is observed through children playing in the streets unsupervised. The same group of students noticed parks for schoolchildren in the median of a neighborhood in Amsterdam. This stuck out to the students- how safe members of the public felt with their children in the streets and the way that streets have been designed with children in mind. In a neighborhood that they came across a playground in the median of a wide boulevard surrounded by a neighborhood of traffic calmed streets a preschool was able to let children out into the street with chalk.

The students remarked, "It was quite impressive to see this sense of safety." Sustainable Safety transportation policies help to create safe areas to play for children and even playgrounds for children anywhere and everywhere.

*Figure 3 Woonerf in Delft, Netherlands*

# Sustainable Safety Design

As the neighborhood system intersects with the higher speed auto system, the Sustainable Safety model focuses on slowing traffic at key intersections and in creating separate facilities for cyclists and pedestrians. An example of the slowing of traffic at the neighborhood interface is shown at the right. This roundabout in Zwolle connects a neighborhood bicycle street through a higher capacity auto corridor. This roundabout is unique in the fact it does not allow motorists to turn left and prioritizes bicycle movement through the intersection all without a traffic light. All auto traffic yields to the cyclist due to the tight turning radii and clear pavement markings. This allows auto vehicles to drive at slow, continuous speeds through the intersection.

The Dutch Sustainable Safety network also works outside of neighborhood areas. The key in these downtown or commercial corridors is the creation of separate cycling and pedestrian facilities parallel to the auto system. This separates speed and makes for a safe, connected environment. This network of separate and raised cycle paths then connects to the Dutch countryside and allows for bicycle intercity travel.

In Rotterdam, for example, one student mentioned that, “Biking is just more efficient than cars. It is easier and quicker to get around and easier to find a spot to park. Even town to town bike paths exist outside of city centers!” Other students wrote, “Getting around Rotterdam is so much fun. Being able to take our hotel bikes out made me understand how and why people enjoy living here.” The student added that, “biking is just more efficient than driving a car. It is easier and quicker to get around and easier to find a spot to park. Even town to town bike paths exist outside of city centers!”


*Figure 4: Children play in the streets in Amsterdam*

*Figure 5: Zwolle roundabout*

Similarly, Amsterdam turned a cross-street and parking lot designed to provide high speed auto traffic to its museum district parking lot into a highly livable and memorable space. The Musuemplein is now a large grassy lawn, situated along a major roadway into Amsterdam's city center. When the Netherlands changed their transportation policies to focus on safety, the city decided to create a park in front of the museum. The Museumplein was transformed from a dangerous and busy roadway to a public space accessible to all through narrowing of streets and lessening the cars influence on the built environment.

## Designing Transportation as a Public Space System: Safe, Comfortable, Happy Places

Lush green parks with connected paths line almost every city block in Amsterdam and Rotterdam. The public spaces are sometimes small, residual lots created from urban or road areas that have been converted into public spaces (Welle, Liu and Li 2015). Sustainable Safety in the Netherlands has narrowed roads to increase the safety of the cyclist and also resulted in this rich, repurposed public space system seen throughout the Netherlands.

Historically, urban planners viewed roads as a tool to reconstruct cities to benefit business districts, impede the expansion of suburban sprawl, and remove slums from the urban core. The objective was for urban planners to relieve congestion by allowing for higher volumes of traffic and speeds on roadways that would provide access to the urban core for suburban commuters (Brown, Morris, and Taylor 2009). In addition, Robert Moses's application of transportation policies helped to obliterate historic urban neighborhoods through highway expansion (Brown, Morris, and Taylor 2009).

Sustainable Safety in the Netherlands provides a more expanded view of how transportation can not only provide a flow of people, but actually enhance public spaces in the process. Students remarked how the Dutch were able to capitalize on their city space to create neighborhood gardens, plazas and connected to cycle paths throughout the city.

One student mentioned how that "public spaces in the Netherlands make the area personable and unique since people interact with one another when walking or biking." These public spaces create an urban environment where you can relax, enjoy, and engage with the city and others. Another student wrote, "The separation of bike lanes creates a safer space for the cyclist, but allows for more space for pedestrians and sidewalk use." This creates a safe area for pedestrians and cyclists to use and creates a social function on the street by encouraging small shops, businesses, and cafes to line the sidewalk

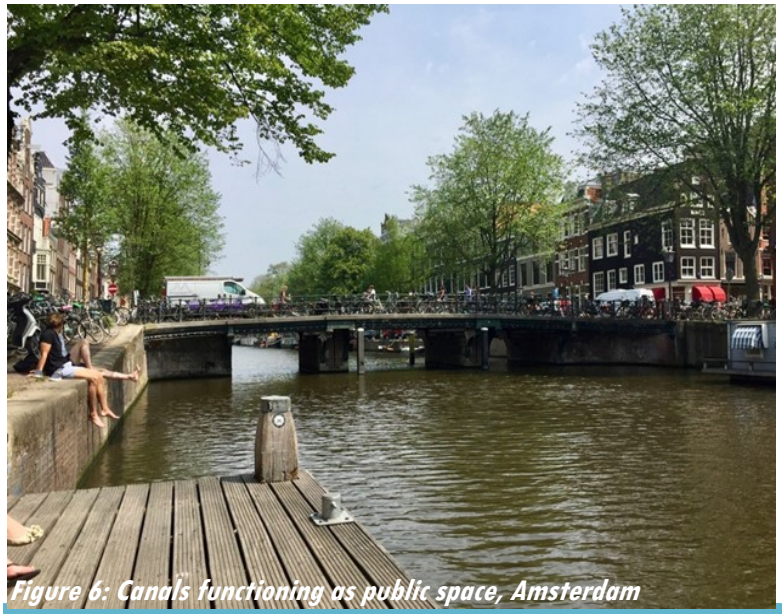

*Figure 6: Canals functioning as public space, Amsterdam*

*Figure 7: View of downtown Rotterdam*

# Place Analysis of Delft

I-STEP 2017's study of Dutch Sustainable Safety culminated in the class conducting a place analysis in Delft. Delft is a small city of about 100,000 residents, located fifteen minutes from Rotterdam. Delft is a good example of smaller urban areas in America with its mix of historic downtown, modern outer peripheral of the city, and high volume of local commuters.

The place analysis examined three areas in Delft:

- Zuidwal and Zuidwal fietspad
- Oude Langendijk
- Delft Train Station

The place analysis was conducted using two safety auditing tools, Sustainable Safety Visioning Tool (SSVT) and Street Interview Tool (SIT). In addition, the class conducted one hour mode share counts of the number of cars, bikes, motorbikes, trucks, buses, and pedestrians using selected locations in Delft.

The SSVT was used in conjunction with mode share counts to identify the cyclists or pedestrian's safety on the provided road. The SSVT rates roads on a scale of +5 to -5. In this rating system, +5 suggests a safe road system accommodated for safe bicycle travel with low-speeds and integrated infrastructure components and -5 shows a system without any of these infrastructure interventions and high speeds. For example, the tool requires the user to deduct one point for roads that do not have significant traffic calming, raised and separate cycling facilities on busy roads, continuous roadway facilities, obstructions in the road, and speed and road intensity.

The Street Interview tool was given to the students to use and help categorize their roads function in the urban environment. The tool allows the auditor to determine road function, culture, and attitude of the street through careful observation and a series of questions.

## Zuidwal and Zuiwal Fietspad

Zuidwal street and the Zuidwal Fietspad in Delft connect to Delft's urban periphery and TU Delft to downtown. The group conducted one morning and one evening count at both locations. The mode share data from all four counts, along with the SIT, confirmed that Zuidwal and Zuidwal Fietspad's primary function was to connect commuters along Delft's urban peripheral. The Sustainable Safety Visioning Tool scored Zuidwal and Zuidwal Fietspad as a 5- the highest score on the safety tool.

Students that conducted the Zuidwal and Zuidwal fietspad analysis noticed areas of road stress at both intersections. Figure 8 is a view of Zuidwal Fietspad. This area is controlled through eye contact and non-verbal communication between cyclists, pedestrians, and drivers. This potential tension was also observed at Zuidwal where the bus lane, median, and sidewalk intersect. In all four analyses, students observed zero collisions. This, they felt, was a direct result of Dutch Sustainable Safety policies.

*Figure 8: View of Zuidwal Fietspad intersection*

*Table 1: Zuidwal and Zuidwal Fietspad*

| Mode | Count | Adjusted Daily Traffic (x26) | Mode Share |
|---|---|---|---|
| **Bicycle** | 2,349 | 61,074 | 59% |
| **Pedestrian** | 659 | 17,134 | 16% |
| **Motorbike** | 123 | 3,198 | 3% |
| **Automobile** | 784 | 20,384 | 19% |
| **Bus/Truck** | 86 | 2,236 | 2% |
| **Total** | 4,001 | 104,026 | |

## Oude Langendijk

Oude Langendijk is a social, public space lined with a variety of shops, restaurants, and offices. “Oude Langedijk,” said a student, “serves as an extension to Delft’s square with low-speeds and a narrow street, shared public space, and access to a bus stop.”

*Figure 9: Oude Langendijk*

Oude Langendijk’s mode count reflected the students observations of a busy and bustling area. The group counted a total of 396 cyclists in one hour and 153 pedestrians. In a hour count, there were only two cars counted at Oude Langendijk. The car is a guest in the city here. Since this area is frequented with pedestrians and cyclists, it makes driving a car slow and difficult. If shops on the square need deliveries, they organize the deliveries to take place earlier in the morning when the square is less busy. The students concluded their place analysis of Oude Langendijk finding that the use Dutch Sustainable Safety Policies discourage the use of automobiles with the narrow, low-speed, traffic-calmed streets, and encourages active transportation and social interaction all in one street.

*Table 2: Oude Langendijk Count*

| Mode | Count | Adjusted Daily Traffic (x26) | Mode Share |
|---|---|---|---|
| **Bicycle** | 396 | 10,296 | 64% |
| **Pedestrian** | 153 | 3,978 | 24% |
| **Motorbike** | 51 | 1,326 | 8% |
| **Automobile** | 2 | 52 | .33% |
| **Bus/Truck/Delivery Bikes** | 14 | 364 | 2% |
| **Total** | 616 | 16,016 | |

## Delft Train Station - Westvest Straat

Westvest Straat is a main transportation node for Delft, situated just outside Delft’s train station. Westvest Straat offers access to bus and tram lines, cycle tracks, and cars.

Using the Sustainable Safety Visioning Tool, Westvest Straat received a score of 4 out of 5. This is due to construction on Westvest Straat which creates stress for cyclists and pedestrians that use the same light as cars and buses. While this construction is only temporary, the stress creates congestion and confusion during peak commute hours.

The street interview of Westvest Straat revealed that this location acts as Delft’s primary transit node, providing access to trains, buses, and trams in one location. Westvest Straat’s primary function is to connect to the urban periphery of Delft and beyond and provides limited social space for users. The mode

count indicated that bicycles dominate Westvest Straat at 49% mode share, followed by cars at 27%, and pedestrians at 22% of the mode share.

Much like Zuidwal and Zuidwal Fietspad, Delft's train station serves as a connector to the outer periphery of Delft and the Netherlands. What makes Westvest Straat's place analysis intriguing are the share of cyclists and pedestrians mixed with a high share of cars. This demonstrates Sustainable Safety's focus of safety for the road user while still allowing for differing modes of transit and instead limiting mode choice.

*Table 3: Westvest Straat Count*

| Mode | Count | Adjusted Daily Traffic (x26) | Mode Share |
|---|---|---|---|
| **Bicycle** | 1,089 | 28,314 | 49% |
| **Pedestrian** | 524 | 13,624 | 23% |
| **Automobile** | 603 | 15,678 | 27% |
| **Bus/Truck** | 22 | 572 | 1% |
| **Total** | 2,238 | 58,188 | |

*Figure 10: Outside Delft Train Station*

*Figure 11: Outside Delft Train Station*

# Summary of Sustainable Safety Findings

The study of the Sustainable Safety system in the Netherlands provided the students with these three key policy conclusions:

- Sustainable Safety and its policies help to provide the backbone of a safe, interconnected transportation system
- Contextually designed roads that have slow speeds in neighborhood areas are at the heart of the Sustainable Safety System.
- And, that the transportation system helped create engaging public spaces where people feel comfortable and happy.

One student summed up the experience by arguing that, "Safety in the Netherlands transportation system prioritizes people of all ages and abilities, so that they can commute to and from their destinations. This is seen throughout the Netherlands, providing a comforting feeling that encourages people, ages 8 to 80, to participate in their communities."

Lastly, the entire class mentioned Rotterdam's use of space, community collaborative planning, and climate mitigation techniques through the use of detention tanks underneath the Grafisch Lyceum. This area is a part of the graphic design school and includes two large open air plazas that were developed through student input. The students were in awe with Rotterdam's climate mitigation techniques and their commitment to serve and engage their local residents.

The use of space in Rotterdam, along with its use of multimodal transportation networks, is supported by the Dutch's focus on the Sustainable Safety of the road user and not the automobile user. Focus on the safety of the road user in the Netherlands provides space a dense urban environment while encouraging participation of local community members and combating the impacts of climate change. The Netherlands engineered their cities by using safe and sustainable practices in public spaces.

*Figure 12: River Taxi Rotterdam*

*Figure 13: Rotterdam Crentraal Train Station*

# Transferring Sustainable Safety to the U.S.: Central Texas

Students returned home from the Netherlands eager to piece together their knowledge of Dutch Sustainable Safety policies and transportation issues in their own communities. Students performed a place analysis of a local area of their choice. Three different locations in South Central Texas were analyzed: South Congress Avenue in Austin, North LBJ Street, and East Hopkins Street in San Marcos. The students place analyses are reviewed below.

## South Congress Avenue- Austin, Texas

Attracting locals and tourists in the Austin metropolitan, South Congress is much like Oude Langendijk in Delft. Home to shops, restaurants, and street art that draw people in to its community. The difference is the extent of car usage. One student wrote "after searching for parking for seventeen minutes, I was able to how many modes of transportation are encouraged on South Congress."

South Congress encourage multiple modes of transportation with provided access to bus stops and bike rentals, but was still built to favor the automobile. South Congress has a cycle lane, next to motorized traffic with a speed limit of 35 miles per hour. Additionally, cycle lanes on South Congress were smaller than the ones provided in the Netherlands. Similarly, the sidewalks on South Congress measured one meter smaller than the sidewalks in the Netherlands, making socialization while walking difficult. The mode count for South Congress was: 350 cars, 7 cyclists, and 16 pedestrians. Students gathered through the use of the SIT and SSVT that South Congress functions as a social space, however due to lack of safe cycling and walking facilities only one mode of transportation dominates this street. It should be noted that this count was taken during the morning rush hour, before much of the pedestrian traffic develops for the shops and restaurants.

*Table 4: South Congress Count- Austin*

| Mode | Count | Adjusted Daily Traffic (x26) | Mode Share |
|---|---|---|---|
| **Bicycle** | 7 | 182 | 1% |
| **Pedestrian** | 16 | 416 | 4% |
| **Motorbike** | 3 | 78 | .79% |
| **Automobile** | 350 | 9,100 | 92% |
| **Bus/Truck** | 4 | 104 | 1% |
| **Total** | 380 | 9,880 | |

## San Marcos

At the intersection of North LBJ Street and University Street, adjacent to the Texas State University campus, students conducted another place analysis. North LBJ connects San Marcos residents from outside its urban center into downtown San Marcos.

The students counted 162 cars, 7 pedestrians, and 3 cyclists in one hour. Due to lack of separate cycling facilities and a speed limit of 35 mph, N LBJ received a score a 2 on the Sustainable Safety Visioning Tool. There is not a continuous cycle lane at the intersection of N LBJ and University, nor is it separated from automotive traffic making the street unsafe for cyclists.

The last place analysis for San Marcos took place at the intersection of East Hopkins and C.M. Allen and was conducted for one hour during peak evening commute times. This intersection sits on the outskirts of San Marcos's downtown square and connects the outer urban periphery to downtown. This makes this intersection one of the busiest in San Marcos. East Hopkins received a score of -3 based on the Sustainable Visioning Tool due to lack of separate bike facilities and a speed limit of 35 mph with no bike lane or track provided. Cars accounted for 98% mode share at the East Hopkins intersection. The intersection was busy and unsafe and discouraged the use of biking of walking. Not surprisingly, students that conducted analyses in San Marcos mentioned the lack of road safety provided to cyclists and pedestrians as a common theme.

The students' analysis of their own transportation systems helped to provide a clear view of the transportation problems that plague the American city today- the mobility culture. This culture of mobility places all road users in danger, while also increasing urban sprawl, congestion, commute times, and pollution. Dutch Sustainable Safety is a current and viable solution to the transportation problems produced by this mobility culture. The Dutch successfully turn dangerous, high-speed neighborhood roads into safe, low-speed, narrow streets, and provided connected and continuous cycle tracks to encourage active transportation. This resulted in Sustainable Safety transportation policies that provide Dutch cities with safe, bikable and walkable streets and cities that produce public spaces that engage people and make them happier.

*Table 5: N LBJ Count- San Marcos*

| Mode | Count | Adjusted Daily Traffic (x26) | Mode Share |
|---|---|---|---|
| **Bicycle** | 3 | 78 | 1% |
| **Pedestrian** | 7 | 182 | 4% |
| **Automobile** | 162 | 4,212 | 94% |
| **Total** | 172 | 4,472 | |

*Table 6: East Hopkins Count- San Marcos*

| Mode | Count | Adjusted Daily Traffic (x26) | Mode Share |
|---|---|---|---|
| **Bicycle** | 3 | 78 | .19% |
| **Pedestrian** | 7 | 182 | .45% |
| **Motorbike** | 5 | 130 | .32% |
| **Automobile** | 1,528 | 39,728 | 98% |
| **Bus/Truck** | 17 | 442 | 1% |
| **Total** | 1,560 | 40,560 | |

# I-STEP Future Directions

In 2018, I-STEP will continue its study abroad program. For further information on this program and past years programs, please visit http://crppt.polisci.txstate.edu/Study-Aboad.html.

If you are interested in engaging with I-STEP, please contact our team:

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