

Developing An Urban Transportation Planning Tool

Developing An Urban Transportation Planning Tool

An Interactive Qualifying Project
Submitted to the Faculty of
WORCESTER POLYTECHNIC INSTITUTE
in partial fulfillment of the requirements for the
Degree of Bachelor of Science

By:
Emily Bowler, Jodi Kurilla, Hunter Lutte, Xavier McLean

Submitted to:
Professor Isa Bar-On, Professor Seth Tuler;
Worcester Polytechnic Institute

Date:
March 01, 2020

Sponsoring Organization: Eilat Municipality;
Myri Lew, Roei Karniel, Elad Topel



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Abstract

Severe road congestion is a major challenge for Eilat. Growth in the population is expected to make it worse. City planners can benefit from planning tools to identify causes of congestion and strategies to mitigate it. Urban planning scorecards for transportation planning are widely used. We created a scorecard tool for Eilat city planners that allows them to characterize, weigh, and prioritize features of transportation planning that contribute to congestion or its alleviation. We produced an Excel version of the scorecard and designed a web platform to house it. These deliverables will be used by the Municipality to adjust their current infrastructure and future plans.

Acknowledgements

We'd like to take the time to acknowledge and recognize some of the people who made our project possible. Without their contributions to our project and our team — our time here wouldn't have been as educational and enjoyable.

- The Municipality of Eilat, specifically our sponsors Elad Topel, Roei Karniel, and Myri Lew for their availability and knowledge that was necessary to complete our project
- Professor Isa Bar-On and Professor Seth Tuler, our two advisors who have guided us till the end of our project
- The Arava Institute for Environmental Studies (AIES) Staff, specifically Avigail Ben Yohanan, Reut Parnes, Michelle Shachar, and Rotem Meiri for coordinating our stay and providing us places to work
- Tami Braun, for her help in understanding the preliminary phases of web development
- Kibbutz Ketura, for being a welcoming home during our time in Israel

Authorship

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1.0. Introduction

Traffic congestion is a large problem because it leads to longer travel times, environmental pollution, and negative public health impacts (Levy, Buonocore, Stackelberg, 2010). The U.S. Department of Transportation has found that roadways and current transportation infrastructure are not equipped for the excess of private vehicles on the road that both cause and result from traffic congestion (Cambridge Systematics, Inc., 2005). Additionally, traffic congestion can cost a country or city a significant amount of money. There are two entities that bear those costs – cities and individuals. For example, “Los Angeles drivers lead the way, spending an average of 102 hours sitting in traffic every year, which costs the city more than \$19 billion annually, with each driver kicking in \$2,828 a pop” (Schneider, B. & CityLab, 2018). Similarly seen in Israel’s “three large metropolitan areas, private cars are used four times as much as public transportation, causing a great deal of congestion” (Cohen, 2019). The problem is not just the number of cars and crowded roads, but short term thinking in transportation planning and a lack of efficient public transit systems as well (Cohen, 2019).

In Eilat, Israel, two of the biggest causes of congestion are the high influx of tourists travelling into the city and the city’s inefficient public transportation system (Meyers et al., 2019). Eilat’s attractive location on the coast of the Red Sea draws millions of tourists to the small resort town annually. Over 80% of all tourists traveling to Eilat are domestic tourists, many of whom drive to Eilat (Halavy, 2019). At the same time, there is a lack of effective public transportation for the influx of people in the city and the residents who are there year round (Meyers et al., 2019). The current transportation system consists of taxis, shuttles and, most importantly, a bus system. This transportation system contains design issues that inhibit efficient mobility. For instance, buses run only once per hour – some every two hours – and bus routes contain too many stops, leading to longer travel times (Myers et al., 2019). Having multiple stops allows for accessibility but it’s more convenient and faster to take a personal vehicle. Therefore, the population has to decide between a longer wait time or traveling on foot or bike around the city in high temperature conditions. These situations encourage tourists and residents to use private vehicles. However, the current transportation infrastructure of Eilat is incapable of handling both the large tourist traffic and local commute.

Urban planning in Eilat must shift their investment and focus from private vehicle usage to all forms of transportation. To do this, cities need to measure how their infrastructure supports walking, cycling, public transportation usage, and private vehicle usage (FGM--AMoR, 2014). For Eilat, this means considering the walkability, bikeability, and use of public transport within the city. To check how a city is accomplishing this task, a scorecard may be used. A scorecard is a tool that can analyze and evaluate how a city’s policies and infrastructure are performing (EPA, n.d.). Eilat’s city planners can use – and benefit from – a scorecard to evaluate how their current urban planning standards alleviate congestion and promote connectivity within the city’s transportation network (FGM-AMoR, 2014). The scorecard can also be used to identify locations in the city where changes to infrastructure could help alleviate congestion and promote connectivity.

The goal of our project was to create an adaptable scorecard for Eilat city planners and decision makers that allows them to weigh and prioritize aspects of transportation planning based on city goals. The scorecard has been created to be applicable to the current streets of Eilat and how they connect with each other. The scorecard will also be applicable to the future streets of

Eilat and what is being planned. To achieve this goal we completed 3 objectives. The first objective was to research urban planning tools and scorecards to find the 'best practices' used globally. The second objective was to create a scorecard, informed by 'best practices' that is usable for the city of Eilat as well as other cities around the world. The third objective was to put the scorecard through a testing process to ensure usability before finalization. Through this process we have been able to create an adaptable scorecard that the municipal planners will be able to use and adapt as the city changes.

2.0. Current and Future Transportation Challenges in the City of Eilat

The content of this chapter focuses on Eilat's current city layout and the direction of future development. It will also shed light on challenges the city is currently facing.

To understand the current challenges in the city, one must understand Eilat's geography of neighborhoods. Below in Figure 1: Neighborhood Breakdown, the division of the neighborhoods of the current and future neighborhoods in the city. From one of our sponsors, Roei Karniel, we've understood the city as an arch with five layers. These layers are as follows:

1. The beachfront, the innermost layer
2. The tourist layer, a layer full of businesses and places geared towards tourists
3. The city center layer, small businesses and central buildings
4. The residential layer
5. The desert, the outermost layer in the arch

Cutting through this arch is Route 90, which goes all the way through the city and is the main access point into the city.

The current layout of the city is as follows:

- There are 12 residential areas outside of the downtown area. This is where local Eilat residents live.
- The downtown part of the city. A high concentration of small businesses, restaurants, and shopping centers are here. Many different industries are located here.
- Surrounding the tourist area are tourist shopping centers and restaurants.
- The North Hotel area, which is hugging the border between Israel and Jordan and is East of Route 90, consists of anything a tourist would want or need on vacation



Figure 1: Neighborhood Breakdown; Provided by Myri Lew

To give more specific details regarding Eilat, locals primarily work in the old industrial area — located West of Route 90 — or the North Hotel area, which are both in the Northern Section of the city. Ye'Elim is the first neighborhood of Eilat and is right next to the old industrial area. These areas are very close and don't require a car to travel there. However, the majority of residential areas are located further from these working areas. For example, Rova 8 is at the complete opposite end of the city – for frame of reference, this neighborhood is adjacent to the military base located at the South most point of the city. This is at least a 10 minute drive during non-peak hours. Alternatively, bus routes to the same location at the same time may take 35 minutes to an hour. Multiple challenges can arise from this. For instance when parents are dropping their kids off to school on the way to work — during peak hours of traffic —, private vehicles will be the most convenient form of transport to ensure that their kids are getting to school. However, the usage of private vehicles will result in increased congestion throughout the city. A specific point one of our sponsors, Elad Topel, made in a call about the traffic in Eilat was that a trip that once took fifteen minutes by car across the city now takes forty-five minutes. Research done by a previous year's Interdisciplinary Qualifying Project (IQP) team supports this assertion. This IQP group looked at the current national bus system in Eilat and found the bus system to be lacking in efficiency when comparing the time it takes to get to the same location by a personal vehicle (Myers et al., 2019). This only encourages people to use their personal vehicles over public transportation. This creates congestion challenges for the city, as well as an unsustainable transport model for the city as it grows. The current infrastructure and layout makes getting to places challenging. In a report investigating Israeli transportation policies — specifically in metropolitan cities such as Eilat — that if the population increases as expected, then the challenges of congestion, increased personal vehicle usage, and an inefficient public transportation will only increase (Cohen, 2019).

Eilat is anticipated to develop a future superblock that would take over the old airport land in the middle of the city. This new plan proposes new neighborhoods, an urban city center, green spaces, hotel space, and areas for high tech companies. These new attractions would lead to an increase in population density and job opportunities, causing an influx of locals and tourists coming to this downtown area. Additionally, Eilat is expanding with several new residential areas in the outskirts of the city. These expansion points can be seen on Figure 1. From Roei Karniel explaining the city's plans, we've understood the new neighborhoods will be positioned as follows:

- North of the city along the East side of Route 90, the salt ponds are being developed into new neighborhoods to offer more connection to the hotel centric area of the city
- More neighborhoods will be developed in the North-West section of the city, expanding the city further into the desert. The new neighborhood section will have a street connecting back to Route 90 for an additional connection point to and from the city
- The South-West section of the city will have more streets added that directly connect to Route 90
- The South-West section will have added neighborhoods
- The borders of the new city will extend beyond what is shown in Figure 1

Expanding outward means that there will be more of a need for transportation to connect these neighborhoods to the downtown. With the current inefficiencies of the mobility system, more private car usage will be expected with the existing infrastructure and proposed

infrastructure for the future. This poses a question for urban planners of Eilat to deal with increasingly congested roads to downtown areas. If Eilat is to mitigate these challenges, they need to adopt new methods of urban planning to evaluate and control the city's transportation situation.

3.0. Design Elements for Good Urban Planning

To achieve our project goal, we first needed to understand the ‘best practices’ put into urban and transportation planning and the tools used by these plans. We identified cities that have future transportation plans. The resulting information came in the form of programs, description of tools, and scorecards. The research was focused on complete streets policies, transportation research organizations, and transportation planning tools to understand what cities are currently doing to evaluate and grade their transportation infrastructure. We looked at policies and tools to learn how cities were assessing problems and strengths in their streetscape infrastructure. We found that around the world cities are using an unsustainable transport model. Cities are experiencing increasing levels of congestion and private vehicle usage that results in environmental consequences and inequitable access to transport (Cohen, 2019). Different transportation organizations like NACTO and ITDP have created best urban design standards that consist of different design requirements for streetscapes. These organizations have standards that lead to an accessible, safe, and efficient streetscape that support all types of transportation.

Urban design standards, which are classified as “ requirements that dictate the design of cities, streets and spaces,” can help to ensure that best urban and transportation planning standards are incorporated into a city’s infrastructure (Urban Design Group, n.d.). A streetscape is everything that makes up the infrastructure of the street such as street furniture, sidewalks, curbs, as well as bike and vehicle lanes. As reported by our sponsor Elad Topel, Israel’s transportation standards are most closely related to Germany’s transportation standards. Israeli cities are walking on the footsteps of the European Union and Germany but are not moving at the same pace. In Berlin, Germany, The Sustainable Urban Mobility Project has implemented changes to Berlin’s transportation design to decrease levels of private vehicle usage, increase bicycle usage and walkability, and emphasize public transport (The Sustainable Urban Transport Guide Germany, .n.d.). Berlin has successfully improved infrastructure, traffic calming measures, and sidewalks to create a more efficient transportation system for coming years (The Sustainable Urban Transport Guide Germany, .n.d.). Israel can draw inspiration from Berlin and best urban practices from research done in other countries, like the United States.

In the United States, there are several organizations - National Association of Transportation Officials (NACTO), Smart Growth America, and Institute for Transportation & Development Policy (ITDP) - that have been researching best transportation planning practices that work around the world. These organizations have looked at cities to understand what works and does not work in an urban environment. This means, they look at different public spaces in cities and identify what infrastructure supports accessibility, safety and connectivity. For instance, they have identified what elements make up a safe, user-friendly sidewalk. Some of these elements include a buffer zone from traffic, width requirements, and proper amenities and lighting (NACTO, 2013). They have found how a street can successfully support walking, biking, buses, and cars (ITDP, n.d.). NACTO’s general mission is to “build cities as places for people, with safe, sustainable, accessible and equitable transportation choices that support a strong economy and vibrant quality of life” (NACTO, 2013). The ITDP is an organization aiming to transform streets by encouraging public transit-oriented development and creating safe and accessible places to walk and cycle (ITDP, n.d.). These organizations consult with cities on how they can adjust and transform their urban infrastructure to bring about incremental change to their streetscape.

Transportation organizations around the world have studied particular cities where streets, sidewalks, and multi-modal transportation are safe and accessible. For a long time, mobility has always been associated with speed and moving cars (Strong Towns, 2015). However, a transport model focused only on moving cars can lead to unsafe roads for pedestrians, congestion, and inefficient public transportation (Cohen, 2019) This unsustainable transport model has led cities across the world to shift their focus to pedestrian and public transportation needs (Schlossberg, et. al. , 2013). In the United States, cities have made “efforts to transform streets into complete streets (or from mobility based to accessibility -based designs)” (Schlossberg, 2013). City streetscapes who lead by example are San Francisco and Seattle. In San Francisco, “restriping the road was all it took to improve vehicle travel times and boost pedestrian activity along 25th avenue” (Schlossberg, et.a 2013). San Francisco’s implementation of four to two travel lanes in their streetscape design led to exemplary improvements. Seattle improved safety and cycling rates without sacrificing car traffic capacity (Schlossberg, 2013). Cities, like San Francisco and Seattle, use standards to measure how their infrastructure matches up with different design requirements. The use of a transportation planning tool, such as goal-assessment scorecards, can measure infrastructural problems and strengths.

4.0. Urban Planning Scorecards

4.1 Scorecards: A Tool to Support Transportation Planning

A scorecard is a tool that supports urban planning by addressing current infrastructural challenges. Scorecards have various purposes, elements, and structures which allow for adaptability. Table 4, which is located in Appendix A: City Scorecard Comparison, is meant to look at how each city's scorecard assesses different streetscape design elements in an urban setting. Examples of streetscape design elements are sidewalks, curb cuts, bike lanes, crosswalks, car lanes, and bus stops (NACTO, 2013). In Table 4, the different design elements show how each city approaches connectivity, alternate modes of transport, safety, accessibility, and aesthetics. As reported by the U.S. Environmental Agency, "...used with baseline information about a community, scorecards can help create a 'build-out' analysis that suggests how communities could grow and develop over time based on current policies..." (EPA, n.d.). Basically, scorecards aim to measure the success of current policies a city has in place. As seen in Table 4 in Appendix A, the various scorecard topics address policies that range from transportation, smart growth, to project development standards. There are distinguishable differences in the approach between each city's scorecard. Worcester's scorecard was created with a focus on walkability and people's access to streets and sidewalks (WRRB, 2019). As a result, the questions focus more on streetscape elements, such as crosswalks, sidewalk maintenance and safety elements (WRRB, 2019). The purpose is for citizens to use this scorecard as a walking audit of Worcester streets (WRRB, 2019). This differs from San Francisco's scorecard which has target goals to meet and uses the data they collect to look at ridership on public transport and if their subway system is on time — to name two examples to see if they're achieving their goals (City Performance Scorecards, .n.d.). Different goals for cities leads to the emphasis of different design elements within their scorecards. The purpose of a scorecard is to be adaptable and flexible to the city's goals.

4.2. Who Can Use a Scorecard?

Scorecards can be used by professionals or ordinary citizens. Worcester's Walkability Scorecard is an example that states in its instructions that the scorecard was designed for citizens to fill out (WRRB, 2019). Some of the Municipal Scorecards that the United States Environmental Protection Agency identify show how communities can promote smart growth initiatives and at some level, ways citizens themselves can be involved in the scoring process (EPA, n.d.). For example, the Vermont Smart Growth Scorecard allows cities in Vermont to focus on changes the community makes for their city to be concentrated on the individual city's growth and development (EPA, n.d.). Other types of scorecards — scorecards specific to project development and bus transportation systems — are designed for developers and city officials to complete because of the overly technical contents of the scorecard (EPA, n.d.; ITDP, n.d.). Alternatively, an auditor may be specified as the evaluator to complete the scorecard — as is the case for the ADVANCE Audit System (FGM-AMoR, 2014). However, there are advantages and disadvantages to having a citizen fill in the data for a scorecard versus an urban planner/auditor.

One advantage of citizens recording scorecard data is that the public can be involved within the city and be informed about city development plans (WRRB, 2019). When citizens become involved with the city via scorecards, they can understand the rationale behind changes

the city is implementing and where they plan on going (WRRB, 2019). For example, Worcester’s Walkability Scorecard explains each aspect of design that went into their scorecard, why it helps the community, and where the city wants to go with the information collected (WRRB, 2019). Another advantage of citizens recording scorecard data is that the public opinion is received by the city officials (WRRB, 2019). When scorecards are made for the general public a section is usually given that lists contact information of city officials as well as a comments section (WRRB, 2019). These two sections allow citizens to either directly contact officials about the scorecard or give feedback about the scorecard or street (WRRB, 2019). An additional advantage to having the general public fill out the scorecard for the city is that there are more citizens than there are urban planners, which allows for more data to be collected and recorded.

A disadvantage to having the general public fill out a scorecard is that, depending on where citizens fill out the data, the location and content could only be focused in one area rather than a broad, complete view of the whole city. Another disadvantage is that effort that could be made toward improving and refining the scorecard is being directed towards keeping the public engaged and involved with using the scorecard (Stelzle & Noennig, 2017). Another disadvantage is having to address gaps in user knowledge (EPA, n.d.; WRRB, 2019). Additional work is created for the scorecard designers by setting up sections explaining how the scorecard works – its purpose, why certain subjects need to be asked, where the city is going, etc. – so that anyone could use the scorecard and understand what they’re supposed to do (EPA, n.d.; WRRB, 2019). An additional disadvantage is that time that could be spent analyzing scorecard data results is spent analyzing if the responses received are worthwhile – fully filled out, partially filled out, random weighting, etc. –, accurate, and are given in a timely manner where changes can be made (Stelzle & Noennig, 2017). The advantages and disadvantages of a citizen filling out the scorecard have been compiled into Table 1 below.

Table 1: Citizen Utilizing Scorecard

(EPA, n.d.; Stelzle & Noennig, 2017; WRRB, 2019)

| Advantages | Disadvantages |
|---|--|
| Public Opinion Received - more feedback on how the city is doing. Comments/feedback section supports that | Data is concentrated in one area and is focused only on one parameter or mode of transport because of recording bias |
| Public Involvement/Engagement | Keeping the citizens engaged in helping. Focus switches from scorecard content to keeping the public engaged |
| More Data to Analyze | Analysis if the responses being recorded are worthwhile, accurate, timely |

Alternatively, an advantage to having an urban planner fill out the scorecard is that the questions can be kept technical, as the urban planners understand the purpose, reasoning, and need for the scorecard (EPA, n.d.; Stelzle & Noennig, 2017; WRRB, 2019). A large knowledge barrier doesn’t exist between the urban planners and the scorecard as it would for ordinary

citizens (EPA, n.d.; Stelzle & Noennig, 2017; WRRB, 2019). Another advantage is that because their plans require an analysis of the entire city, scorecard data will be recorded for the entire city and not be biased by where they live. An additional advantage to having an urban planner fill out the scorecard is that no time is lost analyzing if the responses received are worthwhile, accurate, and timely because filling out the scorecard is their job (Stelzle & Noennig, 2017).

A disadvantage of a city planner using the scorecard is that the municipality only has a limited amount of data for each section of the city even though the whole city is recorded. This is because only a handful of urban planners will go out and record data for the city. Another disadvantage is that regardless of who's utilizing a scorecard, at some level the purpose and reasoning of the scorecard will be explained (EPA, n.d.; Stelzle & Noennig, 2017; WRRB, 2019). Therefore, creating a section of the scorecard on this material is worthwhile to do (EPA, n.d.; Stelzle & Noennig, 2017; WRRB, 2019). The advantages and disadvantages of a city planner/auditor filling out the scorecard have been compiled in Table 2 below.

Table 2: Urban Planner Utilizing Scorecard

(EPA, n.d.; Stelzle & Noennig, 2017; WRRB, 2019)

| Advantages | Disadvantages |
|--|--|
| Data collection is city wide | More areas covered but less data recordings |
| Technical aspects kept. Less content breakdown required | Technical Aspect still has to get explained at some level anyway |
| No need to analyze responses to identify if worthwhile/accurate/timely | |

4.3. Scorecard Types and Applications

There are three major types of scorecards: a report card scorecard, a scaled scorecard, and a checklist scorecard. Table 3 below summarizes and provides pros and cons for each type.

A report card scorecard requires a measurable goal for each attribute. Different from the traditional school report cards used for the purpose of giving a grade, an urban planning report card identifies attributes of interest to city planners (Transportation | City Performance Scorecards, 2019). These attributes range from the ridership on public transportation, the number of municipality collisions, and the percentage of sustainable transportation mode share offered in the city (Transportation | City Performance Scorecards, 2019). City planners then set goals for each of these attributes to be met within a given time period (Transportation | City Performance Scorecards, 2019). As data is collected for each attributes, the existing situation is compared with the created measurable goal to see how the city is performing (Transportation | City Performance Scorecards, 2019). This type of scorecard can also use a color scheme to highlight areas where improvement is needed versus an area where the goal is being achieved (Transportation | City Performance Scorecards, 2019). While an urban planning report card doesn't yield a final grade as a school report card would, they do give an accurate picture of how a city is performing with respect to set city goals.

San Francisco, California uses a report card scorecard to grade its transportation system. In accordance with their vision for the city, San Francisco's city planners identified various areas – such as performance, safety, and congestion – that meet their defined goals (Transportation | City Performance Scorecards, 2019). An example of this is under the performance category. The city set a goal of 85% of their public transit systems arriving on time (Transportation | City Performance Scorecards, 2019). This goal was not achieved, as data showed that only 55.6% of their system was arriving on time (Transportation | City Performance Scorecards, 2019). However, from the safety section, the city came close to their goal of having only 50% of traffic citations issued for the top 5 causes of collisions in their city with a 53% issuance rate (Transportation | City Performance Scorecards, 2019). This statistic was highlighted in green to show that the goal was close to being met, whereas the failed public transit system statistic was marked in red to indicate that city planners still needed to address it (Transportation | City Performance Scorecards, 2019).

Scaled scorecards break down the answers to a scorecard's question into various options (Smart Growth, 2005). This is typically done with a numeric scale with the more desirable options receiving a higher score (Smart Growth, 2005). This type of scorecard allows a city planner to ask questions concerning ranges and intermediate values, such as the distance between intersections or the typical delay in traffic. (Smart Growth, 2005). Once a number is assigned for each question, based on the category where the answer falls, it can be weighted by the city planner according to that question's subject matter's importance to the vision of the city (Smart Growth, 2005). This allows city planners to get a score for their plan that is also adjusted to what the priorities of the city are.

Cleveland, Ohio uses a scaled scorecard in their evaluation of city growth and planning (Smart Growth, 2005). Cleveland's scorecard has the possible answers to each question assigned a specific point value, positive or negative, based on the goals of the city (Smart Growth, 2005). For example, a question used is, "Does the plan include street trees and, if so, at what average spacing?" (Smart Growth, 2005). The possible answers to each question then have a point value assigned to them. The possible answers then include ranges of, "0-30 feet, 31 to 50 feet, 50 feet or greater, or no trees provided" (Smart Growth, 2005). The point value for these answers range from "-50 points to 50 points" towards the final score (Smart Growth, 2005).

An example of a European evaluation system that also uses a scaled scorecard is the ADVANCE Audit Scheme. The ADVANCE Audit scheme is used in nine European cities, such as Malmö, Sweden, Schaerbeek, Belgium, Judenburg, Austria, and Agioi-Anargyroi & Kamatero, Greece, as a method of analyzing how the city adopts a, "Sustainable Urban Mobility Plan," (SUMP) (FGM-AMoR, 2014). The SUMP is designed to blend pedestrian, private vehicle, and public transportation systems in a timely, cost efficient manner (FGM-AMoR, 2014). The ADVANCE Audit begins with an independent auditor – hired by the city – researching background on the city and completing the ADVANCE Audit's scaled scorecard about the city's current planning and mobility infrastructure (FGM-AMoR, 2014). These questions are scaled by the level of commitment and effort a city has put into implementing a SUMP, such as, "making road crossings safer for pedestrians," and, "setting up car sharing services." (FGM-AMoR, 2014). After the questions are answered, a web map is used to show where improvements are needed in regards to parking management, street design, walking, cycling, public transport, car related measures, mobility management, and freight transfer (FGM-AMoR, 2014). The audit is then completed by the city and auditor working together to prioritize what parts of the mobility system need to be fixed first, and then creating an implementation plan

to start resolving the issues (FGM-AMoR, 2014). This proves that urban scorecards are both usable and effective and that scaled scorecards can be successful across a wide range of cities.

A checklist type of scorecard is a simple way of identifying what infrastructure exists within a particular area, regardless of specific measurable qualities. A checklist will list features or objects that should exist within a transportation system, such as clear signage, pedestrian walkways, easily accessible bus stops, and curb cuts (WRRB, 2019). The transportation system can be graded by tallying up the number of “positive” or “desired” responses and dividing that by the total number of questions (WRRB, 2019). This evaluation is useful for residents and non-city officials to use (WRRB, 2019).

Worcester is a good example of a city that utilizes the checklist type of scorecard. The city of Worcester assesses the walkability of the city with a checklist type of scorecard that contains simple questions that can be answered by a resident or city planner. (WRRB, 2019). Such questions include, “[Does] Sidewalk adequately separates pedestrians and motor vehicles,” and “[The] Presence and maintenance of curb cuts,” all answered with either yes or no (WRRB, 2019).

Each type of scorecard has pros and cons. Starting with the pros, the benefits of the report card are that it allows city planners to track their progress over time towards a goal, seeing when adjustments need to be made. The major benefit of the scaled system is that the system allows for a more complex and precise analysis using ranges, as opposed to a binary, yes/no scale. This provides urban planners with more detailed information that can be used to track improvements in infrastructure and how close they are to achieving policy goals. This results in a score that is determined by more than simply the presence of a feature or piece of infrastructure. The scaled scorecard also allows for qualitative comparisons between different systems. The benefits of the checklist is that it is quick, easy to use, and is a simple comparison tool between streets.

Drawbacks to the report card include the fact that specific aspects of a transportation system or street features are not measured, such as lane size, distance between bus stops, and the presence of curb. Another issue to the report card scorecard is that a final cumulative grade is not obtained, as grades are not assigned to a transportation system. An additional issue to the report card system is that it can’t be weighted because each piece of data uses a different metric, making it uncomparable. A potential drawback to the scaled scorecard is the substantial amount of work required to collect and rate each piece of data, meaning this tool takes longer to get results from (FGM-AMoR, 2014). The drawbacks of the checklist scorecard are that the checklist is unable to address questions concerning ranges or option based questions and only works with simplistic, yes-or-no type questions.

Table 3: Comparison of Scoring System Types

(WRRB, 2019; Smart Growth, 2005; Transportation | City Performance Scorecards, 2019)

| SCORING SYSTEM | Report Card | Scaled | Checklist |
|-----------------------|---|--|--|
| HOW IT WORKS | Compares a current statistic/measure with a desired value | A score is assigned according to the particular range a measure/metric falls under | Lists a series of features and criteria, evaluator indicates the presence or lack of a particular item |
| PROS | Allows for the tracking of progress over time towards a goal | Allows for the utilization of a range of scores, rather than an "all or nothing" score. Better comparison between different systems | Easy to use and complete |
| CONS | Does not yield a score for evaluators to see how a plan is working in one location compared to another Does not address specific aspects of a system | Requires extensive measurements/work | Can only be used with yes/no type questions Cannot be used for complex analysis |
| EXAMPLE CITY | San Francisco, CA | Cleveland, OH | Worcester, MA |

A scorecard can be applied to the city of Eilat. The scorecard can be adapted to focus on the overall plan or specific elements of Eilat Municipality's plan. This way, Eilat urban planners can grade their streetscapes and examine where improvements must be made. The scorecard we develop should have all facets of the Eilat transportation system represented and have the ability to be weighted, according to the goals of the urban planners, so that the urban planners can clearly determine if their current plans are working.

5.0. The Developed Scorecard

5.1. Why do Eilat City Planners need a Scorecard?

Eilat urban planners' can benefit from the desire to improve the layout and functionality of the streets they plan for their city. That means something to plan against the challenges the city currently has and will have in the future —while also considering the city's future size, population, and complexity — is needed. From our sponsors — the urban planners for the municipality who need the tool — we've understood the city's goal of expansion and a tool with an ability to change depending on the city's goal. A scorecard has the capacity to do that.

5.2. A Scorecard Design for Eilat

The scorecard designed for Eilat measures the accessibility, safety, aesthetics, and connectivity of different Eilat streetscapes. The streetscape includes different modes of mobility such as walking, cycling, bus transit and car usage, as well as physical street features. Our scorecard groups questions by a parameter, such as accessibility, safety aesthetics, and connectivity. Within these groups, the questions are further grouped by the mode of mobility or street feature. We chose to use a scaled scorecard, as this type provides more detailed information that creates a clear picture of the streetscape.

Accessibility refers to the availability of public amenities and usability of the streets for the public, regardless of age or physical abilities. Accessibility questions address walking, cycling, and the public bus system. The questions evaluate the timeliness and ease of use for the bus system, the presence of curb cuts for walking, and the availability of bike lanes and bike racks on the streetscape. These questions serve to make sure that all forms of alternative transportation in Eilat are both available and easy to use on each streetscape.

Safety refers to the presence of street assets that help prevent injuries and infrastructure damage. Questions in safety include walking and driving questions, such as the visibility of crosswalks and the presence of traffic calming devices in the street. These questions ensure that people can navigate the streetscape without major risk to their health or well-being. These questions also ensure that the relationship between drivers and pedestrians is safe and that accident risks are mitigated.

Aesthetics refers to how attractive or developed the non-safety physical features surrounding the road are and how well they're maintained. These questions deal more with the physical streetscape rather than modes of mobility. Questions in this category concern the inclusion of green spaces and trees within the streetscape and the overall maintenance of the streetscape. By ensuring that the streetscape is maintained and appealing to use, city planners can improve the chances people will use these streetscapes. Additionally, the presence of green spaces and trees can provide shade and encourage walking in the hot summer months.

Connectivity refers to how well the streetscape is connected to other neighborhoods and other modes of transport in Eilat. These questions determine how far a streetscape is to places such as grocery stores, schools, and medical centers or if connections to other streets exist. Additionally, the questions address if street segments promote all forms of mobility, like walking, cycling, and bus use. This information allows city planners to get an overview of how well their mobility network is connected together, as opposed to just seeing an isolated report of one streetscape at a time.

Each question was developed based on our research of transportation planning and urban planning tools. We identified the qualities most desirable in a city street through researching mobility theory, city planning, and other scorecards (FGM-AMoR, 2014; Smart Growth, 2005; Transportation | City Performance Scorecards, 2010; WRRB, 2019). A breakdown of how to rate each question is provided, on a scale of 1 to 5. A rating of 5 is considered the ideal scenario, with slowly decreasing desirability until a rating of 1, the most undesirable score. For each question, a source is provided to indicate where we found the information to create each rating breakdown scale. This way, the evaluator(s) can aim at uniformity when judging the streetscapes.

The scaled scorecard will be calculated by summing all the scores of each individual question. This is called the accrued score. The maximum possible value to score, what would be considered a “perfect street,” is also summated. This is considered the maximum score. The grade is then given by dividing the accrued score by the maximum score, and multiplying it by 100%. This is shown in Equation 1 below.

$$\text{Equation 1} \rightarrow \frac{\text{Accrued Score}}{\text{Maximum Score}} \times (100\%) = \text{Grade\%}$$

Weighting is also used in the grading process. Each question has a corresponding weighting value that the question’s rating will be multiplied by. The maximum possible score for each question is also weighted so that when the final grade is tabulated, it will still be a normal percentage value. These weights will be determined by the city planners according to what they think are the more important aspects of the mobility vision for the city.

We made sure the scorecard is adaptable through the inclusion of the weighting system. If a city planner only wants to look at a specific parameter or mode of mobility, they can simply negate non-related questions by making their weightings zero. This removes that question entirely from the grading process detailed below, so now a streetscape is graded on a more specific topic rather than holistically. We also provide the instructions and the matrix of the scorecard so city planners can add or remove questions as they see fit, or even adapt the scorecard for use by ordinary citizens.

5.3. Building the Scorecard Matrix in Excel

We created an Excel spreadsheet to use as the platform for our scorecard. The first sheet of the scorecard are instructions and definitions to assist the evaluator in filling out the scorecard. Figure 2 showcases the main question portion of the scorecard. We placed the background information on the top of the scorecard, such as who the evaluator is, what street is being evaluated, and the time and date for record purposes. The first column identifies what parameter in mobility is being addressed. The next three columns identify the question number, the question asked, and the mode of transportation the question concerns. The blank column is the raw score column, in which the rating of the question is entered. Following that is the weighting column. The weighting column is where the questions weighting can be adjusted by the city planners as they see fit. If a user wants to have a question not matter in the final score, they can assign a weighting value of 0 to that question. This allows the scorecard to be used broadly and for specifics. The weighted score and maximum possible score columns are calculated using Excel formulas. The maximum possible score is calculated by multiplying 5, the maximum

possible rating, by the weighting value. Figure 3 shows where the scores are summated and where the final grade, in percentage format, is presented. Figure 4 shows the criteria breakdown for each question. Figure 5 shows how we list each question with its supporting source. Question cells are linked across each sheet to ensure that the order and language of the questions remains the same across all the sheets. Our final scorecard can be found in Appendix B. However, this style of scorecard can be translated into a website to provide easier access than a single Excel file could.

| Date/Time: | | | | | | | |
|---|-----------------|--|-------------------|-----------|-----------------|----------------|------------------|
| Street: | | | | | | | |
| Evaluator(s): | | | | | | | |
| FILL OUT THE SCORE ACCORDING TO THE RATINGS BREAKDOWN FOR EACH QUESTION. THEN ASSIGN A DESIRED WEIGHTING FOR EACH QUESTION. DO NOT ALTER WEIGHTED SCORE OR MAXIMIM POSSIBLE SCORE COLUMNS | | | | | | | |
| Parameter | Question Number | Question | Mode of transport | Raw Score | Weighting Value | Weighted Score | Maximum Possible |
| | 1 | What is the distance between local bus stops on this street? | Busing | | 1 | 0 | 5 |
| | 2 | How easily read (not destoryed, torn, soiled, etc.) is the map of the city at all the bus stop on this street? | Busing | | 1 | 0 | 5 |

Figure 2: Primary Scorecard

| | | |
|-------------------|-------|-----|
| NET SCORES | 0 | 125 |
| GRADE | 0.00% | |

Figure 3: Summation of Scores and Grade

| Parameter | Question Number | Question | Scoring Criteria |
|-----------|-----------------|--|---|
| | 1 | What is the distance between local bus stops on this street? | 5- 400m or less 4- 401 to 500m 3- 501m to 600m 2-601m to 700m 1- 700m or more |
| | 2 | How easily read (not destoryed, torn, soiled, etc.) is the map of the city at all the bus stop on this street? | 5- All stops possess a easily read map 4- 80% to 99% of stops possess a easily read map 3- 60% to 79% of stops possess a easily read map 2- 40% to 59% of stops possess a easily read map 1- Less than 40% of stops possess a easily read map |

Figure 4: Rating Breakdown for Questions

| Question | Source |
|--|--|
| What is the distance between local bus stops on this street? | Walker, J. (2010). Basics: The Spacing of Stops and Stations — Human Transit. Retrieved from https://humantransit.org/2010/11/san-francisco-a-rational-stop-spacing-plan.html |
| Are bicycle racks: 1.) Easily visible 2.) Secure 3.) Protected from weather 4.) Of sufficient clearance from buildings or vehicle parking? | Victoria Transport Policy Institute. (2015). Online TDM Encyclopedia - Bicycle Parking. Retrieved from https://www.vtpi.org/tm/tm85.htm |

Figure 5: Sources for Each Question

6.0 The Developed Website

We also developed a website to centralize the scorecard information via a database and to allow multiple users to access it at the same time. This allows various planners to evaluate the streets at once. Additionally, the planners don't need to compile the information themselves as the data is stored automatically. It is also environmentally conscious to utilize a website over a paper scorecard as a website eliminated the need to waste paper on printing scorecards for every street in Eilat. A website provides easy access to the scorecard for both city officials and residents of Eilat.

The most important requirements of our sponsors for the website were simplicity and adaptability. If the tool was not straightforward, if the layout did not lend to a quick workflow, and if there was not a clearly displayed output, the urban planners would not use it. Simplicity saves time and increases efficiency, which is important in the fast-paced urban planning environment of Eilat. Furthermore, a simple framework was important if a future iteration of the tool would be used by regular citizens. Additionally, every question, parameter, and weighting was made manipulable in order to be adaptable to the complex, ever-changing challenges of urban planning.

The website will function as a dashboard to reduce the number of steps in each of our scenarios. This way any tool or resource is accessible in a single click on the home page. The homepage can be viewed as Figure A in Appendix C. Because of a specific request from the Municipality to port an existing 3D Geographic Information System (GIS) model of Eilat into its own page of the website, the website will contain six pages beside the home dashboard. The web pages are for: the Scorecard Tool, a Live Map of Eilat, the Eilat GIS model, Standards Links, Important Contacts, and Recorded Data.

The scorecard web page consists of three different windows. The first window contains two text fields for the evaluator's name and the street that is being evaluated respectively. Once the fields are filled, a button to continue to the next window appears. The second window is a dynamic map of Eilat and a navigation bar on the side with the four scorecard parameters. By clicking on any of the four parameter buttons, a pop-up appears with all scorecard questions for that parameter. There is no question weighting by default, but each pop-up gives the option to weigh questions in the parameter section. By selecting question weighting, a range input appears by each question that allows the user to move a slider to indicate a value of 1-5. After filling out all four question sections, a button appears to move onto the third window. The third window displays the resulting percentage grade score calculated from the answers to all the questions. It also contains options to save the scorecard results to be put onto the recorded data page, to go back to the previous window, to print the results, to view score breakdown on the recorded data page, or to start over at the first scorecard window. These windows for the scorecard web page are viewable as Figures B, C, D and E in Appendix C.

The Live Eilat Map page contains the same map from the second window of the scorecard page. This map dynamically displays various views of the city in the form of "overlays." By selecting from a list of overlays, you can toggle which views are active. For instance, by selecting the bike paths overlay, the map will highlight all bike paths on the map. The overlays are affected by recorded scorecard data. Overlays such as sidewalks, bike paths, and streets are color coded based on their grade. A poor grade results in a corresponding shade of red, a good grade results in a corresponding shade of green. This information allows urban planners to visually see which areas of the city network are not meeting design standards. The

map contains much of the same basic functionality as other online map tools, like Google Maps, such as the ability to zoom in and use your mouse to view different parts of the map.

The GIS, Standards Links, Important Contacts, and Recorded Data web pages are straightforward. The Eilat GIS page houses a ported version of an existing 3D map of the city of Eilat. The Standard Links page contains important links to urban planning standards for Israel and Eilat. The Important Contacts page has a directory of city leaders and urban planners with their emails and/or phone numbers. The Recorded Data page contains a record of all saved scorecard reports. Additionally, the recorded data has a jumbotron that displays either the 10 highest or 10 lowest graded streets in Eilat based on saved scorecard report data.

All of this information in technical detail was amalgamated into a design report. This report functions like an instruction manual, laying out the exact functionality for every facet of the site as we have designed it. It includes visuals of the site design along with some of the use cases and scenarios that were developed. With this specificity, our report can be handed off to a team of developers to realize the website.

The team brainstormed three ideas for future iterations of the website. The first idea was to create a webpage that integrates Eilat city plans and data into a digital workspace. To accomplish this, a future team of developers can inquire what softwares or methods are used by the Eilat Municipality. With this information, the developers can produce a viable platform to develop and simulate future transportation plans. The second idea was to add a sign-in function to create different levels of access to the website. Since the website will contain sensitive information regarding future city plans and personal contacts, Eilat residents cannot have full access to the website. Residents accessing the site with no sign in can use the scorecard tool, live map, and GIS model, allowing them to evaluate streets and gain information about their grade. Urban planners will be given a secure account to sign into the website. By signing into the website, all webpages, tools, and information will become available to the user. The third idea was to make the website accessible only through the Eilat city WiFi network. This will prevent people from outside of Eilat from submitting random scorings that could convolute data integrity.

7.0. Final Thoughts

After completing an evaluation of the landscape, transportation network, and problems in Eilat, we conducted research into urban planning design standards. We determined that the best urban planning practices involved promoting multiple forms of alternative transportation, such as walking, cycling, and public busing, to alleviate private vehicle usage. However, streetscapes have to be able to effectively sustain and promote the use of these alternative transportation methods. This could be checked by urban planning scorecards, which can be applied to a whole transportation system or just individual aspects of it. To evaluate Eilat's streetscapes, we designed a scorecard that evaluates the accessibility, safety, aesthetics, and connectivity of the streetscapes and the modes of transportation that use them. After modeling and testing our scorecard using an Excel spreadsheet, we designed a website that can house the scorecard and other features that may be helpful to Eilat urban planners. We wrote up our design in a report that will be given to professional web developers to turn our design into a functioning website.

Multiple directions can be taken from the creation of the Eilat scorecard. Currently – from our work – the municipal level scorecard can be visualized on a potential web interface with additional features to enhance the city's transportation planning. Recommendations for future projects vary. For instance, a future IQP group could focus on certain problem areas in the city and propose recommendations with the help of the scorecard. The problem areas would be identified utilizing the scorecard. Street segments and general areas with the lowest scores can be assessed and evaluated to discuss potential design changes in the infrastructure. For instance, if safety and accessibility scored low in the area or street segment, new infrastructural changes can be made according to those areas. As a more specific example, a school area on an unsafe street segment can be assessed and surveyed at peak hours of the day to understand the car and pedestrian behavior as well as how the infrastructure impacts this relationship. After analyzing these behaviors, considerations for design changes to the area could be put into a report. This idea would explore more of the urban infrastructure and take the scorecard criteria to a deeper, design level.

Another direction that Eilat municipality officials expressed interest in was to create the scorecard tool catered to citizens. Elad Topel, our sponsor has expressed having this tool be accessible for citizens and visitors to Eilat. Zencity is a company based in Tel Aviv that reinvents how cities make decisions by gathering data from citizens to understand where the local government should allocate money and resources (Zencity, n.d.). Drawing inspiration from this, our tool could be morphed into a tool where feedback from residents and visitors is gathered into a real-time platform. The scorecard topic would still be about streetscape infrastructure. This project idea would allow Eilat officials to hear what citizens feel about Eilat streets. The tool could be updated in real time and can be used daily by people to measure the score of the streets. We have started the foundation of a transportation planning scorecard for urban planners but students next year could develop this tool further for citizen use.

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Appendices

Appendix A: City Scorecard Comparison

Table 4: City Scorecard Comparison

(WRRB, 2019; Smart Growth, 2005; Transportation | City Performance Scorecards, 2019; Smart Growth Criteria Matrix, 2003)

| City | Worcester, MA | San Francisco, CA | Cleveland, OH | Mobile, AL |
|---------------------|---|---|---|--|
| Topic of Scorecard | Walkability | Transportation | Smart Growth | Smart Growth - Project Related Development |
| Design Elements | A checklist of the features, or lack thereof, of a sidewalk/ crosswalk in the city of Worcester | A comparison of real time statistics with designated goals regarding performance, safety, mode share, and congestion | Full-Smart Growth scaled scorecard for a city (transportation, urban structure, neighborhoods, construction, landscaping, etc.) | A scaled scorecard for assessing developmental projects adherence to the smart-growth plan of the city in terms of land use, design, transportation, and the environment |
| Intersections | Assesses light signaling, pedestrian infrastructure, curb cuts, visibility, | N/A | N/A | Assesses if the project maintains grid connectivity of the streets |
| Pedestrian Walkways | Addresses sidewalk width, continuity, material, cleanliness, adjacency to vehicles, presence of buffer zone with street | Assesses Graffiti service requests, street & sidewalk cleaning responses, pothole responses, and a pavement condition index | Assesses if walkways are appealing and safe to use | Assesses if sidewalks, crosswalks, and pedestrian oriented amenities exist within the project |
| Bike Lanes | Assesses bicycle storing, relationship between vehicles, continuity of lanes, | N/A | N/A | Assesses if the project maintains/creates bike lanes |
| Vehicle Lanes | N/A | Assesses safety issues on SF roads. So the scorecard looks at traffic fatalities, causes of collisions, crimes on its muni system, and muni | Assesses if connected streets, rural roads, efficient avenues, shady boulevards, main streets, quiet | Assesses if the project is going to reduce the width of street lanes |

| | | | | |
|---------------------------|---|--|---|---|
| | | collisions. | residential lanes, and convenient alleys all conform to width requirements according to their designation by the city | |
| Parking | N/A | N/A | Assesses availability of on-street and hidden parking | Assesses if the project will create on-street parking or provide a place for off-street parking |
| Modes of Public Transport | N/A | Evaluates ridership, % of scheduled service hours delivered, transit on-time performance | N/A | Assesses if the project is located near a public transit stop and if the project encourages public transportation use |
| Buses | N/A | The scorecard looks at total ridership for their bus and compares it against other modes of public transit. | Assesses the availability of sheltered bus stops with good signage | N/A |
| Connectivity of Transport | N/A | Evaluates sustainable transportation mode share and congestion | N/A | N/A |
| Amenities on a Street | Assesses signage and if streets and sidewalks are intuitive and easy to navigate. Additionally assesses if there is lighting, benches, public restrooms, disposal bins, | This scorecard strictly looks at the public works aesthetics of the street and maintenance of things as opposed to the amenities that the sidewalk and street infrastructure provides. | Assesses if connected streets, rural roads, efficient avenues, shady boulevards, main streets, quiet residential lanes, and convenient alleys all feature certain infrastructure according to their designation by the city | Assesses if traffic calming devices, street trees, and signage are included in any project plans |
| Scaling | Yes/No questions | Color coded. Green = Meeting Target , Yellow = Needs Improvement , Red = Not Meeting Target , White = No Target | Point Additions/ Subtractions for given answers | Rating each question on a scale then weighting that answer according to a predetermined weighting factor |

Appendix B: Excel Scorecard

Introduction to Scorecard

| Eilat Streetscape Scorecard | |
|--|---|
| The purpose of this scorecard is to grade how the Eilat streetscapes promote the use of alternative modes of transportation, such as walking, biking, and public busing, and evaluated the connectivity of the transportation network. | |
| INSTRUCTIONS/NOTES | |
| 1.) Answer each question in the Raw Score column with the appropriate rating according to the Question Rating Breakdown page | |
| 2.) DO NOT ALTER ANY COLUMN BESIDES RAW SCORE- CALCULATIONS WILL BE MADE AUTOMATICALLY FROM RAW SCORE INPUTS | |
| 3.) Weightings are adjusted according to the goals of the Municipality of Eilat | |
| 4.) Photographs are provided to provide identification for how to rate qualitative questions | |
| UNITS | DEFINITIONS |
| m- meters | Arterial Road: A high-capacity urban road that delivers traffic from collector roads to Route 90 and between urban centers |
| kph- kilometers per hour | |
| QUESTIONS? | Neighborhood: Sections of the city defined by the Eilat Municipality. Refer to attached map |
| Contact: Name/Department | Streets: From rotary to rotary |
| Phone: ###-###-#### | |
| Email: address@domain.com | |
| Address/PO Box | |
| Last Updated: 22FEBRUARY2020 | Streetscape: Includes different modes of mobility such as walking, biking, bus transit and car usage, as well as physical street features |
| Questions and weightings are subject to change | |

Full Scorecard

| Date/Time: | | | | | | | |
|---|-----------------|--|-------------------|------------|-----------------|----------------|------------------|
| Street: | | | | | | | |
| Evaluator(s): | | | | | | | |
| FILL OUT THE SCORE ACCORDING TO THE RATINGS BREAKDOWN FOR EACH QUESTION. THEN ASSIGN A DESIRED WEIGHTING FOR EACH QUESTION. DO NOT ALTER WEIGHTED SCORE OR MAXIMUM POSSIBLE SCORE COLUMNS | | | | | | | |
| Parameter | Question Number | Question | Mode of transport | Raw Score | Weighting Value | Weighted Score | Maximum Possible |
| Accessibility | 1 | What is the distance between local bus stops on this street? | Busing | | 1 | 0 | 5 |
| | 2 | How easily read (not destroyed, torn, soiled, etc.) is the map of the city at all the bus stop on this street? | Busing | | 1 | 0 | 5 |
| | 3 | Are buses generally on schedule on this street? | Busing | | 1 | 0 | 5 |
| | 4 | Does the bus stop have the correct information for routes and times? | Busing | | 1 | 0 | 5 |
| | 5 | Are bicycle racks: 1.) Easily visible 2.) Secure 3.) Protected from weather 4.) Of sufficient clearance from buildings or vehicle parking? | Biking | | 1 | 0 | 5 |
| | 6 | Are there clear bike lanes on the street? | Biking | | 1 | 0 | 5 |
| | 7 | Are there curb cuts at every roundabout along the street? | Walking | | 1 | 0 | 5 |
| | 8 | Is there enough room on the sidewalk to walk? | Walking | | 1 | 0 | 5 |
| Safety | 9 | Is there enough space for a bicycle to safely ride? | Biking | | 1 | 0 | 5 |
| | 10 | Are all crosswalks on this street easily identifiable? | Walking | | 1 | 0 | 5 |
| | 11 | Is there an obstruction in your view when crossing an intersection? Does vegetation, parking, street barriers, bus stop furniture, or other obstructions block your view? | Walking | | 1 | 0 | 5 |
| | 12 | Are there traffic calming devices (speed bump, median, texture change, rotary) along this street? | Streetscape | | 1 | 0 | 5 |
| | 13 | Is there enough signage on the street for cars to intuitively get around? Are there provided street name signs, crosswalk intersection signs, pedestrian walking signs, biking signs, lane turning signs, warning signs, and regulatory signs? | Streetscape | | 1 | 0 | 5 |
| Aesthetics | 14 | Are there street trees planted alongside the street? If so, what is the average spacing between trees? | Streetscape | | 1 | 0 | 5 |
| | 15 | Does this street connect to an existing green space or park? | Streetscape | | 1 | 0 | 5 |
| | 16 | What is the maintenance of the street like? Does the street have potholes, cracking, litter (overflowing trash items, broken glass), graffiti, unclear lane paint, broken pavement, indentations, etc.? | Streetscape | | 1 | 0 | 5 |
| | 17 | What is the maintenance of the sidewalk like? Does the sidewalk have cracking, indentations, weeds, litter, graffiti, obstructions to path? | Streetscape | | 1 | 0 | 5 |
| Connectivity | 18 | How close is a bus stop to the nearest grocery store? | Busing | | 1 | 0 | 5 |
| | 19 | How close is a bus stop to a neighborhood school? | Busing | | 1 | 0 | 5 |
| | 20 | How close is a bus stop to the nearest medical center? | Busing | | 1 | 0 | 5 |
| | 21 | Do the bus routes on this street lead to other defined neighborhoods? | Busing | | 1 | 0 | 5 |
| | 22 | Does this street connect to an arterial road? | Streetscape | | 1 | 0 | 5 |
| | 23 | Does the segment of the overall street connect to at least two other streets? | Streetscape | | 1 | 0 | 5 |
| Comments: | | | | NET SCORES | | 0 | 115 |
| | | | | GRADE | | 0.00% | |

Part 1 of Full Ratings Breakdown

| Parameter | Question Number | Question | Scoring Criteria |
|---------------|-----------------|---|---|
| Accessibility | 1 | What is the distance between local bus stops on this street? | 5- 400m or less 4- 401 to 500m 3- 501m to 600m 2- 601m to 700m 1- 700m or more |
| | 2 | How easily read (not destroyed, torn, soiled, etc.) is the map of the city at all the bus stop on this street? | 5- All stops possess a easily read map 4- 80% to 99% of stops possess a easily read map 3- 60% to 79% of stops possess a easily read map 2- 40% to 59% of stops possess a easily read map 1- Less than 40% of stops possess a easily read map |
| | 3 | Are buses generally on schedule on this street? | 5- All buses on this street are within 5 minutes of scheduled time 4- 80% to 99% of buses on this street are within 5 minutes of scheduled time 3- 60% to 79% of buses on this street are within 5 minutes of scheduled time 2- 40% to 59% of buses on this street are within 5 minutes of scheduled time 1- Less than 40% of buses on this street are within 5 minutes of scheduled time |
| | 4 | Does the bus stop have the correct information for routes and times? | 5- Information is displayed electronically and physically posted at all street stops and is accurate 4- Information is physically posted OR electronically and is accurate 3- One stop on this street is missing a posted schedule 2- Two or more stops are missing a posted schedule 1- Any stops information is inaccurate or all stops are missing a posted schedule |
| | 5 | Are bicycle racks: 1.) Easily visible 2.) Secure 3.) Protected from weather 4.) Of sufficient clearance from buildings or vehicle parking? | 5- All 4 criteria met 4- Any 3 of 4 criteria met 3- Any 2 of 4 criteria met 2- Any 1 of 4 criteria met 1- No Bicycle Rack/No criteria met |
| | 6 | Are there clear bike lanes on the street? | 5- Bike lane is defined and continuous along the street 4- 3- Bike lane is defined and partly continuous along street 2- 1- No bike lane present |
| | 7 | Are there curb cuts at every roundabout along the street? | 5- All roundabouts have curb cuts 4- 80% to 99% of roundabouts have curb cuts 3- 60% to 79% of roundabouts have curb cuts 2- 40% to 59% of roundabouts have curb cuts 1- Less than 40% of roundabouts have curb cuts |
| | 8 | Is there enough room on the sidewalk to walk? | 5- Sidewalk width 3.5m or greater, continuous 4- Sidewalk width between 2.5m and 3.5m, continuous 3- Sidewalk width between 1.5m and 2.5m, continuous 2- Sidewalk width less than 1.5m, continuous 1- No sidewalk or sidewalk discontinuous |
| Safety | 9 | Is there enough space for a bicycle to safely ride? | 5- Bike lane width greater than or equal to 1m, continous sidewalk 4- Bike lane width less than 1m, continous sidewalk 3- No bike lane, continous sidewalk 2- No bike lane, discontinous sidewalk 1- No bike lane or sidewalk |
| | 10 | Are all crosswalks on this street easily identifiable? | 5- All of the crosswalks on the street are clearly marked 4- 80% to 99% of crosswalks on street are clearly marked 3- 60% to 79% of crosswalks on street are clearly marked 2- 40% to 59% of crosswalks on street are clearly marked 1- Less than 40% of crosswalks on the street are clearly marked |
| | 11 | Is there an obstruction in your view when crossing an intersection? Does vegetation, parking, street barriers, bus stop furniture, or other obstructions block your view? | 5- Meets no criteria 4- Meets 1 of the criteria 3- Meets 1-2 of the criteria 2- Meets 2-3 of the criteria 1- Meets 4-5 of the criteria |
| | 12 | Are there traffic calming devices (speed bump, median, texture change, rotary) along this street? | 5- 2 or more 4- 3- Just 1 2- 1- None |

Part 2 of Full Ratings Breakdown

| | | | |
|--------------|----|--|---|
| | 13 | Is there enough signage on the street for cars to intuitively get around? Are there provided street name signs, crosswalk intersection signs, pedestrian walking signs, biking signs, lane turning signs, warning signs, and regulatory signs? | 5- Meets 6-7 of the above criteria 4- Meets 4-5 of the above criteria 3- Meets 2-3 of the above criteria 2- Meets 1 of the above criteria 1- Meets none of the above criteria |
| Aesthetics | 14 | Are there street trees planted alongside the street? If so, what is the average spacing between trees? | 5- Yes, less than 10m 4- Yes, 11m to 15m 3- Yes, 16m to 20m 2- Yes, 21m or greater 1- No street trees |
| | 15 | Does this street connect to an existing green space or park? | 5- 400m or less 4- 401 to 500m 3- 501m to 600m 2- 601m to 700m 1- 700m or more |
| | 16 | What is the maintenance of the street like? Does the street have potholes, cracking, litter (overflowing trash items, broken glass), graffiti, unclear lane paint, broken pavement, indentations, etc.? | 5- None of the criteria above 4- Meets 1-3 of the above criteria 3- Meets 3-4 of the above criteria 2- Meets 4-5 of the above criteria 1- Meets 5-7 of the above criteria |
| | 17 | What is the maintenance of the sidewalk like? Does the sidewalk have cracking, indentations, weeds, litter, graffiti, obstructions to path? | 5- Meets none of the criteria 4- Meets 1-2 of the above criteria 3- Meets 2-3 of the above criteria 2- Meets 3-4 of the above criteria 1- Meets 5-7 of the above criteria |
| Connectivity | 18 | How close is a bus stop to the nearest grocery store? | 5- 400m or less 4- 401 to 500m 3- 501m to 600m 2- 601m to 700m 1- 700m or more |
| | 19 | How close is a bus stop to a neighborhood school? | 5- 400m or less 4- 401 to 500m 3- 501m to 600m 2- 601m to 700m 1- 700m or more |
| | 20 | How close is a bus stop to the nearest medical center? | 5- 400m or less 4- 401 to 500m 3- 501m to 600m 2- 601m to 700m 1- 700m or more |
| | 21 | Do the bus routes on this street lead to other defined neighborhoods? | 5- Bus routes connect to 4 or more other neighborhoods 4- Bus routes connect to 3 other neighborhoods 3- Bus routes connect to 2 other neighborhoods 2- Bus routes connect to 1 other neighborhood 1- Bus routes stay within this neighborhood |
| | 22 | Does this street connect to an arterial road? | 5- This street connects to one arterial roads 4- This street indirectly connects by one street to two or more arterial road 3- This street connects to one arterial road 2- This street indirectly connects by one street to two or more arterial road 1- This street does not connect to an arterial road |
| | 23 | Does the segment of the overall street connect to at least two other streets? | 5- All blocks on this street connect to at least two other streets 4- 80% to 99% of blocks on this street connect to at least two other streets 3- 60% to 79% of blocks on this street connect to at least two other streets 2- 40% to 59% of blocks on this street connect to at least two other streets 1- Less than 40% of blocks on this street connect to at least two other streets |

Full Sources for Questions

| Question | Source |
|---|--|
| What is the distance between local bus stops on this street? | Walker, J. (2010). Basics: The Spacing of Stops and Stations — Human Transit. Retrieved from https://humantransit.org/2010/11/san-francisco-a-rational-stop-spacing-plan.html |
| Are bicycle racks: 1.) Easily visible 2.) Secure 3.) Protected from weather 4.) Of sufficient clearance from buildings or vehicle parking? | Victoria Transport Policy Institute. (2015). Online TDM Encyclopedia - Bicycle Parking. Retrieved from https://www.vtppi.org/tdm/tdm85.htm |
| Are buses generally on schedule on this street? | The Scorecard. Retrieved from https://www.itdp.org/library/standards-and-guides/the-bus-rapid-transit-standard/the-scorecard/ |
| Does the bus stop have the correct information for routes and times? | The Scorecard. Retrieved from https://www.itdp.org/library/standards-and-guides/the-bus-rapid-transit-standard/the-scorecard/ |
| Is there enough room on the sidewalk to walk? | Sidewalk Widths. (2013). Retrieved from https://nacto.org/wp-content/uploads/2016/04/1-6_BTD_Boston-Complete-Streets-Guidelines-2.4-6-Sidewalk-Widths_2013.pdf |
| Are there curb cuts at every roundabout along the street? | Worcester Regional Research Bureau (2020). Bureau Brief - Walkability. Retrieved from http://www.wrrb.org/wp-content/uploads/2020/01/WRRB-BureauBrief-Walkability.pdf |
| Are there clear bike lanes on the street? | Bikability Checklist. Retrieved from https://www.epa.gov/sites/production/files/2014-12/documents/bikabilitychecklist.pdf |
| How easily read (not destroyed, torn, soiled, etc.) is the map of the city at all the bus stop on this street? | The Scorecard. Retrieved from https://www.itdp.org/library/standards-and-guides/the-bus-rapid-transit-standard/the-scorecard/ |
| Are there traffic calming devices (speed bump, median, texture change, rotary) along this street? | Victoria Transport Policy Institute. (2017). Online TDM Encyclopedia - Traffic Calming. Retrieved from https://www.vtppi.org/tdm/tdm4.htm |
| Are all crosswalks on this street easily identifiable? | Smart Growth. (2005). Retrieved from https://www.epa.gov/sites/production/files/2014-02/documents/ecocitycleveland.pdf |
| Is there an obstruction in your view when crossing an intersection? Does vegetation, parking, street barriers, bus stop furniture, or other obstructions | Sight Distance (obstruction removal) Road Safety Toolkit. (2010). Retrieved from http://toolkit.irap.org/default.asp?page=treatment&id=61 |
| Is there enough space for a bicycle to safely ride? | National Association of City Transportation Officials. Buffered Bike Lanes National Association of City Transportation Officials. Retrieved from https://nacto.org/publication/urban-bikeway-design-guide/bike-lanes/buffered-bike-lanes/ |
| Is there enough signage on the street for cars to intuitively get around? Are there provided street name signs, crosswalk intersection signs, pedestrian | Israel Road & Traffic Signs. (2019). Retrieved from https://anglo-list.com/general-3/transport-18/israel-road-signs |
| Are there street trees planted alongside the street? If so, what is the average spacing between trees? | Smart Growth. (2005). Retrieved from https://www.epa.gov/sites/production/files/2014-02/documents/ecocitycleveland.pdf |
| Does this street connect to an existing green space or park? | Walker, J. (2011). Basics: Walking Distance to Transit — Human Transit. Retrieved from https://humantransit.org/2011/04/basics-walking-distance-to-transit.html |
| What is the maintenance of the street like? Does the street have potholes, cracking, litter (overflowing trash items, broken glass), graffiti, unclear lane | http://www.wrrb.org/wp-content/uploads/2020/01/WRRB-BureauBrief-Walkability.pdf |
| What is the maintenance of the sidewalk like? Does the sidewalk have cracking, indentations, weeds, litter, graffiti, obstructions to path? | http://www.wrrb.org/wp-content/uploads/2020/01/WRRB-BureauBrief-Walkability.pdf |
| How close is a bus stop to the nearest grocery store? | Walker, J. (2011). Basics: Walking Distance to Transit — Human Transit. Retrieved from https://humantransit.org/2011/04/basics-walking-distance-to-transit.html |
| How close is a bus stop to a neighborhood school? | Walker, J. (2011). Basics: Walking Distance to Transit — Human Transit. Retrieved from https://humantransit.org/2011/04/basics-walking-distance-to-transit.html |
| How close is a bus stop to the nearest medical center? | Walker, J. (2011). Basics: Walking Distance to Transit — Human Transit. Retrieved from https://humantransit.org/2011/04/basics-walking-distance-to-transit.html |
| Do the bus routes on this street lead to other defined neighborhoods? | The Scorecard. Retrieved from https://www.itdp.org/library/standards-and-guides/the-bus-rapid-transit-standard/the-scorecard/ |
| Does this street connect to an arterial road? | National Association of City Transportation Officials. (2013). Urban Street Design Guide. Retrieved from http://www.metamorphosis-project.eu/sites/default/files/downloads/Urban_Street_Design_Guide_NACTO.pdf |
| Does the segment of the overall street connect to at least two other streets? | Smart Growth. (2005). Retrieved from https://www.epa.gov/sites/production/files/2014-02/documents/ecocitycleveland.pdf |

Appendix C: Website

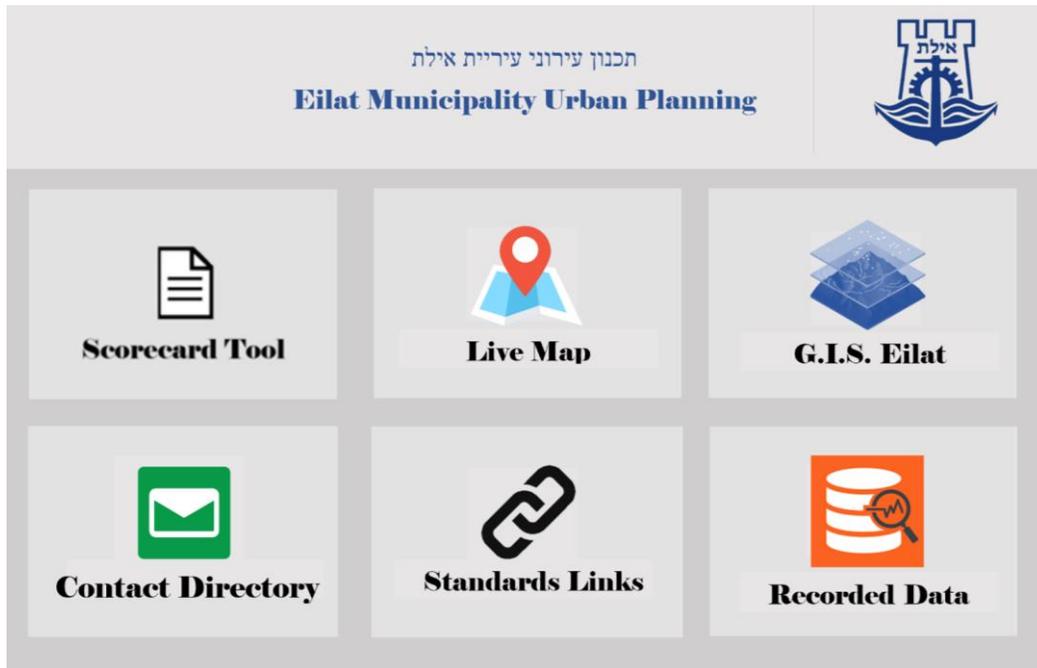


Figure A: Homepage

Figure B: Scorecard Web Page Window 1

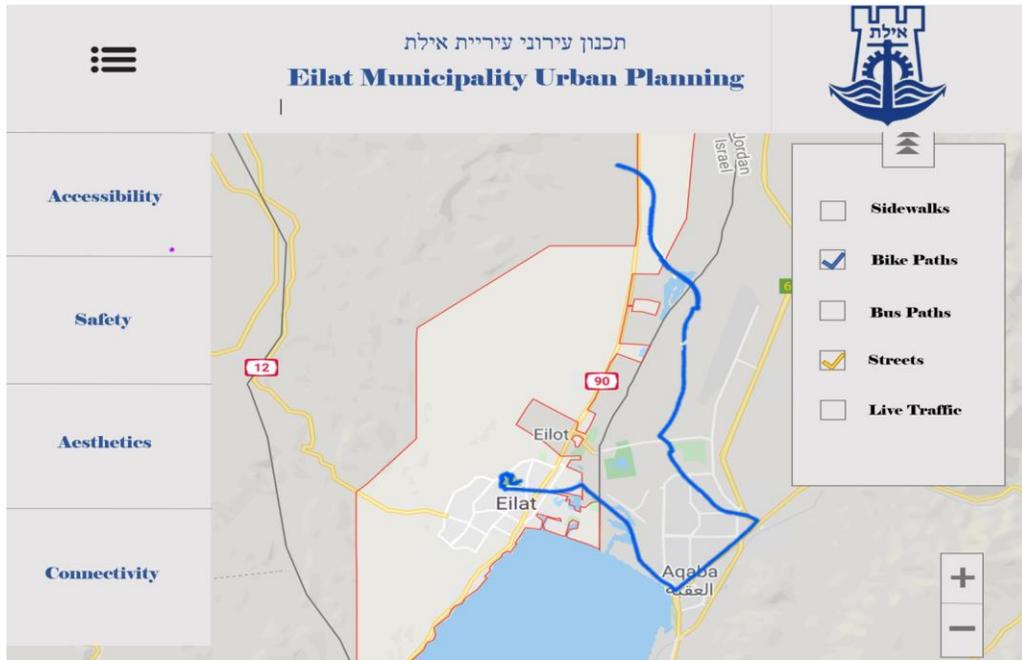


Figure C: Scorecard Web Page Window 2

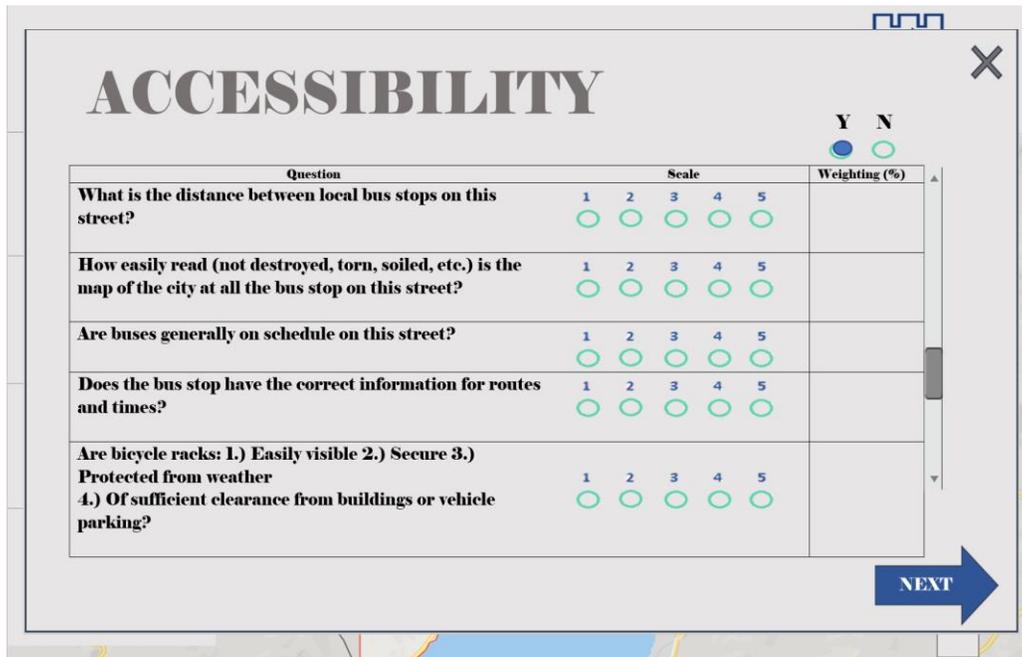


Figure D: Scorecard Web Page Window 2 Pop-up



Figure E: Scorecard Web Page Window 3

Appendix D: Additional Questions

Listed first are questions or concerns we had for our sponsors that we didn't get to ask fully or were only partially answered or addressed. The second list are potential questions for the scorecard that didn't necessarily fit in the scorecard either because of how this question would be tested or if it would be included in a later iteration. Listed third are general questions for Eilat in regards to their transportation and urban planning structure. These aren't all the questions that could go into these categories but we wanted to give a sampling of more information we wanted to know:

- Sponsor Questions/Concerns
 - We had differing definitions for the word efficiency. The sponsors clarified in some way what they're looking for us to define it from our research but that still doesn't tell us what their definition of efficiency is. A question to make sure to ask is, What is efficiency to you - our sponsors?
 - Shade is a subject that was constantly brought up and was an example parameter used in meetings. Has there been work done to increase or test shade levels in the city or was that something that was going to be tried with our project? What exactly is so important about shade? Why should it be a major feature in urban planning for Eilat?
 - What are all the 'needs' that should have/could have been in the scorecard? Meaning what content and features should be included that will allow the sponsors to complete their task
 - What are all the 'wants' that were being put into the scorecard? Meaning what content and features should be included that will allow the sponsors to complete their tasks easier
 - How is Israel's transportation planning similar to Germany's? Is it because of the way policies are implemented? Is it the citizens' reaction to transportation changes and updates? What exactly is it?
- Scorecard Questions
 - Is the speed limit maintained on the street?
 - Is there parking available during peak hours of the day?
 - Is paying for parking available on an app for non-residents?
 - How far away are the closest building entrances for places of work from bus stops?
 - How many shading elements are present on this street and what are they?
 - How many alley paths are on this street?
 - What type of parking is available on the street? Diagonal, horizontal, vertical?
 - What type of street furniture is there?
- Eilat Transportation Questions
 - If locals use a different naming convention for streets, neighborhoods, and buildings, why not incorporate it into the new naming convention the city uses?

- With the addition of the regional bus there are more options for individuals in the surrounding kibbutzim to get into Eilat and other kibbutzim. What were the considerations when creating the time table for the buses?
- Are there any plans for expansion of the central bus terminal?
- What determines the different widths of the pedestrian safety islands in the middle of roads?