APPENDIX A

Literature Review Summaries

FDOT BC353-28 - Measuring the Effectiveness of Community Impact Assessment

The FDOT article entitled "Measuring the Effectiveness of Community Impact Assessment" is a report that aims to measure the impacts from conducting community impact assessments (CIA). One of the essential elements of the report is the initial identification of eight basic qualities of an effective CIA, which are:

1. To provide a safe facility or service for the user and community,
2. To satisfy the purpose and need established by the involved parties,
3. To ensure that the action is in harmony with the community,
4. To ensure that the action makes efficient and effective use of resources,
5. The action will sustain and preserve resources,
6. The action will exceed the expectations of the designers and other stakeholders,
7. The action is designed, built, or otherwise implemented with minimal disruption to the community, and
8. The action is perceived by all partied to have added lasting value to the community.

These qualities are similar to CSS principles developed for NCHRP 15-32. Methods of evaluating these qualities are given, and are similar in nature to performance measures. Methods of public involvement to be used for each of these qualities are discussed as well.

The first project quality discussed is to provide a safe facility of service for the user and the community. Five measures are included as well as the data and analysis methods needed to perform the measures. The first measure is to determine whether crime in the area increased or decreased after the project. Crime statistics can be used to determine this. The next measure involves using data from emergency service agencies to see the effect on response times of emergency services. The third measure is to examine how people who use non-motorized transportation are affected by using a before and after comparison of crash data and hospital emergency department statistics. Another measure is to collect demographic data and primary data from residents to determine if residents feel more or less safe after the project. This is similar to the fifth measure of determining the perception of safety by the facility users. This can be measured using crash statistics and primary data from users. In addition to these measures, several public involvement methods are given to help collect public information. The first is community mapping, in which users, residents or resource agencies are consulted to help map attributes of the area and how they have been affected by the project. Focus groups, interviews of key persons, meetings, surveys or polls and walkability audits are also suggested. The key to an effective focus group is to make sure that participants represent a broad range of

people from the community. Questions should be limited to safety and security and participants should be asked why they feel the way they do and for possible solutions to any problems addressed. Interview of key persons, meetings and surveys are fairly self-explanatory, and the walkability audits simply involve either key persons or focus groups to evaluate the user-friendliness of the project for pedestrians and bicyclists.

The next project quality examined is to ensure that the project satisfies the stated purpose and need. There are seven measures noted for evaluating this quality. The first is to determine whether the project was prompted by a safety hazard correction. This can be done by identifying ways to impact crash occurrence such as number of crashes, injuries, fatalities, damage to property, and hazards to non-motorized traffic. The next measure examines economic development and the role it plays in the purpose and need statement. Traffic counts, data on number of businesses, and zoning information can be used to see if new travel demands could be generated due to economic activity. The third measure identifies whether levels of service improvements were important in purpose and need. Traffic counts, passenger boardings, pedestrian and bicycling facility needs can be analyzed to see if congestion can be decreased or capacity can be increased, or if non-motorized facilities can be improved. The significance of social demand in the purpose and need is another measure. Community suggestions and complaints, changes in education, human services or religious facilities, residential relocations as well as aesthetics can all be used too see if changes in social activities affect travel demands. The fifth measure examines how well the project fits with the existing transportation system. For this measure congestion levels as well as travel demand and volume that would support high speed and express services should be looked at to see where links within modes can be provided. The sixth measure, evaluates how well the project interfaces with other modes is the next step from measure five. Connectivity and the quality of transit and non-motorized traffic can be used to see where links between modes can be provided. The seventh measure determines whether transportation demand is supported by the purpose and need. Vehicle occupancy rates, congestion, crash data, energy consumption, non-motorized travel and the number of zero vehicle households can be used to generate alternative solutions that are useful to non-drivers. Two public involvement methods, visioning and opinion surveys are suggested to help with these measures. Visioning can use focus groups, meetings, charrettes, surveys and various other public involvement methods to examine how well the project meets its envisioned purpose and need. Opinion surveys can be used to determine community's knowledge of the project purpose and need, the project, and the project's relations to the purpose and need.

The third quality is to ensure that the action taken is in harmony with the community. According to this report, "(H)armony then can be measured in regard to the extent the action affects the community's ability to carry out social, economic, and other activities" (p. 36). The report also discusses harmony with regard to both the natural environment and the built and social environment considering aesthetics, visual impacts, and cultural and historical resources. A list of these features includes cultural landmarks and other resources, archaeological sites, historical districts or structures, modal facilities, scenic landscapes, trees and other natural features, and the displacement of residences and businesses. Some less tangible aspects of harmony, such as cultural symbols, should also be noted. Given these definitions and examples of what is meant by being in harmony with the community, it seems that this project quality corresponds with several of the CSS Principles defined in NCHRP 15-32 including: maintaining environmental harmony, addressing social and community issues, and addressing aesthetic treatments and enhancements. Therefore the six measures given could fall under any of these principles. The first measure requires an inventory of aesthetic resources, such as attractions, landmarks, and gathering places, to determine whether any changes have occurred and if those changes have affected the sense of the community with regards to safety and security. The second measure collects data on cultural and historic resources to determine changes in important community symbols or facilities. The third measure determines whether any visible changes have occurred, using tools such as photographic mapping, paintings, historical photographs, illustrations or videos. The next measure examines the level of public support for changes to these aesthetic, cultural and other resources. Requests for the designation of certain sites or facilities to be landmarks should be checked to ensure that these resources are preserved and that adverse impacts are minimized. The fifth measure determines how the project will affect households in the community using demographic, employment and housing information to do before-and-after comparisons and quantitative and sociodemographic assessments. It is important to know the effects on social networks that may be disturbed and to know whether the changes are temporary or not. The final measure identifies whether the project will displace community facilities, businesses, places of worship, etc. Inventories and maps of these facilities as well as economic information will be useful in assessments similar to those mentioned in the fifth measure. Social activities are the most important to be considered, and economic considerations are only secondary. There are four public involvement methods mentioned to help collect data to perform these measures. The use of meetings, visual records, windshield surveys and interviews and key informants are suggested. Visual records can be made using disposable and video cameras to do before-and-after comparisons. Windshield

surveys involve taking key informants on a tour of the area and allowing them to identify important cultural and historic resources.

The project quality of whether the project made efficient and effective use of resources is discussed next. The report takes into consideration economic, environmental and societal resources and lists four measures to estimate the CIA impacts. The first measure determines whether there is support for the resulting plan, project or service. The stated goals and objectives as well as the statement of purpose and need can be used to determine if the results of the project are in line with the initial objectives. The next measure examines whether there is support for the resulting plan, project or service. Surveys, interview data, comments and polls can be used to see how satisfied the public is with the project. The third measure ensures that the affected communities continued to be engaged throughout the decision making process. Data such as the number of participants in workshops and meetings and also the number of calls made to the public involvement telephone number can be used to determine how well the affected communities were reached and how well they participated throughout the process. The final measure determines whether resources were used responsibly. The responses to questions about expectations and how well expectations were met can help determine whether the community feels the time, budget and other assets that were invested were worth the outcome of the project. Surveys, interviews, meetings, and visualizations were suggested public involvement techniques to help complete the measures.

The fifth project quality deals with how well the project sustains and preserves resources. This is different from the fourth quality, since that evaluated sociocultural resources and the built environment, where this quality evaluates the effects on the natural environment. Some issues to be included are air and water quality, highway or storm water runoff, brownfields, and noise. There are four measures presented for this project quality. The first examines whether there will be significant effects on natural resources. There are various forms of data that can be used to do before-and-after analysis, check for compliance or enhancement of local plans and avoidance or mitigation of impacts. These data sources include air quality analyses, highway and/or storm water runoff data, location of native vegetation, transportation improvement programs, water quality action plans, wetland delineation and mitigations, locations of wildlife habitats, designated wild and scenic rivers, and locations of wilderness areas. The next measure identifies the effects the project will have on land uses. Known brownfield, farmland, hazardous waste, public parks, recreation and historical site locations can be used to do before-and-after comparisons, and to look for ways to enhance brownfields and hazardous waste sites and ways to minimize impacts on farmland, parks, and historical and recreational sites. The

next measure examines the important natural resources and land uses as the community views them. Through the use of public involvement data, photographs, local government plans and histories, comparisons with plans and archival data, as well as mitigation and enhancement opportunities can be determined so that important resources are identified and considered throughout the project. The final measure determines whether there are any opportunities to enhance natural resources and land uses. A list of enhancement activities is given in the report, including but not limited to providing bicycle and pedestrian facilities, scenic or historic highway programs, landscaping and scenic beautifications, historical preservation, control and removal of outdoor advertising, archaeological planning and research, public art, etc. In order to help obtain public input for these measures, meetings, stakeholder advisory groups and surveys are suggested as public involvement methods.

The sixth project quality is that the action exceeds the expectations of the designers and other stakeholders. While this does match one of the principles proposed in NCHRP 15-32, the measures used for this project quality could be utilized in the CSS principles of tracking and meeting all commitments, involving all stakeholders, and seeking broad-based public involvement. There are four measures to ensure that the public's expectations are met. The first identifies the goals included in the statement of purpose and need, as well as members of affected parties, special populations, changes made to the original statement and to look at whether or not input from the community was used in developing the statement of purpose and need. This project quality involves comparing the outcomes with the stated goals. The next measure examines the visions that the stakeholders had for the projects. To do this, documentation of facilities amenities, features and other developments should be obtained and checked to see whether or not those visions were incorporated into the project. The third measure reviews the commitments that were made to the stakeholders about the outcome of the project. Documentation from issues and solutions identified earlier are needed to ensure that commitments that were made are followed through by the responsible agencies. The final measure identifies the needs and expectations of special populations through demographic data, and ensures that the needs of racial minorities, low-income households, female-headed households, youths, elderly and other special populations are identified and incorporated into the project. There are three suggested public involvement methods, including revisiting the statement of purpose and need, visioning, and surveys, focus groups and workshops.

The seventh project quality examines how the project was implemented with minimal disruption to the community. Five measures are discussed for measuring the CIA impacts. The first measure determines the impacts identified by the affected parties. Anticipated effects

identified by affected parties can be used to monitor and document all impacts to ensure that they are being addressed. The second measure examines whether the project meets the design or the implementation plans. Plans previously formulated to mitigate disruptions should be used to ensure that the project is in compliance with them. The next measure estimates the number of residential, civic organizations or businesses relocated due to the project. This can be found by performing before and after comparisons using parcel data, tax assessors' records, business licenses and homeless censuses. The fourth measure is calculates the loss of trade incurred by businesses through before and after comparisons or sales and use of businesses. The final measure determines whether there has been a loss of access or mobility. Again, before and after comparisons are done, this time using data on changes in use of services, access to goods, crashes, etc. Some public involvement techniques suggested to help identify disruptive effects, includes cognitive or mental maps, visual imaging and map overlays, public meetings, and telephone hotlines, a project office or comment cards.

The final project quality is that the project is perceived by all parties as having added "lasting value" to the community. The measures for this project quality are simply the seven other project qualities: the project provides a safe facility; it meets the purpose and need; it is harmonious; it sustains and preserves cultural, historic, and other valued resources; efficient and effective use of resources is made; the stakeholders expectations are exceeded; and negative impacts are avoided, minimized or mitigated. Basically, if the measures discussed in the previous seven sections show that those qualities have been met, then the project will have added a lasting value to the community.

While this report does not identify the exact same context sensitive solution principles, the eight standards of CSS do take into account the principles we have identified as being key in CSS. The measures identified can be used in our research as measurements of how successful CSS projects are in meeting its 15 principles.

NCHRP Report 456 – A Guidebook for Assessing the Social and Economic Effects of Transportation Projects

The objective of this research effort was to develop a guide that will allow the assessment of social and economic effects of transportation projects. The efforts concentrated in analyzing 11 different areas that could be affected by a transportation project, which were: travel time, safety, vehicle operating costs, transportation choice, accessibility, community cohesion, economic development, traffic noise, visual quality, property values and distributive

effects. For each of these areas guidelines were developed indicating when the analysis should be performed, the steps to be taken, and the methods of analysis. The sections on safety, transportation choice, community cohesion and visual quality, closely relate to some of the CSS principles proposed in NCHRP 15-32. While the analyses discussed do not actually provide performance measures, they can be used as methods to measure the benefits of CSS principles.

Considering a safe facility for users & community is a CSS principle that can be applied in almost all phases of the project development process. Section 3 of the report discusses steps to analyze the safety of a project as well as methods to quantify the overall safety value of a project. The repost states that road safety can be affected by projects that increase capacity and reduce congestion, projects that change signals, turn lanes and passing restrictions, and projects that improve road conditions. Most transportation projects often require a safety analysis, and a four-step analysis is outlined in the report. These steps are: 1. selection of evaluation method; 2. collection of appropriate and required data; 3. estimation of safety level of and changes from the project; and 4. analysis of the safety of a proposed project in conjunction with the level of user benefits from the chosen alternative.

The report outlines 4 methods that can be used in the first step of the analysis. The first method involves using national crash data to determine the effects on safety of a project. The resources for collecting data, as well as information on how to estimate crashes and assign monetary values for the proposed project are discussed. Another method is the comparison approach which compares the existing roads with other similar roads in the region and identifying roads in the region similar to the proposed roadway. Comparisons are made to attempt to estimate the change in crash rates if the project is carried through. The third method is development of regression models where crash data is collected based on a characteristic of the road, such as curvature, lane width, shoulder composition, traffic volume, etc. The characteristics of the proposed road can be correlated with the data of the various characteristics and safety evaluated. The fourth method to evaluate the safety of a transportation project is the bicycle safety index (BSI), which as the name suggests, evaluates safety with regards to cyclists. This index is determined based on an equation that considers pavement factors, location factors and roadway characteristics such as AADT, number of lanes, speed limit, and width of outside lane. The estimate resulting from the equation indicates the safety of a proposed roadway with respect to cyclists. Using these methods the safety of proposed projects, which is a key principle of context sensitive design, can be quantified and determined.

Section 5 of the report discusses how to measure the effect of a transportation project on transportation choices. This correlates with the CSS principle of addressing all alternatives and modes, which is most influential in the programming, planning and design phases of a project. The report provides several examples of projects that would affect various transportation alternatives and modes, such as road widening, increasing traffic volume, eliminating transit stops, trails sidewalks and other non-motorized facilities, reduction of shoulder width, addition of rumble strips, increase in city block length, increase in number of driveways that intersect non-motorized facilities and increase in the incline of pedestrian or bicycle facilities. In order to analyze the effects of these kinds of projects a four-step process is provided. The first step is to define the study area. This identifies the neighborhoods and infrastructure that will be affected by the project. Next, all of the existing motorized and non-motorized transportation facilities should be documented, followed by determining the demand for the various modes. The final step is the evaluation of the effects on safety and mobility.

There are 7 methods proposed for this analysis. The first method is the use of case studies, which is similar to the comparison method described in the section on safety. Basically, similar projects are studied and compared to predict the effects of a particular project. The second method is a qualitative analysis, which looks to answer the question, “will this project affect the number and quality of transportation choices?” The key to qualitatively asses this is collection of appropriate information. First the transportation modes being considered must be identified. Next standards from each mode should be determined based on overall goals, such as whether the goal for each mode is to provide transportation options to disadvantaged persons or to alleviate congestion among other modes or to simply improve quality of life by adding recreation. It is also important to know the values and preferences of the community. From having an estimate for these elements, a list of indicators that will reflect preferences and concerns of persons affected by the project can be developed and the ability of the project to provide mode options can be evaluated based on those indicators. The third method discussed is user demand and evaluation surveys. These surveys can be given to walkers and cyclists to determine current conditions and issues for walkers and cyclists and the project design can be altered to meet the needs addressed in these surveys. The fourth method discussed is the use of improved transportation surveys and models. This method looks to improve the quality of surveys with respect to travel demand to alternative modes, travel requirements of transportation disadvantaged persons and functional barriers to the use of alternative transportation, all things that traditional surveys do not accurately reflect. In order to improve survey quality it is important to know the number of people with transportation-relevant attributes such as being low-income,

having a disability, being a commuter, etc., as well as knowing the demand for transportation alternatives by each of these groups. The current quality of various modes as well as barriers to these modes should also be investigated. The analysis of this data can be used to better determine how a transportation project will affect various modes. The fifth method is the bicycle compatibility index (BCI), which evaluates cycling conditions and can predict how projects will affect cycling. It is similar to the bicycle safety index discussed earlier, in that the BCI is a function dependent on variables such as presence of bike lane or paved shoulder, the width of the bike lane or paved shoulder, the curb lane width, the curb lane volume, other lane volumes, 85th percentile speed, presence of parking lanes with more than 30% occupancy, type of roadside development, and the sum of truck volume factor, parking turnover factor and right turn factor. Based on the value given for the BCI there is an index that provides the compatibility of the average adult cyclist. The sixth method is pedestrian street crossings, where crossings are given a level of service. This can be assessed by pedestrian delay, which states that the longer people have to wait; the more likely they are to not wait for a cross walk signal or for traffic to clear. A table has been developed that provides a level of service for a crossing based on delays, and this table can be used to evaluate the effect of a project on pedestrian crossings. The final method listed is the barrier effect analysis. The report defines the barrier effect as "the negative effect that highways and vehicle traffic can have on non-motorized mobility," which can be quantified by calculating additional travel delay that pedestrians and cyclists experience. Information such as number of pedestrian crossings, AADT, flow speed, vehicle mix, demographic information and land use patterns should be collected and once this is done, the report outlines a three step process that can calculate barrier effect. The first step is to calculate barrier size, which is dependent on average annual daily traffic, correction factor for trucks, and average traffic flow speed. Crossing potential is calculated in the second step, and another equation, dependent on population density, portion of total population for each age range and crossing potential factor for each age ranged summed over all ages, is provided for the calculation. The final step is to calculate total disruption per kilometer of barrier which is dependent upon an adjustment for controlled crossings, crossing potential, a relative disruption factor and barrier size. This will give a result which is an amount of total disruption. The same process should be taken for the proposed transportation project and the two values of total disruption can be compared to quantify the effect of the project on all modes.

Section 7 of the report is on community cohesion, which is similar to the CSS principle of addressing community and social issues. Because transportation projects can have large impacts on neighborhoods, businesses and communities, community cohesion is a crucial issue

to be considered. There are five steps in the analysis of the effect a project will have on community cohesion, the first being to define the study area, which can be done through collection and analysis of census data, work with community leaders and identification of community facilities and geological features. Next information on social institutions, activity centers, and other binding community features should be gathered from community leaders and civic groups. The third step is to spend time in the community and get to know its workings and dynamics. Next, with all the information and observations an estimate of the existing level of community cohesion should be made, and finally the effects that the project will have on existing community cohesion, whether positive or negative, should be determined and discussed.

There are four suggested methods that can be used to determine the effect a project will have on community cohesion. The first method is the use of interviews, focus groups and surveys. In order to optimize the use of this method it is important to make sure that a group of community and neighborhood leaders such as clergy, business owners and community activists, and also a group that includes a range of citizens are involved in the process. Also, the questionnaire, survey or interview guide should include questions about where community-serving stores and service and recreation facilities are located, as well as special populations, pedestrian pathways and commonly traveled routes, and other special issues that might affect community cohesion. A list of potential effects that the project will have on community cohesion, or a database can be used to determine the most critical effects as well as what can be done to mitigate them. The second method is that of site analysis, which involves spending time in the community, meeting residents and learning from them as well as photographing the area. A site visit is considered essential to identify and determine the buildings, houses, roadways and other facilities that will be affected and possibly relocated as a result of the project. It is important to know the number of people, businesses and families that will be relocated. A third method is the use of maps and aerial photographs. This method will provide a means of showing the effects of the project so that affected facilities can be visually identified. Also, various alternatives can be looked at and alternatives that may have better effects on community cohesion can be explored. This method also provides a way to present visuals to residents so they may better understand the project and how it will affect their community. The fourth method is the use of a database on structures. The database should include information on structures that will be razed and occupant who will be relocated. The current use, size, number of businesses, number of residential units, occupancy, number of employees, value, rental rates, and ownership status are details that should be included in the databases. Through the use of these four methods, the

benefits and consequences that a project will have on community cohesion can be accurately measured and quantified.

Section 10 on Visual Quality is the last section of the report that helps identify methods of quantifying the benefits of CSS principles. This section corresponds to the CSS principle of providing aesthetic treatments & enhancements. Transportation projects can have significant impacts on the visual quality of an area. This section begins with a list of ways to measure visual quality. The concept of "legibility" in an urban area is used as the means of measuring visual quality and is defined in the report as "the ease with which its part can be recognized and can be organized into a coherent pattern." The legibility is determined by topological elements such as paths, edges, districts, nodes and landmarks. Lynch is the developer of this concept and his research found that paths, mainly roadways are the main thing that people think of when they think of a community, and that it is important that features such as trees are placed along it in order to provide continuity, as well as landmarks and nodes (i.e. bridges), to give the road texture. Finally attractive lighting and other features should be added in order to avoid a boring roadway. The analysis and methods discussed in this section describe ways to put the legibility concept into practice. First, the steps in the analysis are given, starting with defining the study area. The second step is to determine what changes to visual quality that would be affected by the proposed project as well as possible alternatives. Next, the medium or media by which the environment is to be represented on should be determined. The fourth step involves identifying persons who would be able to determine the effects that the project would likely have on visual quality. Next determine how the chosen persons' opinions and responses can be evaluated, and finally those responses should be analyzed so that changes that need to be made to avoid harsh impacts on visual quality can be discussed.

Six methods for simulating and evaluating visual effects are discussed. Each of these methods should be able to simulate the area before and after the project, and also be able to depict operational characteristics such as staff capabilities, cost and production time. The first method is the use of visual preference surveys. This is a method that should be used early in the planning phase, and involves showing a series of slides of different design features and concepts that would be similar to options for the proposed project and determining person's preferences with respect to various features and concepts. Participants are given only a few seconds to rate each slide on a scale of -10 to +10, and their immediate reactions can be recorded and analyzed. The second method is analogous case studies, in which various pictures of different types of designs and mitigation efforts are shown to focus groups, and their responses are used to determine their preferences towards various visual effects. The third

method is the use of artist's sketches. In this method photos are taken of the project site and sketches of various options are created. Respondents' preferences are collected and statistics are generated that can be used to evaluate how well the final project meets the preferences of the users. The fourth method is the use of photo-realism techniques. This method is similar to that of artists' sketches, however digitized photos are used and various views and more photos can be evaluated. The number of views to be used, as well as how many photos to use and if an actual picture or a simulated background should be used, all must first be determined. The number of photos as well as the sequence in which they will be shown should also be considered. The results can be analyzed similarly to that of artists' sketches. The fifth method consists of GIS-based approaches. This method is useful for the legibility concept discussed earlier. GIS can be used to identify important nodes, landmarks, boundaries and edges that are important for respondents to identify to fully visualize the effects of the project. The sixth method is the use of virtual metropolitan models, which basically combines the previous methods to create a virtual model with a high level of detail. This method is the best for being able to assess how visual quality would be affected by a transportation project, however they are very expensive and time consuming. One characteristic that all of these methods have in common is that they utilize the public who will be the end users of the project. Community involvement is another principle of CSS and is incorporated in the visual effects analysis. Using the analysis and methods provided, researchers can gain an understanding of what a particular community values aesthetically and can have a standard by which to measure their final project.