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City Mobility Planning

H O U S T O N

Technical Memorandum # 1:
The City Mobility Planning Process

List of Acronyms

CIP – Capital Improvement Program
CMP – City Mobility Planning
CMS – Congestion Management Systems
ETJ – Extraterritorial Jurisdiction
GCFRD – Gulf Coast Freight Rail District
HAS – Houston Airport System
H-GAC – The Houston-Galveston Area Council
HOT Lanes– High Occupancy Toll Lanes
HOV Lanes – High Occupancy Vehicle Lanes
ITS – Intelligent Transportation Systems
METRO – The Metropolitan Transit Authority of Harris County
Model – Travel Demand Model
MTFP – Major Thoroughfare and Freeway Plan
RTP – Regional Transportation Plan
TAC – Technical Advisory Committee
TDM – Transportation Demand Management
TIP – Transportation Improvement Program
TIRZ – Tax Increment Reinvestment Zone
TPC – Transportation Policy Council
TSM – Transportation System Management
TTD – Traffic and Transportation Division
TxDOT – The Texas Department of Transportation
UTP – Unified Transportation Program

The City Mobility Planning Process

The City of Houston is growing rapidly, with its population predicted to grow by more than 700,000 by 2035. With this increase in population will come an increase in the number of jobs and entertainment destinations within the City, and a corresponding increase in travel demand throughout the City, the ETJ, and the region. Providing for the mobility necessary to support the present and future population of the City will be a challenging task. As the region grows and develops, travel in and around the region will change continually. Additionally, with limited funding available, transportation projects that are undertaken need to be effective and efficient.

A number of plans have been developed in Houston that set out values and goals for mobility, and several agencies are responsible for developing transportation projects to meet the need. To facilitate informed decisions about the mobility options, the City of Houston is creating a City Mobility Planning (CMP) Process that can be used to select projects with the most potential to improve mobility. Key elements of the CMP Process include a travel demand model that accurately reflects travel demand and available 'supply,' a 'toolkit' for prioritizing proposed projects, and measures of effectiveness that can be used to evaluate the extent to which selected projects are effective in improving mobility within the City and its ETJ. To ensure that the CMP Process is able to adjust to the continual changes that are expected, the toolkit will be flexible and able to consider a multitude of mobility options as the City continues to grow. As a result, some tools in the toolkit may not be in use currently, but as the technology options for mobility increase, the CMP Process will be able to adapt and consider these new options.

What follows is a description of the initial steps taken in developing the City Mobility Planning Process, specifically: the goals and principals that are driving the CMP Process; a review of local plans that influence mobility in Houston and their relevance to the CMP Process; and a review of tools and measures being used in peer cities.

Goals and Principles Driving the City Mobility Planning Process

Two recent public outreach events – Blueprint Houston's Citizen Congress and the Houston-Galveston Area Council's Envision Houston + Region – established goals for mobility in Houston. In recognition of this public input, the City of Houston's Planning Commission established a set of guidelines for the CMP Process based on these goals. To ensure clarity about the goals, and to establish objectives and observation metrics for the CMP Process, the goals from each effort were reviewed. The following is a summary of the mobility-related goals that emerged from these two efforts.

Envision Houston + Region and the 2035 Regional Transportation Plan (H-GAC)

The five goals that were proposed in the Envision Houston + Region process have been carried forward as Goals and associated Actions for the 2035 Regional Transportation Plan (RTP) created by H-GAC. They are as follows:

Goal 1: Better mobility, less congestion and cost.

Action 1: The 2035 RTP has expanded the scope of innovative approaches to improving mobility and accessibility in the region, such as coordinating land use and transportation.

Goal 2: Easier access to jobs, homes and services.

Action 2: The 2035 RTP proposes considering more efficient development patterns where work, shopping and leisure activities are grouped together, allowing people to combine multiple destinations into one trip.

Goal 3: Preservation of floodplains for reservoirs and recreation.

Action 3: The 2035 RTP recognizes the challenges of continued development in the floodplains, as well as the potential benefits of preserving green space for use as both recreational areas and storm water detention basins.

Goal 4: Expanded transit alternatives.

Action 4: The 2035 RTP recognizes that the region cannot build itself out of congestion. A state-of-the-art, efficient public transportation system is a necessary component of any future transportation system. METRO's 2035 Long Range Plan also reflects this awareness and includes a significant expansion of transit services, including new Commuter Rail lines, new Light Rail and Guided Rail Transit lines, new signature express bus service, and new transit facilities.

Goal 5: Healthier environment by preserving the region's green space and improving air quality.

Action 5: The 2035 RTP recognizes the importance of the natural environment to the region's quality of life.

Blueprint Houston's Citizen Congress

A total of 29 goals were proposed in Blueprint Houston's planning effort. Of these goals, eleven were related to mobility and considered in the guidelines established by the Planning Commission. The goals that were reviewed for this effort include the following (Goal numbers are those assigned by Blueprint Houston):

Environmental Goals

Goal 7. Air Quality – Houston improves the quality of its air and in turn improves the quality of life and health of its citizens.

Goal 8. Flood Management – Houston develops and adopts a flood management plan that encourages cooperation among City, County and developers in all aspects of flood management.

Goal 9. Preservation, Parks, and Trails – Houston adds, preserves and restores natural areas; creates more parks evenly distributed geographically and accessibly to all citizens; develops linear parks along bayous; and connects neighborhoods with hike and bike trails.

Infrastructure and Services Goals

Goal 12. Infrastructure Provision and Maintenance – Houston maintains and improves its infrastructure - including streets, roads, sidewalks, traffic management devices and public facilities – in an efficient and fiscally responsible manner.

Planning and Managing Growth Goals

Goal 16. Community Appearance – Houston's neighborhoods become beautiful, well-preserved, and free of visual blight supported by appropriate development standards that respect their unique identity and values.

Goal 17. Growth Management – Houston creates a master plan for city growth that fosters dense, vibrant urban cores surrounded by affordable, accessible, diverse, mixed-use neighborhoods.

Goal 18. Neighborhoods and Regulations – Houston protects and strengthens its neighborhoods through sensible application of regulations.

Redevelopment Goals

Goal 20. Urban Cores – Houston promotes the revitalization of vibrant, walkable urban cores as entertainment, workplace, and residential destinations, preserving historic older areas and neighborhoods and promoting sensitive new development.

Transportation Goals

Goal 27. Alternative Transportation – Houston improves and expands existing pedestrian trails and bike paths providing alternative transportation options and ensuring safety and connectivity.

Goal 28. Public Transportation – Houston develops a public transit system that reduces traffic congestion, improves air quality, provides increased density and mobility options throughout the region, and that is clean, fast, efficient, high frequency, comfortable, accessible and well-routed.

Goal 29. Roads and Congestion – Houston supports a coordinated and accessible network of streets, roads and expressways that are well-built, well-maintained and integrated with other modes of transportation; that reduce congestion through traffic management, road construction, and parking; and that are aesthetically pleasing.

Based on these sixteen goals, the City Planning Commission established the following Guiding Principles for the CMP Process.

City of Houston Planning Commission Guiding Principles

1. Mobility is a key factor in community's vitality.
2. Costs associated with new development/redevelopment must be equitably allocated.
3. Access (curb cuts/medians) must be consistently and pro-actively managed.
4. Right-of-way standards for future major arteries must reflect "best practices," fully recognize aesthetic concerns, and anticipate peak traffic volumes at fully developed conditions.
5. Neighborhood concerns must be carefully balanced with the need to maintain circulation (recognize the value of connectivity/circulation).
6. Long-term "notice" provided by Major Thoroughfare Plan must be effectively publicized and communicated.
7. Non-structural approaches should be considered as well as new road construction.

Local Plans that Influence Mobility in Houston

An effective CMP Process requires an accurate picture of existing transportation conditions and travel demand, and awareness about transportation projects that are proposed or under development. As a means of capturing this information for ready analysis, a CMP travel model will be developed that incorporates relevant information from the following plans. Additionally, any tools and measures that are used in these local plans will be considered in the development of the CMP toolkit and measures of effectiveness (MOEs).

The Houston-Galveston Area Council (H-GAC)

The Houston-Galveston Area Council (H-GAC) develops and maintains short- and long-range plans for the 8-county metropolitan planning region. These plans include projects that are developed by local governmental agencies. Some of the plans contain projects funded completely by local funds while many are funded by a combination of local, federal, and state funds. H-GAC is responsible for the following activities:

- 2035 Regional Transportation Plan (RTP)
- Transportation Improvement Plan (TIP, 5 year list of transportation projects)
- Regional Commuter Rail Connectivity Study
- Access Management Corridor Plans

- Hurricane Evacuation Planning
- Bicycle and Pedestrian Planning
- Livable Centers Initiative

Relevance to the CMP: *The H-GAC travel demand model will be refined to develop a travel demand model for the City Mobility Planning Process. Refinements will include: verifying population and employment segregated by traffic analysis zones (TAZs), expanding the existing street network to include more collector streets, and checking the transit network. Additionally, all of the planned projects within the City of Houston will be added to the City Mobility Planning (CMP) travel demand model and will be used as a baseline for*

Texas Department of Transportation (TxDOT)

TxDOT, in cooperation with local and regional officials, is responsible for planning, designing, building, operating and maintaining the state's transportation system. As such TxDOT plays a major role in the region in defining and including projects in the H-GAC TIP and RTP. Corridor studies are underway throughout the region and are in various stages of development from planning to construction. Once adopted by the Transportation Policy Council, corridor recommendations are incorporated into the long range plans and are added to the H-GAC model.

Relevance to the CMP*: The entire planned TxDOT state highway and numerous adopted corridor studies will be verified and included in the City Mobility Planning Model. Since H-GAC coordinates with TxDOT regarding planned projects, all of the planned projects are already in the H-GAC model and as such are incorporated into the CMP Model.*

Harris County

In June 2007, Harris County Commissioners Court adopted a five year Capital Improvement Plan proposed by the Public Infrastructure Department (PID). The PID is an amalgamation of county departments including the Toll Road Authority, the Flood Control District, Architecture & Engineering, Facilities and Property Management, Right-of-Way, Planning and Operations, and Construction Programs. Infrastructure projects in the current County CIP are funded, with a combination of toll road revenue and bonds.

Relevance to the CMP:

The projects that are planned by the County will be verified and added to the City Mobility Model. As projects are added and removed from the County plan, they also have to be coordinated with the HGAC TIP. All of these projects have been included in the CMP Model and will be used as a baseline for future planning for the City.

City of Houston

In April 2008, the Houston City Council approved the 2009-2013 Capital Improvement Plan for each of the City of Houston departments. The projects shown in the Street and Traffic CIP include projects to reconstruct local streets within subdivisions to improve the quality of life for the residents of Houston. Other projects are included to improve mobility.

Relevance to the CMP:

All the City planned projects will be verified and included within the City Mobility Model. Moreover, additional existing road segments have been added to the City Mobility Model that were not included in the H-GAC model. These include major collectors and in some cases local streets that act as collectors.

The Metropolitan Transit Authority of Harris County (METRO)

In November 2003, voters approved METRO Solutions, a comprehensive transit system plan designed to help resolve some of the region's traffic congestion. METRO Solution's transit improvement program includes light rail, commuter rail, Signature bus service, transit facilities, and the conversion of High Occupancy Vehicle (HOV) lanes to High Occupancy Toll (HOT) lanes. These high capacity transit options will be supported by METRO's regular bus service and park and ride lots.

Relevance to the CMP:

The transit improvements in METRO Solutions will be verified within the City Mobility Plan travel demand model. This poses other relevant issues such as coordinating City street design to function better with transit vehicles, pedestrian amenity planning to allow safe walking to transit stops, and planning for bicycle facilities as an extension to the transit system. The integration of fixed-guideway transit systems into the current street pattern will be facilitated by the incorporation of transit elements into the transit street cross sections.

Port of Houston

The Port of Houston is ranked first in the United States in foreign waterborne tonnage and second in the U.S. in total tonnage. The rail and truck traffic generated by the Port will continue to grow as the industrial population of Houston expands to support the increase in population and employment of the area. The completion of the Panama Canal expansion is also expected to increase the freight moving through the Port. The Port works with Harris County and TxDOT to provide the land-side infrastructure needed to support their activities.

Relevance to the CMP:

Data provided by the Port will be used for freight and employment trip generation, and incorporated into the City Mobility travel demand model.

Houston Airport System

The Houston Airport System (HAS) operates three airports in Houston including George Bush International Airport, William P. Hobby Airport and Ellington Field. Master plans were developed for each facility, each of which provides a summary of existing ground transportation and improvements needed to support future activities. HAS works with the City of Houston, Harris County and TxDOT to plan and develop the needed infrastructure.

Relevance to the CMP:

Some of the projects in the Aviation section of the City's CIP will be included in the CMP model. Other projects included in TxDOT's Unified Transportation Plan require funding verification. Additionally, data provided in the master plans will be useful in trip generation for both people and freight in the City Mobility travel demand model.

City of Houston Major Thoroughfare and Freeway Plan

The Major Thoroughfare and Freeway Plan (MTFP) is maintained by the City's Planning Department. The current MTFP is the result of years of work as it is updated annually as a result of additions and deletions approved by the Planning Commission. No time schedule is assigned to the development of any of the facilities. Many of the proposed streets are built as the result of land development.

The MTFP is the cornerstone of relevance to the City Mobility Planning Process. *The result of various alternatives from the CMP Toolbox can affect the alignments and design of many of the future thoroughfares. In addition, existing thoroughfares may require retrofitting and additional improvements as a result of the City Mobility Planning efforts. The CMP process is designed to allow the City to consider the impact of future development on the Major Thorough Fare Plan.*

City of Houston General Plan

The City of Houston has a begun the process of creating an overall General Plan which includes elements of drainage planning and drainage, airports, emergency preparedness; fire protection; housing; infrastructure; libraries; mobility; parks; and traffic. The City Mobility Planning Process is being conducted under the auspices of the General Plan.

Relevance to the CMP:

As the General Plan Elements are described in more detail, it will be important to examine the Elements to ensure that they are working in concert with one another. Additionally, specific elements, such as housing and drainage, will interact with the City Mobility Planning Process throughout the life-cycle of their implementation and as such should be regularly examined for opportunities to connect.

Traffic and Transportation Division Strategic Plan

The Traffic and Transportation Division exists to facilitate safe and efficient mobility on city streets. The goals and objectives of their Strategic Plan are to develop new and sustainable resources and to increase organizational readiness so as to achieve their mission of "to keep Houston moving."

Relevance to the CMP:

It will become the responsibility of the Traffic and Transportation Division to implement certain aspects of the City Mobility Planning Process. Therefore, it is important that the division's goals for increased efficiency and staff training for the technical nature of implementing mobility tools be realized. Additionally, it is important that as the CMP Process progresses, the attitude of constituents are collected to determine the effect of the mobility improvements recommended by the CMP Process. Recommended methods for collecting constituent attitudes are presented in the Traffic and Transportation Division's Strategic Plan report.

Urban Corridor Planning

Urban Corridor Planning is working to change the City's land development regulations and infrastructure standards to accommodate a broad range of mobility options – walking, bicycling, public transit, and driving – to improve access to jobs, services, entertainment and recreation, now and in the future. Urban Corridor Planning is concentrated on the areas surrounding the five light rail and guided rapid transit corridors currently being developed by METRO, focusing especially on areas around the transit stations. Urban Corridor Planning will not result in land use zoning, nor will it affect METRO's decisions on the transit alignments.

Relevance to the CMP:

The outcomes of the Urban Corridor Planning process will include development regulations and infrastructure standards for more transit-supportive built environment. Relevant elements of the Urban Corridor Planning will be incorporated into the development of alternative street design standards, which are being proposed in the CMP Process.

Main Street Strategic Plan

The Main Street Coalition developed a Main Street Strategic Plan for eight miles of Main Street, stretching from Buffalo Bayou to Reliant Stadium. The plan, which is being implemented over a 20 year period, is designed to make Main Street the signature boulevard of Houston. The plan includes streetscape improvements and other amenities that will facilitate the redevelopment of Main Street and make it a desirable place to live, work, and play.

Relevance to the CMP *is found in their proposed typical sections for streets. These will be reviewed in the CMP Process' preparation of new street standards. Additionally, the reduction or change in capacity will be included in the City Mobility Model to gauge the implications for mobility.*

Blueprint Houston Compendium of Plans

This Compendium of Plans reviews and analyzes 35 different plans for Houston that have been produced over the last 13 years. It provides a summary of common elements as well as gaps found in these plans.

Relevance to the CMP:

The analysis of common elements and gaps was used in the development of the goals established for the CMP Process. Additionally, as the mobility toolbox is developed in later stages, this analysis will be a reference point for considering options in which the community expressed an interest.

Gulf Coast Freight Rail District

The Gulf Coast Freight Rail District (GCFRD) was formed to facilitate improvements to the existing rail system in the Houston region. With increases in rail traffic projected, the mobility of Houston will continue to deteriorate if delays of at-grade crossings are not addressed. A TxDOT study proposed improvements that include building rail bypasses around Houston, and the GCFRD is currently assessing which of these improvements to undertake first. However, these improvements alone are not expected to not solve all the rail congestion problems.

Relevance to the CMP:

The freight rail study included very detailed information about the movement of freight via multiple modes of transport within the Houston Region. This information will be included in the travel demand model to identify areas that are prone to heavy volumes of truck and freight traffic. Projects identified by GCFRD will improve the overall mobility of the region through the use of grade separations and other freight related improvements. These projects are crucial to the continued growth of the City.

Management Districts

Management Districts are political subdivisions of the state and as such have the power to levy taxes and assess property owners in order to make improvements and offer services that benefit those that live and work within their boundaries. There are 16 management districts in the Houston area, most of which have developed plans to improve mobility within their designated area.

Relevance to the CMP:

Management district funds often are sufficient to support the cost of their transportation projects and so these plans are reviewed during the annual MTFP update cycles. These plans have been included in the baseline CMP travel demand model and plans for increased population and employment within the management districts have been incorporated into the CMP travel demand model. However, as subsequent plans are made, this information will need to be updated to ensure that proposed growth patterns are accurately reflected in the travel demand model.

Tax Increment Reinvestment Zones

Tax Increment Reinvestment Zones (TIRZ) facilitate the redevelopment of an area by using taxes that are attributable to new development to fund projects that will attract additional investment in the area. There are 22 TIRZs located within the City of Houston. TIRZ funds can be used to support transportation projects within their boundaries.

Relevance to the CMP:

Because TIRZ funds can be used to support transportation projects within their boundaries, their plans have been incorporated into the CMP travel demand model. Like the management district plans, updates to TIRZ plans need to be incorporated into future versions of the CMP travel demand model to ensure the connectivity of all modes within the City.

Other Mobility Stakeholders

The CMP Team also reviewed the plans of several other mobility stakeholders that were deemed to have an impact on transportation demand in the region. These include stakeholders such as universities and colleges, not-for-profit entities, and chambers of commerce. The population and employment patterns that are reflected in these plans has been included in the CMP travel demand model, but beyond that, given their lack of funding sources and implementation abilities, these plans will have limited impact on mobility.

The Mobility Planning Process: A Peer Review

Most large urban communities share the challenge of improving mobility and many cities have undertaken similar processes to develop strategies to alleviate congestion. In order to learn from these other city efforts, the CMP Team examined the mobility plans of 10 large cities and regions across the United States. Plans developed by the agencies listed below were reviewed with the goal of identifying strategies, tools and techniques that could be effectively incorporated into Houston's Mobility Planning Process. What follows are brief summaries of these plans, noting specifically the focus of the plan; relevant components that potentially address the City's needs, such as appropriate strategies, tools, and MOEs; and the relevance of the overall plan on the City Mobility Planning Process. Where appropriate, best practices that are identified within these peer city plans will be built upon and customized to work within the City of Houston.

1. **Atlanta Regional Commission**
2. **City of Denver**
3. **City of Dallas**
4. **Regional Transportation Commission of Southern Nevada (Las Vegas)**
5. **Maricopa Association of Governments (Phoenix)**
6. **Metropolitan Council (Minneapolis/St. Paul)**
7. **Miami-Dade Metropolitan Planning Organization**
8. **Bexar County Metropolitan Planning Organization (San Antonio)**
9. **San Diego Association of Governments**
10. **Southern California Association of Governments (Los Angeles)**

Envision6 (Atlanta)

Focus of the Plan

In 2007, Atlanta created a vision for mobility that would meet the mobility needs of the forecasted 6 million people within the region. The Atlanta Regional Commission (ARC) posed the following question to guide the vision: "How can we accommodate this growth and still maintain our high quality of life?" This process resulted in the *Envision6 Regional Transportation Plan*, *2008-2013 Transportation Improvement Program*, and *Unified Growth Policy Map*.

Relevant Components of the Plan

Envision6 tested the potential effect of proposed improvements on overall regional mobility. Rather than focusing only on roads or transit or system bottle-necks, the plan created a balance of projects that met the overall mobility needs of the region. This balanced approach was key to successfully crafting a plan that truly balanced the needs of everyone.

Plan Relevance to Houston

Like Houston, Atlanta is a city with rapid population growth and a vast transportation infrastructure. What is relevant about Atlanta's planning process is that they have been able to overcome large growth projections while being fiscally constrained. Key to Atlanta's approach was using a number of measures to prioritize projects that would most benefit the region and outlining multimodal concepts that would improve the mobility within the region. These measures include travel time savings using transit, increase in transit mode-splits, air quality measures such as NOX and VOC, and benefit-cost ratios. These measures were paired with other indicators to determine the effectiveness of projects, however, the measures listed above were highlighted as very important indicators within the plan.

Blueprint Denver

Focus of the Plan

Blueprint Denver is a planning document that combined the *2000 Comprehensive Plan* and the *2020 Metro Vision Plan*, as well as area plans, citywide plans, and regional plan coordination. The focus of the document was on improving the quality of life within the region by developing clear implementation strategies. Importantly, *Blueprint Denver* resulted from a planning process that brought everyone together to focus on and achieve their common goals.

Relevant Components of the Plan

Blueprint Denver proposes that streets be viewed as a means to move people and not just cars, emphasizing that multi-modal streets could accommodate more trips by more people in the same amount of space by improving transit and providing better pedestrian and bicycle facilities. Multi-modal streets consider all types of transportation as equally important, and they help mixed-use development - another key concept - to become successful. *Blueprint Denver* created an overlay of the transportation system with major changes to functional street classifications that focused on improving multimodal travel.

Blueprint Denver maps out an aggressive implementation strategy, outlining the task, action required, responsible agency, and timeframe. The series of tools that were outlined in this document were used by the City of Houston in their research and recommendations regarding the initial toolbox for the CMP Process. Tools noted in the *Blueprint Denver* document include: multi-modal streets, pedestrian connectivity, build-to lines for new development, Transportation Demand Management, and increased transit options.

Plan Relevance to Houston

Denver is a model city for setting goals and achieving them. As detailed in the Relevant Components section, Blueprint Denver set a clear vision that allowed the region to be proactive in creating new tools - such as functional street classifications, a vibrant multimodal transportation system, and strategic development – to address their mobility needs.

Forward Dallas! Vision

Focus of the Plan

The City of Dallas lacked the guidance of a comprehensive plan for many years, so the focus of *Forward Dallas!* was to build on existing area plans and create a unifying comprehensive vision for the city. To gain insight and consensus, a diversified community involvement process was employed. The goal of the process was for the City of Dallas to adopt a comprehensive plan that included a new vision, policies, implementation strategy, and monitoring program for mobility in the region.

Relevant Components of the Plan

Dallas created a new functional street classification system that used current right of way width, but established new options for elements that can be included in the right of way. Specifically, the city used Context Sensitive Design (CSD) to develop transportation projects that serve all users and meet the needs of the neighborhoods through which they pass. CSD calls for an approach to roadway design that

sets neighborhood context, safety and transportation mobility as priorities for each design element, such as sidewalks, travel lanes, parking lanes and medians.

Challenges Faced

Since the City of Dallas did not have an existing comprehensive plan, the vision focused on creating the policies required to maintain and implement a comprehensive plan. Although the vision was long range in scope, many of the recommended policies, actions, implementation measures, and implementation dates remained short range.

Plan Relevance to Houston

In general, *Forward Dallas*! offers additional examples of how other cities have implemented new functional street standards as well as set key action dates for their plan. Although much of the implementation plan and monitory system are related to policies, they do demonstrate how a city can set strict deadlines for specific projects. More specifically, as part of the building blocks that were established, the Plan identifies redevelopment areas surrounding transit nodes.

Regional Transportation Commission of Southern Nevada

Focus of the Plan

The Regional Transportation Commission (RTC) of Southern Nevada created a series of planning Goals, similar to those established in *Blueprint Houston* and H-GAC's *2035 Regional Transportation Plan*, although Southern Nevada's RTC goes further to create a series of Objectives and Measures of Effectiveness for achieving their goals.

Relevant Components of the Plan

Compared to other plans reviewed for this project, the RTC had the most specific outline of Goals, Objectives, and Measures of any from the peer group. Examples of these Goals, one Objective, and associated Measures are shown below as examples.

Goal 1: Implement transportation systems that improve air quality.

Objective – Reduce travel times, especially at peak periods

Measures

- Increased average speeds on arterial roadways during peak periods
- Improved ratings by such agencies as the Texas Transportation Institute Urban Mobility Study and the Road Information Program
- Improved survey results such as the Census

Goal 3: Integrate system geographically.

Objective – Provide travel options that are responsive to individual preferences for time, cost, convenience, and reliability

Measures

- Number of HOV lane miles
- Fixed guideway implementation
- Number of miles of sidewalks
- Number of miles of bike lanes
- Number of car and van pools
- Number of miles of mass transit routes
- Frequency of transit trips

Goal 6: Improve access to mass transportation facilities and services.

Objective – Identify barriers such as affordability and gaps in service

Measures

- Specific programs and services designed to improve affordability for low-income residents
- Specific programs and services designed to improve continuity of service

Goal 7: Improve safety and security for all travelers.

Objective – Reduce injuries and fatalities on the region's roadway

Measures

- Number of injuries and fatalities
- Identification of trouble spots
- Number of Strip pedestrian overpasses
- Inventory and improvement of crosswalks

Goal 8: Support more efficient freight travel.

Objective – Identify key improvements to public facilities that would improve the flow of freight through Valley roadways and airports

Measures

- Number of freight related projects included in UPWP and TIP
- Identify long term capacity issues associated with cargo movement through airports
- Reduce non-grade separated intersections with rail corridors

Plan Relevance to Houston

The Regional Transportation Commission of Southern Nevada Regional offers the most comprehensive listing of Goals, Objectives, and Measures of Effectiveness for consideration in this process. Although some may not apply to the Houston region, they provide insight as to how the Nevada region planned to track their progress in achieving their goals. Several of the objectives can be applied in Houston and are considered in the CMP Goals refinement process.

Maricopa Association of Governments (Phoenix)

Focus of the Plan

The Regional Transportation Plan (RTP) is a comprehensive, performance based, multi-modal and coordinated regional plan to guide decision-making through Fiscal Year 2026.

Relevant Components of the Plan

The RTP covers all major modes of transportation from a regional perspective, including freeways/highways, streets, public mass transit, airports, bicycles and pedestrian facilities, goods movement and special needs transportation. In addition Plan addresses key transportation-related activities, such as transportation demand management, system management, safety and air quality conformity. To meet this mission, the plan outlines four goals with objectives that help define the intent of each goal in further detail.

Plan Relevance to Houston

This RTP lists projects and organizes them by funding amount and funding year. The plan does not outline the specific measures that were used to flush out project priorities, but it did state that specific criteria were used during their project selection process. The greatest strength of this Plan, and where it is relevant to mobility planning efforts, is the listing of specific projects and their associated costs and date for funding. This process enables the region to examine their budgetary needs over the life of the plan and to assess when funding constraints may become more severe.

Metropolitan Council (Minneapolis/St. Paul)

Focus of the Plan

The Metropolitan Council prepares a comprehensive development guide for the seven-county Twin Cities metropolitan area. The development guide, as currently implemented, consists of the *2030 Regional Development Framework* and four "chapters" that deal with transportation, aviation, water resources and regional parks.

Relevant Components of the Plan

To achieve their mission, the Council created eight main goals. The eight goals are specific and to the point, however this plan is based more in policy application so the policies within the plan outline specifically how these goals are to be achieved.

Plan Relevance to Houston

The structure of the Metropolitan Council allows for a more detailed policy approach to their planning initiatives. The policy goals are strengthened by staff recommendations about the comprehensive plans for each of the member communities. While this approach is not relevant for Houston, policy-based initiatives apart from the CMP Process may have the ability to influence the mobility of the Houston region in regards to certain goals. This plan did not offer ways to measure the progress of the plan, and so does not present significant relevance to the City Mobility Planning process.

Miami-Dade Long Range Transportation Plan

Focus of the Plan

By the year 2030, Miami-Dade's population is expected to exceed three million and its employment base to surpass 1.5 million, representing an increase of roughly 40% for both demographics. As a result of this population and employment growth, traffic is also expected to grow: without significant intervention, the people in Miami-Dade County will be making more than 11 million trips each day by the year 2030, including trips to work, school, and shopping. The purpose of Miami-Dade *2030 Plan*, then, was to develop a plan for a multimodal transportation system that complied with state and federal requirements, optimized the movement of people and goods, and met the goals and objectives adopted by the Miami-Dade MPO Board.

Plan Relevance to Houston

Most relevant to the Houston region was this Plan's focus on a lack of right-of-way and on strategies that increase the operational efficiency of their current infrastructure. By maximizing the investments already made in the roadway system using short-term solutions such as Congestion Management Systems, Intelligent Transportation Systems, and Traffic Management Systems, Miami-Dade MPO was able to create a fiscally constrained plan that built upon their previous investments while allowing for continued growth within the region. This strategy directly relates to Houston's CMP process given the investment that has already been made in the Thoroughfare and Freeway system and the complementary transportation systems that are already in use within the Houston region. However, beyond the tools listed above, the plan's relevance to the Houston CMP is limited.

Mobility 2030 Metropolitan Transportation Plan (San Antonio)

Focus of the Plan

The economy and environment of San Antonio's metropolitan area depends heavily on the condition and efficient performance of the regional transportation system. As a result, the *Mobility 2030 Plan* aims to identify the mobility needs of the community and propose improvements to address those needs so as to lead to improvements in the economy and quality of life.

Plan Relevance to Houston

San Antonio provides roadway and transit systems that are comparable, on a per capita basis, to the capacity of those offered in Houston. Although the *Mobility 2030 Plan* presented interesting topics and goals, other peer city plans reviewed in this process provided more insight and detail regarding plan implementation and measurement.

Mobility 2030 (San Diego)

Focus of the Plan

The focus of *MOBILITY 2030* is to better connect freeway, transit, and road networks to homes, schools, work, shopping, and other activities. The ultimate success of the Plan will be measured by how well the region implements smart growth as its communities are developed and redeveloped over time. To this end, *MOBILITY 2030* strengthens the land use – transportation connection and offers regional transportation funding incentives to support smarter, more sustainable land use.

Relevant Components of the Plan

The goals reflected in *MOBILITY 2030*, which are listed below, closely mirror the goals set out for the CMP Process and were used to define appropriate distinctions between elements of measurement, since measures can be used for different goals as discussed later in this document.

Land Use Intensity -Transportation Connection

Systems Development: More Travel Choices

Systems Management: Making Better Use of What Exists

Demand Management: Taking the Pressure Off of the System

Plan Relevance to Houston

The *Mobility 2030 Plan* encompasses a number of key components. Each of these components works in concert with the other to fulfill the main goals. What is notable about this report is the implementation procedure that is included in the Plan. Each component has a set of action items that are required in order to achieve the goal. This establishes a system of accountability that helps the region reach the goals set forth in the plan. The San Diego *Mobility 2030 Plan* could be used as a best practice for implementation procedures and reaching the goals established in this CMP Process.

2008 Regional Transportation Plan (Southern California Association of Governments)

Focus of the Plan

The *2008 RTP* presents the transportation vision for Southern California through the year 2035 and provides a framework for long-term investment in addressing the region's transportation and related challenges. The Plan is the culmination of a multi-year effort focused on maintaining and improving the transportation system through a balanced approach. The report considers system preservation, system operation and management, improved coordination between land-use decisions and transportation investments, and strategic expansion of the system to accommodate future growth.

Relevant Components of the Plan

The 2008 RTP sets out clear goals and measures for achieving those goals, as demonstrated in the chart below. Key goals include:

Safety and Security First

Travel Demand Management

System Completion and Expansion

Mitigating Environmental Impacts

Measures of Effectiveness

TABLE 2 RTP GOALS AND RELATED PERFORMANCE MEASURES

RTP Goals	Mobility	Accessibility	Reliability	Productivity	Safety	Sustainability	Preservation	Cost-Effectiveness	Environmental	Environmental Justice
Maximize mobility and accessibility for all people and goods in the region	✓	✓						✓		✓
Ensure travel safety and reliability for all people and goods in the region	✓		✓		✓					
Preserve and ensure a sustainable regional transportation system						✓	✓		✓	✓
Maximize the productivity of our transportation system	✓			✓						
Protect the environment, improve air quality and promote energy efficiency						✓			✓	✓
Encourage land use and growth patterns that complement our transportation investments and improves the cost-effectiveness of expenditures	✓	✓							✓	
Maximize the security of our transportation system through improved system monitoring, rapid recovery planning, and coordination with other security agencies*										

* SCAG does not yet have an agreed-upon security performance measure. Therefore, it is not included in this table.

Plan Relevance to Houston

Southern California offers valuable comparisons for Houston due to their similar size, national importance and environmental vulnerability. The mobility challenges that are faced in Southern California are similar to those in Houston and therefore solutions implemented there can be retrofitted for the transportation constraints that exist in Houston. The performance indicators noted above tie to specific goals, providing a good example of how to gauge the efficiency of improvements recommended for the multi-modal transportation system. A suggestion of how these measures of effectiveness could be applied in the Houston region, using the goals and objectives refined for the City Mobility Planning Process, is described later in this document.

TABLE 3 PERFORMANCE MEASURES

Performance Measure	Measure(s)	Definition	Performance Target	Calculation Data Sources
Mobility	Speed Delay	Speed – experienced by travelers regardless of mode Delay – excess travel time resulting from the difference between a reference speed and actual speed Delay per capita can be used as a supplemental measure to account for population growth impacts on delay.	Improvement over Base Year	Travel demand model outputs AM peak, PM peak, Off-peak, Daily Link speeds, travel times, trips
Accessibility	Percent PM peak period work trips within 45 minutes of home Distribution of work trip travel times		Improvement over Base Year	Travel demand model outputs • PM peak • OD travel times • OD person trips
Reliability	Percent variation in travel time	Day-to-day change in travel times experienced by travelers. Variability results from accidents, weather, road closures, system problems and other non-recurrent conditions.	Improvement over Base Year	Highways – PeMS Transit – National Transit Database or triennial audit reports
Productivity	Percent capacity utilized during peak conditions	Transportation infrastructure capacity and services provided. Roadway Capacity – vehicles per hour per lane by type of facility Transit Capacity – seating capacity by mode	Improvement over Base Year	Highways – PeMS Transit – National Transit Database or triennial audit reports
Safety	Accident rates	Measured in accidents per million vehicle miles by mode for: • Fatalities • Injuries • Property	"0" for all accident types and modes	Highways – freeway accident rates from Caltrans Transit – National Transit Database or triennial audit reports
Sustainability	Total cost per capita to sustain system performance at Base Year levels	Focus is on overall performance, including infrastructure condition. Preservation measure is a subset of sustainability.	Improvement over Base Year	Sub-regional submittals Regional population forecast
Preservation	Maintenance cost per capita to preserve system at Base Year conditions	Focus is on infrastructure condition. Subset of sustainability.	Improvement over Base Year	Sub-regional submittals Regional population forecast
Cost-Effectiveness	Benefit to Cost (B/C) Ratio	Ratio of benefits of travel alternatives to the costs of travel including infrastructure, maintenance, travel time, environmental, accident, and vehicle operating costs. This can be used to evaluate impacts of mode split changes resulting from RTP investments.	Improvement over Base Year	Travel demand model outputs Revenue forecasts RTP project expenditures Other cost estimates
Environmental	Emissions generated by travel	Measured/forecast emissions include CO, NOX, PM2.5, PM10, SOX, and VOC. CO2 as secondary measure to reflect greenhouse gas emissions.	Meet SIP Emission Budgets & Transportation Conformity requirements	Travel demand model outputs EMFAC2007
Environmental Justice	Distribution of benefits and costs Accessibility Environmental Emissions Noise	Share of net benefits and costs by mode, household income, race/ethnicity: • RTP expenditures • Taxes paid (e.g., income, sales & use, gas) • Access to jobs (See "Accessibility") • Travel time savings by mode • Environmental impacts from PEIR	Equitable distribution of benefits and costs	Travel demand model outputs Revenue forecasts RTP project expenditures PEIR

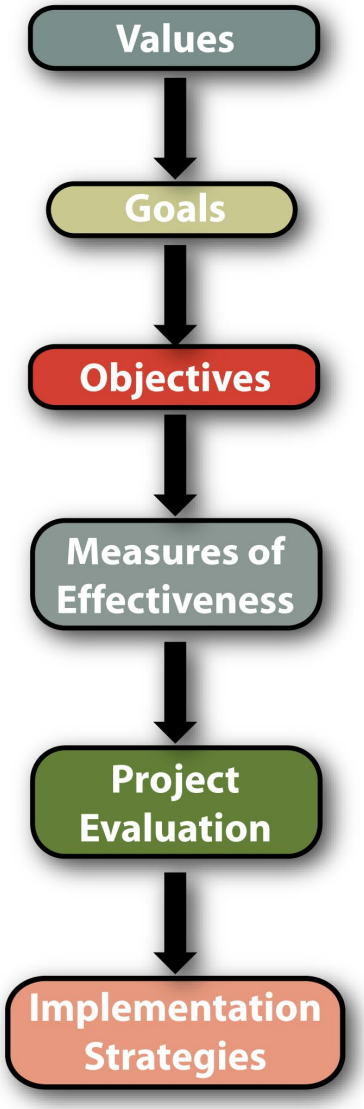
Conclusions drawn from the Peer Review

This review of plans and efforts undertaken in the peer cities demonstrates that the process of goal setting and effectively measuring those goals against a well-defined benchmark would allow the City of Houston to accurately and appropriately determine how well a project or policy, or a set of projects and policies, will achieve their mobility goals. However, it is important to note that this process worked best in cities that use concrete measures that can be updated on a regular basis for each of the areas over which they control. Setting goals and tying specific objectives and measures to them will be discussed throughout the CMP project, as refinements are made to the ways in which the City measures its progress. Additionally, tools that are effectively used by the peer cities will be considered when defining the City Mobility Planning toolbox.

As well as offering examples of best practices, tools and measures of effectiveness, the analysis of plans developed in peer city studies was used to help guide the refinement of the Goals and Objectives as discussed in the following section.

The City Mobility Planning Objectives

In working to address any problem, broad values and goals are established first, after which more specific objectives are established for achieving the goal. Therefore, taking the goals expressed through the efforts of Blueprint Houston and Envision Houston + Region and the Guiding Principals established by the Planning Commission, a meeting of the CMP technical working group was held to refine the goals and develop a set of recommended objectives for each goal. Each objective had to be specific, measurable, attainable, realistic, and timely.



The following are the recommended Objectives that resulted from this meeting:

1. Increased access to transit facilities
2. Increased access to pedestrian facilities
3. Increased access to bicycle facilities
4. Improve connectivity of the system
5. Accommodate the movement of freight
6. Cost efficiency
7. Minimize travel times
8. Reliable commutes
9. Reduce increase in congestion
10. Minimizing conflict points
11. Provide a safe and secure environment for pedestrians and bicyclists
12. Neighborhood traffic
13. Air quality conformity
14. Ability to maintain infrastructure
15. Maintain a system that is Energy Efficient
16. Improve corridor aesthetics
17. Expand pedestrian Amenities
18. Streets that are pedestrian scale
19. Facilitate all modes of travel

These Objectives will be used in the CMP Process to help prioritize projects and track progress in meeting the broad goal of improved mobility. On the following page, each of these objectives has been linked to specific goals from the 2035 RTP as well as to the specific Guiding Principles established by the City of Houston Planning Commission. In later sections of this document, these objectives will be tied to specific measures that will provide a way for the CMP Process to demonstrate the effectiveness of a particular mobility improvement and to compare that to the effectiveness of other improvements.

CMP Process Objectives as they Relate to H-GAC's 2035 RTP Goals

	2035 RTP Goals				
Objective	**1**	**2**	**3**	**4**	**5**
1. Increased access to transit facilities				X	
2. Increased access to pedestrian facilities	X	X			X
3. Increased access to bicycle facilities	X	X			X
4. Improve connectivity of the system	X	X			
5. Accommodate the movement of freight	X				
6. Cost efficiency	X				
7. Minimize travel times	X				
8. Reliable commutes	X				
9. Reduced increase in congestion	X				
10. Minimize conflict points					
11. Provide a safe and secure environment for pedestrians and bicyclists					
12. Minimize Cut Through Traffic in Neighborhoods					
13. Air quality conformity					X
14. Ability to maintain infrastructure					
15. Maintain a system that is Energy Efficient	X				X
16. Improve corridor aesthetics					
17. Expand pedestrian amenities		X			X
18. Streets that are pedestrian scale					
19. Facilitate all modes of travel	X	X		X	

CMP Process Objectives as they Relate to the Planning Commission's Guiding Principals

	Planning Commission Guiding Principles						
Objective	**1**	**2**	**3**	**4**	**5**	**6**	**7**
1. Increased access to transit facilities	X	X					X
2. Increased access to pedestrian facilities	X						X
3. Increased access to bicycle facilities	X						X
4. Improve connectivity of the system	X						X
5. Accommodate the movement of freight	X						
6. Cost efficiency		X					
7. Minimize travel times	X						
8. Reliable commutes	X						
9. Reduced increase in congestion	X						
10. Minimize conflict points			X				X
11. Provide a safe and secure environment for pedestrians and bicyclists			X				X
12. Minimize Cut Through Traffic in Neighborhoods					X		
13. Air quality conformity							
14. Ability to maintain infrastructure		X					
15. Maintain a system that is Energy Efficient		X					
16. Improve corridor aesthetics				X			X
17. Expand pedestrian amenities							X
18. Streets that are pedestrian scale				X			X
19. Facilitate all modes of travel	X		X		X		X

Measuring the Effectiveness of City Mobility Planning

Using Measures of Effectiveness (MOEs) to analyze outputs from the CMP travel demand model will allow the City and its project stakeholders to examine areas of growth and congestion, and determine which areas should be studied further. Additionally it helps to document the benefit of investments that are made through several iterations of the CMP Process. The eight indicators listed below are the most commonly used throughout the United States and provide a first glance into the problems and potential solutions for the mobility concerns that will arise as the City continues to grow.

1) **Vehicle Miles Traveled (VMT)** – Using the travel demand model for both the base and future years, vehicle miles traveled will be calculated the for the region as well as sub areas within the City of Houston. Projects will be evaluated on their ability to decrease the number of miles traveled within the model.
2) **Vehicle Hours Traveled (VHT)** – Using the travel demand model for both the base and future years, vehicle hours traveled will be calculated for the region as well as sub areas within the City of Houston. Projects will be evaluated on their ability to decrease the number of hours traveled within the model.
3) **System delay (Delay)** – Using the travel demand model for both the base and future years delay will be calculated for the region as well as sub areas within the City of Houston. Projects will be evaluated on their ability to decrease the estimated delay within the model.
4) **45 minute commute in PM peak hour by traffic analysis zones (45 min. Zones)** – Using the travel demand model, the average commute time will be examined for each traffic analysis zone. This will be based on the distribution set within the model as well as any network improvements. The measure will look to reduce commute time through roadway and transit improvements.
5) **45 Minute Commute Skims (45 min. Skim)** – A skim is a modeling technique that allows the user to identify the travel time between different geographic regions of the City. For example, an analysis of the Traffic Analysis Zones that can be reached within a 45 minute commute of downtown would document mobility over the lifecycle of the CMP Process. As congestion increases, the number of zones and their distance from downtown will lessen, documenting a reduced level of mobility. This analysis can be very useful in identifying areas or corridors that need further analysis given the lessened mobility that occurs in the future.
6) **% congested miles (% Cong.)** – Using the travel demand model, the assigned traffic projects will be compared with the modeled capacity. This ratio will determine the percentage of roadways that are congested. This MOE correlates to the stated CMP objective of reducing the increase in congestion.
7) **Minimize NOX, CO, VOC** – Based on alternative roadway configurations and land use configurations, reductions in travel time and delay will be determined to calculate reduction in NOX, CO, and VOC.
8) **Gallons of gas consumed** – Using the travel demand model, a calculation using vehicle miles travel and delay will be completed to determine the amount of consumed gallons of fuel within the region.

The following measures of effectiveness relating to transit are available as outputs from the travel demand model and are useful for tracking purposes. Each of the five MOEs listed below directly relates to the stated CMP objective of increased access to transit facilities. Because the Metropolitan Transit Authority of Harris County (METRO) operates the transit services within the City and ETJ, there is not a direct mechanism for implementation by the City. The City will have the ability to use this information, first in coordination with METRO to determine the most effective transit infrastructure investments, and second, during the MTFP update process to designate future transit corridors and document the benefits of transit within the multi-modal system.

1. **Transit miles by type** – Using the travel demand model, current miles of transit as well as the future miles will be calculated. The model will also have the ability to examine the population and employment that will be served by transit.
2. **Average headways** – Average headways can be calculated for each route. Initially schedules will be used to determine the predicted headway versus the actual on group headway.
3. **Population and employment within ¼ mile and ½ mile from transit stop (Transit Demo)** – Within a ¼ mile of each current and future transit stop, the population and employment 'capture' of that area will be determined, as will the population and employment within ½ mile of the rapid transit station locations. This will also serve as a way to determine ideal locations for future transit stations.
4. **Number of intermodal transfer stations** – Using the current condition as well as the future network in the travel demand model, the number of transfer stations within the region will be determined, noting the locations and the types of transit that will use the facility.
5. **Number of park and ride facilities** – Again using current conditions as well as the predicted future condition, the number of park and ride facilities as well as their population and employment capture areas will be analyzed. This will be a similar analysis to that of the transit stations, providing an opportunity to locate facilities in appropriate areas.

The following Measures of Effectiveness are not commonly used over an area the size of the City of Houston and its ETJ, but they are very useful indicators of area specific concerns once specific corridors or areas within the City are selected for further analysis. Many of these MOEs are readily available using the travel demand model; however, several of them will need to be gleaned from Geographic Information Systems (GIS) datasets that would be used for the area specific analyses.

1. **Miles of paths and sidewalks per acre** – Using geographic layers showing the existing and proposed miles of pedestrian facilities, the miles to the Travel Analysis Zones in the Travel Demand Model will be compared to create a ratio. This ratio will demonstrate the accessibility of pedestrian facilities to residents. Population and employment can also be incorporated into the ratio to determine how well the dense areas of the city perform.
2. **Street distance per acre** – Using geographic layers showing the existing and proposed miles of roadway facilities, the miles to the Travel Analysis Zones in the Travel Demand Model will be compared to create a ratio. This ratio will demonstrate the accessibility of

roadway facilities to residents. Population and employment can also be incorporated into the ratio to determine how well the dense areas of the city perform.

3. **Number of miles of bike lanes/paths**– Using geographic layers showing the existing and proposed miles of bicycle facilities, the miles to the Travel Analysis Zones in the Travel Demand Model will be compared to create a ratio. This ratio will demonstrate the accessibility of bicycle facilities to residents. Population and employment can also be incorporated into the ratio to determine how well the dense areas of the city perform.
4. **Number of intersection or nodes per acre by type** – Using the travel demand model, a ratio will be calculated to determine the number of intersections within the travel analysis zone. This ratio will be used to determine the connectivity of the area as well as the type and function of the street intersections. Additionally, this ratio is useful in determining the density of the street grid within an area or corridor.
5. **Number of lane miles per acre by type** – Using geographic layers showing the existing and proposed miles of roadway facilities, the miles to the Travel Analysis Zones in the Travel Demand Model will be compared to create a ratio. This ratio will demonstrate the accessibility of roadway facilities to residents. Population and employment can also be incorporated into the ratio to determine how well the dense areas of the city perform.
6. **Reduce non-grade separated intersections with rail corridors** – Using geographic layers, the number of intersections that are currently grade-separated versus the number of intersection that are at-grade will be determined. The total counts will be evaluated verses the current and future condition.
7. **Benefit-Cost Ratios** – Looking at specific projects, an appropriate benefit-to-cost ratio will be created to evaluate the efficiency of the project. The ratio will be planning based, but will need to be realistic and not skew the benefit of the project.
8. **Conflict points per mile** – Using aerial photography, the number of driveways and intersections along a corridor will be determined. Using that information, the number of conflict points per mile will be established. This analysis will be limited to specific corridors that may see high crash rates.
9. **Lane miles with raised median** – Using geographic layers, the amount of lane miles within the city that have a raised median will be reviewed.
10. **Continuity of bike system** – Using geographic layers showing the existing and proposed miles of bicycle facilities, gaps in the system will be identified. Dense population and employment centers will be examined in detail to see if the routes meet demand.
11. **Average pavement condition for the region** – Using asset management evaluation criteria such as horizontal cracking per mile and depressions per mile, an image of the current infrastructure can be created. Using a mobile vehicle, like the one used by TxDOT, these elements can be evaluated.
12. **CSS process** – Using context sensitive solutions, right of ways will be tailored to meet the needs of the roadway and the land use. New functional classifications as well as alternative cross sections will allow the city to improve the aesthetics within priority corridor.
13. **Reduce interruptions in sidewalk and roadway continuity** – Using geographic layers showing the existing and proposed miles of sidewalk and roadway, gaps in the system will be identified. Dense population and employment centers will be examined in detail to see if the routes meet demand.

14. **Overall sidewalk to building height ratio** – Using geographic layers showing the existing and proposed miles of sidewalk facilities, the miles to the Travel Analysis Zones in the Travel Demand Model will be compared to create a ratio. A population and employment ratio will then be created to determine how well the dense areas of the city perform.
15. **Person trips by mode** – Using the travel demand model, the current mode split process and what types of modes each person is choosing will be examined and a summary of these person trips by mode will be created.

Each of these measures of effectiveness has been tied to the CMP Objectives, as depicted in the matrix below. In so doing, this documents a method that will allow the City to determine the best course of action to meet the Objectives. In the following chapter, these measures will be tied to specific tools for implementation.

The next step is to create baseline indicators for each of the measures. Using the descriptions outlined above to determine the current condition in Houston, the team can create a scale for rating each element. The scale for each measure will eventually lead to a comprehensive equation that will allow each corridor or area to be prioritized. This gives the City of Houston the ability to appropriately direct funding to those projects that will most efficiently meet their goals.

City Mobility Planning

HOUSTON

Objective	VMT	VHT	Delay	45 min. Zones	45 min. Skim	% Cong.	NOX, VOC, CO	Fuel Consumed	Transit Miles by Type	Avg. Headways	Transit Demo	Intermodal Stations	Park and Ride Facilities	Sidewalks per acre	Bike Lanes per Acre	Intersections per Acre	Lane miles per Acre	Grade Separated Rail Intersections	Benefit Cost Ratios	Conflict Points per Mile	Miles of Raised Median	Avg. Pavement Ratings	CSS Process	Road and Sidewalk Continuity	Sidewalk to Building Ratio	Person Trips by Mode
1. Increased access to transit facilities									X	X	X	X	X													
2. Increased access to pedestrian facilities											X			X		X				X			X	X	X	X
3. Increased access to bicycle facilities															X					X			X	X		X
4. Improve connectivity of the system	X								X		X	X	X	X	X	X	X						X	X		X
5. Accommodate the movement of freight	X	X	X				X	X										X		X	X	X		X		
6. Cost efficiency								X	X										X							X
7. Minimize travel times	X	X	X	X	X	X				X								X								X
8. Reliable commutes	X	X	X	X	X	X		X	X	X				X	X	X		X								X
9. Reduce increase in congestion	X	X	X	X	X	X	X	X	X	X	X					X	X	X	X	X	X		X	X		X
10. Minimizing conflict points			X											X	X	X	X	X		X	X	X		X		
11. Provide a safe and secure environment for pedestrians and bicyclists									X	X	X	X	X	X	X	X	X	X		X	X				X	X	X
12. Minimize Cut Through Traffic in Neighborhoods	X			X	X	X								X	X	X	X			X	X	X	X	X	X	X
13. Air quality conformity			X			X	X	X						X	X									X	X	X
14. Ability to maintain infrastructure																X	X		X			X				
15. Maintain a system that is Energy Efficient	X	X	X	X	X	X	X	X	X	X		X	X	X	X				X							X
16. Improve corridor aesthetics														X	X								X	X	X	
17. Expand pedestrian Amenities									X	X	X			X	X	X				X	X		X	X	X	X
18. Streets that are pedestrian scale														X	X	X	X			X			X	X	X	X
19. Facilitate all modes of travel						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X