
Task 2: Deliverable B-2
Performance Measures
June 2017

Central Oahu Transportation Study

Prepared for
Oahu Metropolitan Planning Organization



Prepared by
SSFM International, Inc. with
Weslin Consulting Services, Inc. and
Fehr & Peers

Document Control

Deliverable Name	Date	Activity Completed
Performance & Sustainability MOE	10/18/16	1 st Draft to OahuMPO
Measures of Effectiveness	01/10/17	Responding to comments received from OahuMPO <ul style="list-style-type: none">• C. Clark (10/31/16)• T. Ellis (12/30/16)
Performance Measures Table Feasibility Analysis Table	04/18/17	Providing revised Performance Measures and Feasibility Analyses tables for discussion
Performance Measures	06/26/17	Responding to comments received from OahuMPO and Project Management Working Group (06/08/17)

This report was funded in part through grants from the Federal Highway Administration and Federal Transit Administration, U.S. Department of Transportation. The views and opinions of the agency expressed herein do not necessarily state or reflect those of the U.S. Department of Transportation.

Table of Contents

Overview of the Central Oahu Transportation Study	iii
1.0 Performance Measures	1
2.0 Background for Performance Measures.....	5
2.1 Vision and Goals for the COTS	5
2.2 Selecting Appropriate Performance Measures.....	6
2.3 Short-term versus Long-term Goals.....	7
2.4 Strategies to Improve Performance.....	7
2.5 Timeframe for Observing Performance	7
3.0 Feasibility Analysis	9
4.0 How the Performance Measures and Feasibility Criteria will be used in the COTS.....	11

List of Tables

Table 1. Recommended Performance Measures.....	1
Table 2. Goals for the Central Oahu Transportation Study	6
Table 3. Feasibility Analysis Criteria.....	9

This page intentionally left blank

Overview of the Central Oahu Transportation Study

The Central Oahu Transportation Study (COTS) will assess the multi-modal transportation needs of the region and identify key transportation system improvements, strategies and policies that can improve regional transportation mobility and access in a sustainable way. The strategies and system improvements will be technically feasible, financially realistic, sustainable, and meet regional transportation needs.

This report comprises the deliverable for Task 2, Deliverable B-2. The full list of tasks are:

- Task 1: Coordinate and review past and on-going traffic, transit, and land use studies prepared by other agencies, establish a project management working group, and stakeholder involvement process.
- **Task 2: Establish performance measures and measures of sustainability, collect and establish a comprehensive baseline multi-modal transportation dataset.**
- Task 3: Analyze and evaluate regional transportation, demographic, economic, and land use trends and issues.
- Task 4: Determine and assess current and future multi-modal needs and opportunities for the region through technical methodologies, user surveys, and stakeholder outreach. The technical forecasting of future traffic, transit, land use, and other related projections will utilize and be done in coordination with OahuMPO's current travel demand forecast model and Congestion Management Process.
- Task 5: Identify potential strategies and system improvements for key corridors in the region, including but not limited to, transit improvements with connections to the Honolulu rail transit system and the Central Highway.
- Task 6: The potential strategies and system improvements shall be provided (not exhaustive) in terms of transportation measures, expected performance, project delivery and land acquisition costs, environmental impacts and possible mitigation, time, and operations and maintenance costs.
- Task 7: Conduct a multi-modal transportation systems benefit-cost analysis of the regional and environmental impacts of the potential strategies and system improvements. The comparison shall provide for the evaluation of individual and system (i.e., several solutions) to each other in terms of transportation benefits, impacts/costs and trade-offs, ideally in a "dashboard" type format.
- Task 8: Compare and prioritize those potential strategies and system improvements that meet the desired purpose mentioned above (technically feasible, financially realistic, and sustainable).
- Task 9: Develop recommendations and an implementation timeframe to set priorities for those strategies and system improvements.

The full set of twelve deliverables will document the results of the nine tasks and their subtasks. Briefly the reports include:

- A. Assessment of Previous Studies and Surveys associated with the study area and recommendations for further data collection or survey work as needed. Report A provides the assessment of the studies and surveys identified in two deliverables that have been submitted: List of Previous Studies and List of Previous Surveys.
- B. Identification of the Trends and Issues impacting the COTS area. This report will include the demographics, economics and land trends occurring in the study area as well as identify the impacts of those trends.

B.2 Identification and definitions of Performance Measures, Sustainability Measures, Baseline and Data Elements that will be used to guide and evaluate project alternatives.

- C. Data Needs Memo will list the information needed based upon Deliverables A through B.2.
- C.2 Documents the results of the data collection identified in the Data Needs Memo.
- D. A discussion of previous Alternatives as well as strategies for improvements will be presented in this report.
- E. The Preliminary Ranking of identified Alternatives will be detailed in this report. The performance measures identified in Report B will be applied to the alternatives. TransCAD model runs will provide a means to compare alternatives. The outcome of these tasks will be a ranking of alternatives and their impacts on the study area.
- F. Documents the Feasibility Assessment of the alternatives. Documentation will include identifying criteria for feasibility and sustainability assumptions; reporting on the impacts by performance measure; identification of environmental impacts and identified mitigations; and, assumptions for implementation all leading to a refinement of the alternative rankings.
- G. The Financial Assessment will be documented in this report. Financial assumptions and requirements including costs will be reviewed. The benefits and costs of the alternatives will be assessed and compared including any identified trade-offs.
- H. The Final Report on Prioritization and Recommendations for Implementation will summarize and prioritize strategies; identify recommendations; identify impacts of no implementation; recommend an implementation timeframe; and, identify any impacts if implementation is not accomplished within the recommended timeframe.
- I. This report will provide a summary of the Community Input and how that input was used to inform the study.
- J. Survey Results from any new surveys will be documented in this report.

1.0 Performance Measures

Performance Measures will be applied to projects to determine how the potential project benefits the region. There are 21 Performance Measures for the Central Oahu Transportation Study (COTS) that are recommended to be utilized during the initial screening phase of work. As shown in Table 1, the Performance Measures are divided into four (4) categories: (1) Traffic and Transportation Reliability and Congestion Reduction, (2) Multi-Modal System, (3) Safety, and (4) Asset Management.

Table 1. Recommended Performance Measures

GOAL	PERFORMANCE MEASURE	TYPE OF MEASURE	EXPLANATION
CATEGORY 1: TRAFFIC AND TRANSPORTATION RELIABILITY AND CONGESTION REDUCTION			
Increase the reliability of the transportation system so that travelers can be secure that they will arrive by chosen mode in a timely manner between Mililani Town Centre and the following regional destinations: <ul style="list-style-type: none"> • Leeward Community College • Kapolei • Primary Urban Center (Honolulu) • University of Hawaii – Manoa 	MEASURE 1: Peak period travel time by Mode (except bike and walk) <ul style="list-style-type: none"> • Single-occupancy vehicle • Carpool • Transit • Transportation network company (TNC)/Taxi • Freight 	Quantitative	Measures the number of hours where there is a substantial difference between free flow speeds and actual conditions.
	MEASURE 2: Transit travel time to major destinations and “on-time” service	Quantitative	Measures average travel time and the percentage of on-time transit trips.
	MEASURE 3: Provide regional congestion relief for auto travel	Quantitative	Measures number of congested lane miles.

Table 1. Recommended Performance Measures (cont.)

GOAL	PERFORMANCE MEASURE	TYPE OF MEASURE	EXPLANATION
<p>Increase the reliability of the transportation system so that travelers can be secure that they will arrive by chosen mode in a timely manner from the following nodes within the COTS area:</p> <ul style="list-style-type: none"> • Wahiawa (California Avenue/Kamehameha Highway) • Mililani Mauka (Mililani Middle School) • Mililani (Meheula Pkwy/Lanikuhana Ave) • Waipio (Crestview Community Park) • Waikele (Fire Station) 	<p>MEASURE 4: Provide local congestion relief for auto travel within the COTS area to the following destinations:</p> <ul style="list-style-type: none"> • Mililani Town Center • Mililani Mauka Park and Ride • Central Oahu Regional Park • Koa Ridge • Wahiawa (California Avenue/Kamehameha Highway) 	Quantitative	Measures reduction of time spent in congested lanes or intersections.
CATEGORY 2: MULTI-MODAL SYSTEM			
<p>Provide a balanced, multi-modal transportation system that allows transportation choices for all residents.</p>	MEASURE 5: Travel time between origins and destinations in Measure 4 via biking and walking	Quantitative	Measures the improvement in non-auto travel time.
	MEASURE 6: Amount of transit service	Quantitative	Measures the number of service hours of transit per population.
	MEASURE 7: Connectivity to rail transit and frequency of intermodal connections	Quantitative/ Qualitative	Methods and means for making inter-modal transfer to and from rail.
	MEASURE 8: Amount of pedestrian infrastructure	Quantitative	Measures miles and widths of pedestrian facilities.
	MEASURE 9: Amount of bicycle infrastructure	Quantitative	Measures miles and type of bicycle facilities.
	MEASURE 10: Improvements to existing bicycle and pedestrian system.	Qualitative	<p>Connectivity of pedestrian and bicycle facilities to other modes and to neighborhoods.</p> <p>Connectivity across major barriers (e.g., gulches, major arterials, freeways).</p>

Table 1. Recommended Performance Measures (cont.)

GOAL	PERFORMANCE MEASURE	TYPE OF MEASURE	EXPLANATION
Provide a balanced, multi-modal transportation system that allows transportation choices for all residents.	MEASURE 11: Mode split shift away from single-occupant vehicle	Quantitative	Measures the commute mode shift percentage against the following goals: <ul style="list-style-type: none"> • Single-occupant vehicle – 60% • Carpool – 12% • Bike, walk– 7% • Transit – 10% • TNC/Taxi – 8% • Work from home – 3%
CATEGORY 3: SAFETY & SECURITY			
Improve the safety of the transportation system for all modes	MEASURE 12: Number of annual fatalities from vehicle collisions	Quantitative	Measures the number of vehicle related fatalities.
	MEASURE 13: Rate of fatalities per 100 million vehicle miles traveled (VMT)	Quantitative	Measures the rate of fatal crashes.
	MEASURE 14: Number of serious injuries by mode	Quantitative	Measures the number of vehicle related serious injuries.
	MEASURE 15: Rate of serious injuries per 100 million VMT	Quantitative	Measures the rate of crashes causing serious injury.
	MEASURE 16: Number of non-motorized fatalities and serious injuries	Quantitative	Measures the number of fatalities and serious injuries involving pedestrians and bicyclists.
CATEGORY 4: ASSET MANAGEMENT			
Ensure that pavement condition, bridges, pedestrian and bicycle facilities, and transit shelters are in a state of good repair	MEASURE 17: Facility state of good repair	Quantitative	Measures the condition and priority need for repair of pavement using the State’s programs to improve and maintain the transportation system in a state of good condition.

Table 1. Recommended Performance Measures (cont.)

GOAL	PERFORMANCE MEASURE	TYPE OF MEASURE	EXPLANATION
Ensure that pavement condition, bridges, pedestrian and bicycle facilities, and transit shelters are in a state of good repair	MEASURE 18: Bridges in state of good repair	Quantitative	Measures the condition and priority need for repair of bridges using the State’s programs to improve and maintain the transportation system in a state of good condition.
	MEASURE 19: Sidewalk, bikeways, and multi-use path conditions	Qualitative	Review of pavement condition of existing sidewalks, bikeways, and multi-use path conditions.
	MEASURE 20: Transit shelter availability	Quantitative	Measures the number of transit shelters compared to number of transit stops.
	MEASURE 21: Transit shelter conditions and amenities	Qualitative	Review of condition and amenities of existing transit shelters.

2.0 Background for Performance Measures

Performance Measures are an essential part of the planning process which examine the potential outcome of an action. The ORTP 2040 provides the foundation for aspects of transportation decision-making by establishing the vision and goals for transportation and identifying strategies and project concepts for implementation. Projects are normally drawn from multiple sources, such as sub-area and corridor studies.

Performance Measures are used to explore how different policy and investment projects can help achieve the objectives set for the study. Individual projects, programs and strategies need to be sufficiently defined so their probable performance can be measured. Performance Measures are an impartial means of evaluating both individual projects and programs.

There are several steps involved in any performance management system:

- Determine the goals that apply
- Choose the appropriate Performance Measures to fit these goals
- Sort measures for short term versus long term focus
- Develop strategies for improving performance
- Select the Timeframe for observing changes in performance

2.1 Vision and Goals for the COTS

The OahuMPO Vision for 2040 as presented in the *Oahu Regional Transportation Plan 2040* (ORTP 2040) is as follows:

In 2040, Oahu will be a place where we will have efficient, well-maintained, safe, secure, convenient, appropriate, and economical choices in getting from place to place. Our transportation system will move us and the goods we use in a manner that supports the island's high quality of life, natural beauty, economic vitality, and land use policies by supporting appropriate density development and avoiding urban sprawl. This system will promote energy conservation and economic sustainability as well as the protection of our ports of entry, preparation for emergency situations, and changes in global climate patterns.

The goals for the COTS come from the goals detailed in the ORTP 2040, which were developed through review of the eight Federal Performance Goals. COTS goals are shown in Table 2.

Table 2. Goals for the Central Oahu Transportation Study

CATEGORY	GOAL
Congestion Reduction	Reduce the amount of time it takes during peak periods to get to important destinations
Multi-Modal System	Shift travel trips from drive alone to: <ul style="list-style-type: none"> • Drive with others • Transit • Bicycle • Walk
	Increase the number of miles of bicycle lanes and pedestrian paths in Central Oahu
	Improve access to the rail system for Central Oahu residents
System Reliability	Increase the amount of transit service in Central Oahu
Infrastructure Condition	Ensure that pavement condition and bridges are in a state of good repair
Safety	Reduce the number of fatalities, injuries, and property damage on H-2 and Kamehameha Highway
Freight	Reduce the amount of time for trucks to travel to important destinations from Central Oahu

2.2 Selecting Appropriate Performance Measures

The COTS is a sub-area study. This study seeks to find a combination of multi-modal strategies and projects that provide recurring travel movement in a financially feasible manner. The composition of the person trips in this sub-area is expected to change due to the introduction of the fixed rail system in Honolulu. Performance measures should be quantifiable and should accurately measure the goals shown in Table 1-1 above.

Potential measures were reviewed that follow Federal guidance and that match the ORTP vision, goals, and objectives. The recommended measures for COTS are presented in the Section 2.0. Baselines would be established for each measure in the year 2016, or closest year for which data is available.

The study team anticipates using the FHWA White Paper “Map 21 Proposed Measures for Congestion, Reliability and Freight” (January 2016) and the associated National Performance Management Research Data Set (NPMRDS) for several of the selected measures. This White Paper provides step-by-step procedures for calculating seven important measures:

- Percent of interstate providing reliable travel times (This would apply to H-2).
- Percent of non-interstate providing reliable travel times (this applies to Kamehameha Highway and other arterials).
- Percent of interstate where peak travel time meets expectations (H-2 only).
- Percent of non-interstate where peak travel time meets expectations (Kamehameha Highway and other arterials).
- Percent of interstate mileage providing reliable truck travel times (H-2 only).
- Percent of interstate system uncongested (H-2 only).
- Annual hours of excessive delay per capita (all facilities).

The NPMRDS measures that do not involve travel time reliability will be used as performance measures for purposes of screening candidate improvement projects and comparing the potential benefits of alternative sets of mobility improvement strategies out to Year 2040. The study team discussed and

considered travel time reliability as a desirable potential measure. But in our professional experience, the measures relating to travel time reliability can only be used to establish an operating baseline for this study because they rely on a substantial amount of travel time data (i.e., over weeks and months) that is not available and cannot be predicted for future scenarios. The primary tool for forecasting future traffic operations is the OahuMPO regional travel demand model, which only provides estimates of congestion and travel time. Thus, travel time reliability measures are not included in the proposed list of performance measures.

2.3 Short-term versus Long-term Goals

Two time periods will be used in the COTS. Short-term is defined as within five (5) years. Long-term is defined as the year 2040. Each performance measure will be applied for both short-term and long-term.

2.4 Strategies to Improve Performance

Projects and program strategies will be examined in an iterative manner to see how they can be adjusted to improve their performance and effectiveness. The evaluation of candidate projects becomes an iterative process by using performance measures. Some projects that perform poorly can be dropped. Some can stand alone and be prioritized over present and future timeframes. Still others rise in value when combined with other strategies. By iteratively using the performance measures, project performance can be improved, justified, and given position for decision-makers.

2.5 Timeframe for Observing Performance

The following timeframes will be utilized to observe performance:

- Immediately upon completion
- 5 years after completion
- 20 years after completion

By applying performance measures to multiple timeframes, takes into account the immediate benefits versus benefits over time which can account for changed traffic volumes and conditions (demand), and other projects (e.g., rail) come on-line (supply).

Page intentionally left blank

3.0 Feasibility Analysis

After initial screening is completed, projects may be combined into packages or remain as stand-alone. Feasibility measures are applied to potential packages and projects to determine potential difficulties for implementation. There are five (5) categories of project feasibility: (1) Construction, (2) Environment, (3) Financial, (4) Regional Planning, and (5) Community. Table 3 identifies the Feasibility Analysis criteria.

Table 3. Feasibility Analysis Criteria

CATEGORY	FEASIBILITY CRITERIA
CONSTRUCTION	Constructability
	Right-of-way
	Maintenance of Traffic
	Temporary construction impacts
ENVIRONMENT	Environmental issues and mitigations
	Type of documentation required (i.e., Catex, EA, EIS)
	Takings
	Reduce greenhouse gases
FINANCIAL	Packages or individual projects
	Public-Private Partnerships (PPP)
	Cost
	Cost per funding availability
	Benefit-Cost
REGIONAL PLANNING	Consistency with <i>Central Oahu Sustainable Communities Plan</i>
	Consistency with <i>Oahu Regional Transportation Plan 2040</i>
COMMUNITY	Community and Social Characteristics

Page intentionally left blank

4.0 How the Performance Measures and Feasibility Criteria will be used in the COTS

The COTS work progresses in several steps. This section describes how the performance measures are used in each of those steps.

STEP ONE: A list of multi-modal projects which address transportation in Central Oahu is collected from various previous studies, as well as from community and agency input. This report comprises the list of potential projects, which is included as Table 1.

STEP TWO: A filter of all the initial projects is made using Performance Measures, which are applied to projects to determine if the potential project would provide any benefit to the region (see Deliverable B-2). A matrix is prepared that compares these Performance Measures and that flags any that provide no benefit. Such projects may be candidates for no further work. Those that do provide transportation benefit become the Candidate Projects.

STEP THREE: Alternatives are developed from the Initial Projects. An alternative may be as simple as a single project, combined with one or more projects, or as complex as an inter-related set of improvements and strategies.

STEP FOUR: The alternatives are subjected the Feasibility Analysis criteria to determine if the alternative is reasonable. As a result of this evaluation and analysis, alternatives may be modified or removed from further consideration.

STEP FIVE: Community reaction and preferences are measured through a Public Information Meeting.

STEP SIX: Recommendations are made and a Final Report prepared. The recommendations relate back to the Performance Measures.

Diagram of the COTS steps:

