



Agenda Item 2: Air Navigation Matters
2.3 Other Specific Air Navigation Developments
2.3.1 Aerodromes and Ground Aids (AGA)

**FEDERAL AVIATION ADMINISTRATION (FAA) RESEARCH ON AERODROME
PERFORMANCE METRICS**

(Presented by the United States)

SUMMARY	
This Information Paper addresses the role of metrics in the performance-based approach (PBA) used to develop performance objectives contained in the North American/Caribbean (NAM/CAR) Regional Performance Based Air Navigation Implementation Plan (PBANIP). Specifically, the research activities of the United States Federal Aviation Administration (FAA) on aerodrome performance metrics is discussed.	
References:	
• NACC/DCA/3 – <i>Final Report</i> • E/CAR/WG/31 – <i>Final Report</i>	
Strategic Objectives	<i>This working paper is related to Strategic Objectives A and D.</i>

1. Introduction

1.1 At the recent meeting of the Directors of Civil Aviation of the North American, Central American, and Caribbean Region (NACC/DCA/3), a performance-based approach was approved as the basis for a new NAM/CAR Implementation Plan (Decision 3/3). One of the key aspects of the performance based approach (PBA) to air navigation planning is the development of performance objectives with related measurable indicators and metrics. Subsequently, the recently approved NAM/CAR Regional Performance Based Air Navigation Implementation Plan (PBANIP) contained terms of reference that relied heavily on the forthcoming performance areas and associated metrics that would be collected by the States and Territories in the Region.

1.2. The recent meeting of the Eastern Caribbean Working Group (E/CAR/WG/31) reviewed the PBANIP and was informed that the data needed for some of the metrics (e.g. fuel consumption or aircraft movements) are in the final phase of being officially collected from the Contracting States, in the context of the ICAO Statistics Programme, managed by the Economic Analyses and Databases (EAD) section at ICAO Headquarters, Montreal. Conclusion 31/9, “Air Navigation Performance Monitoring and Measurement,” of the E/CAR/WG/31 meeting states:

“That the E/CAR States/Territories:

- a) assign the E/CAR/WG to establish a set of metrics related to key performance areas including access, capacity, cost effectiveness, efficiency, environment, flexibility, predictability and safety by the 32th E/CAR/WG meeting to be held in 2010;*
- b) incorporate agreed metrics into the performance monitoring process by the end of 2010, collect and submit relevant data to the ICAO NACC Regional Office on a regular basis; and*
- c) coordinate with the ATM community members to promote information and data collection.”*

1.3. As directed by the NACC/DCA conclusions, the E/CAR region, on the basis of its experience, could determine the appropriate metrics applicable to its situation. Agreement on the metrics would necessitate common definitions and understanding. Therefore, the purpose of this paper is to provide information to the E/CAR Region on the research activities of the Federal Aviation Administration (FAA) on aerodrome performance metrics, so as to provide the Members with the most up-to-date information as they refine the PBANIP.

2. FAA Aerodrome Performance Research

2.1. There are three projects currently underway within the FAA’s Airport Cooperative Research Program (ACRP) that address the development and implementation of a performance measurement system for aerodromes. The purpose of each project is summarized below:

2.2. ACRP Project 01-06, “Developing an Airport Performance-Measurement System,” is producing a practical, user-friendly guidebook that will (1) assist aerodrome management in understanding the practical benefits of a performance-measurement system, (2) identify methods to help aerodromes discern how well they are meeting their customer and stakeholder expectations, (3) guide the development and implementation of the most appropriate performance-measurement system, and (4) provide examples of key performance indicators and how to incorporate them into a system.

2.3. ACRP Project 01-09, “Airport Performance Indicators,” is a compendium of many of the performance metrics that aerodromes can use to measure their economic, operational, and service performance. The compendium of metrics is intended to complement the guidebook described in ACRP Project 01-06. This compendium will contain an extensive list of aerodrome performance indicators, categorized by aerodrome functional type. Also identified is a subset of “key” and “core” performance indicators within each category. The manual will present and define each indicator, suggest methods for collecting relevant data for each indicator, and, generally, support the implementation of an aerodrome’s performance-measurement system as described in ACRP Project 01-06.

2.4. ACRP Project 01-13, “Developing a Database-Driven Web Application for Benchmarking Airport Performance,” will propose to study two objectives. The first objective is to design, build, and implement a secure, expandable, database-driven web application that allows the hierarchical entry and extraction of aerodrome operational, financial, and other data for meaningful performance comparison purposes with a pre-determined and customizable peer group over time. The second objective is to maintain the database-driven web application for 1 year and assist with transferring the application to a permanent host. The web application should (a) offer a single data-entry point; (b) assist users in determining and selecting airport peer organizations for various performance comparisons; and (c) provide pre-formatted reports, including report forms required by FAA and various national aerodrome industry associations.

2.5. A copy of the detailed scope and administrative tasks for each project is provided as appendices to this paper:

- ACRP Project 01-06 – **Appendix A**
- ACRP Project 01-09 – **Appendix B**
- ACRP Project 01-13 – **Appendix C**

2.6. The results of all ACRP research projects are available online, free of charge, to anyone interested in benefiting from the program. The ACRP website is: <http://www.trb.org/acrp>.

3. Conclusion

3.1. The development of a PBANIP that functions efficiently and effectively requires the collection of relevant data in order to be successful. The FAA is developing a number of products through the ACRP that may be of interest to the E/CAR Regions as further refinement and implementation of the PBANIP is performed.

3.2. The Meeting is invited to review the ACRP project information and access the research results as they become available.

— — — — —

APPENDIX A

ACRP 01-06 Request for Proposal

Guidebook for Developing an Airport Performance-Measurement System

Posted Date: 11/28/2007

Project Data	
Funds:	\$400,000
Contract Time:	15 months <i>(includes 2 months for ACRP review and approval of the technical memorandum, data collection plan, and interim report; and 3 months for ACRP review and contractor revision of the final report)</i>
Authorization to Begin Work:	
	4/15/2008 -- estimated
Staff Responsibility:	Michael R. Salamone, C.M. Phone: (202) 334-1268 Email: MSalamone@nas.edu
RFP Close Date:	1/23/2008
Fiscal Year:	2008

BACKGROUND

Continuous improvement for the airport industry means identifying how well airports meet their customer and stakeholder expectations, then taking active steps toward established goals to effect constructive change. The two key elements to this process are a means to measure performance internally and standard internal and industry benchmarks that establish goals.

Airports operate in a complicated environment and have varying degrees of control over the services that customers expect. The volume of metrics or performance indicators available to airports is overwhelming and used non-uniformly. Moreover, there are insufficient standardized and generally accepted metrics in the industry to benchmark operations and finances at airports.

Research is needed to describe the benefits and applications of a performance-measurement system in the airport environment; develop a method for the appropriate application of performance measurement; list, describe, and establish generally accepted performance indicators; and establish industry benchmarks so that airports can track their performance over time and compare their performance to other, similar airports.

This project will provide guidance to establish a performance-measurement system as the first part of a potential multi-phased research initiative. Following this project, additional research will be needed to develop a more comprehensive list of traditional performance indicators and explore non-traditional metrics and measurement systems. Finally, guidance to assist the airport industry in peer-to-peer comparisons will be developed. (See Special Note A.)

OBJECTIVE

The objective of this research is to produce a practical, user-friendly guidebook that will (1) assist airport management in understanding the practical benefits of a performance-measurement system; (2) identify methods to help airports discern how well they are meeting their customer and stakeholder expectations; (3) guide the development and implementation of the most appropriate performance-measurement system; and (4) provide examples of key performance indicators, and how to incorporate them into a system. Performance-measurement systems resulting from this guidebook will enhance the decision-making process to improve service and efficiency.

Accomplishment of the project objective will require at least the following tasks.

TASKS

Task descriptions are intended to provide a framework for conducting the research. The ACRP is seeking the insights of proposers on how best to achieve the research objective. Proposers are expected to describe research plans that can realistically be accomplished within the constraints of available funds and contract time. Proposals must present the proposers' current thinking in sufficient detail to demonstrate their understanding of the issues and the soundness of their approach to meeting the research objective.

Task 1. Conduct a thorough review of relevant literature, existing research, regulatory requirements, published practical guidance, and other appropriate material to (1) identify characteristics of effective performance-measurement systems at airports and other relevant industries; (2) describe the linkage of such systems to strategic planning, regional planning, and efficiency improvement; (3) identify performance indicators relevant to airport management; and (4) list critical issues, challenges, and limitations related to the application of performance-management systems. Prepare a summary analysis of the most useful material collected and an annotated bibliography for the final report.

Note: This literature review shall also include relevant publications from airport and airline industry associations, as well as relevant and available TRB reports.

Task 2. Simultaneously with the initiation of Task 1, develop a detailed data collection plan to collect material and information from appropriate staff at airports, state and federal agencies, and airlines that (1) augments material collected in Task 1 relevant to airport performance-measurement systems; (2) assists airport management in determining if a performance-measurement system is needed; (3) guides the development and implementation of the most appropriate system; and (4) identifies key performance indicators, their characteristics, and how to incorporate them into a performance measurement system. Submit the detailed data collection plan to the project panel for review.

Note: The ACRP project panel will require 2 weeks from the date of submission of the plan for its review and approval. The research agency shall conduct a teleconference with the ACRP project panel to discuss progress of the Task 1 summary analysis and finalize the data collection plan before proceeding with the subsequent tasks. (See Special Note B.)

Task 3. Conduct the data collection and analyze the relevant material in accordance with the ACRP project panel-approved data collection plan.

Task 4. Develop a graphical flow-chart tool that presents and explains the sequential decisions related to assessing the need and method of measuring performance. This performance-measurement system assessment tool will guide the user through an individual assessment of need and select the most

appropriate performance indicators by category. The tool should first help airport managers establish the need for a performance-measurement system, and then determine which performance indicators are most appropriate to meet that need.

Task 5. Prepare a technical memorandum that presents and explains (1) a very brief summary of relevant material collected to date; (2) a discussion of issues, challenges, and limitations faced by airport operators using a performance-measurement system; (3) best practices to address these issues, challenges, and limitations; and (4) topic areas where information was anticipated but not available from the initial effort. Identify steps needed to collect this missing information.

Note: The research agency shall be required to conduct a teleconference with the project panel approximately 2 weeks after submission of the technical memorandum to obtain ACRP approval before proceeding with subsequent tasks.

Task 6. Based on discussion with and direction from the project panel, adjust and complete the data collection and analyze all material and information collected.

Task 7. Prepare an interim report within 9 months of contract execution that presents the initial content and substance of, and be presented in a suggested format for, the Task 8 guidebook. The interim report shall also update the annotated bibliography.

Note: The research agency shall be required to meet with the project panel approximately 1 month after submission of interim report to obtain ACRP approval of the interim report before proceeding with subsequent tasks.

Task 8. Prepare a guidebook in a format suitable for use by practicing airport professionals. The guidebook should present information in a balanced and informative manner. The manual should use innovative and creative approaches using text, charts, graphs, photos, flowcharts, and tables to (a) describe the purpose for the guidebook; (b) discuss the theory and practice of effective performance-measurement processes, including examples of successful applications of a performance-measurement system adaptable to airports; (c) describe critical issues, challenges, and limitations pertaining to the application of performance-measurement systems at airports; (d) present best practices to address these issues, challenges, and limitations; (e) present a performance-measurement system assessment tool and instructions to use the tool; (f) recommend best practices, linked to the assessment tool, to fully implement a performance-measurement system; (g) provide examples of key performance indicators, providing for each indicator a specific definition, data requirements, data sources, and data collection and analysis; (h) present a method to select the most appropriate performance indicators; (i) discuss current and emerging technology available to assist in the performance-measurement process; (j) discuss the regional, state, and federal applications of performance-measurement systems; and (k) suggest a mechanism to periodically assess the performance-measurement process and adjust to changing conditions. The guidebook shall recognize that airport systems of various characteristics (e.g., size, operating characteristics, geographical location, and role) may require different guidance.

Task 9. Submit the guidebook and a final report. The final report will document the entire research effort, explain and justify the recommendations, and provide background data used in the development of the manual. Include in the final report an executive summary, any recommendations for further research – including specific recommendations for subsequent ACRP projects directly tied to this project – and a plan for dissemination and implementation of the guidebook.

SPECIAL NOTES

A. This project provides only the first phase of a potential multi-phased research initiative. Future research, not part of this project, may include (1) developing a more comprehensive list of traditional performance indicators, metrics, and data collection methods; (2) describing methodologies to establish micro and macro benchmarks (peer-comparisons); (3) establishing methodologies to apply the results to a system of airports or the industry as a whole; and (4) exploring non-traditional performance metrics and measurement systems. Proposals shall include the proposer's initial thinking on this multi-phased research initiative, and how this guidebook and the results of future projects can or should be linked.

— — — — —

APPENDIX B

ACRP 01-09 Request for Proposal

Airport Performance Indicators

Posted Date: 11/25/2008

Project Data	
Funds:	\$400,000
Contract Time:	22 months <i>(includes 1 month for ACRP review and approval of the interim report and 3 months for ACRP review and for contractor revision of the final report)</i>
Authorization to Begin	
Work:	4/1/2009 -- estimated
Staff Responsibility:	Michael R. Salamone, CM Phone: 202-334-1268 Email: MSalamone@nas.edu
RFP Close Date:	1/14/2009
Fiscal Year:	2009

BACKGROUND

Performance measurement systems are a critical challenge for airports today. Many airports do not have them and those that do measure performance can improve their system. With reduced resources and the other challenges facing airports and the industry today, it is critical that airports have access to best practices to develop a performance measurement system and an extensive list of supporting performance indicators and measures that are linked to the system. ACRP is currently developing a guidebook for preparing airport performance measurement systems. Research is needed to develop an extensive list of supporting performance indicators and measures that are linked to the guidebook. The combination of these will greatly facilitate implementation of performance measurement systems at airports and make possible the comparability of information between airports over time.

OBJECTIVE

The objective of this research is to develop, for a wide variety of types and sizes of airports, a resource manual with a searchable (by airport type and size) CD-ROM that contains an extensive list of airport performance indicators, categorized by functional type, and identifies a subset of fundamental "core" performance indicators within each category. The resource manual will present and define each indicator, suggest methods for collecting relevant data for each indicator, and generally, support the implementation of an airport's performance measurement system as intended in ACRP Project 01-06, "Guidebook for Developing an Airport Performance Measurement System."

Accomplishment of the project objective will require at least the following tasks.

TASKS

Task descriptions are intended to provide a framework for conducting the research. The ACRP is seeking the insights of proposers on how best to achieve the research objective. Proposers are expected to describe research plans that can realistically be accomplished within the constraints of available funds and contract time. Proposals must present the proposers' current thinking in sufficient detail to demonstrate their understanding of the issues and the soundness of their approach to meeting the research objective.

Task 1. Review existing pertinent literature and research findings in the area of airport performance indicators and measures worldwide. Prepare a working paper for the project panel that includes a summary of key findings, best practices, and an annotated bibliography of relevant resource documents for project review and comment.

Note: The research agency may continue with subsequent tasks during the project panel review.

Task 2. Develop an extensive list of performance indicators and measures for use at a wide variety of types and sizes of airports. Categorize these indicators by functional type (i.e., financial, operational, maintenance, employee-related, customer service, etc.). For each indicator and measure, recommend its optimum definition and provide its data requirements and data sources. When applicable for any indicator or measure, discuss other definitions used in the airport industry, if different from the recommended optimum definition.

Task 3. Identify and justify a subset of core performance indicators and measures within each category and the usefulness of each at different types (e.g., large-hub, medium-hub, small-hub, non-hub, and general aviation) of airports. Core indicators and measures should be applicable to many or all airports and have the greatest potential for use as a peer-to-peer benchmarking indicator. Discuss benchmarking in general and the applicability of core indicators and measures in benchmarking. For each core indicator and measure, in addition to the central elements called for in Task 2, also describe data collection methodologies, data analysis techniques, and reliability of the data sources. Identify if the indicator or measure is a leading or lagging indicator or measure. Identify linkages between findings of this project and guidance presented in ACRP Project 01-06, "Guidebook for Developing an Airport Performance Measurement System." Prepare a working paper summarizing the results of Tasks 2 and 3 for project panel review and comment.

Note: Research for ACRP Project 01-06, "Guidebook for Developing an Airport Performance Measurement System" is in progress and a preliminary draft of the final report is expected in June 2009. The research agency will receive a copy of the draft report when it is available. The research agency may identify linkages between the two ACRP projects at that time. The ACRP project panel will require 3 weeks from the date of submission of the Task 3 working paper for its review. The research agency shall participate in a conference call with the ACRP project panel to discuss the Tasks 1 and 3 working papers. Proposals shall include a detailed plan for collecting information required for Tasks 1 through 3, compiling the extensive list of indicators and measures, and a general discussion and categorization of indicators and measures typically used by airports.

Task 4. Prepare an interim report that refines information collected in Tasks 1 through 3 with feedback received from the project panel on the Tasks 1 and 3 working papers. The interim report should be prepared as an early draft document for the Task 6 workshop. The interim report will (1) present an extensive list of performance indicators and measures, sorted by functional categories that include the central elements listed in Task 2; (2) present a subset of core performance indicators and measures within

each category that include the detailed elements listed in Task 3; and (3) include a plan for presenting and collecting feedback on the document at the Task 6 industry workshop.

Note: The research agency shall be required to meet with the project panel approximately 1 month after submission of the interim report to obtain ACRP approval and discuss plans for the format and presentation of the workshop before proceeding with subsequent tasks.

Task 5. Prepare a revised document for the workshop that refines information collected in previous tasks, based on feedback received from the project panel. Prepare the final workshop presentation and describe the process to collect feedback from workshop participants. Submit this document to the ACRP project panel 45 days before the scheduled date of the industry workshop.

Note: The research agency may continue with subsequent tasks during the project panel review. Panel comments received 1 week prior to the scheduled date of the industry workshop can be incorporated into the workshop document and presentation. The project panel will participate in the industry workshop.

Task 6. Conduct a 1-day workshop with a representative sample of industry participants. The research agency will present the workshop document in aggregate and summary form to a plenary session and simultaneous individual presentations of performance indicators and measures to categorical breakout sessions. Prepare a working paper summarizing the results and feedback obtained from the industry workshop along with proposed changes to the workshop document.

Note: The project budget shall include a line item up to \$40,000, for partial reimbursement of travel expenses for workshop participants. The research agency shall not be responsible for expenses related to project panel participation at the workshop. The tentative location for the workshop is near Dallas/Fort Worth International Airport.

Task 7. Prepare the resource manual and a searchable (by airport type and size) CD-ROM that contains an extensive list of airport performance indicators, sorted by category, subset of core performance indicators and measures within each category, and linkages with ACRP Project 01-06, "Guidebook for Developing an Airport Performance Measurement System."

Task 8. Submit the resource manual, searchable CD-ROM, and a final report. Include in the final report an executive summary, any recommendations for further research, and a plan for dissemination and implementation of the project deliverables.

SPECIAL NOTES

A. This research project is the second phase of what is envisioned to be a multi-phase project based on ACRP Project 01-06. The objective of ACRP Project 01-06 is to produce a practical guide to design and implement a performance measurement system at airports. In support of the guidebook, this project intends to produce an extensive list of airport performance indicators as well as a subset of core indicators that airports have in common. Future research, not part of this project, may include refining and validating core indicators and building a database of standardized airport performance data, supporting accurate peer-to-peer comparisons.

APPENDIX C

ACRP 01-13 Request for Proposal

Developing a Database-Driven Web Application for Benchmarking Airport Performance

Posted Date: 3/4/2010

Project Data	
Funds:	\$550,000
Contract Time:	20 Months + 12 Months of maintenance <i>(20 months includes 2 weeks for ACRP review and approval of the first technical memorandum, 3 weeks for ACRP review and approval of the interim report, 3 weeks for ACRP review and approval of the Task 10 work plan, and up to 2 months for ACRP review and for contractor revision of all Phase II deliverables)</i>
Authorization to Begin Work:	
Staff	Michael R. Salamone
Responsibility:	Phone: (202) 334-1268 Email: MSalamone@nas.edu
RFP Close Date:	5/4/2010
Fiscal Year:	2010

BACKGROUND

Benchmarking is the process of identifying best practices in a particular organization or industry and using measures to track performance against an organizational or industry level of quality or excellence. Benchmarks have various purposes. They can be used to measure progress within a particular organization or to compare performance among similar or competing organizations. At airports, benchmarks have frequently been used to measure financial and operational performance. Recently they have also been used to relate levels and types of commercial services with customer satisfaction.

Five recognized basics of benchmarking are (1) deciding what and how to measure performance, (2) identifying and analyzing key performance metrics, (3) determining peers for performance comparisons, (4) refining performance goals, and (5) monitoring progress and communicating results to decision makers. Benchmarking is most valuable when used as a catalyst to increase performance to that of leading organizations, which have similar demographic, economic, or operational characteristics. For airports, such peer comparisons can help place performance into perspective and improve the understanding of airport performance.

ACRP research is addressing the development and implementation of a performance measurement system for airports. ACRP Project 01-06, "Developing an Airport Performance-Measurement System," is producing a practical, user-friendly guidebook that will (1) assist airport management in understanding the practical benefits of a performance-measurement system, (2) identify methods to help airports discern how well they are meeting their customer and stakeholder expectations, (3) guide the development and

implementation of the most appropriate performance-measurement system, and (4) provide examples of key performance indicators and how to incorporate them into a system. ACRP Project 01-09, "Airport Performance Indicators," is a compendium of many of the performance metrics that airports can use to measure their economic, operational, and service performance. The compendium of metrics is intended to complement the guidebook described above. This compendium will contain an extensive list of airport performance indicators, categorized by airport functional type. Also identified is a subset of "key" and "core" performance indicators within each category. The manual will present and define each indicator, suggest methods for collecting relevant data for each indicator, and, generally, support the implementation of an airport's performance-measurement system as described in ACRP Project 01-06.

Research is needed to develop the means for airports to input performance data into a central database so certain standardized performance metrics can be calculated. Then, airports need a tool to assist them in differentiating among similar airports and selecting a group of peer organizations for each type of performance metric. Finally, the industry would be well served by an application to extract airport performance metrics and compare one airport with other peer organizations over time. A web-based application would be ideal for this purpose.

OBJECTIVES

The objectives of this research are twofold. The first objective is to design, build, and implement a secure, expandable, database-driven web application that allows the hierarchical entry and extraction of airport operational, financial, and other data for meaningful performance comparison purposes with a pre-determined and customizable peer group over time. The second objective is to maintain the database-driven web application for 1 year and assist with transferring the application to a permanent host. The web application should (a) offer a single data-entry point; (b) assist users in determining and selecting airport peer organizations for various performance comparisons; and (c) provide pre-formatted reports, including report forms required by FAA, ACI-NA, and others.

Accomplishment of the project objectives will require at least the following tasks.

TASKS

Task descriptions are intended to provide a framework for conducting the research. The ACRP is seeking the insights of proposers on how best to achieve the research objectives. Proposers are expected to describe research plans that can realistically be accomplished within the constraints of available funds and contract time. Proposals must present the proposers' current thinking in sufficient detail to demonstrate their understanding of the issues and the soundness of their approach to meeting the research objectives.

The research will be executed in two phases. The first phase will develop a detailed work plan, reflecting input from the ACRP panel and other industry stakeholders. Depending on the results of Phase I, Phase II will implement the work plan and maintain the database-driven web application for 1 year.

Phase I

Note: The following tasks provide a detailed work plan to (a) assess concepts for web-based benchmarking services and take inventory of possible functions; (b) evaluate these concepts using market research and pilot-tests; (c) explore alternative ways to implement and sustain these concepts; (d) evaluate available technologies; (e) refine the concepts so that they are ready for implementation; and (f) develop a design document and work plan that describes the steps required to build, implement, and sustain the web application in a timely manner within the remaining available resources.

Task 1. Review and prepare a summary list of currently available data sources that provide airport demographic, operational, financial, and passenger data and may have potential value for comparative purposes. Data sources should include the following, at a minimum:

- ACI-NA benchmarking survey and database,
- ATA member portal – Airport Cost Website (proprietary),
- Current and pending revisions FAA form 5100-127,
- Airport Master Record form 5010,
- FAA Aviation System Performance Metrics database,
- BTS Form 41, and
- Related schedules of the BTS Form 41 (e.g., T-100).

Evaluate each data source for its reliability, usability (e.g., validity and accuracy), data-entry format, age, frequency, and owner's willingness to permit import/export of data for airport comparisons.

Task 2. Review preliminary results from ACRP Project 01-09, "Airport Performance Indicators." Specifically, examine the "core" and "key" performance indicators identified in the research, and identify the prime data elements necessary to calculate these performance indicators. Review and refine existing descriptions of these core performance indicators and their prime data elements to maximize clarity and minimize ambiguity or confusion. Also, identify and develop a list of types of users and the prime data elements each user will input to (a) populate all required fields in FAA form 5100-127; (b) complete the ACI-NA benchmarking survey; and (c) complete any other industry-wide data-entry forms identified in Task 1 and usable for performance-measurement or benchmarking purposes.

Task 3. Develop a concise list of inputs for all types of users, necessary to establish an accurate peer comparison profile to permit the meaningful selection of peers for benchmarking comparisons. The inputs will be used as filter criteria for peer determination and peer-group selection purposes for various metric comparisons. Peer groups will likely change for different metrics. Inputs should include key airport demographic, economic, operational (e.g., hub size and activity), and organizational characteristics.

Task 4. Provide a technical memorandum that summarizes the results of Tasks 1 through 3 and provides a detailed plan to conduct the Task 5 needs assessment workshop. The detailed plan for the workshop should include an agenda, goals and objectives, participant questions necessary to achieve each goal and objective, and a proposed interactive format for the workshop. The plan shall be designed to achieve all requirements in Tasks 5 and 6.

Note: ACRP will require 2 weeks from the date of submission of the Task 4 technical memorandum for its review and comment. The research agency will participate in a conference call to discuss and approve the workshop plan before proceeding with subsequent tasks.

Task 5. Conduct a 1-day needs assessment workshop with the ACRP panel and selected representatives from the airport industry. ACRP will select, invite, and reimburse workshop participants. The workshop should provide sufficient information and solicit feedback to (a) validate user types and assess user functional needs, (b) identify hierarchical data access needs, (c) collect and prioritize prospective features, (d) validate peer determination criteria and methodology, (e) address other requirements detailed in subsequent tasks, and (f) align ACRP panel and stakeholder (workshop participant) expectations for a database-driven web application.

Note: Immediately following the 1-day workshop, the research team will meet with the ACRP project panel for 1 day to discuss findings and expectations, set research priorities, and detail subsequent tasks. Proposers are encouraged to discuss in the proposal early concepts for the Task 5 workshop and provide examples of various elements listed in Task 6 from similar database-driven web applications.

Task 6. Prepare an interim report that further develops concepts, system requirements, functionality, and preliminary approaches to the user interface for input and output. The interim report should include the following:

1. Recommend approaches for retaining historical and ongoing data transfer to or from external databases;
2. Describe a user hierarchy and security requirements;
3. Describe the proposed information architecture (e.g., organizing, labeling, navigating, and searching within the website) and provide a site-map (e.g., a model of the structure and organization of the website);
4. Develop wireframes and flows (e.g., simplified views of content that will appear on each screen and sequence of screens for the final web application) that demonstrate (a) the approaches for peer determination and selection and (b) data selection and extraction screens;
5. Provide examples of creative and visual reports, tables, and charts using data visualization techniques, which compare airport data year-to-year and peer-to-peer;
6. Examine methodologies and cautionary issues for user upload of data via spreadsheet or other similarly convenient means;
7. Discuss possible long-term approaches to administer, maintain, host, and sustain the website, including cost and accessibility criteria to preserve reasonable rights to use the website; and
8. Discuss a plan to conduct a usability study to evaluate and validate the above elements with a representative group of end-users, using a workshop or focus group, webinar, survey, pilot-test, or other means to collect feedback.

Note: Allow 3 weeks for ACRP review of and comment on the interim report. The research team will conduct a teleconference with the ACRP project panel to discuss and approve the interim report. The research team will provide a web-based presentation for the teleconference and afterward distribute notes on discussions and decisions made during the call.

Task 7. Conduct the usability study with contractor selected industry representatives. (These may include individuals from the ACRP panel or participants from the Task 5 workshop.) The contractor will select, invite, and reimburse study participants. Summarize the findings and deliver them to the ACRP panel for comment.

Task 8. Provide final wireframe models and recommendations for the graphical user interface based on the final wireframe models. Deliver to ACRP panel for comment.

Task 9. Based on the results of previous tasks, identify and document all technical requirements of the database-driven web application. Conduct a technical assessment of available technologies and recommend a solution that meets all technical requirements. Deliver to ACRP panel for comment, including the ability to move the database to another Internet host at the end of the project.

Task 10. Provide the final detailed work plan that describes and documents the final concept for the database-driven web application, including robust peer determination and reporting features. The detailed work plan should include a detailed design document and work plan that describes the sequential steps and detailed budget required to build, implement, and sustain the database-driven web application in a timely manner within the remaining project resources. The plan should include usability testing, acceptance testing, data migration, sustainability planning, and regular communication and progress feedback between the project panel, stakeholders, and the research team.

Note: Allow 3 weeks for ACRP of review and comment on the final detailed work plan. The research team will meet with the ACRP project panel to discuss and approve the work plan. The research team will

provide a presentation for the meeting, keep notes on discussions, and document decisions that change the detailed work plan.

Phase II

Note: Although a detailed work plan for Phase II will be developed as part of Phase I, each proposal shall contain the proposers' current thinking on what and how Phase II tasks should be undertaken and estimate remaining project resources that may be available for Phase II. An example of Phase II tasks are shown below. Some of the tasks in Phase II may differ from the descriptions below, based on the results of Phase I. The contractor may wish to independently select the user test group (contractor user-group) for Phase II. The contractor will accommodate and ACRP will select, invite, and reimburse an ACRP user-group to observe progress on behalf of ACRP.

Task 11. Develop the prototype database and website. Using a webinar, demonstrate the prototype to the ACRP panel, contractor-selected user test group, and other stakeholders and describe how the full-scale website and database will be developed. Address key features (e.g., peer determination, hierarchical access, data uploading, and data reporting). Record comments and document decisions that change the detailed work plan. Distribute to ACRP for review.

Task 12. Develop user acceptance criteria and perform and document user acceptance testing during application development. In addition to the contractor's selected user test group, the ACRP panel and ACRP select stakeholders should also be included. Identify defects and revise as necessary. Provide ongoing documentation of the test results to ACRP.

Note: Upon ACRP review and explicit approval of the testing results, proceed to subsequent tasks.

Task 13. Build and implement final software and database for the website. The final website should contain readily available help tools and be integrated with technical documentation and online training materials.

Task 14. Develop user acceptance criteria and perform and document user acceptance testing for the finished product. In addition to contractor's selected user-test group, the ACRP panel and ACRP select stakeholders should also be included. Identify defects and revise as necessary.

Task 15. Move existing data into the online system. Provide descriptive and well-commented source code and technical documentation for the final product. Develop a sustainability plan for transferring the database-driven web application to a permanent host. This plan should address permanent administration, maintenance, cost recovery, industry concerns for reasonable accessibility to the data, and a plan for migrating the database to a permanent host.

Task 16. Provide training materials and conduct a minimum of five webinars (in conjunction with AAAE, ACI-NA, ATA, and TRB events) to train users. Demonstrate the features at TRB, AAAE, ATA, and ACI-NA meetings.

Task 17. Provide maintenance, technical support services, and administration of the database and web application, for 12 months after public deployment of the website, to fix any defects in the delivered product and provide user support. This effort will cover defects and minor enhancements (e.g., addition of a link or an export function requiring minimal programming).