



Nighttime Operations Feasibility Study

Submitted To

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Carson Airport, Carson City, NV

Overview

Lean Engineering will perform a feasibility study to assist the Carson Airport (CSN/KCXP) in evaluating potential approach lighting system and instrument approach procedure alternatives that have the highest likelihood of achieving nighttime fixed wing operations. The study will consider the possibility of new approach lighting systems including but not limited to MALS, RAIL and LDIN for use on runway 27. The study will also consider modifications to existing RNAV (GPS) instrument approach procedures and new RNAV (RNP) approach procedures to the runway that can take advantage of the lighting system enhancements. The feasibility study will contain information, graphics and tables to assist the airport, FAA and other consultants supporting the airport in considering safety, cost and likelihood of being approved by the FAA for use by existing and future air traffic needs at the airport.

The study will be performed in four tasks with a fifth task for tracking progress update meetings following each of the tasks, a site inspection and a formal review meeting with key stakeholders identified by Lean and the airport.

Task 1 Baseline Assessment

Lean will perform a baseline assessment of the Carson Airport to establish the existing flight operations considerations that nighttime operations will be conducted in. The baseline assessment includes information related to historical weather conditions, aeronautical information, current fixed wing operations, terrain and obstacle information.

Historical weather information, taken primarily from weather data available from NCDC and the onfield AWOS, will be summarized into a series of tables presenting the existing temperature, pressure, wind, ceiling and visibility conditions that can be expected for flight operations at the airport. Additional information related to the Washoe Zephyr will also be described based on information from Terminal Area Forecasts and other public data sources.



Aeronautical data, terrain and obstacle information will be collected from FAA and airport source information and converted into CAD and GIS formats. Information collected from the airport will include a current version of the Airport Layout Plan, including any updates from obstruction removal for 20:1 and 34:1 surface compliance, along with any additional terrain information that may be available along the areas where the approach lighting systems are being considered. Information related to obstacles and terrain will be based on FAA AIRNAV 2 and USGS source information with additional consideration of the DDOF and OE/AAA systems.

Lean intends to perform a site visit during this task to ensure that any information necessary for the initial consideration of the approach light systems has been considered. This may require a brief inspection of airport power systems and the possibility to travel along the final approach path, and visual approach section, of the existing RNAV (GPS) RWY 27 approach. Effort related to the coordination and review of findings from the site inspection is considered in this task. The hours performing the site inspection are considered in Task 5.

Current fixed wing operations data will be provided by the airport and supplemented with any future aircraft that the airport would like to have considered for the overall nighttime feasibility assessment. Of particular importance are any aircraft with approach categories of C or higher, or aircraft with RNP-AR approach capabilities that may choose to serve the airport following approval for nighttime operations, or following other enhancements to the airport identified in the master plan.

The information will be summarized in a draft powerpoint presentation and delivered to the airport at the completion of this task. Lean will review the presentation with the airport and apply any changes/modifications before proceeding to Tasks 2 and 3.

Task 2 Approach Lighting Assessment

Lean will assess the conceptual design and costs associated with several approach light systems on runway 27. This will include the analysis of the following systems:

- Runway Alignment Indicator Lighting system (RAIL)
- Medium intensity Approach Lighting System (MALSL)
- Lead-IN lighting system (LDIN)

Conceptual exhibits will be prepared that consider the light placement, light plane clearance and power supply to each system independently and in combination with a LDIN showing the location of the lighting system, dimensions for the lights from common reference points and placement overlaid on public satellite imagery.



All lighting is considered to be activated by pilot controlled inputs and no consideration will be given to additional power or communication connections for monitoring to a future tower or airport operations facility in this assessment.

The results of this task will consist of a series of exhibits indicating the potential layout of the lighting system in accordance with FAA design orders and considering the information gathered in Task 1. Cost estimations for each lighting system will also be provided and summarized via a draft powerpoint presentation delivered to the airport for review at the completion of the task. Lean will review the presentation with the airport and apply any changes/modifications before proceeding to Tasks 3 and 4.

Task 3 Flight Procedures Assessment

Lean will assess existing, and new, flight procedures to runway 27 to determine the potential benefits to nighttime approach operations for the lighting systems identified in Task 2. This will include a review of the existing RNAV (GPS) RWY 27 approach, initial design of a new RNAV (GPS) RWY 27 approach and the initial design of a new RNAV (RNP) RWY 27 approach utilizing RF legs to final. No consideration will be made for existing or new circling approaches.

Each approach will be designed/evaluated in both TARGETS and the Global Procedure Development System (GPD) to determine compliance with existing FAA TERPS and PBN criteria. This will include consideration for use of both local and remote altimeter settings from KRNO.

For each new procedure developed, Lean will create flight inspection graphics showing the profile and plan view of the procedure, along with any minimums and lighting system credits that could be applied. Lean will also create 3d graphics in Google Earth of the approach procedures, their ground tracks and applicable obstacle clearance/obstacle evaluation areas. Lean will also identify the existing, and future, fixed wing aircraft

The flight procedure benefits and depictions will be summarized in a draft powerpoint presentation and provided to the airport for review at the completion of the task. Lean will review the presentation with the airport and apply any changes/modifications before proceeding to Tasks 4.

Task 4 Implementation Assessment and Stakeholder Review

Lean will analyze the potential steps to implement any lighting system or flight procedure enhancements identified in tasks 2 and 3. This will include a description of the key stakeholders that would need to be involved along with a ranking of lighting systems and approaches that are believed to provide the highest likelihood of success



for achieving nighttime operations with the lowest overall estimated cost of implementation.

Lean will prepare a final powerpoint presentation to be shared with stakeholders accompanying the report. The presentation is intended for FAA, airport and aircraft operator stakeholders that may wish to consider the options presented in the report.

Comments and feedback delivered following the presentation will be incorporated into the presentation, along with any other technical memos, exhibits or flight procedure information and delivered as a .PDF to the airport to complete the project.

Task 5 Meetings and Site Inspection

As a part of the scope of work, Lean will facilitate 4 progress meetings, 1 stakeholder review meeting and 1 site inspection.

Progress meetings will occur every two weeks and are anticipated to last not more than 1 hour each. Lean will provide virtual conference access for the meetings.

The stakeholder review meeting will take place either at the Carson Airport, a location identified by the airport in Carson City, NV or a location identified by the airport in Reno, NV. The meeting is anticipated to last 2 hours. Lean will also provide/support virtual conference access for stakeholders that can not attend the meeting in person.

Deliverables:

- Baseline Operational Capability Materials, Tables and Exhibits in PPT/PDF Format
- Approach Lighting Assessment Materials, Tables and Exhibits in PPT/PDF Format
- Flight Procedures Assessment Materials, Flight Inspection Graphics, 8260 Forms, Tables and Exhibits in PPT/PDF Format
- Implementation Assessment Materials, GANTT Chart, Tables and Exhibits in PPT/PDF Format

Schedule

- Task 1, including site inspection, to be completed 45 calendar days following NTP
- Task 2 and 3 to be completed 45 calendar days following Task 1
- Task 4 to be completed 30 calendar days following Tasks 2 and 3 completion
- Final comment incorporation and delivery of materials 15 calendar days after completion of Task 4



Fee Schedule:

The proposed fee scheduled is based on a lump sum fee of \$49,235.00 payable upon completion of each task as follows:

- Completion of Task 1 - \$4,970.00
- Completion of Task 2 - \$23,475.00
- Completion of Task 3 - \$10,225.00
- Completion of Task 4 - \$3,050.00
- Completion of Project 5 - \$7,515.00