APPENDIX O

Runway Length Analysis

C&S ENGINEERS

Runway Length Validation

In 1999, the Erie Municipal airport Authority (EMAA) initiated an update to their master plan. As part of the planning process, a Runway Length Analysis was prepared.

A runway length validation was requested by the Federal Aviation Administration (FAA) because of the significant amount of time that has passed since the initial analysis was performed and the fact that aircraft operations have changed as a result of September 11th and USAIR financial situation. Additionally, the validation will take into consideration the loss of the DC-9 aircraft for passenger service.

In reviewing the Runway Length Analysis, the following variables were considered:

- Stage length
- Take off weight
- Aircraft engines
- Flap settings

Stage Length

The master plan concluded that a 625 NM trip length was appropriate based on the expected aviation demand for the planning period. Considering the change in operations at the airport since USAIR removed operations of their DC-9 aircraft, the events of September 11th and EMAA agreement to begin cargo operations, the trip length was revisited.

According to EMAA, given Erie Aviation's exclusive product distribution rights for both North and Latin America, initial target distribution points will be Miami, Florida; close proximity to Mexico City, Mexico, Salt Lake City, Calgary, Canada, and Montreal, Canada. As the potential market expands, additional distribution points will be evaluated and established.

For the purpose of establishing runway length, it is reasonable that the previous 625 NM trip length will be adequate recognizing that the actual trip length will vary for different cargo operations. Therefore the trip length of 625 NM used in the master plan remains valid.

Take Off Weight

Payload capacity for a DC-9 either being used a passenger aircraft or as a commercial jet freighter as the same. The take off weight will remain a variable based on trip length, meaning the further an aircraft needs to travel, the less cargo it can carry due to the need for additional fuel. Therefore, the take off weight used in the master plan remains valid.

Aircraft Engines

The FAA computer software for calculating runway length does not take into consideration various aircraft engines types when determining the appropriate runway length for a given design aircraft. Although, aircraft manufactures performance tables contained in FAA AC 150/5325-4A do take aircraft engine into consideration as shown on Figures 2 & 3 in the master plan.

According to the 2003 Aviation & Aerospace Almanac, all DC-9 aircraft being used for commercial operations use the Pratt & Whitney JT8D series engines. For the purpose of this validation, it is reasonable to assume that the same engine series are being used by commercial jet freighters utilizing DC-9 aircraft. Therefore the engine type used in the runway length analysis included in the master plan remains valid.

Flap Settings

The FAA computer software for calculating runway length does not take into consideration various flap setting when determining the appropriate runway length for a given design aircraft. Although aircraft manufactures performance tables contained in FAA AC 150/5325-4A do take flap settings into consideration. Therefore the following analysis was performed for a DC-9-50 series to determine the shortest runway length when two or more flap settings are unitized.

Mean daily Temp.: 80 degrees (F)

Airport Elevation: 733 MSL

Trip Length: 625 NM

Takeoff weight: 625 NM x 19 Lbs./mile = 11,825 Lbs.

Fuel weight: 11,875 Lbs. + 73,109 = 84,984 Lbs.
(based on 1.25 hours of reserve)

Payload: 84,984 Lbs. + 33,825 Lbs. = 118,809 Lbs.

By identifying the flap setting that accommodates the above weight (118,809 Lbs.) we find that 5 degree flap settings allow for a maximum allowable takeoff weight of 119,000 Lbs. A 15 degree flap setting and a 15 degree flap setting, 2% speed increase produce a maximum allowable takeoff weight of 111,068 Lbs and 112,068 Lbs. respectively.

By using Tables 58-63 in appendix 3 of AC 150/5325-4A we determine the runway lengths for the corresponding flap settings are as follows:

15 degree flaps: 7,610 feet
15 degree flaps, 2% speed increase: 7,960 feet

5 degree flaps:	8,360 feet
*5 degree flaps, 5% speed increase:	9,480 feet
*0 degree flaps:	9,520 feet
*0 degree flaps, 6% speed increase:	10,740 feet

*(118,809Lbs. controls since it is less than the maximum allowable takeoff weight of 121,000 Lbs)

In accordance with AC 150/5325-4A when there are two or more flap settings yielding the design takeoff weight, the takeoff length is the shortest runway length obtained from any of the flap settings.

Therefore, the recommended flap setting is 15 degrees which produces the shortest runway length of 7,610 feet.

Summary

This analysis reviewed the stage length, takeoff weight, aircraft engines, and flap settings and concludes that what was recommended as part of the previous analysis remains valid

Additionally, the analysis also concludes that the recommended runway length of 7,500 feet remains valid despite the incrementally higher runway length produced from various flap settings.