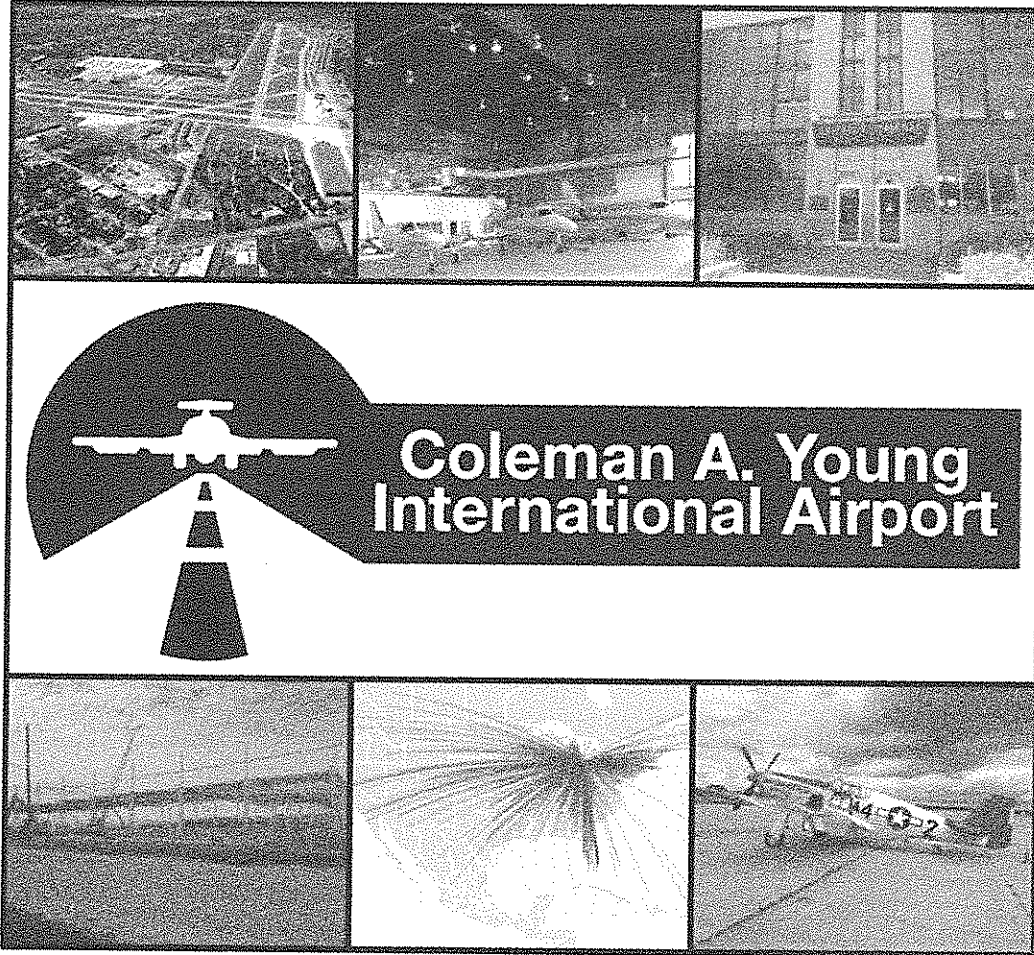


Future Use of Coleman A. Young International Airport Phase I Findings



January 25, 2017



GRA, Incorporated

In association with:

QED

Airport & Aviation Consultants

JUERGENSEN+ASSOCIATES, LLC

baltimore design

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Project Overview

The City has contracted with GRA, Incorporated, QED Airport & Aviation Consultants, Juergensen+Associates, LLC, and BaltimoreDesign (the "GRA Team") to analyze the following specific scenarios of future uses of DET in terms of their fiscal impact on the City and the region's economy:

1. Maintain DET in a state of good repair
2. Make DET the premier destination for general aviation aircraft in metro Detroit
3. Bring passenger air carrier service back to DET
4. Re-purpose DET for non-aviation use

The project is designed to have three phases as shown in Figure 1. This report presents the results of the first phase of the project, which includes a general overview of the Detroit metro aviation market, financial and operating analyses of DET, and summaries of proposed Airport improvement plans.

The next steps for the project will be for the City to authorize the team to work on Phase II and Phase III and finalize the project schedule. It would be possible to accelerate project completion by running Phase II and Phase III in parallel. Once the contract modification is approved the GRA Team will be able to begin work on Phase II and Phase III.

Figure 1: Project Schedule

Task Descriptions	2017					2018				
	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
Phase I - Create Coleman A. Young Municipal Airport (DET) Operational and Financial Baseline										
Kickoff Meeting with Study Committee										
Task 1: General Overview of Detroit Metro Aviation Market										
Task 2: Provide an Overview of DET Financial Performance										
Task 3: Identify and Summarize Assets and Liabilities and Cost of Aviation Related Improvements										
Task 4: Interview City Officials, Civic Leaders and Stakeholders										
Task 5: Preparing for Aviation and Non-Aviation Use Analyses										
Draft Report										
Review Period for Study Committee										
Review Meeting with Study Committee										
Phase II - Identify Potential Aviation and Non-Aviation Uses and Calculate Potential Economic Impact										
Task 1: Evaluate Maximum Economic Impact of DET as a General Aviation Airport										
Task 2: Evaluate Maximum Economic Impact of DET as a Commercial Service Airport										
Task 3: Evaluate Maximum Economic Impact of Repurposing DET for Non-Airport Use										
Draft Report										
Review Period for Study Committee										
Review Meeting with Study Committee										
Phase III - Summarize Future Use Options and Identify Next Steps										
Task 1: Synthesize Potential DET Uses and Recommend Strategic Actions										
Draft Final Report										
Review Period for Study Committee										
Review Meeting with Study Committee										
Final Report										
Presentation to City Council										

Methodology

The research and analysis were performed in line with industry best practices and with consideration of FAA and other relevant government agency regulations. Data were gathered from sources including the City of Detroit, FAA, and other authoritative sources. The most recently available data as of fall 2017 were used. The GRA Team visited five airports in the Detroit region (in addition to DET) to obtain first-hand information and observations of the airports.

Local stakeholder perspective is a key ingredient to charting a sound course for DET and its potential repurposing. To accomplish the research objectives of Phase I, the GRA Team conducted one-on-one interviews and focus groups with more than 60 people collectively. The interviews and focus groups included city officials, airport management, economic development organizations, area businesses, and existing and potential DET users (pilots, aviation service providers, customers, and others) and the Coleman A. Young Improvement Association (which includes both community and aviation interest group representatives).

The stakeholder feedback will be incorporated into Phase II (identification of potential aviation and non-aviation uses and calculation of potential economic impact) and Phase III (summary of future use options and identification of next steps).

Coleman A. Young International Airport (DET) Overview

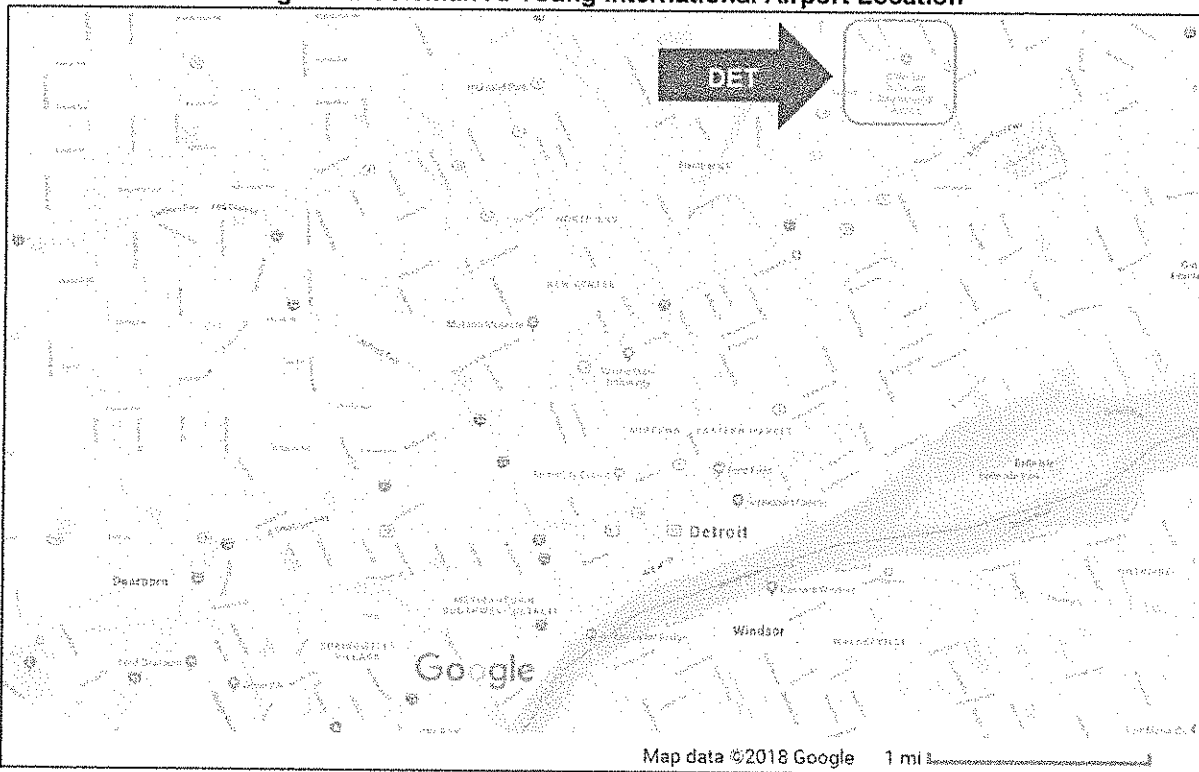
In 1927, the Detroit City Airport opened just five miles northeast of downtown Detroit. As the only airport with passenger airline service in the region, it served as the Detroit region's gateway to the rest of the United States and the world through the end of World War II. After World War II, passenger airline service at Detroit City Airport moved first to Willow Run Airport in Ypsilanti and then to Detroit Metropolitan Wayne County Airport in Romulus, which remains the dominant passenger airline service airport in the region today. Both airports are located in the suburbs of Detroit and are substantially farther from downtown Detroit than DET.

Since 1975, at least 11 airlines have started passenger service at DET with hopes to draw passengers due to DET's proximity to downtown Detroit.¹ However, none of the airlines served DET for any significant length of time due to weak passenger demand, short runways at DET, and airline financial difficulties. DET has not had scheduled passenger service since 2000.

Detroit City Airport was renamed Coleman A. Young International Airport in 2003 in honor of the former Mayor. The location identifier assigned to the Airport by the Federal Aviation Administration (FAA) is DET.

DET today occupies an area of 264 acres; an aerial view of DET is shown in Figure 2. It is located directly northeast of the intersection of I-75 and I-94 on the east side of Detroit and is located approximately 10 minutes away from downtown Detroit by car. This location presents a clear advantage for users destined to and from downtown Detroit, in comparison to other airports in the region.

Figure 2: Coleman A. Young International Airport Location






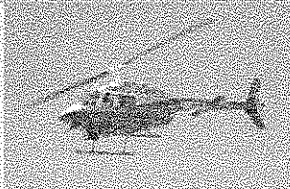
DET is served with two runways, Runway 15-33 and Runway 7-25. Runways are designated using their compass bearing (rounded to the nearest 10 degrees) such that a runway that is 152 degrees from magnetic north would be designated as runway 15. Since most runways are able to be used in both directions, the opposite compass bearing would be 180 degrees plus the first compass bearing. At DET:

¹ Darci McConnell, Cameron McWhirter, and Joel J. Smith, "Mayor: Fix or shut Detroit City Airport," *The Detroit (MI) News*, March 20, 2002.

- Runway 15-33 is the primary runway with a length of 5,090 feet. Instrument approaches may be conducted during periods of low ceiling and visibility to each end of the primary runway
- Runway 7-25 is the secondary runway at 3,714 feet long and is restricted to use during visual flight rule conditions

The runways are served with a taxiway network to facilitate aircraft ground movement. All aircraft activity at DET is under the control of an FAA contract air traffic control tower that is staffed full-time. Facilities at DET provide hangar storage for based and, when available, transient aircraft. There are large apron areas for tiedown of aircraft such as small piston engine aircraft, small turboprop aircraft, and business jets. Table 1 shows characteristics of common aircraft types at DET. The apron areas are used nearly to their capacity for transient aircraft parking during periods of peak demand typically resulting from major sporting events and concerts at Detroit venues.

Table 1: Characteristics of Common Aircraft Types at DET

Aircraft Type	Photo of Representative Aircraft	Typical Seating Capacity	Typical Users
Small Piston		2 - 4	- Flight training - Recreational flight
Small Turboprop		7 - 15	- Air taxi - Air ambulance - Corporate flight department - Shared ownership program
Business Jet		9 - 19	- Air taxi - Air ambulance - Corporate flight department - Shared ownership program
Helicopter		2 - 6	- Police - Air ambulance - Air taxi

Airports similar to DET often contract with one or more Fixed Base Operators (FBO). An FBO is a commercial business that provides aeronautical services (such as fueling, aircraft storage, aircraft parking, aircraft rental, and aircraft maintenance) at an airport with the permission of the airport sponsor.² As DET's sponsor, the City of Detroit is responsible for the operation and maintenance of DET.

The City has assigned certain duties under contract to AvFlight, the sole FBO at DET. AvFlight leases two hangar bays in the Historic Executive Terminal and office/operations space in the main terminal building. Private individuals offer maintenance services to based and transient aircraft.

² FAA, Advisory Circular 160/5190-7, *Minimum Standards for Commercial Aeronautical Activities*, August 2006.

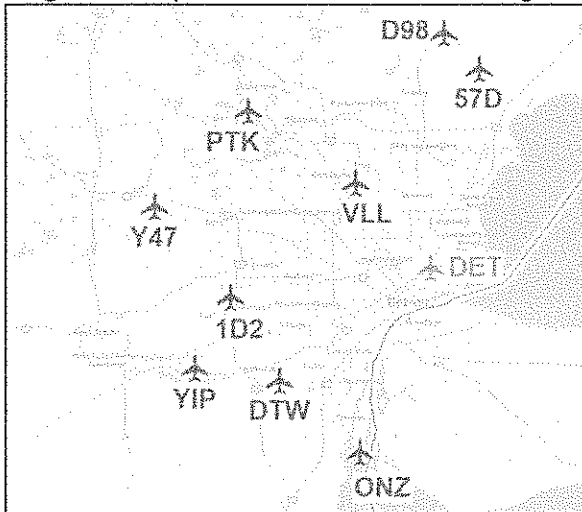
DET includes a 200,000 square foot, three-story Main Terminal Building on Conner Avenue along with a number of single and two-story accessory buildings and an air traffic control tower that is staffed 24 hours a day, seven days a week. A 191,000 square foot Historic Executive Terminal prominently occupies land near the corner of Gratiot and Conner Avenues and a Detroit Police Department hangar built at approximately the same time, is nearby to the west of Gethsemane Cemetery. There are 131 T-Hangars, some of which are located north of the Main Terminal Building with others are located on the southwest quadrant of the grounds. A fuel farm, located at the terminus of French Road, near Grinnell Avenue serves DET. There are other vacant buildings scattered about the site.

Since the last scheduled passenger service in 2000, DET has served general aviation (GA) and non-scheduled commercial aviation flights. General aviation is the term used to refer to all civilian aviation except for scheduled passenger or cargo airlines. General aviation includes a wide variety of aviation activity, including air taxi, corporate flight departments, fractional aircraft ownership programs, sightseeing flights, air medical services, agricultural flying, civilian government aircraft operations, flight training, flying clubs, and personal flying. General aviation aircraft can range from non-powered aircraft such as gliders to large jet aircraft with multiple engines. Scheduled passenger or cargo service is the offering of transportation services for hire on routes pursuant to published flight schedules. Airlines such as Delta Air Lines are in the primary business of providing scheduled passenger service and airlines such as FedEx are in the primary business of providing scheduled cargo service.

Summary of Aviation Activity in the Detroit Metro Region

DET is one of ten airports in the Detroit Metro region, as shown in Figure 3.³ The remaining nine airports are listed to the right of the map.

Figure 3: Airports in the Detroit Metro Region



Canton-Plymouth-Mettetal Airport (1D2)
Detroit Metropolitan Wayne County Airport (DTW)
Grosse Ile Municipal Airport (ONZ)
Oakland County International Airport (PTK)
Oakland Southwest Airport (Y47)
Oakland/Troy Airport (VLL)
Ray Community Airport (57D)
Romeo State Airport (D98)
Willow Run Airport (YIP)

Of the ten airports in the Detroit Metro region, three (DET, PTK, and YIP) can be considered to be major general aviation airports based on activity levels and the size of aircraft served. In 2017, DTW was the 12th largest passenger airport in the United States by scheduled flight departures.⁴ Table 2 provides a summary of key characteristics and recent operations at the six closest GA airports to Detroit.

PTK has the highest level of aircraft operations and number of based aircraft. YIP and DET have similar levels of aircraft operations but YIP has many more based aircraft. Based on interviews with industry experts, this is due in part the lack of attractive and suitable hangar facilities at DET.

Total operations include both visual flight rules (VFR) and instrument flight rules (IFR) operations. VFR flight is based on the principle of "see and avoid" which means that weather conditions must be clear enough to allow the pilot to see other aircraft, obstructions, and the ground. Pilots must use IFR when the conditions for VFR are not met. The FAA Traffic Flow Management System Counts provide a count of IFR flights that are captured by the FAA's air traffic control enroute computers.

³ The Detroit Metro region in this report is defined as the Detroit Metro region Michigan Economic Prosperity Region as designated by the state of Michigan.

⁴ OAG

Table 2: Aviation Activity at the Principal GA Airports in the Detroit Metro Region

	DET Coleman A Young	YIP Willow Run	PTK Oakland County	ONZ Grosse Isle	VSL Troy	IDZ Plymouth
Air Traffic Control Tower	Yes	Yes	Yes	No	No	No
Runway(s) Length in Feet	5,090 3,714	7,543 7,292 5,996	6,521 5,676 2,582	4,846 4,424	3,549	2,303
Based Aircraft						
Piston & Turboprop: Single Engine	49	111	295	52	92	76
Piston & Turboprop: Multi-Engine	6	34	107	8	5	3
Jet	5	65	159	0	0	0
Helicopter & Other	1	7	12	2	6	5
Total	61	217	573	62	103	84
Total Operations						
Air Carrier	0	2,966	910	0	0	0
Air Taxi	0	8,796	8,762	0	0	0
Military	0	255	178	0	0	0
General Aviation Local	26,294	26,827	50,289	10,000	15,000	22,000
General Aviation Itinerant	39,440	23,900	65,931	6,000	15,000	10,000
Total	65,734	62,744	126,070	16,000	30,000	32,000
Instrument Flight Rules (IFR) Operations						
Jet	4,454	12,752	23,901	36	38	0
Turboprop	1,472	2,760	5,276	80	364	0
Piston	1,604	2,868	7,200	476	1,465	607
Helicopter & Other	68	94	207	2	17	4
Total	7,598	18,474	36,584	594	1,884	611

Sources: Air traffic control tower, runway length, based aircraft, and total operations – most recent FAA Form 5010; Instrument flight rules operations – 2016 FAA Traffic Flow Management System Counts (TFMSC)

DET is the second busiest GA airport in the region based on number of aircraft operations due, in large part, to the volume of itinerant aircraft movements. These flights are conducted by based and transient aircraft that use DET as a point of origin or destination. Local aircraft operations are those conducted at DET as training flights. DET accounts for the lowest number of based aircraft (approximately six percent of the total) of the six largest GA airports. Of note is the low number of based jet aircraft at DET given that it is located closer to downtown Detroit than any of the major GA airports in the region.



Evaluation of Competing Airports

DET principally competes with two other airports (PTK and YIP) in the Detroit metro region for corporate and private jet flight operations. Of these airports, DET is the closest airport to downtown Detroit. The GRA Team conducted site visits to these airports to assess the relative competitive position of DET in terms of serving the general aviation market. The runways, facilities, services, fees, charges, and lighting and visual aids were evaluated at DET, PTK, and YIP.

Runways

The primary runway length at DET is significantly shorter than those at PTK and YIP, although as described in a later section of this report, aircraft operational capability is not hampered. The runway pavement condition at DET does not meet the goal for its FAA Aircraft Approach Category (AAC) C aircraft, based on data presented in the 2017 Michigan Aviation System Plan (MASP). The MASP focuses on the 114 public-use airports in Michigan that have been acknowledged as critical to state aviation system. Facility development goals, system accessibility, activity forecasts, and economic impacts are discussed for each of the airports included in the MASP.

The aircraft approach category is a means to classify aircraft based on wingspan and approach speed, characteristics which may be translated into airport facility requirements. Approach category C aircraft include most twin-engine jet aircraft used in airline service such as the Boeing 737 series and a range of business jets. The pavement condition index of the primary runway at DET was determined to rate a score of 50 versus a minimum value of 60, owing principally to cracks and other deterioration of the pavement surface that can eventually lead to structural failure of the pavement if not corrected.

YIP occupies an area of 2,600 acres and provides potential for additional aeronautical and non-aeronautical use development. The secondary runway can be extended to the east, whereas the primary runway is at its maximum length barring road relocation at either end. On the contrary, runway extensions at PTK are not considered possible without the relocation of roads and residences.

Table 3 summarizes the runway features at DET, YIP, and PTK.

Table 3: Runway Features Summary for DET and Competitor Airports

Runway Features	DET	YIP	PTK
	Coleman A. Young	Willow Run	Oakland County
Primary Runway	15/33	05R/23L	09R/27L
Length and Width	5,090' x 100'	7,543' x 150'	6,521' x 100'
Pavement Strength	75,000 single wheel 135,000 dual wheel	100,000 single wheel 200,000 dual wheel	120,000 single wheel 219,000 dual wheel
Displaced Landing Threshold	N/A	N/A	N/A
Surface	Paved	Paved	Paved
Lighting	High intensity runway lights	High intensity runway lights	High intensity runway lights
Secondary Runway	07/25	09/27	09L/27R
Length and Width	3,714' x 100'	7,292' x 160'	5,676' x 100'
Pavement Strength	12,500 single wheel	55,000 single wheel 70,000 dual wheel	57,500 single wheel 81,000 dual wheel
Displaced Landing Threshold	Runway 7 – 715'	Runway 9 – 576'	N/A
Surface	Paved	Paved	Paved
Lighting	Medium intensity runway lights	Medium intensity runway lights	Medium intensity runway lights
Secondary Runway	-	5L/23R	18/36
Length and Width	-	5,996' x 160'	2,582' x 75'
Pavement Strength	-	35,000 single wheel 45,000 dual wheel	N/A
Displaced Landing Threshold	-	N/A	Runway 18 – 650'
Surface	-	Paved	Paved
Lighting	-	Medium intensity runway lights	None

Facilities and Services

Services offered to based and transient aircraft at the three airports are comparable, with the notable exception of the condition of the airfield and terminal area facilities. The terminal area facilities at DET have exceeded, or are at or near their remaining useful lives. Publicly-owned facilities at YIP are in observably better condition than those at DET and PTK facilities are in excellent condition. Table 4 summarizes the facilities and services available at DET, YIP, and PTK.

Table 4: Facilities and Services at DET and Competitor Airports

Features	DET	YIP	PTK
	Coleman A. Young	Willow Run	Oakland County
Ownership			
Public Agency	City of Detroit	Wayne County Airport Authority	Oakland County Airport Authority
Instrument Approach			
Type	Precision	Precision with Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights	Precision with Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights
Lowest Approach Minimums			
Ceiling	250 feet	250 feet	200 feet
Visibility	1 mile	0.75 mile	0.50 mile
Air Traffic Control Tower			
Presence	✓	✓	✓
Hours of Operation	24 hours	24 hours	24 hours
Services			
Number of FBOs / Service Providers	1	2	14
Air Cargo and Passenger Charter	x	✓	✓
Aircraft Interiors	x	x	✓
Avionics	x	✓	✓
Car Rental	✓	✓	✓
Catering	✓	✓	✓
Customs	✓	x	x
Deicing	✓	✓	✓
Flight Training	x	✓	✓
Free Trade Zone	x	✓	x
Ground Power	✓	✓	✓
Ground Run-Up Enclosure	x	x	✓
Jet Engine Run Up Cell	x	✓	x
Major Maintenance	✓	✓	✓
Minor Maintenance	✓	✓	✓
Hangar Spaces			
T-Hangar	131	60	476
Single / Community	2	1 + 15 private	40 private
Spaces Available	86 (T-Hangar)	3	55 (T-Hangar)
Waiting List	4	None	None

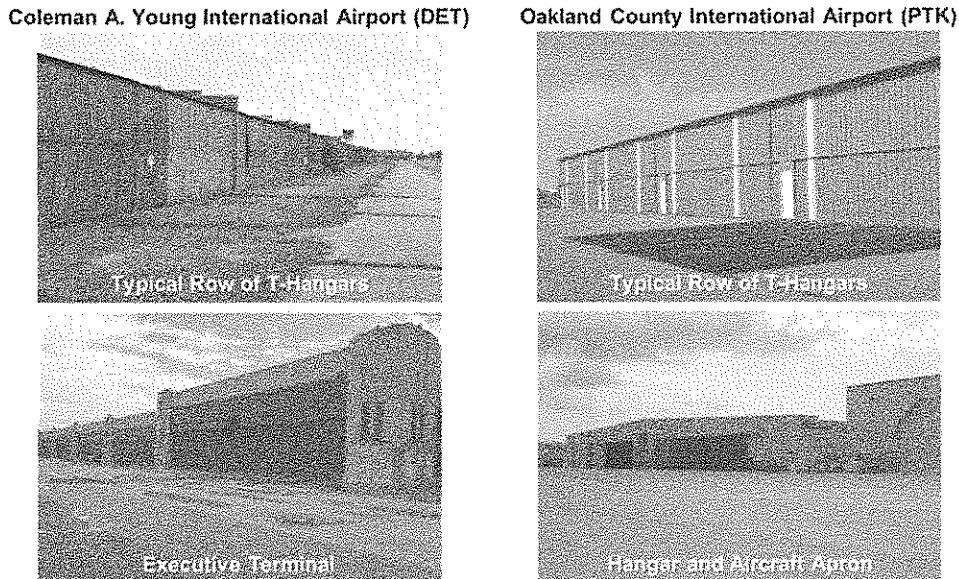
Legend: ✓ - service present at airport; x - service not present at airport

Both PTK and YIP own aircraft storage facilities. At YIP, the Wayne County Airport Authority owns two conventional aircraft hangars, one of which has eight bays (each approximately 20,000 square feet) and an additional hangar (approximately 123,000 square feet). The remaining hangar facilities, including the T-hangars, are owned by the private sector, with ground rent paid to the Wayne County Airport Authority. The reverse applies to PTK where all the T-hangars are owned by the Oakland County Airport Authority and all the conventional hangars were constructed by private interests under long-term ground leases. At DET, all the terminal area facilities are owned by the City of Detroit and leased to tenants.

It is noteworthy that a significant number of T-hangars owned by the Oakland County Airport Authority at PTK are unoccupied. This is due to unfortunate timing of their construction just prior to the early 2000's economic recession and the nationwide, long-term downward trend in the number of small general aviation aircraft that typically utilize T-hangars. The occupancy rate at PTK has been increasing slightly and it will take several years to fill the available T-hangar spaces. There remain opportunities for terminal area facilities for aeronautical uses at PTK and two new sites are currently under development for larger aircraft.

Figure 4 contains photographs of aircraft storage facilities at DET and PTK that illustrate the differences in existing physical condition. The aircraft storage facilities at DET compare unfavorably with those at PTK and would require replacement or rehabilitation to attract more tenants and achieve higher occupancy and rental rates.

Figure 4: Comparison of DET and PTK Facilities



Fees and charges at DET, PTK, and YIP are influenced by supply and demand as well as the physical condition of the facilities. DET has been hampered in modifying its rates and charges due to the uncertainty of its long-term viability as viewed by existing and potential tenants.

Based on existing charges, service providers at DET have generally comparable tiedown and handling fees, although the imposition of a security fee at DET is unique. DET is well below market rates with regard to hangar rents for both T-hangars and conventional hangar space. Fuel providers at PTK and YIP offer lower pricing for full-service avgas and Jet-A, which can influence decisions with respect to purchasing fuel at DET or tankering fuel ("tankering" is the practice of carrying excess fuel to benefit from a lower purchase price or to avoid the need to refuel at the flight's destination).

Although DET has 131 T-hangars, many are considered to not meet user needs in terms of their physical condition. Only 45 T-hangar units are occupied at DET. PTK is experiencing an overbuilt situation that has contributed to a surplus of available T-hangar units that are in excellent physical condition.

If the T-hangars at DET were in comparable physical condition to those at PTK or YIP, DET may be able to attract new tenants. DET does not have a waiting list for T-hangar space. The four spaces available for rent at DET are in the Historic Executive Terminal and its physical condition and door heights are two primary factors adversely affecting their use by new tenants.

Services at DET are less comprehensive than those available at PTK and YIP, but there are niche market opportunities at DET including aircraft exterior painting services which is not available at PTK or YIP.

Fees and Charges

Fees at DET are generally lower than at YIP and PTK. The maximum tiedown fee at DET for transient aircraft is \$35 per day, while the equivalent fees are \$225 at YIP and \$400 at PTK. Landing fees at DET range from \$25 to \$115, while landing fees at YIP can exceed \$300. Fuel prices at DET are generally slightly higher than at YIP and PTK. Table 5 summarizes the fees and charges at DET and competitor airports.

Table 5: Fees and Charges at DET and Competitor Airports

Features	DET Coleman A. Young	YIP Willow Run	PTK Oakland County
Tiedown Fees			
Based (monthly)	N/A	N/A	\$30
Transient (daily)	\$10 - \$35	\$130 - \$225	\$150 - \$400
Transient Aircraft Fees			
Handling	\$100 - \$600	\$10 - \$700	Variable
Security	\$20 - \$50	None	None
Landing Fee			
Rate 1	\$25 - \$115	Greater than 6,000lbs gross landing weight: \$28 - \$338	Fixed wing, greater than 12,500lbs gross takeoff weight: \$15 - \$105
Rate 2	None	Greater than 150,000lbs gross landing weight: \$2.25 per 1,000lbs	Rotorcraft: \$7
Hangar Fees			
T-hangar	\$210 - \$235 per month	\$325 per month	\$214 - \$380 per month
Single / community	\$2.25 per SF per month	\$7 per SF per year	N/A
Ground / Land Rent			
Annual, per square foot	N/A	\$0.10	\$0.27

Lighting and Visual Aids

The MASP provides report cards for each airport that evaluate whether the airport meets the development goals for its airport classification. DET, PTK, and YIP are all classified as C-II airports, which are airports that serve medium/large business and regional jets. There are seven development goals for lighting and visual aids for the C-II airport classification and all three airports meet most of the goals. However, DET does not meet the Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR) and segmented circle goals. PTK and YIP also do not meet the segmented circle goal, and YIP does not meet the Runway End Identifier Lights (REIL) goal.

MASP goals should not be interpreted as facility design standards or requirements as defined by the Federal Aviation Administration inasmuch as the need to achieve these goals may not be cost-justified. According to the MASP, "Facility development goals reflect an airport's role in Michigan's aviation system. They are not requirements or justification; rather they serve as a guide to airports, along with local, state, and federal agencies, in identifying deficiencies in the state's aviation system."

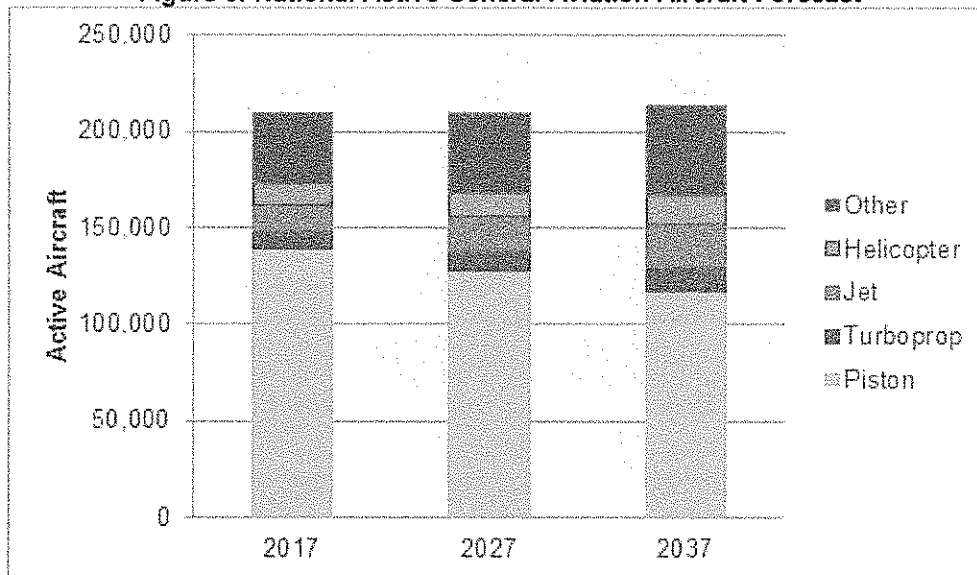
Aviation Activity Demand

National Trends

Each year, the FAA prepares a forecast of demand for aviation, which is driven by forecasts of economic activity. The latest FAA Aerospace Forecast was prepared for the 2017 through 2037 period. On a national scale, the FAA does not expect significant change in overall levels of GA activity during the medium and long term. According to the FAA, "the long term outlook for general aviation is stable to optimistic, as growth at the high end offsets continuing retirements at the traditional low end of the segment."

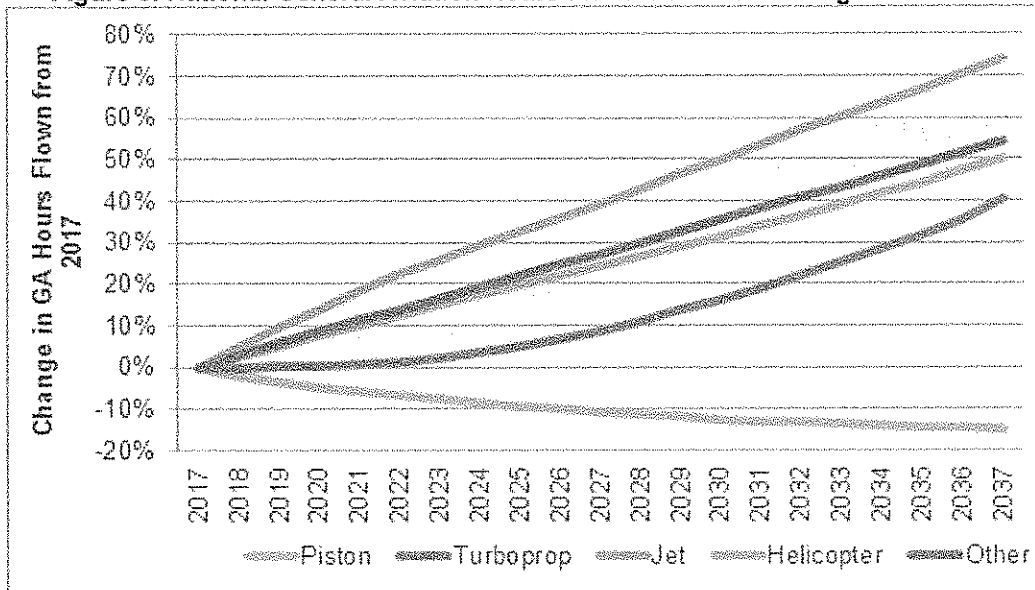
Overall, the FAA forecasts an average annual growth rate of 0.1% in the total active GA fleet over the forecast period. While piston aircraft are expected to remain the largest part of the GA fleet, the FAA forecasts that this segment of the market will continue shrinking (at an average annual rate of -0.8%) as smaller segments such as turboprop, jet, helicopter, and other aircraft grow at average annual growth rates of 1.4%, 2.3%, 1.6%, and 1.2% respectively. The "other" category primarily includes amateur-built aircraft that are smaller than aircraft in the other categories and are typically limited to maximum of two seats. Figure 5 shows the national active GA aircraft forecast from the FAA Aerospace Forecast 2017-37.

Figure 5: National Active General Aviation Aircraft Forecast



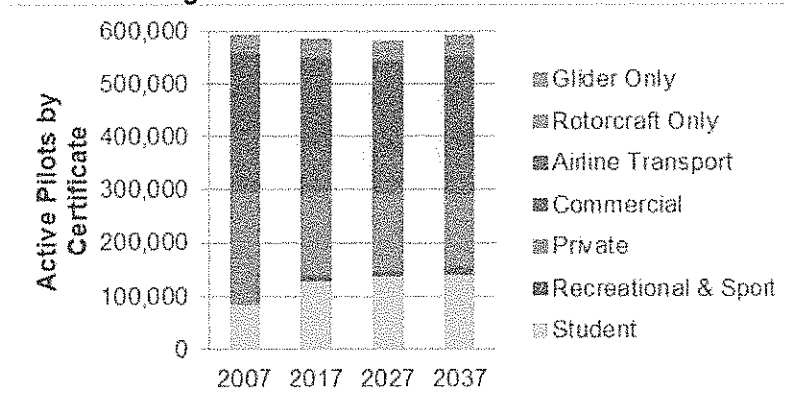
The FAA anticipates 0.9% average annual growth in total GA hours flown from 2017 to 2037, which is significantly greater than its expected growth rate for GA fleet size. As with the piston fleet size, hours flown by piston aircraft are expected to decrease at an annual rate of 0.8% over the forecast period. However, hours flown by jet & turboprop aircraft are forecast to grow at rates of 3.0% and 1.6% per year, respectively. Figure 6 shows the forecast change of national GA hours flown from 2017 per the FAA Aerospace Forecast 2017-37.

Figure 6: National General Aviation Hours Flown Forecast: Change since 2017



The FAA expects that the number of private and commercial pilots will continue to decrease, while airline transport and student pilots are likely to increase over the forecast period. It estimates a 0.1% annual decrease in the number of active GA pilots, a balance of the expected increase in student and sport pilots with the 0.6% and 0.7% expected average annual decrease in certified commercial and private pilots. Figure 7 shows the national active pilots forecast by certificate type from the FAA Aerospace Forecast 2017-37 with the number of pilots in 2007 for historical comparison.

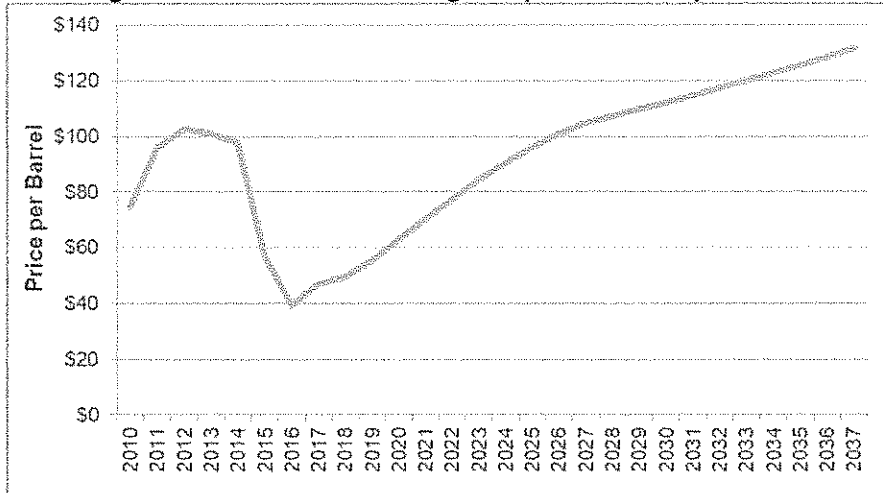
Figure 7: National Active Pilots Forecast



Like most other industries, the global economy impacts aviation in that economic downturns are correlated with a decrease in both leisure and business travel. The 2017 MASP outlines a few global and national trends that impact aviation activity and GA specifically in that nearly every segment of GA operations in the airports studied decreased between 2007 and 2008, consistent with the global economic downturn.

Fuel prices have a substantial impact on general aviation. Jet fuel tends to be more expensive for GA operators than it is for larger airlines, which are more able to buy fuel in bulk. Jet fuel prices have increased substantially over the past twenty years and are expected to continue increasing over the forecast period. Like the overall economy, fuel prices are subject to significant year-to-year fluctuations that impact both levels of GA activity and GA aircraft sales. Figure 8 shows the historical and forecast average acquisition costs per barrel of oil for U.S. refiners from the FAA Aerospace Forecast 2017-37. The cost decreased substantially from 2012 to 2016, but is expected to increase at an average annual growth rate of 5.9% from 2016 through 2037.

Figure 8: U.S. Refiners' Average Acquisition Cost per Barrel



Regional Trends

The gross domestic product (GDP) growth rate in the Detroit-Warren-Dearborn, MI metropolitan statistical area (MSA) began to diverge from the national GDP growth rate in 2004 and began to substantially decline in 2006, which preceded the national recession that began in late 2007. At the lowest point of the recession in 2009, the Detroit MSA's GDP was nearly 15% lower than it was in 2001. Since then, annual GDP growth in the Detroit MSA has been similar or exceeded the national GDP growth rate. In 2015, GDP in the Detroit MSA exceeded the 2001 level for the first time since 2007. Figure 9 shows the change in real (inflation-adjusted) GDP from 2001 to 2016 for the United States and the Detroit MSA.

Figure 9: National and Detroit MSA Change in Real GDP from 2001

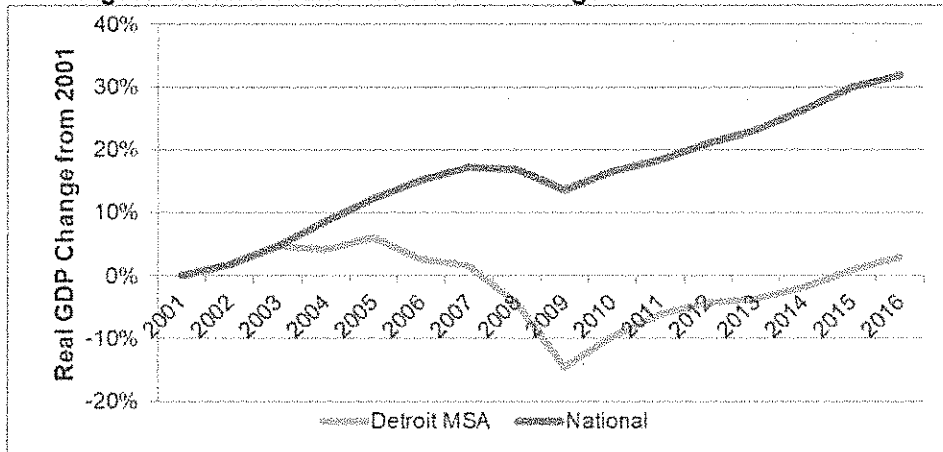
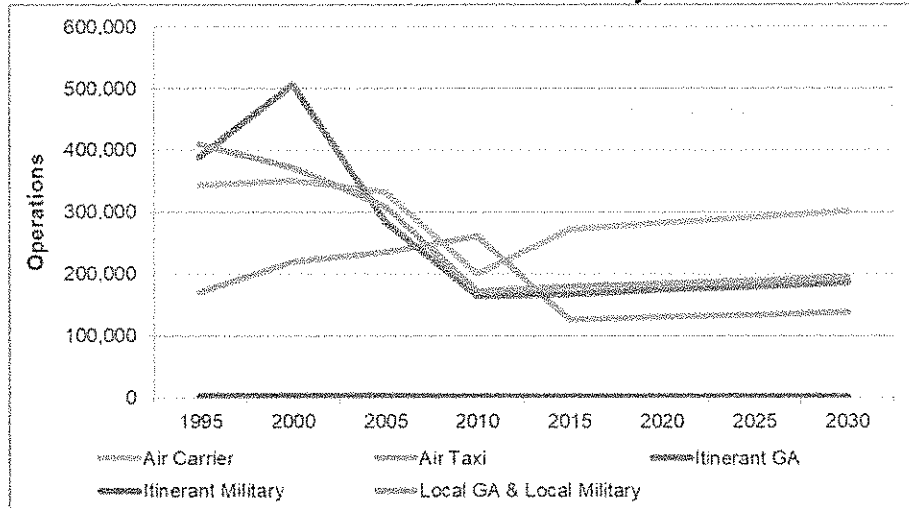


Figure 10 shows the historical aviation activity for the ten airports in the Detroit Metro region from 1995 through 2015 and the forecast aviation activity from 2020 through 2030 per the MASP. Total aviation activity in 2030 is forecast to be approximately 820,000 operations, which is 38 percent lower than the 1,300,000 operations in 1995.

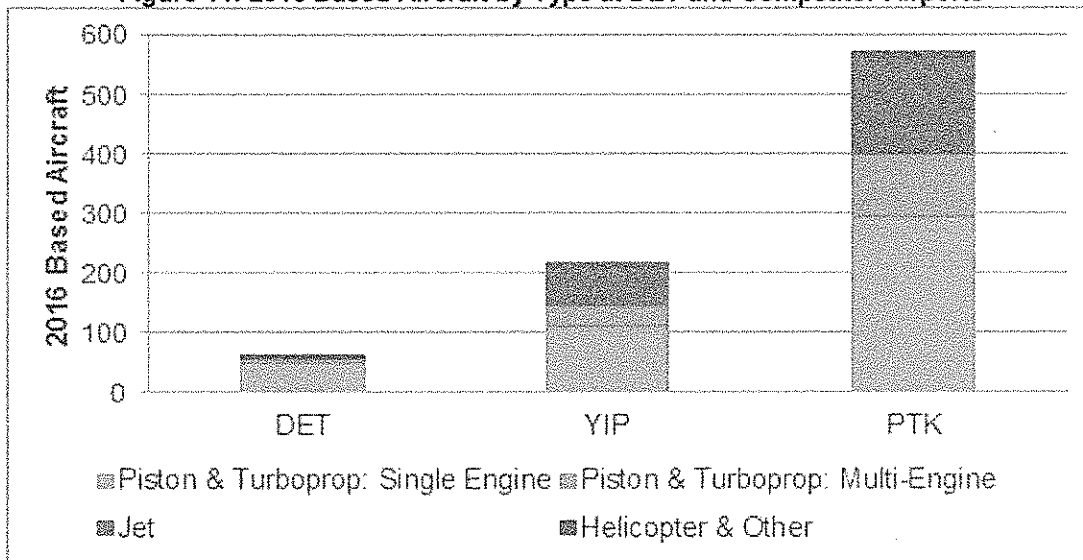
Figure 10: MASP Historical and Forecast Aviation Activity in the Detroit Metro Region



Local Trends

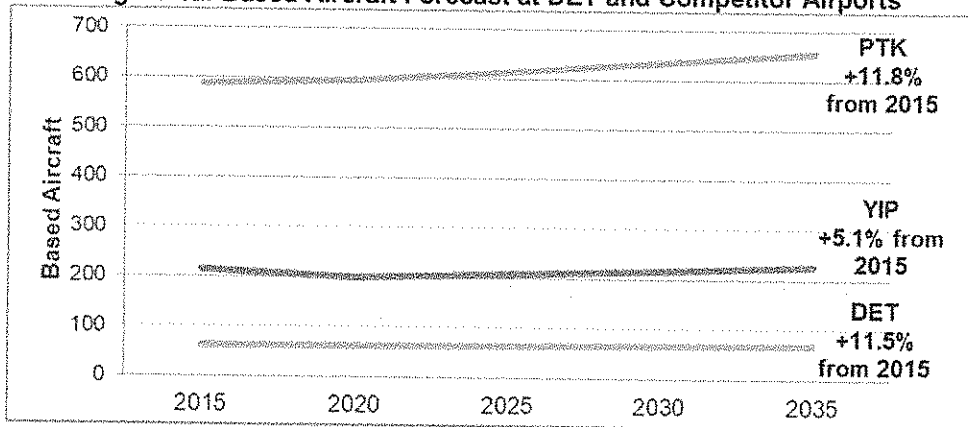
DET's prominent competitors are PTK and YIP due to their physical proximity and facilities. A majority (53%) of aircraft based at DET, YIP, and PTK are piston & turboprop single-engine aircraft. In 2016, there were 61 based aircraft at DET, 217 based aircraft at YIP, and 573 based aircraft at PTK. Figure 11 shows the number of based aircraft by type at DET and the competitor airports in 2016. Of the 229 jet aircraft based at the three airports, only 2% are based at DET. The majority (69%) of jet aircraft based at GA airports in the Detroit metro region are based at PTK and the remaining 28% are based at YIP.

Figure 11: 2016 Based Aircraft by Type at DET and Competitor Airports



The 2017 MASP forecasts an overall 10% increase in the number of based aircraft at DET, YIP, and PTK, but this increase is not evenly distributed among the airports. As shown in Figure 12, the number of based aircraft at DET and PTK will be about 12% higher in 2035 than in 2015, while the increase at YIP will be approximately 5%.

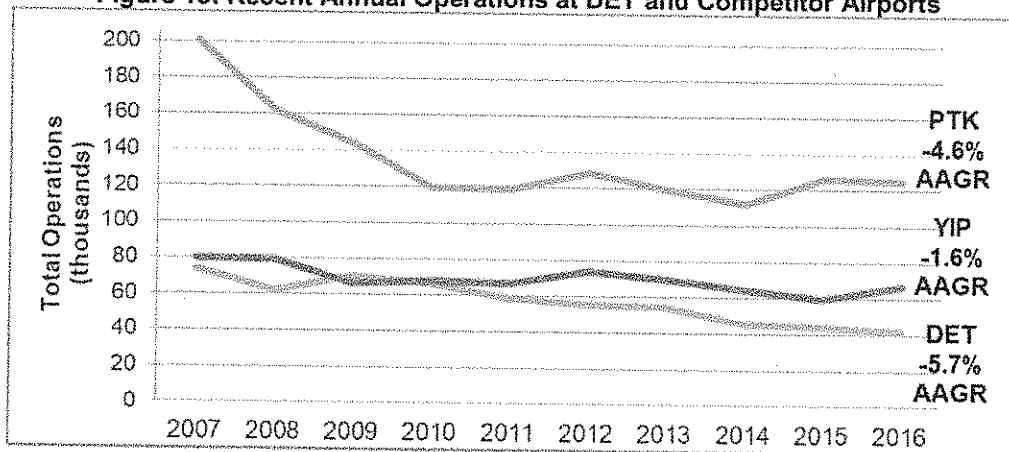
Figure 12: Based Aircraft Forecast at DET and Competitor Airports



PTK has about two to three times as many annual operations as YIP or DET, but all have air traffic control (ATC) towers and serve a mix of local and itinerant traffic for aircraft operating under both visual (VFR) and instrument (IFR) flight rules. Figure 13 shows historical annual operations and average annual growth rates (AAGR) at DET and competitor airports from 2007 to 2016.

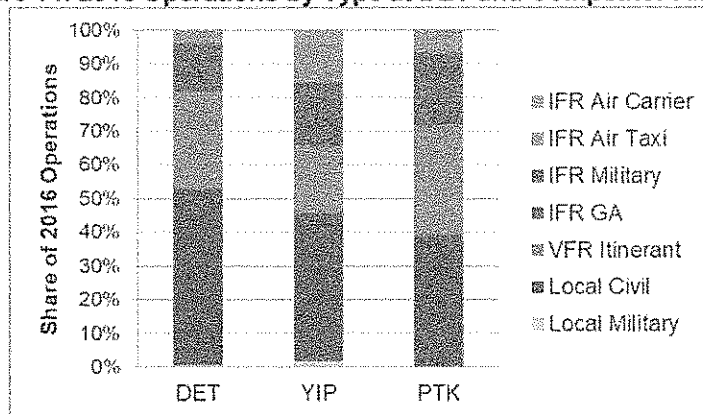
Between 2007 and 2010, DET had around the same number of annual operations as YIP, with 55,000 to 80,000 takeoffs and landings (operations) per year. However, while operations at YIP have remained relatively stagnant since then, aircraft operations at DET have steadily declined since 2009. PTK operations declined substantially from 2007 to 2010 and have remained relatively steady since 2010. While the national economic recession of 2007-2009 appears to have had a substantial impact on operations at PTK, it does not appear to have substantially impacted operations at DET or YIP.

Figure 13: Recent Annual Operations at DET and Competitor Airports



The 2016 mix of operations at DET (about 56% local GA, 40% itinerant GA, and 4% air taxi) represents an increase in the share of local operations at DET. In 2007, the mix was about 42% local GA, 53% itinerant GA, and 5% air taxi. Figure 14 shows 2016 operations by type at DET and competitor airports. The mix of operations at DET is fairly similar to that at PTK and YIP.

Figure 14: 2016 Operations by Type at DET and Competitor Airports



Absent any major capital improvements at DET in terms of aircraft storage and other physical facilities, it is anticipated that future general aviation activity will mirror the trends reflected in the 2017 MASP. The number of based aircraft at DET is projected to increase by nearly 12% through 2035, comparable to the growth rate anticipated at PTK and more than twice the growth rate predicted for YIP. This increase in based aircraft will translate to higher numbers of aircraft operations at DET.

The majority of new aircraft operations will be generated by corporate aircraft that continue to reflect the current practice of transitioning aircraft from PTK to pick up and drop off passengers originating their ground travel from downtown Detroit, coupled with transient aircraft operations from other airports generally within a 500-nautical mile range of DET.

Should the City opt to upgrade the terminal area facilities at DET and other aspects important to users of DET such as security measures and aesthetics, it is likely that higher levels of aviation activity in terms of based aircraft and operations can be realized. These levels will be more pronounced in the short-term, following the implementation of the capital improvements and then follow national trends that reflect the overall health and strength of the general aviation market.

The 2017 MASP forecasts operations at DET to increase at an AAGR of 0.53% per year over the forecast period. The AAGR for operations at PTK is also forecasted to be 0.53%, while the AAGR at YIP is forecasted to be 0.88% as shown in Figure 15. For comparison, the 2017 MASP estimates that growth in aviation activity within the state of Michigan will average about 0.74% per year, over the 20-year forecast period.

Figure 15: Forecast Operations at DET and Competitor Airports

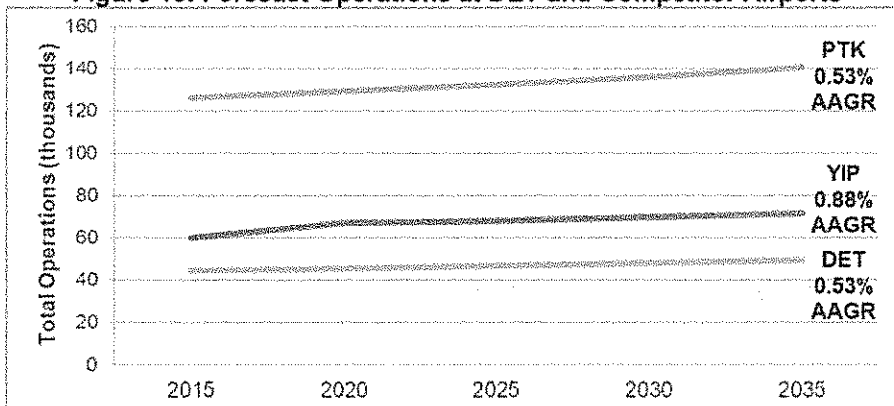


Figure 16 shows the change in the historical and forecast air taxi, commuter, and itinerant GA operations at DET and competitor airports from FAA's Terminal Area Forecast (TAF) relative to 1995. Itinerant operations by air taxi, commuter, and GA operators fell substantially from 1995 through 2016. Future

operations are forecast to be fairly steady or slightly increasing. At DET specifically, the number of itinerant air taxi, commuter, and GA operations decreased from about 59,000 in 1995 to about 20,000 in 2016, a decrease of 66%.

Figure 16: Historical and Forecast Air Taxi, Commuter, and Itinerant GA Operations at DET and Competitor Airports

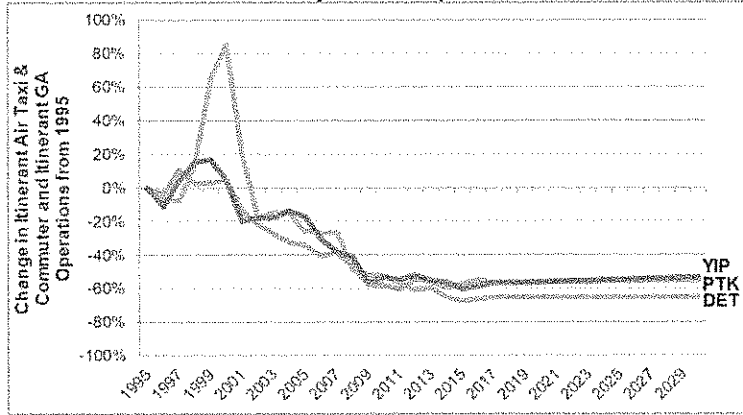
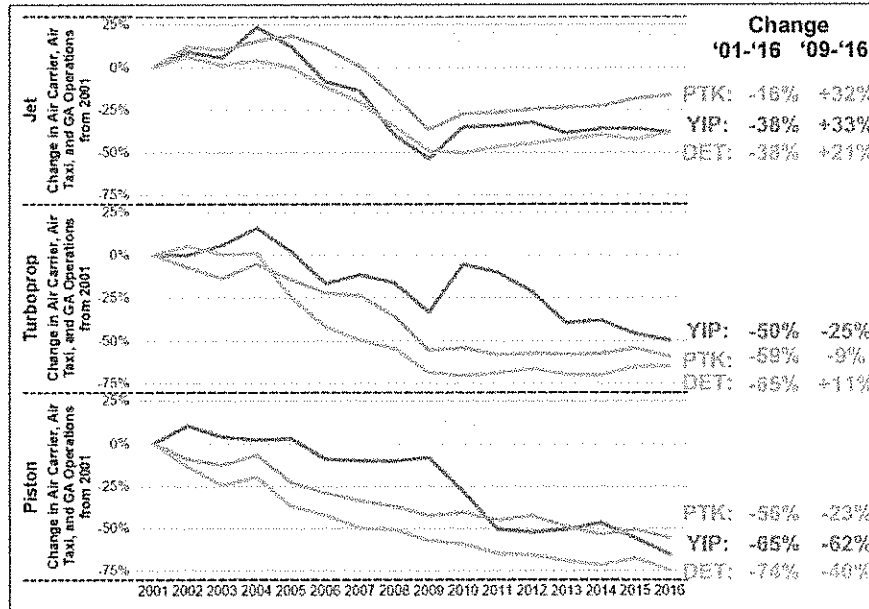


Figure 17 shows a subset of the change in recent operations at DET, PTK, and YIP from 2001 to 2016. The data source is FAA's Traffic Flow Management System Counts (TFMSC) which includes most IFR flights. Most flights by high-performance aircraft (jet and turboprop engine aircraft) are IFR flights due to the speed at which they fly and the need for air traffic control services. Some piston engine aircraft (often those operated by air taxi or other commercial operators) also fly IFR and are thus included in TFMSC.

The TFMSC data show that there has been a substantial decrease in these high-performance operations at DET, PTK, and YIP since 2001. However, there has been a recovery in the number of operations by jet engine aircraft at all three airports and by turboprop engine aircraft at DET since the end of the recession in 2009. The number of TFMSC operations by piston engine aircraft has continued to decline at all three airports since 2009. This means that the focus for attracting new aircraft operators and revenue at DET must be on jet and turboprop engine aircraft operators as this segment of the industry continues to grow in the future.

Figure 17: Recent TFMSC Operations by Engine Type at DET and Competitor Airports



As shown in Table 6, fuel prices tend to be higher at DET than at YIP or PTK. Self-serve avgas (which is used by piston engine aircraft) was similar at DET and YIP in August 2017, while full service avgas was substantially more expensive at DET than at YIP or PTK. Jet A fuel (which is used by turbine engine aircraft) was also substantially more expensive at DET than at YIP or PTK.

Table 6: Fuel Prices at DET and Competitor Airports, August 2017

Airport	Avgas		Jet A
	Self-Serve	Full-Service	
DET - Coleman A. Young	\$4.56	\$6.47	\$6.21
YIP - Willow Run	\$4.99	\$5.10 to \$5.50	\$4.25 to \$4.57
PTK - Oakland County	N/A	\$4.50 to \$4.87	\$3.15 to \$3.86

DET Facilities and Condition

A review of the current primary airfield and terminal area facilities by the GRA Team yields the following observations:

1. Runway 15-33 and the western portion of Runway 7-24, the south parallel Taxiway J serving Runway 7-25, Taxiway F serving the eastern T-hangar area, and apron areas serving the passenger terminal, and executive and police department hangars are deteriorating and in need of major rehabilitation or reconstruction. Figure 18 shows the DET Pavement Condition Index (PCI) from the 2015 Statewide Pavement Management System Update prepared by the Michigan Office of Aeronautics. Higher scores (in green) indicate pavement in good condition and lower scores (in red) indicate pavement in poor condition.
2. The Main Terminal Building is being used as offices for DET, AvFlight (the fixed base operator), and U.S. Customs and Border Control. A facilities assessment conducted in 2016 by the Detroit Building Authority highlighted functional and integrity issues that should be addressed to maintain the serviceability of the building in the short- and long-term.
3. The Historic Executive Terminal (approximately 191,000 square feet) is used for aircraft storage and appears to be structurally sound. Some bays have been upgraded for aircraft storage. The hangar doors slide into position and are motor-powered but the door heights (19 feet high in two bays and 22 feet high in 12 bays) are too low to accommodate some of the larger, more advanced corporate jet aircraft. Figure 19 shows the existing Executive Terminal at DET.
4. Currently, DET has no facilities to house large corporate aircraft. DET receives requests repeatedly during inclement weather to overnight aircraft inside a hangar, but DET has no facilities for aircraft with tail heights that exceed 22 feet. Consequently, these users drop their passengers and depart to other airports, reducing potential operating revenue for DET.
5. The 131 T-hangars in the north and southwest quadrants of DET have exceeded their useful lives, are mostly unusable, prohibiting the attraction of new tenants. Reconstructing these T-hangars is not cost-effective. New facilities would attract small corporate and light aircraft operators, which will improve Airport finances. Figure 19 shows the existing T-hangars at DET.

Figure 18: DET Pavement Condition Index

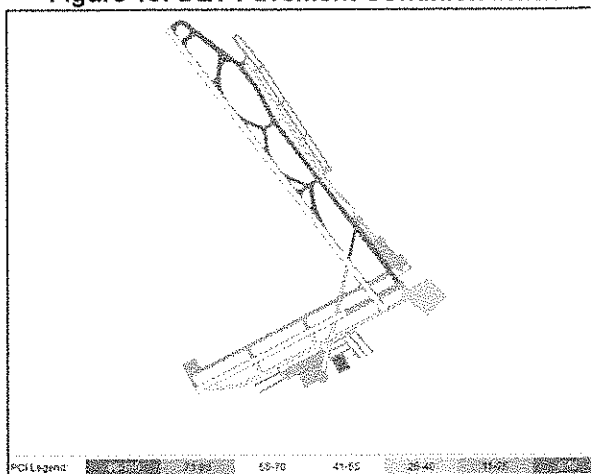
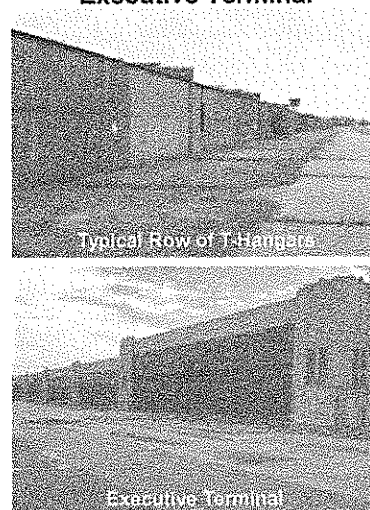
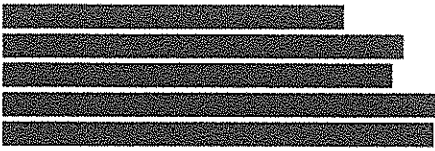


Figure 19: DET T-Hangars and Executive Terminal



6. The Detroit Police Department bases



7. There are other small structures on DET property that are abandoned and in poor condition. The current snow removal equipment (SRE) storage is in two bays of the Historic Executive Terminal, but should be stored in their own facility. The aircraft rescue and firefighting (ARFF) building is in serious need of repair due to a waterline break several years ago. Consolidating these two functions into a single facility will result in more efficient DET operation and will open two hangar bays to house new tenants.

8. The length of Runway 15-33 (5,090 feet) affords adequate operational performance by corporate jets as illustrated in Figure 21. These aircraft operate to nonstop destinations in the western United States, Central America, the Caribbean, and Europe. The length of Runway 7-25 (3,714 feet) is adequate to serve the light aircraft operating from this facility. The overall activity level of DET does not exceed its annual and hourly capacities.

Figure 20: Detroit Police Department Hangar at DET

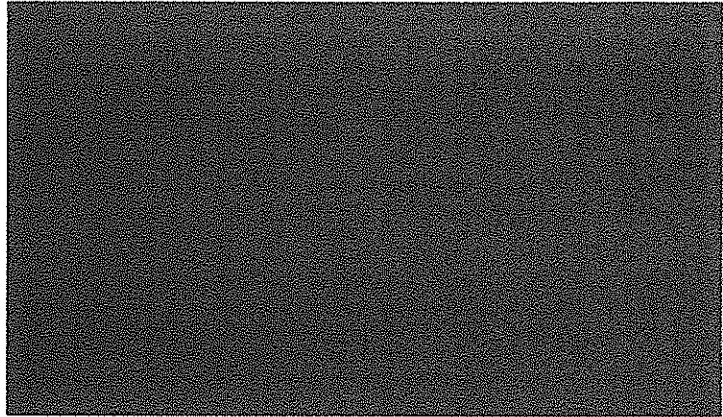
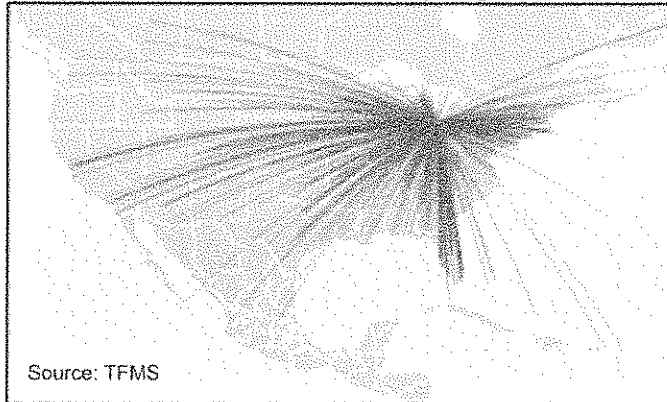


Figure 21: FY2016 TFMS Nonstop Flights from DET



Source: TFMS

Runway Design

While both runways are serviceable, DET does not meet several facility design standards applicable to runway design standards for each. The design standards differ based on the critical design aircraft operating on or anticipated to operate on each runway. Runway 15-33, the primary runway with a length of 5,090 feet, is categorized as a C-II-5000.

- C applies to aircraft with approach speeds of at least 121 but not less than 140 knots;
- II references wing spans of at least 49 feet but not more than 79 feet and tail heights of at least 20 feet but not more than 30 feet
- 5,000 include runway ends with instrument approach visibility minimums of not lower than one statute mile.

Runway 7-25 is 3,714 feet in length and the Runway 7 threshold is displaced 715 feet and is classified as a B-I (SAE)-VIS runway.

- B applies to approach speeds of at least 91 knots but less than 121 knots;
- SAE is the abbreviation for Small Aircraft Exclusively, that is, those with maximum takeoff weights of 12,500 pounds or less; and
- VIS indicates that the runway is used only for visual approaches.



GRA, Incorporated



Airport & Aviation Consultants

JUERGENSEN+ASSOCIATES, LLC Baltimore design



Figure 22 provides an aerial view of the runways at DET.

Runway 7-25 does not meet runway safety area length dimension on the Runway 7 end. Additionally, the FAA has expressed concern about the intersection of Runway 7-25 and Runway 15-33 at the southeastern end (Runways 25 and 33.) The intended action is to decouple the runway ends and thereby afford less interaction of aircraft maneuvering concurrently to either runway end.

Runway 15-33 is observed to have several design features that are not in compliance with FAA standards. These include the length of the runway safety area at each of the runway, the location of McNichols Road in the runway safety area and its proximity to the Localizer Navigational Aid at the Runway 15 end, and the lack of a 90-degree access taxiway to the Runway 15 end. The primary surface (which is a federal aviation regulation as opposed to a facility design standard) of Runway 15-33, is also deficient on the west side and involves what is commonly referred to as the French Road Mini-Take Area.

The distinction between compliance with a federal regulation and a facility design standard is that regulations assert an intended situation or outcome that is achieved through the imposition of facility design standards. The FAA has not identified the primary surface as a design standard, but rather incorporates this imaginary surface through the determination of applicable design standards. The FAA also allows for modifications to design standards when these do not compromise flight safety and cannot otherwise be reasonably achieved.

The Runway Safety Area Evaluation and Recommendation for Runway 15-33 and Runway 7-25 study prepared by QOE (the engineering firm under contract with DET) in June 2016 recommended that the runway safety area on the Runway 7 end be achieved by shortening the runway at that end by 223 feet resulting in a total runway length of 3,491 feet. The resulting length was assessed as adequate to continue serving the types of aircraft operating on the runway.

Decoupling the runway at the eastern end (Runway 25) from Runway 33 will require shortening one or the other runway end. A determination on the better means has not been made, but would favor a reduction at the Runway 25 end in order to avoid any adverse aircraft operational capabilities on the primary Runway 15-33. The GRA Team estimates that the Runway 25 end would need to be relocated to the southwest by some 730 feet in order to meet the runway safety area associated with Runway 15-33 and achieve an effective decoupling of the runway ends. This would reduce the length of Runway 7-25 to 2,761 feet, a length that would likely discourage its use by all but piston single-engine aircraft. The runway width can then be reduced from 100 feet to 60 feet to meet facility design standards applicable to this runway use, which will necessitate a repositioning or replacement of the runway edge lights and the precision approach path indicator serving the Runway 25 end. As mentioned above, the decoupling of the Runway 25 and Runway 33 ends has not been fully evaluated by the City, Michigan Office of Aeronautics, or the FAA and no determinations have been made.

The same study presented a detailed assessment of the runway safety area for Runway 15-33 and concluded that the best means to achieve compliance with this FAA facility design standard was to install an engineered material arresting system (EMAS) at both ends of the runway. EMAS is a crushable material that serves to decrease the speed of an aircraft that has overrun the runway and bring it to a stop in less time and distance than a paved surface. This recommendation maintains the 5,090 foot length of Runway 15-33 and avoids impacts on the cemeteries that lie immediately beyond each runway end.

Figure 22: Aerial View of DET Runways



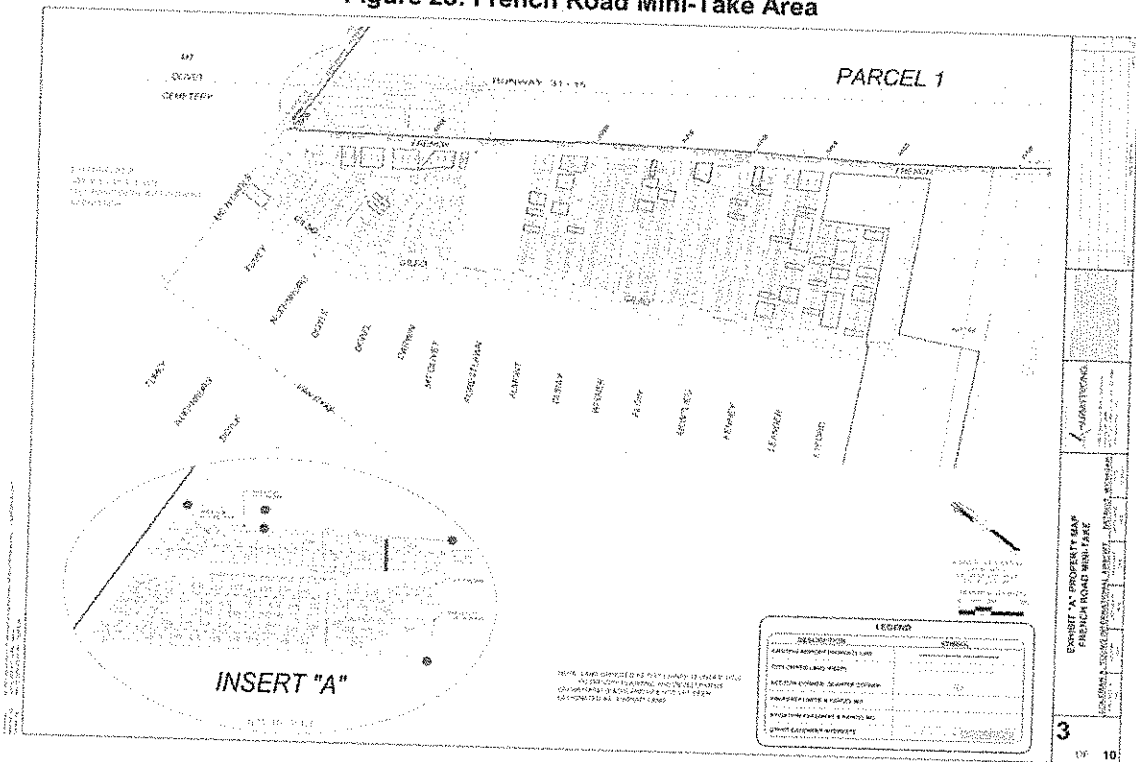
Implementation of EMAS at the Runway 15 end may also resolve the McNichols Road runway safety area and proximity to the localizer facility issue at this runway end.

Resolution of the status of McNichols Road and the 90-degree access taxiway access to the Runway 15 end is currently under consideration by the City, Michigan Office of Aeronautics and FAA with the intent to result in no reduction in the usable length of Runway 15-33.

Land Acquisition

The French Road Mini-Take Area land acquisition program has been an on-going initiative since 1994. The area is principally located west of Runway 15-33 at its northwestern end and is highlighted in drawings provided by QOE shown as Figure 23. The basis for acquiring the land was to achieve compliance with the Federal Aviation Regulations (FAR) Part 77 primary surface (total width of 1,000 feet centered on the runway.) Prudent planning also provides for the potential development of that land area just to the west and beyond the primary surface. Industry standards are to establish a "building restriction line" that would allow for structures as high as 35 feet above the runway elevation.

Figure 23: French Road Mini-Take Area



Federal Aviation Regulations (FAR) Part 77 establishes the standards used to determine obstructions to air navigation, and navigational and communication facilities. A transitional surface is defined as one that rises from the FAR Part 77 primary surface surrounding the runway at the rate of one foot vertically for each seven feet horizontally and results in a setback distance of 245 feet. Industry practice has been to define a 750-foot lateral separation from the runway centerline (500 feet + 245 feet = 745 feet ~750 feet.) This lateral distance places the building restriction line west of French Road and nearly midway to Gilbo Avenue. Rather than acquiring split parcels, that is, those located between French Road and Gilbo Avenue, the City has opted to acquire that land between the western boundary of DET to Gilbo Avenue. The City has acquired many of these parcels.

The above are the primary facility design standards that are to be addressed at DET. Other standards may not be met; however, at present the Michigan Office of Aeronautics and the FAA have not assessed these as imminent needs. The challenge at DET is that the City has not been willing to undertake remediation action with federal and/or state grants. Rather, the City is contemplating funding the imminent

design standards deficiencies with its own resources and seeking federal and/or state reimbursement at a later date. Although this may appear to be a rational approach for the City given that it is also considering the closure of DET, the federal policies associated with reimbursement do not allow for such action unless the improvements are depicted on an FAA approved airport layout plan, which is currently not in effect.

Airport Layout Plan

The City, Michigan Office of Aeronautics, and FAA recently met concerning an updated airport layout plan (termed a Phase II update), which is to be accompanied by a comprehensive analysis of alternative means to address the noncompliance with design standards issues. The FAA and State require this planning initiative inasmuch as the cost to implement the runway safety area improvement alone is anticipated to be in the tens of millions of dollars. The agencies are also concerned that the City may move to close DET and thus an allocation of large sums from these State and Federal agencies requires commitments from the City as to the continued operation of DET. The entire matter may not be resolved until the conclusion of the study conducted by the GRA Team, but may also not be dependent on the GRA Team's work.

Ultimately, at some point in the near future, the City will need to decide how best to address these facility design standards. Maintaining DET will necessitate action and funding to accomplish this – the majority of which can be provided by MDOT and FAA.

Financial Analysis

The majority of publicly-owned GA airports nationwide fail to break even on an operating basis and are not "profitable" (i.e revenue is less than operating and investment costs). Investments are often paid for by grants from federal, state, or other government agencies and GA airports attempt to cover the local share of federal and state grant-eligible projects with the net income from operations. Net income is the funds remaining after operating costs are absorbed by operating revenue. The majority of publicly-owned airports nationwide that primarily serve GA aircraft operate at a net loss and require subsidy from their owner's general fund. That fund may rely on general obligation bonds issued by the public agency.

GA airports can be profitable if they have very large numbers of based aircraft (especially jet and turboprop aircraft) or if they have unique land assets that produce revenues (such as agriculture, mineral extraction, or a specific industrial use). "Reliever" airports that support a mix of commercial and GA flights typically receive funds from a larger airport serving scheduled passenger airlines and may break even and generate funds for investment. Regardless of whether an airport is profitable, GA airports commonly use FAA and other grant funds to make capital investments or are able to let commercial enterprises make selected investments to help meet investment needs, including hangars and other facilities.

The FAA wants airports to be as self-sustaining as possible and allow excess land to be used for non-aviation purposes as long as revenues support the aviation activities. FAA and DOT policies require all airport revenues to be used for aviation purposes. The principal sources of GA airport revenues include:

- Fuel flowage fees (if airport contracts out the right to provide fuel)
- Fuel sales (if airport retains right to provide fuel)
- Hangar rents/leases
- Landing/ramp fees
- Aircraft parking fees
- Land and building leases
- Concessions revenue (such as food and beverage providers or rental car agencies)

Airports are very volume sensitive and many assets are underutilized relative to their physical capacity, leading to economies of scale such that increasing the number of flights is likely to have a low unit cost and high revenue benefit. Changing the mix of aircraft served to more jet and turboprop aircraft rather than piston aircraft can improve revenues. Investments needed to attract high performance aircraft (like runway improvements) are eligible for FAA and state grants while other improvements can be privately financed. Once an airport can accommodate larger aircraft, adding more flights and based aircraft has large revenue benefits:

- Jet and turboprop aircraft fly longer distances and use more fuel
- Jet and turboprop aircraft tend be larger and more expensive; owners are more willing to pay for modern hangar space

DET Finances

The City has not been able to achieve a positive net operating income at DET for the past several years. A snapshot of recent DET operating revenue and expense data is presented in Table 7. Detailed data on operating expenses were not available for FY 2015.

In FY 2017, approximately:

- 41% of operating revenue was from landing fees,
- 19% was from T-hangar rentals,
- 19% was from the rental of miscellaneous property, and
- 13% was from the rental of hangar bays.

The largest contributors to operating expenses were

- utility charges (57%),
- salaries, wages, and benefits (16%), and



- materials, supplies, and other expenses (10%).

In FY 2016, operating expenses were impacted by atypical events including a \$1.5 million pension expense item due to the City's bankruptcy and an \$80,000 workers compensation item which contributed to a negative expense for salaries, wages, and benefits. The 'materials, supplies, and other' item was significantly higher in FY 2016 due to \$1.9 million of expenses related to DET litigation.

Utility charges doubled from \$678,688 (27% of total operating expenses) in FY 2016 to \$1,385,345 (57% of total operating expenses) in FY 2017. Water charges were the single largest component of utility charges in FY 2017 after increasing nearly 10 fold to \$498,008 from \$55,207 in FY 2016. Sewage charges decreased from \$483,168 to \$439,524. Gas charges nearly doubled from \$185,739 to \$305,605. Electricity charges were recorded as a negative expense in FY 2016 and were \$142,207 in FY 2017. An audit of utility expenses at DET should be conducted, as they appear to be extremely high for a general aviation airport of DET's size (\$1.4 million of \$2.4 million in total expenses) and exhibit extreme year over year changes.

Table 7: DET Recent Net Operating Income

Values in Dollars (\$)	FY 2015	FY 2016	FY 2017
Operating Revenue			
Sales and Charges for Services	5,885	12,162	32,011
Rentals, Fees and Surcharges	586,064	438,128	668,609
Miscellaneous	36,272	27,172	411
Total	628,221	477,462	701,031
Operating Expenses			
Salaries, Wages and Benefits	99,085	(1,175,677)	393,691
Operating			
Water	-	55,207	498,008
Sewage	-	483,168	439,524
Gas	-	185,739	305,605
Electricity	-	(45,426)	142,207
Other Operating	-	287,985	216,109
Total Operating	1,076,050	966,673	1,601,454
Maintenance	52,361	38,586	53,212
Materials, Supplies and Other	41,680	2,446,569	235,797
Depreciation and Amortization	95,796	216,370	145,925
Total	1,364,972	2,492,522	2,430,079
Net Operating Income (Loss)			
Total	(736,751)	(2,015,060)	(1,729,048)

Table 8 shows recent non-operating and net financial performance data for DET. Non-operating income includes federal and state grants, of which DET received \$4.1 million in FY 2015, \$220,000 in FY 2016, and \$14,000 in FY 2017. Major recent non-operating expenses include \$550,000 in special items in FY 2015 and \$2.0 million in losses on disposal of capital assets in FY 2016. 'Transfers in' reflect transfers from the City's general fund to DET and ranged from \$0.7 million to \$1.0 million per year.

The net impact of the operating and non-operating income and expenses and the transfers from the general fund to DET is shown in the last row of Table 8. DET experienced a \$3.7 million increase in net position in FY 2015, largely as a result of federal and state grants. In FY 2016, DET experienced a \$3.1 million decrease in net position, largely resulting from \$1.9 million of litigation expenses and a \$2.0 million loss on the disposal of capital assets which were partially offset by \$1.5 million in negative pension expenses that was accrued to DET due to the City's bankruptcy. DET experienced a \$0.7 million decrease in net position in FY 2017, which did not experience any major atypical expense or revenue items. The operating loss in FY 2017 resulted from low revenue relative to high expenses which were primarily driven by a significant increase in utility costs.

Table 8: DET Recent Non-Operating and Net Financial Performance

Values in Dollars (\$)	FY 2015	FY 2016	FY 2017
Non-Operating Income (Expense)			
Interest Expense	(7,081)	(20,287)	-
Federal and State Grants	4,090,467	220,008	14,070
Special Item	(552,308)	-	-
Loss on Disposal of Capital Assets	-	(2,042,496)	-
Total	3,531,078	(1,842,775)	14,070
Net Financial Performance			
Net Gain (Loss) Before Contributions and Transfers	2,794,327	(3,857,835)	(1,714,978)
Transfers In	866,910	721,762	1,048,986
Increase (Decrease) in Net Position	3,661,237	(3,136,073)	(665,992)

DET Grant History

DET has received federal and state grants to acquire land and make improvements throughout its history. The obligation to repay the federal and/or state government if DET is converted to non-aviation use depends on the purpose of the grant. The City is obligated to repay Federal grants that were used to acquire land. Repayment must be made at current market value and FAA may assert that repayment could apply to the entire Airport land area as opposed to those portions acquired with federal funds.

Using the recent Flex-N-Gate land sale as a rough estimate for current market value would put the approximate value of DET at nearly \$12 million (\$44,737 per acre multiplied by 264 acres). The airports in Rialto, CA and St. Clair, MO were recently closed and in both cases, land value for the entire airport grounds became an issue of contention and negotiation with FAA and should be included in the City of Detroit's analysis of possibly closing DET.

The City would also be obligated to repay the federal government for grants that were used to make capital improvements to DET that were grant-funded. Repayment is based upon the unamortized value of the improvements with a common understanding that most capital projects have a useful life of 20 years from the date of the grant.

The State of Michigan retains the right of first refusal to buy the land if DET is sold for non-aviation use and, because it is an asset of the City, the State would have to acquire DET at fair market value. In St. Clair, MO, the City of St. Clair had to release revenue in the airport account as of the closure date, and following the payment of any outstanding expenses, the remaining balance would become an asset of the State and might be used to continue to continue airport operations.

DET estimates that it has received a total of \$33.2 million in grants over nearly 20 years; however these data are subject to confirmation. Table 9 shows the estimated federal and state grants received by DET before fiscal year 2000 and in five-year periods thereafter by type of grant. Of this total, \$16.2 million was used for land acquisition, \$11.3 million was used for improvements, and \$5.7 million was used for both. Closure of DET could create a large obligation of the City of Detroit for grant repayment. These estimates will be refined in Phase III.⁵

Table 9: DET Grant History

FY Period	Land	Mixed Land and Improvements	Improvements	Total
Pre-2000	\$5,685,231	N/A	N/A	\$5,685,231
2000-2004	\$4,750,796	\$5,670,900	\$6,462,798	\$16,884,494
2005-2009	\$2,576,563	\$27,132	\$826,682	\$3,430,377
2010-2014	\$3,214,000	\$0	\$3,573,583	\$6,787,583
2015-2016	\$0	\$0	\$450,000	\$450,000
Total	\$16,226,590	\$5,698,032	\$11,313,063	\$33,237,685

⁵ Grant agreements prior to 2000 are not available from FAA's automated tracking system. The City is working with FAA to obtain copies of these agreements.

An attempt to close a grant obligated airport could be a lengthy process as evidenced recently by events in St. Clair, Missouri and Santa Monica, California. In St. Clair, the process to close St. Clair Regional Airport (K39) consumed about seven years, as the FAA was reluctant to make a decision allowing closure despite the City's efforts that followed FAA guidelines.⁶ Eventually, the City obtained the support of its Congressional delegation to pass federal legislation authorizing the closure of K39. The City was then obligated to prepare an environmental assessment that addressed the repurposing of the land and conclude other administrative matters that consumed two of the seven years leading to closure. The airport was released from all federal obligations on November 13, 2017.

In Santa Monica, the City has been seeking the closure of the Santa Monica Municipal Airport (SMO) for decades in response to residents' complaints.⁷ An agreement was finally reached with FAA to allow closure of SMO in 2028. This matter is still facing litigation from those who want to keep SMO open. For 55 years (since 1962), Santa Monica has spent a substantial amount of money on attorneys, accountants, and consultants trying to make the case for closing SMO.

Financial Comparison of DET with Competitor Airports

To better understand DET's financial performance and potential areas for improvement, it is helpful to compare DET to its competitors PTK and YIP. Table 10 shows selected operating revenue data for all three airports (FY2017 for DET and YIP; FY2016 for PTK because FY2017 was not available). DET lags behind its competitors in nearly all operating revenue categories.

PTK and YIP both generate substantial (\$0.7 million to \$0.9 million) revenue from fuel sales, while DET generates very little revenue from fuel sales. There are several causes for DET's relatively low fuel sales: 1) there are many more high-performance (jet and turboprop) based aircraft and operations at PTK and YIP; and 2) DET has the highest fuel prices of the three airports. While DET has relatively high, yet competitive, landing fees, this category may be the best way to increase revenue due to the large quantity of operations by transient aircraft. PTK and YIP each generate significantly more revenue than DET from T-hangar rentals and airline & non-airline rent.

Table 10: Comparison of Selected FY 2017 DET Operating Revenue with Competitor Airports

Values in Dollars (\$) DET PTK YIP	DET	PTK	YIP
Operating Revenue			
Fuel Sales	25,872	895,612	650,000
Land Lease	130,000	1,271,032	-
Landing Fees (including concessions)	286,231	84,670	723,000
T-Hangar Rental	133,716	1,119,351	-
Airline & Non-Airline Rent	88,626	60	1,163,000
Utility Service Fee	-	-	119,000
Total (including items not listed above)	701,031	3,860,408	2,994,000
* FY2016 data			

Table 11 contains a detailed comparison of fuel sales at DET, PTK, and YIP. PTK sold 10 million gallons of fuel for \$895,612 in revenue in FY2016, resulting in average revenue of 9 cents per gallon sold. YIP sold 6.5 million gallons of fuel for \$650,000 in revenue in FY2017, resulting in average revenue of 10 cents per gallon sold. DET sold an estimated 258,720 gallons of fuel for \$25,872 in revenue in FY2017. DET received far less fuel sales revenue per aircraft operation (58 cents) than PTK (\$7.12) or YIP (\$10.87).

⁶ Elizabeth Barmeier, "St. Clair Regional Airport Officially Closed," *The Missourian*, November 15, 2017, http://www.emissourian.com/local_news/saint_clair/st-clair-rgional-airport-officially-closed/article_e8775f33-d0f3-5adc-b996-823210a30b91.html, accessed 11-15-2017.

⁷ Dan Weikel and Dakota Smith, "Santa Monica Airport will Close in 2028 and be Replaced by a Park, Officials Say," *Los Angeles Times*, January 28, 2017, <http://www.latimes.com/local/lanow/la-me-santa-monica-airport-20170128-story.html>, accessed 12-4-2017.

Table 11: Comparison of FY 2017 DET Fuel Sales with Competitor Airports

Measure	DET	PTK	YIP
Fuel Sales Revenue	\$25,872	\$895,612	\$650,000
Gallons of Fuel Sold	258,720**	10,000,000	6,461,000
Average Fuel Sales Revenue per Gallon of Fuel Sold	\$0.10**	\$0.09	\$0.10
Aircraft Operations	44,524	127,732	59,800
Average Fuel Sales Revenue per Aircraft Operation	\$0.58	\$7.12	\$10.87
* FY2016 data			
** The number of gallons of fuel sold for DET was estimated based on the \$0.10 per gallon Avflight fuel flowage fee			

Table 12 contains a detailed comparison of landing fees at DET, PTK, and YIP (FY2017 for DET and YIP; FY2016 for PTK because FY2017 was not available). DET had less than half of the landing fee revenue of YIP and about three times the landing fee revenue of PTK. On a per-operation basis, DET generates \$6.43 of landing fee revenue per operation compared with \$12.09 at YIP and \$0.66 at PTK. It is likely that YIP generates higher landing fee revenue per operation because YIP is served by freight airlines that operate aircraft that are much heavier (and thus generate high landing fees) than the average aircraft that operates at DET.

Table 12: Comparison of FY 2017 DET Landing Fees with Competitor Airports

Measure	DET	PTK	YIP
Landing Fee Revenue	\$286,231	\$84,670	\$723,000
Aircraft Operations	44,524	127,732	59,800
Average Landing Fee Revenue per Aircraft Operation	\$6.43	\$0.66	\$12.09
Landed Weight (thousand pounds)	Unknown	Unknown	300,000
Average Landing Fee Revenue per Pound of Landed Weight	Unknown	Unknown	\$2.41
* FY2016 data			

Table 13 shows selected operating expense data for all three airports (FY2017 for DET and YIP; FY2016 for PTK because FY2017 was not available). Although DET's expenses for salaries, wages, and benefits, professional & contractual services, and repair & maintenance appear to be roughly in line with DET's number of operations relative to PTK and YIP, the utilities expenses at DET greatly exceed those at PTK and YIP even after accounting for the relative level of operations. Utilities comprise 57% of total operating expenses at DET, compared with 3% at PTK and 14% at YIP.

Table 13: Comparison of Selected FY 2017 DET Operating Expenses with Competitor Airports

Values in Dollars (\$)	DET	PTK	YIP
Operating Expense			
Salaries, Wages, and Benefits	393,691	1,684,072	1,459,000
Professional & Contractual Services	138,507	64,324	903,000
Utilities	1,385,345	197,266	663,000
Repair & Maintenance	53,212	-	252,000
Depreciation	145,925	2,391,401	-
Total (including items not listed above)	2,430,079	5,913,780	4,787,000
* FY2016 data			

PTK Finances

A more detailed review of the financial data for PTK in Table 14 illustrates how positive net operating income can be achieved by airports of similar character and use to DET. Note that Table 14 contains a small amount of revenue and expenses attributable to Oakland/Southwest and Oakland/Troy Airports, both of which are also operated by Oakland County. Oakland County does not make detailed financial statements by individual airports readily available, but PTK accounts for the vast majority of revenues and expenses. Financial data for YIP was assessed and determined to be less relevant to DET due to the large, open land areas, much longer runway lengths and emphasis on air cargo operations.

Table 14: PTK Historical Net Operating Income

Values in Dollars (\$)	FY 2014 Actual	FY 2015 Estimated	FY 2016 Budget
Operating Revenue			
Aviation Gas (fuel flowage fee)	844,335	867,660	870,200
Car Rental Concessions	47,750	61,250	41,000
Costs	1,392	1,400	1,800
Gasoline Oil Grease Charges	184	100	100
Land Lease	1,196,882	1,225,000	1,194,000
Landing Fee Concessions	56,802	61,304	57,000
Landing Fees	23,490	23,600	17,000
Late Penalty	7,721	7,394	7,100
Miscellaneous	3,138	41,500	5,000
Parking Fees	1,670	3,550	1,900
Reimb US Customs Service	353,956	357,800	400,000
Rental Facilities	60	100	0
T Hangar Rental	1,719,593	1,612,163	1,710,000
Terminal Space	0	0	0
Tie Down	11,215	10,000	11,300
Total	4,268,188	4,272,821	4,316,400
Operating Expenses			
Salaries and Benefits	1,813,441	1,923,198	1,984,217
Contractual Services	1,558,805	1,819,920	1,535,500
Supplies	134,312	105,573	107,500
Internal Services	217,711	236,283	265,660
Total	3,724,270	4,084,974	3,892,877
Net Operating Income (Loss)			
Total	543,918	187,847	423,523
*Includes a small amount of revenue and expenses attributable to Oakland/Southwest and Oakland/Troy Airports			

The greatest contributors to operating revenue are the leases on the T-hangars owned by PTK (despite the large number of vacancies) followed by ground leases paid by the various PTK tenants. The current ground lease at PTK is \$0.27/SF/year with an increase of a penny per square foot effective in 2019. Most ground leases are for 20 years and require a minimum hangar size of 10,000 square feet. Fuel flowage fees are the third largest source of operating income and reflect the \$0.08/gallon avgas and \$0.09/gallon charge. The fuel flowage fee is imposed on the number of gallons delivered and in 2016 about 10 million gallons of fuel was delivered to PTK tenants, of which only about 2.8% (280,000 gallons) was avgas. These volumes highlight the relatively high use of PTK by corporate and charter jet aircraft.

Whether publicly- or privately-owned, the largest operating expenses at most airports are those related to staffing. At PTK, salaries, wages, and benefits account for just over one-half of total operating expenses.

Net operating income at PTK is positive and has been for several years – averaging 9% of operating revenue over the last 3 years. This is a result of the large number of corporate jets based at PTK, which translates into high volume fuel sales and other operating charges earned by the fixed base operators and service providers at PTK, a portion of which flows to the Oakland County Airport Authority through its lease arrangements.

Proposed Airport Improvement Plans

The GRA Team assessed three airport investment scenarios for Phase I: (1) maintain DET in a state of good repair; (2) make DET the premier destination for GA aircraft in metro Detroit; and (3) bring passenger air carrier service back to DET.⁸ The investment required for these scenarios ranges from \$23 million for Scenario 1 to \$83 million for Scenario 3.

Some projects within the scenarios are identified as eligible for grants, but grant eligibility does not necessarily mean that a project will be funded when a grant is applied for. Both FAA and MDOT have limited grant budgets; airports projects generally compete for funds and there are priority criteria that are used to decide which projects are funded. Under the Airport Improvement Program (AIP), FAA can provide up to 90 percent of the cost for the design and construction of eligible grant projects. The AIP provides federal grants to operators of public-use airports for most airfield capital improvements or rehabilitation projects and, in some specific situations, for terminals, hangars, and nonaviation development. MDOT typically provides a 5 percent match in these projects and may be able to participate at some financial rate in projects that are not eligible for AIP grants.

In general, private funding sources require long-term agreements that cover the life of an investment or buy-back provisions if the lease is terminated. Please note that the costs for Scenarios 2 and 3 do not include the costs of Scenario 1, which are incremental expenses that must be incurred for either Scenario 2 or Scenario 3 to occur.

Scenario 1: Maintain DET in a State of Good Repair

Scenario 1 involves various runway, taxiway, apron, and security improvements that are needed to meet airport design standards. The estimated cost of the improvements is \$23 million; estimated costs by project type are shown in Table 15. Many of these projects would be eligible for FAA or MDOT grants, but a commitment to continue operating DET as an airport would likely be required to receive these grants.

Table 15: Scenario 1 Estimated Cost of Improvements

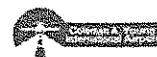
Action Item	Year in Place	Establishment Cost	Grant Eligible*
Runway 15-33			
Rehabilitate pavement	2018	\$3,700,000	Yes
Install EMAS at each runway end	2018	\$11,750,000	Yes
Runway 7-25			
Relocate Runway 7 threshold for RSA	2019	\$100,000	Yes
Decouple Runways 25 and 33	2019	\$150,000	Yes
Rehabilitate pavement; reduce width to 60'	2019	\$1,500,000	Yes
Apron Pavement			
Rehabilitate apron pavements serving terminal building and Historic Executive Terminal	2020	\$5,000,000	Yes
Security			
Install airport-wide security camera system	2020	\$1,000,000	Yes
Total		\$23,200,000	

* Both FAA and MDOT grants may be available to fund a majority of costs for these improvements. However, obtaining these funds would require the City to commit to maintaining the facility as an airport. Funds for any one airport are generally limited so some of the timing in this chart may be optimistic. GRA estimates of cost based on Airport input.

Scenario 2: Make DET the Premier Destination for GA Aircraft in Metro Detroit

Scenario 2 involves rehabilitating existing T-hangars, renovating the Historic Executive Terminal, and constructing a new fixed base operator (FBO) hangar. The total cost of the improvements is estimated to be \$37 million to \$50 million; Table 16 shows estimated costs by project. At least one corporate hangar is needed for larger business jets; more hangars can be developed on a self-sustaining basis as market demand requires. Not all of these expenditures need to be completed at the outset; the projects could be

⁸ The GRA Team did not create the plans or independently estimate the costs of the improvements proposed within each plan.



sequenced to match demand and available funding. The new corporate hangar could house aircraft maintenance and painting facilities. The renovation of the Executive Terminal and commitment to long-term leases could attract investments by an FBO, the two museums, and others. A historic renovation grant should be investigated for the Historic Executive Terminal, which would require that the building (not land) be owned by a non-government party.

The Historic Executive Terminal could house museums and could continue to be used as leased space for large aircraft. T-hangar rehabilitation should be completed in phases dependent on market demand. The aircraft rescue and firefighting (ARFF) building should be renovated so that it can also house snow removal equipment. All of the projects should be undertaken when funding is available and dependent on market demand.

Table 16: Scenario 2 Estimated Cost of Improvements

Action Item	Year In Place	Establishment Cost	Funding
Build New Corporate Hangar			
Needed for larger business aircraft	2020	\$4,000,000	MDOT, MEDC
Could house aircraft maintenance and painting facility			FBO Investment*
T-Hangars Phase 1			
Replace existing T-hangars including taxiways	2019	\$4,000,000	AIP for taxiway only – private investor*
Renovate Historic Executive Terminal			
To locate FBO and provide corporate hangars	2020	\$25,000,000 to \$32,000,000	Historic Tax Credit Private Investor MEDC
Tuskegee and Fighter Jet Museum			Donors*
T-Hangars Phase 2			
Replace existing T-hangars including taxiways	Based on need	\$4,000,000	AIP for taxiway only – private investor*
Renovate Main Terminal			
Validate needs – excluded from low estimate	2021	\$3,600,000**	MDOT, MEDC, or private investor
Renovate ARFF Building			
Renovate ARFF building to handle ARFF needs and snow removal equipment – excluded from low estimate	2020	\$2,800,000**	MEDC or City
Total		\$37,000,000 to \$50,400,000	

*Potential for MEDC grants, private investment, or public-private partnership. Funding sources have limited budgets and may only fund certain types of projects. Private investors will see some predictable rate of return and protection from early termination. Cost estimates from various studies for DET.

** Excluded from low estimate

Scenario 3: Bring Air Carrier Service Back to DET

Scenario 3 involves making a number of improvements with the goal of attracting passenger air carrier service to DET. A terminal building with baggage handling and passenger loading bridges would need to be constructed to support airline operations. A parking structure, connected to the terminal building by a pedestrian overpass, would need to be constructed to accommodate parking for airline passengers. Improvements to parking lots and traffic flow would be necessary to accommodate the additional automobile traffic of airline passengers. A rough order of magnitude (ROM) estimate for the improvements needed to attract air carrier service is \$60 million as prepared for the City by QOE Consulting in March 2017. ROM costs by project type are shown in Table 17.

Table 17: Scenario 3 Rough Order of Magnitude PLOOM Costs

Development Item	Description	ROM Cost
Terminal building with baggage handling	2-level, 60,000 sf	\$26.2M
Five passenger loading bridges	Estimated unit cost of \$700,000	\$3.5M
Parking structure	3-level, 380ft x 125ft, 400 spaces	\$10.0M
Pedestrian overpass	300ft x 10ft, enclosed	\$3.0M
Demolition of old terminal		\$1.0M
Traffic flow improvement	RW Armstrong 2000 study	\$4.0M
Existing parking lot improvements	Rehabilitation of auto lots B, C, and D	\$3.0M
Terminal apron improvements		\$3.0M
Miscellaneous		\$6.3M
Total		\$60.0M

Source: QOE Consulting report prepared for the City of Detroit, March 2017

Grant Eligible Projects

Pavement projects for runways and taxiways are essential and are AIP-eligible for FAA (90%) and MDOT (5%) funding. While MDOT is more flexible in the kinds of projects it funds, its budget is fairly modest and grants are competitive. It may offer grant funding for non-AIP eligible projects on a negotiated percentage of the cost and also has a revolving loan program.

T-hangars are not essential for a safe airport, but they are eligible under AIP, when the airfield meets all applicable facility design standards. DET does not currently meet those standards. However, the public-use taxilanes that run parallel to the T-hangars are AIP-eligible, but not the stubs that lead to the individual T-hangar units.

Apron pavement is essential and AIP-eligible as long as the apron will be used on a regular basis and is available to all airport users.

A security camera system that is part of a complete security program that includes fencing, gates, and related controls is AIP-eligible. Fencing is considered important by FAA, so the camera security system could be labeled as essential if it is the only practical solution for certain areas of DET.

As a private, revenue generating facility, the FBO hangar is not AIP-eligible. But, the public-use apron is and if the City builds the FBO hangar and leases it to a private entity, then it is still not grant-eligible because it would be considered an exclusive use of that investment. If the City is the FBO, the hangar could be considered as nonexclusive use provided that it allows for tenants to operate from the facility. For example, airport owners have installed self-fueling systems with AIP grant funds. But, an FBO hangar would be a low priority project for the FAA/MDOT funds, and they would push for private sector funding even though it is viewed as an essential to service the aircraft using DET.

Phase I Findings

The Phase I research focused on evaluating the metro Detroit aviation market, DET's current use as an airport, and identifying the costs of various investment scenarios for DET. Phases II and III will focus on evaluating the economic impact of each of these scenarios in more detail, identifying potential partners for DET, and providing additional detail and economic impact analysis for non-aviation operations for DET.

There are three principal conclusions from Phase I:

1. While flight operations have rebounded at DET since the financial crisis, the overall market for GA flight activity is down significantly from its peak.
 - a. The majority (69%) of jet aircraft based at GA airports in the Detroit metro region are based at PTK and the remaining 28% are based at YIP.
 - b. The FAA's national forecast predicts faster growth in GA hours for higher performance aircraft (average annual increases of 1.6% for turboprop and 3.0% for jet aircraft) than for lower performance aircraft (average annual decrease of 0.8% for piston aircraft).
 - c. The 2017 MASP forecasts operations at DET to increase at an AAGR of 0.53% per year over the forecast period. The AAGR for operations at PTK is also forecasted to be 0.53%, while the AAGR at YIP is forecasted to be 0.88%.
2. DET continues to lose a substantial amount of money on an operating basis due to its high cost structure and comparatively lower levels of flight activity.
 - a. DET received far less fuel sales revenue per aircraft operation (58 cents) than PTK (\$7.12) or YIP (\$10.87); this could be due to the relatively low number of based aircraft at DET and the relatively high fuel price at DET
 - b. Utilities comprise 57% of total operating expenses at DET, compared with 3% at PTK and 14% at YIP.
3. Investment in DET will range from \$23 million to maintain it in a state of good repair to \$83 million to bring back passenger air carrier service.
 - a. Some of the investments would be eligible for federal and state grants.

Potential Short-Term Strategies to Improve DET's Financial Performance

The City should examine strategies to improve DET's short-term financial performance. Some of the strategies to increase DET operating revenues or decrease operating expenses could include the following:

- Is it possible to increase airport landing fees for larger aircraft? Many of the jet aircraft using DET do so because of the proximity to downtown, but most operations are simply a passenger pick-up or drop-off and do not purchase fuel or other services from the fixed base operator.
- The City should review utility expenditures and how much DET pays relative to other City departments. The review should include an evaluation of how utility fixed costs are recovered from the various users to ensure that they do not disadvantage DET.
- In concert with the above point, can some of the utility costs for water, electricity, and gas be passed on to tenants? Utilities represent the largest share of DET operating costs and to the extent usage by tenants can be measured, then passing some charges on to them should be considered. If this is not possible under current lease and rental agreements, the City should investigate whether it can be negotiated when leases are up for renewal. At present, tenants do not have the incentive to conserve the usage of utilities because they do not bear the direct costs.
- The City should review existing lease terms and conditions to ensure that rates and charges can be adjusted upward to meet rising operating costs. Are escalation factors incorporated into the leases, and, if so, are they the best ones to use for DET's operation?
- The City should review staffing levels and compensation (whether it is competitive with the marketplace) and assess if, how, and why other City staff charge time to support current DET staff.
- The City should conduct audits to determine if tenants are current in their payments.
- The City should investigate whether the Police Department and other City departments that use DET pay market rates for land and building leases. This is necessary to comply with relevant FAA guidance.



Glossary

Air Traffic Control (ATC) – ATC is the provision of air navigation services to aircraft pilots on the ground and in the air to ensure safe and efficient aircraft operations.

Aircraft Approach Category (AAC) – AAC means a grouping of aircraft based on reference landing speed (if specified) or stalling speed (if not specified) at the maximum certificated landing weight.

Aircraft Rescue and Firefighting (ARFF) – ARFF is the response, hazard mitigation, evacuation, and possible rescue of people involved in an aircraft emergency on the ground.

Airport Improvement Program (AIP) – The AIP is an FAA-administered program that provides grants to public agencies (and, in some cases, to private owners and entities) for the planning and development of public-use airports that are included in the National Plan of Integrated Airport Systems (NPIAS).

Average Annual Growth Rate (AAGR) – The AAGR is the average change over a specified interval of time. It is calculated by taking the arithmetic mean of the growth rate over the specified time periods.

Canton-Plymouth-Mettetal Airport (1D2) – 1D2 is owned and operated by MDOT and is located in Canton, Michigan. 1D2 has a 2,300-foot paved runway and offers T-hangars and box hangars for aircraft storage.

Coleman A. Young International Airport Education Association (CAYIAEA) – The CAYIAEA is a broad coalition of business based at DET and other concerned stakeholders.

Coleman A. Young Municipal Airport (DET) – The Coleman A. Young Municipal Airport is DET's official name. It is marketed as the Coleman A. Young International Airport. The location identifier assigned to Coleman A. Young International Airport by the Federal Aviation Administration (FAA) is DET.

Detroit Metropolitan Wayne County Airport (DTW) – DTW is commonly known as Detroit Metro Airport and is Michigan's largest and busiest airport. DTW is served by numerous scheduled passenger and cargo airlines. DTW is operated by the Wayne County Airport Authority.

Engineered Material Arresting System (EMAS) – An EMAS uses materials of closely controlled strength and density placed at the end of a runway to stop or greatly slow an aircraft that overruns the runway. The best material found to date is a lightweight, crushable concrete. When an aircraft rolls into an EMAS arrestor bed, the tires of the aircraft sink into the lightweight concrete and the aircraft is decelerated by having to roll through the material.

FAA Aerospace Forecast – The FAA Aerospace Forecast is developed to support budget and planning needs of the FAA. The forecasts are developed using statistical models to explain and incorporate emerging trends of the different segments of the aviation industry. This year's document contains updated forecasts for US airline traffic and capacity, FAA workload, General Aviation activity and pilots, as well as Unmanned Aircraft System (UAS) fleet and remote pilots.

Federal Aviation Administration (FAA) – The FAA regulates and oversees all aspects of civil aviation in the United States.

Fiscal Year (FY) – A fiscal year is the period used by a company or government for accounting purposes.

Fixed Base Operator (FBO) – An FBO is a commercial business that provides aeronautical services (such as fueling, aircraft storage, aircraft parking, aircraft rental, and aircraft maintenance) at an airport with the permission of the airport sponsor.

Form 5010 – The FAA's Office of Aeronautical Information maintains a database of descriptive information of U.S. airports. The information is collected via FAA Airport Master Record (Form 5010).

General Aviation (GA) – All civilian aviation except for scheduled passenger or cargo airlines. General aviation includes a wide variety of aviation activity, including air taxi, corporate flight departments, fractional aircraft ownership programs, sightseeing flights, air medical services, agricultural flying, civilian government aircraft operations, flight training, flying clubs, and personal flying. General aviation aircraft can range from non-powered aircraft such as gliders to large jet aircraft with multiple engines.

Gross Domestic Product (GDP) – Gross domestic product is the value of the goods and services produced by the nation's economy less the value of the goods and services used up in production. GDP is also equal to the sum of personal consumption expenditures, gross private domestic investment, net exports of goods and services, and government consumption expenditures and gross investment.

Gross Landing Weight (GLW) – The gross landing weight is the maximum weight that an aircraft is permitted to be at due to design or operational limitations during landing.

Gross Takeoff Weight (GTW) – The gross takeoff weight is the maximum weight that an aircraft is permitted to be at due to design or operational limitations at takeoff.

Grosse Ile Municipal Airport (ONZ) – ONZ is a publicly-owned airport located in Grosse Ile, Michigan. It has one paved 4,800-foot runway and one paved 4,400-foot runway.

High Intensity Runway Lights (HIRL) – HIRL are one type of a runway edge light system, which is used to outline the edges of a runway during times of darkness or poor visibility.

Instrument Flight Rules (IFR) – Flight rules adopted by the FAA governing aircraft flight using visual references. VFR operations specify the amount of ceiling and the visibility the pilot must have in order to operate according to these rules. When the weather conditions are such that the pilot cannot operate according to VFR, he or she must use instrument flight rules (IFR).

Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR) – The MALSR is a navigation aid installed in airport runway approach zones along the extended centerline of the runway. The MALSR, consisting of a combination of threshold lamps, steady burning light bars and flashers, provides visual information to pilots on runway alignment, height perception, roll guidance, and horizontal references for Category I Precision Approaches.

Medium Intensity Runway Lights (MIRL) – MIRL are one type of a runway edge light system, which is used to outline the edges of a runway during times of darkness or poor visibility.

Metropolitan Statistical Area (MSA) - The metropolitan statistical areas used by BEA for its entire series of GDP statistics are the July 2015 county-based definitions developed by the Office of Management and Budget (OMB) for federal statistical purposes. OMB's general concept of a metropolitan area is that of a geographic area consisting of a large population nucleus together with adjacent communities having a high degree of economic and social integration with the nucleus.

Michigan Aviation System Plan (MASP) – The MASP was commissioned by the Michigan Department of Transportation to provide an update to a similar study produced in 2008. The MASP focuses on the 114 public-use airports in Michigan that have been acknowledged as critical to state aviation system. Facility development goals, system accessibility, activity forecasts, and economic impacts are discussed for each of the airports included in the MASP.

Michigan Department of Transportation (MDOT) –MDOT is responsible for Michigan's 9,669-mile state highway system, comprised of all M, I, and US routes. MDOT also administers other state and federal transportation programs for aviation, intercity passenger services, rail freight, local public transit services, the Transportation Economic Development Fund (TEDF), and others.

Michigan Economic Development Corporation (MEDC) – The Michigan Economic Development Corporation is the state's marketing arm and lead advocate for business development, job awareness and community and talent development with the focus on growing Michigan's economy.

Oakland County International Airport (PTK) – PTK is the 118th busiest airport in the United States and serves more than 500,000 passengers and pilots per year. More than 550 private and corporate aircraft are based at PTK.

Oakland Southwest Airport (Y47) – Y47 is a publicly-owned airport located in New Hudson, Michigan. Y47 has a 3,100-foot paved runway.

Oakland/Troy Airport (VLL) – VLL is located in Troy, Michigan and is the executive airport serving Oakland County. Business travelers and tourists using private, corporate and charter aircraft benefit from



VLL's convenient proximity to business, recreation and entertainment facilities. Charter passenger, air freight, as well as aircraft maintenance and fuel, are available on the field.

Pavement Condition Index (PCI) – The PCI is a numerical indicator that reflects the structural integrity and surface operational condition of a pavement. It is based on an objective measurement of the type, severity, and quantity of distress.

Ray Community Airport (57D) – 57D is privately-owned, public use airport located in Ray, Michigan. 57D has one 2,500-foot paved runway and a 2,200-foot paved/turf runway.

Romeo State Airport (D98) – D98 is owned and operated by MDOT and is located in Romeo, Michigan. D98 has a 4,000-foot paved runway.

Rough Order of Magnitude (ROM) – A ROM estimate is an estimate of costs provided in the early stages of a project when the project's scope and requirements have not been fully defined.

Runway End Identifier Lights (REIL) – The REIL system provides rapid and positive identification of the end of the runway. The system consists of two synchronized, unidirectional flashing lights. The lights are positioned on each corner of the runway landing threshold, facing the approach area and aimed at an angle of 10 to 15 degrees.

Runway Safety Area (RSA) – The FAA requires that commercial airports, regulated under Part 139 safety rules and federally obligated, have a standard RSA where possible. At most commercial airports the RSA is 500 feet wide and extends 1,000 feet beyond each end of the runway. The FAA has this requirement in the event that an aircraft overruns, undershoots, or veers off the side of the runway.

Segmented Circle – A segmented circle is a navigation aid that aids a pilot in locating an airport and provides a centralized location for such indicators and signal devices as may be required on a particular airport.

Snow Removal Equipment (SRE) – Airports use SRE during winter storms to remove snow and ice from runways and taxiways.

Terminal Area Forecast (TAF) – The TAF is the official FAA forecast of aviation activity for U.S. airports. It contains active airports in the National Plan of Integrated Airport Systems (NPIAS) including FAA-towered airports, Federal contract-towered airports, nonfederal towered airports, and non-towered airports. Forecasts are prepared for major users of the National Airspace System including air carrier, air taxi/commuter, general aviation, and military. The forecasts are prepared to meet the budget and planning needs of the FAA and provide information for use by state and local authorities, the aviation industry, and the public.

T-Hangar – T-hangars are structures designed to store light general aviation aircraft and are primarily used at general aviation airports.

Traffic Flow Management System (TFMS) – TFMS is a data exchange system for supporting the management and monitoring of national air traffic flow. TFMS processes all available data sources such as flight plan messages, flight plan amendment messages, and departure and arrival messages. The FAA's airspace lab assembles TFMS flight messages into one record per flight. TFMS is restricted to the subset of flights that fly under IFR and are captured by the FAA's enroute computers. Most VFR and some non-enroute IFR traffic is excluded.

Traffic Flow Management System Counts (TFMSC) – TFMSC provides information on traffic counts by airport or by city pair for various data groupings such as aircraft type or by hour of the day (city pair) from TFMS.

Visual Flight Rules (VFR) – VFR flight is based on the principle of "see and avoid" which means that weather conditions must be clear enough to allow the pilot to see other aircraft, obstructions, and the ground.

Willow Run Airport (YIP) – YIP serves cargo, corporate, and general aviation clients and is the third busiest airport in Michigan. YIP is operated by the Wayne County Airport Authority.