

CHAPTER 2

EXISTING FACILITIES

Due to the increased demand for aviation facilities, an update to the airport's 1981 Airport Plan is necessary in order to insure that Mansfield Municipal Airport continues to meet the existing and forecasted need for aviation facilities. This inventory of existing facilities will identify what aviation facilities are currently at Mansfield Municipal Airport and identify the baselines used in future sections of the Airport Plan. Additionally, this inventory of existing facilities will evaluate the airport's compliance with regulations established by the Massachusetts Aeronautics Commission (MAC) and the Federal Aviation Administration (FAA).

A photo-journal consisting of over 100 photographs taken in June 1998 was prepared in conjunction with the plan and is included as **Appendix D**. This photo-journal documents the airport's buildings, facilities, signage, pavement condition and marking, drainage structures, lighting fixtures and surrounding terrain.

2.1 GENERAL INFORMATION

Mansfield Municipal Airport is owned by the Town of Mansfield and governed through a five-member appointed Airport Commission. The airport is classified in the National Plan of Integrate Airport Systems (NPIAS) as General Aviation. The NPIAS is a federal-level document that identifies airports that are eligible for federal funding through the Aviation Investment Reform Act for the 21st Century (AIR-21) for airport projects.

Typical general aviation aircraft operating from Mansfield Municipal Airport include most single and some multi-engine propeller aircraft with occasional use by turbine powered business jet aircraft (i.e. Cessna Citations), balloons and airships. As of 1999, 109 aircraft were based at the airport. The Town of Mansfield and the Airport Commission leased the operating and management rights of the Airport to a privately owned Fixed Base Operator (FBO). The "master lease," due to expire in 2002, was then sub-leased to two additional privately owned aviation companies, King Aviation Mansfield and Casey Aviation.

2.2 AIRPORT LOCATION AND HISTORY

Mansfield Municipal Airport is conveniently located along Interstate-495 and is approximately twenty (20) miles northeast of Providence, Rhode Island and thirty (30) miles southwest of Boston, Massachusetts (see Figures 2.1 and 2.2). Mansfield Municipal Airport is approximately two miles southeast of downtown Mansfield and straddles the Town of Mansfield and the Town of Norton (see Figure 2.3). Surface transportation access to the airport is provided by Fruit Street, which is a two-lane collector road north of the airport.

The nearest comparable general aviation facilities are Taunton Municipal Airport (TAN), Plymouth Municipal Airport (PYM), Norwood Memorial Airport (OWD), and New Bedford

FIGURE 2.1
Location Map



FIGURE 2.2
Vicinity Map

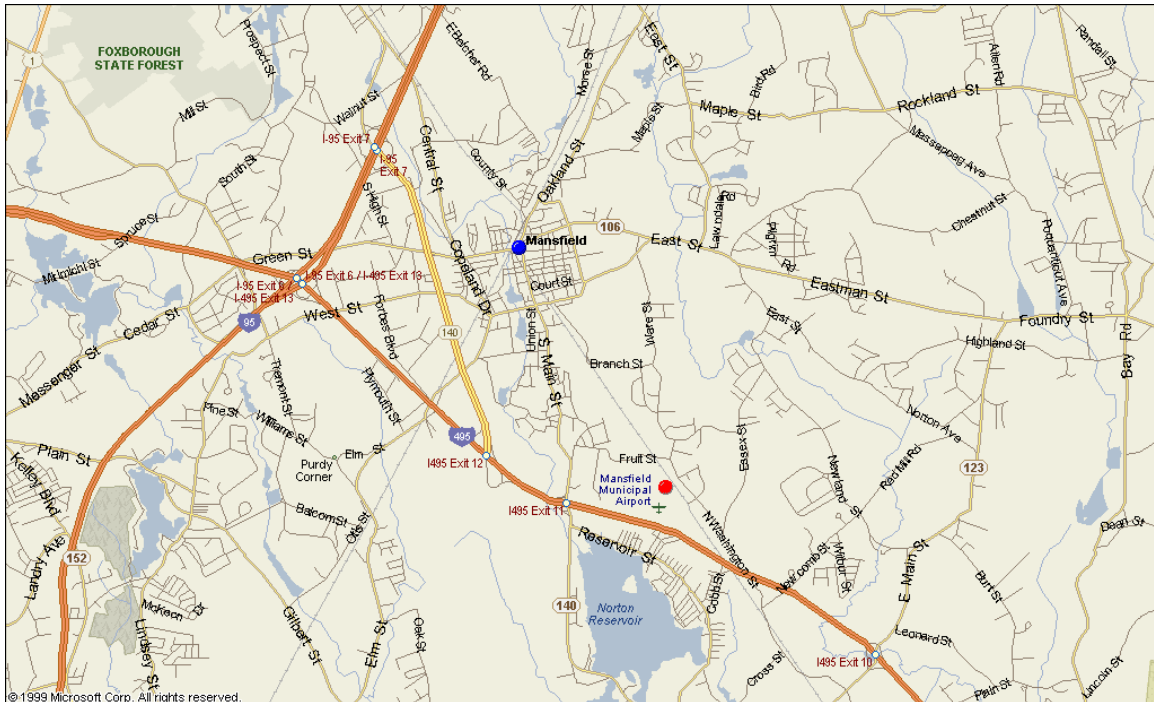


Figure 2.3

Regional Airport (EWB). New Bedford Regional Airport consists of two 5,000-foot by 150-foot runways (5-23 and 14-32) and accommodates a large portion of business jet operations in the area.

Airport History:

Mansfield Municipal Airport was originally developed by private interests in the 1920s and 1930s around a 1890s equestrian facility known as “The Old Trotting Track.” Consistent with many facilities in the area, the airport was donated to the U.S. Government for use as a flight training facility for U.S. Naval cadets during World War II. In 1947, the Town of Mansfield re-acquired the airport under the War Surplus Act.

During the first half of the 1950s, the airport remained mostly a turf facility with two hangar buildings and an administration building. In 1955, the airport became eligible for federal funding and Runway 14-32 was constructed and paved to a length of 3,000-feet and an improved access road was completed in 1956. In 1957 the airport was leased to Carelton-Whitney Aero Services for a twenty-year period. The 1960s saw infrastructure improvements consisting of a parallel taxiway with medium intensity runway light system (MIRLs) and an extension of the parallel taxiway and Runway 14-32 to a total length of 3,500-feet in 1969.

In 1971, the five member Airport Commission was established and charged with the overall responsibility of the Airport. The Commission’s objectives were to:

- Develop Mansfield Municipal Airport to meet all Federal and State regulations;
- Provide adequate facilities for current and future demand;
- Enhance the level of safety for both airport users and the surrounding community;
- and
- Develop the airport into a financially self-sufficient facility.

In support of these goals, the Commission initiated an Airport Layout Plan study in 1971. This study identified several capital improvements for a planning horizon of ten-years. At the conclusion of the ten-year planning horizon, a comprehensive Airport Plan Study was completed. The Airport Plan identified existing facilities, forecasted operations, and identified needed capital improvements through the years 1981 to 1990.

2.3 EXISTING AIRPORT TENANTS

Existing airport tenants include two fixed base operators, two club organizations and one privately owned business. The two fixed base operators are King Aviation which has been located at the airport for nine years and Casey Aviation which has been located at the airport for fifteen years. King Aviation has been at Mansfield Municipal Airport since 1991 and is charged with the overall management of the airport including maintenance and property/tenant management. In addition to the airport’s general aviation services, King Aviation provides flight training, fueling, scenic flights and aircraft rentals. The King Aviation lease expires in 2002.

Casey Aviation is an aircraft maintenance company and has been at Mansfield Municipal Airport since 1985. Casey Aviation provides maintenance services for most single and twin reciprocating engine aircraft, including overhauls, annuals, and light metal work. The Casey Aviation lease also expires in 2002.

The two club organizations are the Experimental Aircraft Association (EAA) and the Civil Air Patrol (CAP). The EAA was founded in 1953 in Milwaukee, Wisconsin and is an organization of members with a wide range of aviation interests and backgrounds. Included in the EAA are antique aircraft, classics, warbirds, aerobatic aircraft, ultralights, helicopters and contemporary manufactured aircraft. The CAP was formed in 1941 and is primarily involved with assisting local, regional and national law enforcement agencies and the military in search and rescue missions. The private business located on the airport is a restaurant located in the terminal building.

2.4 AIRPORT SERVICE AREA

An Airport Service Area (ASA) is the geographic region that the airport provides aviation related services. The ASA for Mansfield Municipal Airport was determined by establishing a 30-minute drive time from the airport. The thirty minute driving radius represents a reasonable amount of time that a person or business may travel to reach an airport like Mansfield Municipal and is consistent with normal planning practices. Mansfield's ASA has an elliptical shape with a greater east-west diameter than a north-south diameter as the 30-mile driving time includes a greater east-west distance as driving speeds are higher on I-495 than on other roadways. The Mansfield ASA includes many of the towns in Bristol County and those in the surrounding counties such as Norton, Plainville, North Attleborough, Attleborough, Easton, Brockton, Stoughton, Sharon and Foxboro. Because of the proximity of other airports to Mansfield, portions of the Mansfield Municipal Airport ASA overlap the ASA's for other airports in the vicinity (i.e., Taunton).

2.5 EXISTING AIRSIDE FACILITIES

An inventory of the facilities at Mansfield Municipal Airport was conducted in June 1998. Facility data was obtained through a review of airport drawings, previous capital improvement projects, interviews with airport tenants and airport management, as well as a physical review of the airport (see Figure 2.3).

2.5.1 Runways

Mansfield Municipal Airport consists of two runways: Runway 14-32 and Runway 4-22 with Runway 14-32 considered the airport's primary runway. This runway was reconstructed in 1993 with 3-inches of bituminous pavement (P-401) over 8-inches-10-inches of granular base consisting of recycled bituminous pavement and sandy-gravel. The sub-base soils are high in sand content.

There are two non-precision instrument approaches established at the airport. A non-precision

instrument approach is an electronic system that provides horizontal navigation information, whereas a precision approach also provides vertical information. Runway 32 has both a “straight-in” non-directional beacon (NDB) instrument approach and a GPS (global positioning satellite). The GPS approach was established in 1996 (see Figures 4.1 and 4.2). The remaining runways provide for visual approaches only.

Runway 14-32 has the standard runway centerline markings which consists of a line of uniformly spaced stripes (120-feet in length) spaced 80-feet apart. The width of the stripes are 18 inches (45 cm) for non-precision instrument runways and 12 inches (30 cm) for visual runways. Runway 14 has pavement markings indicating a visual approach runway and a displaced threshold while Runway 32 has pavement markings indicating a non-precision approach and a displaced threshold. The runway designator markings are painted in a striated pattern instead of a solid block pattern. The striated pattern is intended to mitigate the effects of frost and increase friction by decreasing the painted surface area.

The wind coverage provided by the airport’s two runways was calculated during the preparation of the 1981 Airport Plan. Weather data was obtained from the South Weymouth Naval Air Station and T.F. Green Airport in Warwick, Rhode Island for the period of 1966 to 1970. These facilities are the closest official reporting stations to Mansfield Municipal Airport for which data is available. An aircraft’s ability to safely use a runway is related to wind direction and speed. Wind coverage is used to calculate the percentage of time an airport’s runway system can accommodate aircraft operations given known wind patterns. The FAA suggests that an airport’s runway system provide at least 95-percent wind coverage for the types of aircraft that use the airport. Generally, the smaller the aircraft the greater the impact the wind has on the operation of the aircraft.

The 1981 Airport Plan estimated that the airport’s two runways provide approximately 98-percent wind coverage for most small general aviation aircraft, assuming a maximum 10.5-knot crosswind component. Runway 14-32 provides 86.1-percent coverage and Runway 4-22 provides 90.5-percent coverage individually. With the winds favoring Runway 4-22, the importance of this runway to the safe operation of Mansfield Municipal Airport is increased.

2.5.2 Taxiways

The taxiway system at Mansfield Municipal Airport includes a full-length parallel taxiway, four entrance/exit taxiways, a bypass taxiway, a terminal taxiway and three apron connector stubs. The taxiway system is generally constructed of 2- to 3-inch bituminous pavement on top of approximately 4- to 7-inches of base course material.

The parallel taxiway is located 160-feet (taxiway centerline to runway centerline) north of Runway 14-32 and was originally built in 1961. The taxiway is approximately 3,500-feet in length and thirty-feet (30) in width.

FIGURE 2.4 TERMINAL AREA PLAN

There are five entrance/exit taxiways connecting the parallel taxiway to Runway 14-32. An entrance/exit taxiway is located at both ends of Runway 14-32, a third entrance/exit taxiway is located at approximately the mid point of the runway, a fourth entrance/exit taxiway is located approximately 500-feet west of the end of Runway 32. The fifth entrance/exit taxiway is actually a *bypass taxiway* and is located near the end of Runway 32. The purpose of a bypass taxiway is to increase ground circulation and clearance between aircraft entering and exiting the runway and can also be used by aircraft during “run-up” operations.

A terminal taxiway and two connector stubs connect the main apron to the parallel taxiway. The terminal taxiway provides a direct route from the parallel taxiway to the terminal and fuel pumps by bypassing the main apron and parked aircraft. As the terminal taxiway and Runway 4-22 are not parallel, the distance between the runway centerline and the terminal taxiway centerline varies. The closest distance between the terminal taxiway centerline and the turf runway centerline is approximately 84-feet. An additional connector stub is located between the Main Apron and the East Ramp (see Figure 2.4). The taxiway and taxiway centerlines are yellow in color and are the standard FAA 6-inch stripe. Holdlines, located at each entrance/exit taxiway, are also painted in the standard FAA yellow format. Holdlines are used to stop/hold aircraft outside of the runway’s *obstacle free zone* and *runway safety area* prior to entering the runway. Additional holdlines may be required to keep aircraft outside the localizer and glideslope critical areas if an ILS is located at the airport.

2.5.3 Apron Areas

Mansfield Municipal Airport maintains approximately 33,720 square yards of apron area. The apron pavements are generally constructed of 3-inch P-401 bituminous surface over 6-inches of modified or reclaimed base material. The apron area includes three separate aircraft parking areas. The main apron is approximately 24,500 square yards in area, the east ramp is approximately 2,500 square yards in area and the hangar apron is approximately 6,720 square yards in area. Excluding the taxiways and fueling areas and their associated safety areas, approximately 14,500 square yards are available for aircraft parking and tie downs. In 1999, approximately 67 aircraft tie-downs, 20 t-hanger parking positions and six hangar parking positions were available for parking aircraft.

Both the main and secondary aprons have tie down positions marked with either yellow or white paint. These are in the shape of a ‘T’ and are used to assist in guiding the aircraft during push-back operations. A compass calibration pad is painted on the taxiway connector stub between the main apron and parallel taxiway that is used by pilots to verify the accuracy of the aircraft’s magnetic compass.

2.5.4 Navigational Aids

Navigational aids at Mansfield Municipal Airport include a non-directional beacon (NDB) and a visual approach slope indicator (VASI). An NDB is a radio system that transmits an airport specific signal in a 360-degree radius from its origin at a frequency between 190 and 535 kHz.

This signal is received in the aircraft with an audible tone for verification that the pilot has the correct frequency. If the frequency is correct, the pilot will home on the frequency until reaching the desired airport. NDBs are classified by the transmission power, altitude and range of the signal strength (called the standard service volume) and by whether the NDB has the capability to carry voice transmissions (see Table 2-1)

TABLE 2-1		
NON-DIRECTIONAL BEACON CLASSIFICATION SYSTEM		
<u>Signal Classification</u>	<u>Watts</u>	<u>Distance (NM)</u>
MH	< 50 watts	25
H	>50 watts <2,000 watts	50
HH	> 2,000 watts	75
<u>Standard Service Volume (SSV)</u>	<u>Altitude and Range Boundaries</u>	
T (terminal)	1,000' AGL up to 12,000' AGL at radial distances out to 25 NM	
L (low-altitude)	1,000' AGL up to 18,000' AGL at radial distances out to 40 NM	
	1,000' AGL up to 14,500' AGL at radial distances out to 40 NM.	
H (high altitude)	14,500' AGL up to 60,000' AGL at radial distances out to 100 NM.	
	18,000' AGL up to 45,000' AGL at radial distances out to 130 NM.	
<u>Voice Transmission</u>	<u>Designator</u>	
Without 'W'	NDB transmission does not carry voice	
With 'W'	NDB transmission does carry voice	
Source: FAR AIM 1999, 30JAN97 A/FD		

The NDB at Mansfield Municipal consists of two wooden utility poles 30-feet in height with two antennae wires strung between the poles and an electronics shed on the ground. The NDB is currently located near the tree line to the east of the turf runway in Quadrant Four. The NDB at Mansfield Municipal Airport broadcasts on a 220 kHz frequency up to a twenty-five (25) nautical mile radius and is able to carry voice transmissions. Based on these parameters, the FAA classification for this system is MHTW.

A VASI system provides a visual reference for approaching pilots to assist them in determining the proper glide path to the runway. The VASI at Mansfield Municipal Airport serves the approach end to Runway 32 and consists of a series of two light boxes arranged perpendicular to the runway. The two boxes are spaced 600-feet apart and will show red lights to an approaching pilot that is below the proper approach slope or white lights if they are above the proper approach slope. A pilot's objective is to approach the runway with the farthest set of lights showing red and the nearest set showing white.

2.5.5 Lighting Aids

A tower-mounted rotating beacon is located to the north of the maintenance hangar. The beacon is controlled by a photo sensor and typically operates from dusk to dawn, but occasionally will

operate during dark days. The beacon flashes alternating green and white lights at a rate of approximately 30 flashes per minute that transmits to a pilot that the airport is a “lighted, land based facility.” The beacon was last serviced in 1998 at which time the motor and rotating assembly were replaced.

Runway 14-32 has a medium intensity runway lighting system (MIRL) consisting of white, red, amber and green stake mounted light units. The white lights mark the edges of the runway and the amber lights identify the last 1,000 feet of the runway for pilots using the non-precision instrument approach. The red lights identify the displaced thresholds and ends of the runway. The green lights identify the runway threshold or the beginning of pavement usable for landing. Runway 4-22 is not marked with lights.

The MIRL system on Runway 14-32 is a pilot activated light system (PALS) and can be activated by broadcasting on the airport’s Common Traffic Advisory Frequency/UNICOM (CTAF/UNICOM) frequency of 123.0 MHZ. When broadcasting on the CTAF/UNICOM, the pilot can activate the lighting system by “keying” or depressing the microphone switch. The number of times the system is keyed determines the intensity of the lights. Seven keys results in high intensity and five keys results in medium intensity.

Other lit navigational aids include a lighted windsock and runway identification signs. The lighted windsock is located near the intersection of the two runways and provides visual information on wind direction and speed. An area of ground, approximately 20-feet in diameter, directly beneath the windsock has been covered in white stone to enhance visibility. A non-lighted supplemental wind cone is located adjacent to the eastern most VASI and is intended to provide wind information to pilots landing or departing on Runway 32.

Runway identification signs are located near the hold lines of the four entrance/exit taxiways. These signs are red with white numbers and indicate which end of the runway is being entered.

A medium intensity taxiway lighting system (MITL) was installed on the parallel taxiway and the apron taxiway in 1998 and are controlled along with the runway lights. The MITL identifies the edges of the taxiway with blue lights.

2.6 EXISTING LANDSIDE FACILITIES

2.6.1 Terminal Building

The Terminal Building is a converted two-story house relocated to its present position in 1957. It is available for use by the FBO and is currently leased by King Aviation, Inc. for use as an office, a classroom for flight school, an operations office, a pilot lounge, a coffee shop/restaurant and restrooms. The Airport Commission maintains one room on the second floor of the terminal building for files and other storage (see Figure 2.4).

The coffee shop/restaurant has operated intermittently, under various agreements, but as of June

1999 it was not in operation although there is an active lease on the property. In lieu of an operating restaurant, the FBO has provided various vending machines in the lounge area. The terminal building has an outside picnic area consisting of benches and picnic tables that provide views of the apron areas, taxiways and runways.

The terminal's automobile parking lot was repaved and expanded (drainage issues were also addressed) in 1997 and 1998. The lot can accommodate approximately 50 automobiles and has a spectator area near the parking lot and secondary apron. This area is shaded, has picnic tables and provides a view of operations at Mansfield Municipal. Informational signs identifying the various aircraft that might be seen operating at the airport are provided by the FBO.

2.6.2 Storage Hangar

A 60-foot by 60-foot corrugated sheet metal storage hangar is located next to the terminal building and houses numerous small aircraft and miscellaneous equipment. A portion of this building is separated by an interior wall and is accessed through a 10-foot wide overhead door and a standard personnel access door. This part of the building is used to store supplies and maintenance equipment such as tractors and mowers. The building was repainted in 1998 and the electrical system improved to meet current code requirements (see Figure 2.4).

2.6.3 T-Hangars

As of 1999, there are two wood framed, metal skinned 10-bay t-hangars at the airport that are available for rent through the FBO and are accessible through multi-panel, sliding metal doors. The hangars are not lit and provide no electrical service for the tenants. The floors are asphalt and due to environmental factors (i.e., frost heave), have become uneven and cracked in some places. Additionally, the building foundations have settled unevenly which has led to many of these doors hanging crooked on their runners which results in large gaps between the bottom of the door and the pavement surface. Over the last few years, numerous roof panels have been replaced due to weather damage. As of 1999 all of the hangars were occupied and there were nine aircraft owners on a waiting list for available units (see Figure 2.4).

2.6.4 Maintenance Hangar

Aircraft maintenance at Mansfield Municipal Airport is provided by Casey Aviation. Casey Aviation occupies a 32-foot wide by 192-foot long (6,144 square foot) hangar building located near the FBO hangar, north of the t-hangars. This building is constructed of cinder block with an asphalt-shingled roof. It has three- hangar bays, each with multi-panel sliding metal doors. The western end of this building is painted with an aviation oriented mural and is one of the first views of the airport by traffic heading east on Fruit Street. According to the FBO management team, a contest is sponsored every few years with local schools submitting design ideas.

The building appears to be in fair condition due to general upkeep efforts of the tenant and includes a 490-square foot office. The exterior appears to have been recently painted and, according to the tenant, the oil-burning heat system was replaced within the last few years. The

tenant also indicated that the roof in both the office and hangar area leaks during heavy rains. The sliding hangar doors are un-insulated and the gap seals are severely worn which necessitates hanging tarpaulins during the winter months to block wind and snow from blowing into the building.

2.6.5 Other Structures

The Experimental Aircraft Association (EAA) and the Massachusetts Wing of the Civil Air Patrol (CAP) owns two single-wide mobile home trailers at the airport. These two organizations have made arrangements with the Airport Commission to utilize the airport property at no charge as long as certain insurance and liability requirements are met. A Remote Transmitter Receiver (RTR) facility, owned by the FAA, was commissioned in 2000. The RTR provides for ground-to-ground communications between the airport, FAA, ATCT, and pilots when delivering en-route clearances, issuing departure authorizations, and acknowledging flight plan cancellations or departure and landing times. An equipment storage trailer, emergency response vehicle and the CAP unit's single engine Cessna aircraft are parked adjacent to the CAP building.

2.6.6 Fuel Storage

All the fuel dispensed on the airport is pumped from one above ground, 8,000-gallon fuel tank. This tank dispenses 100 Octane low-lead (100LL) AV-Gas through two free-standing gas pumps. This system is located on the main apron approximately 100-feet southwest of the existing FBO hangar. The fuel tank and pumps are installed on a concrete foundation and are surrounded by 9-foot tall steel bollards. Pavement markings around the tank include aircraft lead-in lines and stop marks to facilitate safety and consistency during fueling operations.

This system was installed in 1994 and replaced the previous underground storage tank system in accordance with the 1988 United States Environmental Protection Agency (US-EPA) mandate requiring all underground storage tanks (USTs) not in compliance with the EPA's new standards to be either removed or upgraded. According to available records, the new system meets these requirements.

2.6.7 Airport Maintenance Equipment

As part of the sub-lease agreement, airport maintenance is the responsibility of King Aviation. As such, a majority of maintenance equipment (i.e. front-end mowers, lawn-mowers, tractors etc.) is provided by the FBO. The airport owns three surplus military vehicles ("Deuce-and-a-half") that range in model years from 1964 to 1974 and are equipped to carry a large sized snow-plow blade.

2.6.8 Security Fencing

There is security fencing installed around the entire perimeter of the airport. The fence is chain link and is 8-feet tall with three strands of barbed wire along the top. There are four vehicle access gates and one personnel gate. Two of the larger gates are located along Fruit Street, one is located between the maintenance and FBO hangars and one is located by the secondary aircraft apron. The personnel access gate is located by the terminal. A shorter 3-foot tall chain-link fence

separates the terminal's picnic area from the main apron.

Gate A, located to the west of the terminal on Fruit Street, has been identified as the "Emergency Response Gate." This is the widest of the gates and operates on rollers, whereas the other gates swing on hinges. A paved access road leads from this gate to the main apron between the maintenance and t-hangars.

2.6.9 Interior Access

Movement of ground vehicles within the interior of the airport is limited. Paved travel-ways include the existing aprons, taxiways, runway and two small access roads near Gates A and B. In Quadrant Four there is one non-paved access road leading from Gate D to approximately the midpoint of the parallel taxiway.

In conjunction with previous tree clearing operations, a small log bridge was constructed over Back Bay Brook near the RPZ to Runway 14. This bridge spans approximately 12-feet and is hidden within the tree line. The log bridge is a part of the approved Forestry Management Plan for the airport and was identified as a temporary structure.

2.6.10 Utilities

The airport is serviced with electric, phone, domestic water, cable and public sewer. Electric power is provided by the Town of Mansfield's Municipal Electric Company through underground conduit from Fruit Street to a pad mounted transformer located between the Terminal Building and the Storage Hangar. The underground cable and transformer were installed in 1998. Electric power is then transmitted from the transformer to the various terminal area buildings and the airport's electrical vault that provides power to the airfield lighting systems. Phone and water service are also provided from Fruit Street to the various terminal area buildings. New phone cables were installed underground in 1998.

Drainage from the main apron generally flows southwest after being collected by four in-pavement and three off-pavement drop inlets. These drop inlets are connected by 15-inch and 18-inch Rigid Concrete Pipe (RCP) that feeds into a 24-inch RCP that empties into a RIP-RAP outfall and drainage ditch that ultimately leads to Back Bay Brook.

Drainage from the runways and parallel taxiways generally flow east. The paved runway and taxiway are constructed with crowns (meaning the pavement slopes away from the centerline in both directions) that allows water to exit off the runway and then sheet flow over the grass to either 1) an existing creek northeast of the taxiway, 2) drainage swales located between the runway and taxiway or 3) an existing creek southwest of the runway. Drop inlets associated with the drainage swales collect the water and transport it through 18-inch RCP under the taxiway, to outfalls near the existing creeks.

Airfield drainage is further accomplished by an "underdrain system" contiguous to the majority

of the parallel taxiway. This system consists of 6-inch perforated *asphalt coated corrugated metal pipe* (ACCMP) buried approximately four- to six-feet below grade and surrounded by porous backfill material. Observation risers, or clean-outs, extend to the surface every 400-feet to 600-feet and are capped with 8-inch metal covers. Ground water will seep through the existing soils, be filtered by the porous backfill, enter the ACCMP and then drain southeasterly towards the existing stream.

2.7 PART 77 SURFACES AND AIRSPACE CLASSIFICATION

The Federal Aviation Administration and the Massachusetts Aeronautics Commission have established regulations concerning objects affecting navigable airspace. FAA regulations are included in Part 77 to Chapter 14 of the United States Code of Federal Regulations and are commonly referred to as “Part 77 Surfaces.” These regulations define and explain the various imaginary surfaces surrounding an airport. Imaginary surfaces are three-dimensional areas designed to enhance the safety of an airport by limiting the height and type of structures that may be placed within them. The dimensions of these surfaces are specific to each airport and are based on the airport layout, existing and forecasted design aircraft, and the type of approaches existing or planned at the airport (see Figure 2.5).

2.7.1 Imaginary Surfaces

The imaginary surfaces for each existing runway at Mansfield Municipal Airport are identified below. As of 1999, both Runways 14-32 and 4-22 are considered utility runways which means they only serve only small aircraft under 12,500 pounds. Runway 32 has a non-precision instrument approach while Runways 4, 22 and 14 have visual approaches. The approach minimums for all four runways are established at not less than one-mile visibility.

- ✦ **Primary Surface** - This is a rectangular surface that is longitudinally centered on the runway centerline. The elevation of any point of the primary surface is equal to the elevation of the nearest point on the runway centerline. The width of the primary surface is dependent upon the type of approach existing and planned for the runway and the visibility minimums. The length beyond the physical end of the runway is dependent on the type of surface the runway has. For runways with a specially prepared hard surface, the primary surface extends 200-feet beyond the physical end of the runway and for runways that do not have a specially prepared hard surface, the primary surface ends at the physical end of the runway. Because Runway 14-32 has a non-precision instrument approach and visibility minimums above $\frac{3}{4}$ -mile, the existing primary surface is 3,900-feet long and 500-feet wide. With only a visual approach to Runway 4-22 the existing primary surface is 2,293-feet long and 250-feet wide.
- ✦ **Approach Surface** - This is a trapezoidal shaped plane, longitudinally centered on the extended runway centerline. It extends outward and upward from each end of

FIGURE 2.5 ISOMETRIC VIEW OF PART 77 SURFACES

the primary surface. The dimensions and slope of the approach surface are determined by the approach planned or available for the runway and visibility minimums. For all utility runways, the slope of the approach surface is one-foot vertically for every twenty-foot of horizontal distance (20:1) along the extended runway centerline regardless of the type of approach available to the runway. The inner width of the approach surface is always the same width as the primary surface. At Mansfield Municipal Airport, the approach surface for Runway 32 is 500-feet in width at its inner edge and extends for a horizontal distance of 5,000-feet at a slope of one foot vertically for every twenty-feet of horizontal distance along the extended runway centerline (20:1). The outer width of the approach surface is 2,000-feet. The approach surface for Runway 14 is 500-feet in width at its inner edge and extends for a horizontal distance of 5,000-feet at a slope of one foot vertically for every twenty-feet of horizontal distance along the extended runway centerline (20:1). The outer width of the approach surface is 1,250-feet. The approach surface for Runways 4 and 22 are both 250-feet in width at their inner edge and extend for a horizontal distance of 5,000-feet at a slope of one foot vertically for every twenty-feet of horizontal distance along the extended runway centerline (20:1). The outer width of both approach surfaces to Runway 4-22 are 1,250-feet.

- **Transitional Surfaces** - This surface rises at a slope of one-foot vertical for every seven-feet of horizontal distance (7:1) as measured at 90-degree angles from the runway and extended runway centerline. The transitional surface starts at the edge of the primary surface and approach surface and terminates when intersecting the horizontal surface at an elevation of 150-feet above the established airport elevation (124-feet MSL).
- **Horizontal Surface** - This is a horizontal plane located 150-feet above the established airport elevation and is longitudinally centered on each runway. The perimeter of the horizontal surface is formed by swinging arcs of specified radii from the center of each end of the primary surface. The radii for the swinging arcs is 5,000-feet for all runways designated as visual or utility and 10,000-feet for all other runways.
- **Conical Surface** - This is a surface that extends outward and upward from the periphery of the horizontal surface at a slope of one-foot vertical for every twenty-feet of horizontal distance (20:1). This conical surface extends for a horizontal distance of 4,000-feet and has an ultimate elevation of 350-feet above the established airport elevation.

2.7.2 Airport Obstructions

The displacements to Runway 14-32 are required to provide the runway with clear 20:1 approach surfaces through the use of threshold siting criteria. A runway threshold marks the beginning of the runway available for landings and are ideally located at the physical end of the runway. If a threshold is not located at the physical end of the runway, then the threshold is said to be either

displaced or relocated.

A displaced threshold means the portion of the runway available for landing is displaced from the physical end of the runway. For example, a 5,000-foot runway with a 500-foot displaced threshold means that 4,500-feet of the runway is available for landings. The portion of runway behind the displaced threshold is useable for takeoffs in either direction and for landings in the opposite direction. Displaced thresholds do not meet current MAC and FAA guidelines of full utilization of runway pavements, but are permitted when circumstances will not allow for the removal of the obstructions. An alternative to displacing a threshold is to relocate the threshold. When a threshold is relocated, the pavement is marked with chevrons instead of displacement arrows. The pavement that is marked with chevrons is unavailable for any aircraft operation.

Even though Runway 14-32 is 3,500-feet long, the usable landing length of the runway is restricted because of displaced thresholds on both ends of Runway 14-32. The threshold to Runway 14 is currently displaced approximately 583-feet and the threshold to Runway 32 is currently displaced by 170-feet. Both displacements are a result of vegetative obstructions (mainly trees) in the approach surfaces to the runways.

As of July 1999, trees located on private property outside of the airport's boundaries penetrated the approach surface resulting in an "obstruction." If any Part 77 surface has an obstruction to it, the FAA must make a determination as to whether the obstruction is considered a "hazard to air navigation." Due to these obstructions, the runway's thresholds were displaced using threshold siting criteria to a distance that would allow a 20:1 approach to be clear of obstructions. **It should be noted that the Part 77 approach surface still begins 200-feet beyond the physical end of the runway and that the 20:1 approach created by threshold siting criteria is different from the Part 77 approach surface.**

The existence of obstructions affects the airport's eligibility for both Federal and State funding. An airport is considered "non-compliant" and will generally not receive grant-in-aid funds if any of the imaginary surfaces (i.e. approach, transition etc.) have unmitigated hazards to air navigation. The funding agencies will however, occasionally provide assistance if the airport sponsor is making adequate progress towards achieving compliance. The Airport Commission and the FBO are diligently working on removing obstructions that are located within the airport boundaries.

The FBO in conjunction with the Airport Commission and the Town and Mansfield are continually seeking opportunities to coordinate the removal of obstructions that are not on airport property.

One major factor in completing the removal of obstructions, especially trees, around an airport is the potential environmental impact that removal might cause. For that reason, the Massachusetts Aeronautics Commission has commissioned a Vegetation Management Plan

(VMP) to assess and mitigate potential environmental impacts. Mansfield Municipal Airport has been identified in this program and, depending on the outcome of the VMP, the airport will be able to address the remaining obstructions appropriately.

2.7.3 Airspace

Mansfield Municipal Airport is located in Class G “uncontrolled” airspace which means that under visual flight rules (VFR), it is the pilot’s responsibility to see and avoid other aircraft. To operate in Class G airspace, a pilot must be able to maintain specific visibility requirements that are prescribed in Federal Aviation Regulation Part 91 “General Operating and Flight Rules.” A pilot should maintain at least one-mile visibility and remain clear of clouds while operating below 1,200-feet mean sea level, or maintain at least one-mile visibility and either remain 500-feet below, 1,000-feet above or 2,000-feet to the side of clouds while operating between 1,200-feet and 10,000-feet mean sea level. During night operations, the minimum visibility is increased from one mile to three miles (see Figure 2.6).

Mansfield Municipal Airport is located approximately ten (10) nautical miles southwest of Boston’s General Edward Lawrence Logan International Airport (BOS) Class B airspace. Class B airspace is associated with most large commercial service airports such as Miami International Airport (MIA), Dulles International Airport (IAD), John F. Kennedy International Airport (JFK), and O’Hare International Airport (ORD) and extends from the surface to 10,000-feet MSL. To operate in Class B airspace, a pilot must have an operable two-way radio, obtain Air Traffic Control (ATC) clearance prior to entering the airspace, the pilot-in-command must hold at least a Private Pilot’s Certificate, and the aircraft must be equipped with a “Mode C” transponder and a Very High Frequency Omnidirectional Range (VOR) or Tactical Air Navigation (TACAN) receiver.

Mansfield Municipal Airport is approximately twenty (20) nautical miles northeast of the Class C airspace for T.F. Green Airport in Providence, Rhode Island (PVD). Class C airspace is associated with airports that have an operating control tower and are serviced by radar approach control but have fewer operations and passenger enplanements than an airport in Class B airspace. Pilot’s flying in Class C airspace must have an operable two-way radio, must obtain Air Traffic Control clearance prior to entering the airspace, and the aircraft must be equipped with a “Mode C” transponder (see Figure 2.7).

2.8 EXISTING PAVEMENT CONDITIONS

A visual inspection and a review of existing documents provided a basis for the pavement analysis that was performed in June 1998. Photographs of the various pavement conditions are documented in the photo-journal included in **Appendix D**.

Based on the findings of this pavement analysis, an updated Pavement Management Plan was developed. This plan is included in **Appendix E**.

FIGURE 2.6 AIRSPACE DIAGRAM

FIGURE 2.7 Sectional Chart

2.8.1 Runways

Runway 14-32 is generally in good condition with a minor amount of low severity transverse cracking. The majority of cracks have been sealed and the sealant appears to be in good condition. The surface of the pavement appears to be *open-graded* which refers to an inconsistency in the granularity or smoothness of the pavement surface. The open grade could be the result of the mix becoming segregated during placement or from weathering and could cause accelerated raveling and environmental deterioration of the pavement surface.

Runway 4-22 appears to be in good condition and has been well maintained over the years even though turf runways are highly susceptible to environmental and traffic related damage. Transitions between the turf runway with paved areas (i.e., Runway 14-32 and the parallel taxiway) appear to be in good condition.

2.8.2 Taxiways

The parallel taxiway is divided into two distinct sections evident by varying dates of construction and rehabilitation. The eastern most portion of this taxiway was resurfaced in 1994 and is in very good condition with a minor amount of transverse cracking. These cracks have been sealed and the sealant is in good condition. An open-graded texture is present on this section, similar to the runway pavement.

The western portion of this taxiway was resurfaced in 1981 and is generally in fair condition but with several pavement patches and a moderate amount of transverse and longitudinal cracking. These cracks appear to be caused by environmental stresses rather than structural stresses. The cracks have been sealed and the sealant is in good condition. An open-graded surface condition also exists on this portion of the taxiway which could result in foreign object debris (FOD) and aircraft ride problems.

The terminal taxiway was reconstructed in 1994 and is generally in good condition. There appears to be little or no cracking, however, low severity weathering has resulted in an open-graded texture. The taxiway connector stub between the main apron and the parallel taxiway to Runway 14-32 was recently reconstructed.

2.8.3 Aprons

A portion of the Main Apron directly in front of the Terminal and East Ramp was refurbished in 1999 and is in very good condition. There is low to medium severity alligator cracking in portions of the seal-coat but the seal-coat generally appears to be in good condition. The older portion of the Main Apron was completely reconstructed in 1999 and is in very good condition. The East Ramp was reconstructed in the late-1990s and is generally in good condition.

2.8.4 Automobile Parking Lot

Due to the recent expansion and rehabilitation of the parking lot, the pavement is in very good condition. Three new 1,200 gallon dry-wells were installed in 1998 to improve the storm water

drainage from the parking lot.

2.9 CAPITAL IMPROVEMENT HISTORY

The following is a summary of Capital Improvement Projects (CIP) that have taken place at the Airport since 1970. Major construction projects previous to this time are identified in the “Airport History” section of this report.

- 1970: Both the parallel taxiway and Runway 14-32 were extended by 500-feet to a new 3,500-foot length.
- 1975: The eastern portion of the parallel taxiway was reconstructed.
- 1981: The western portion of the parallel taxiway was reconstructed and the main apron was expanded by an additional 19,000 square yards.
- 1989: Airport security fencing was installed.
- 1993: Runway 14-32 was reconstructed.
- 1994: The eastern half of the parallel taxiway was reconstructed, the terminal taxiway was reconstructed, the pre-1967 portion of the main apron was reconstructed, the East Ramp was reconstructed, and a by-pass taxiway was constructed at the east end of Runway 14-32. A new above-ground aviation fuel storage facility with a capacity of 8,000-gallons was constructed along with the removal of two older 3,000-gallon steel underground tanks.
- 1998: Medium Intensity Taxiway Lighting System (MITLS) was installed.
- 1999: Main Apron reconstructed.