INFORMATION ON PROPOSED RUNWAY BROOM PURCHASE FOR WITTMAN REGIONAL AIRPORT

The initial portion of this report is a repeat of information previously provided to the Supervisors for an older resolution. New information is provided in the latter portion of this document, primarily under "Additional Alternative Explored."

BACKGROUND

More than one year has passed since the initial presentation and first resolution to the County Board on Wittman Regional Airport's proposed purchase of a dedicated runway broom. Information airport management provided at those meetings has either been forgotten, or has been distorted to the point that there is gross misinformation being spread about the why/how/what of this particular vehicle. The following points will clarify the airport's needs in terms of the proposed broom.

1. **Why do we need a broom?**

   Airport snow removal techniques and technology have advanced, especially in the past decade. At one time, the standard for airport snow removal procedures was to merely plow snow into a berm, blow the resulting berm, and apply sand as needed to increase friction for braking action. By and large, that is the current snow removal plan for Wittman Airport.

   The new standard, in place for nearly two decades, is to utilize a rotary broom as the first line of defense when snow starts to fall. Because it wicks away light snow with ease, it is often employed as the first thin coating of snow has fallen, and thereafter throughout the snow removal process, oftentimes in place of conventional plows. Brooms are especially useful with thin layers of snow, and after plowing operations is completed because of the snow left behind by plows and the packed snow left by plow tires. We will still have to employ the plowing to a berm/blowing method when larger amounts of snow dictate, but the broom will still remove any lingering loose snow left by the plow and blower, and remove the packed snow left by the tires of the snow removal equipment. Removing any remnants of snow, to the greatest extent possible, will greatly reduce our need to apply sand to increase the friction coefficient for effective braking. Additionally, reducing the amount of sand usage makes for a happier pilot, as sand is ingested into turbine engines, which over time degrades the turbine blades in the engine inlet. Sand also wears the surfaces of propeller blades, and again, over time may lead to catastrophic fractures/failures of the propeller blade. Recall that airports do not have the luxury of using road salt for snow control, as it is corrosive to aircraft, and the resulting consequences of its use would also be catastrophic.

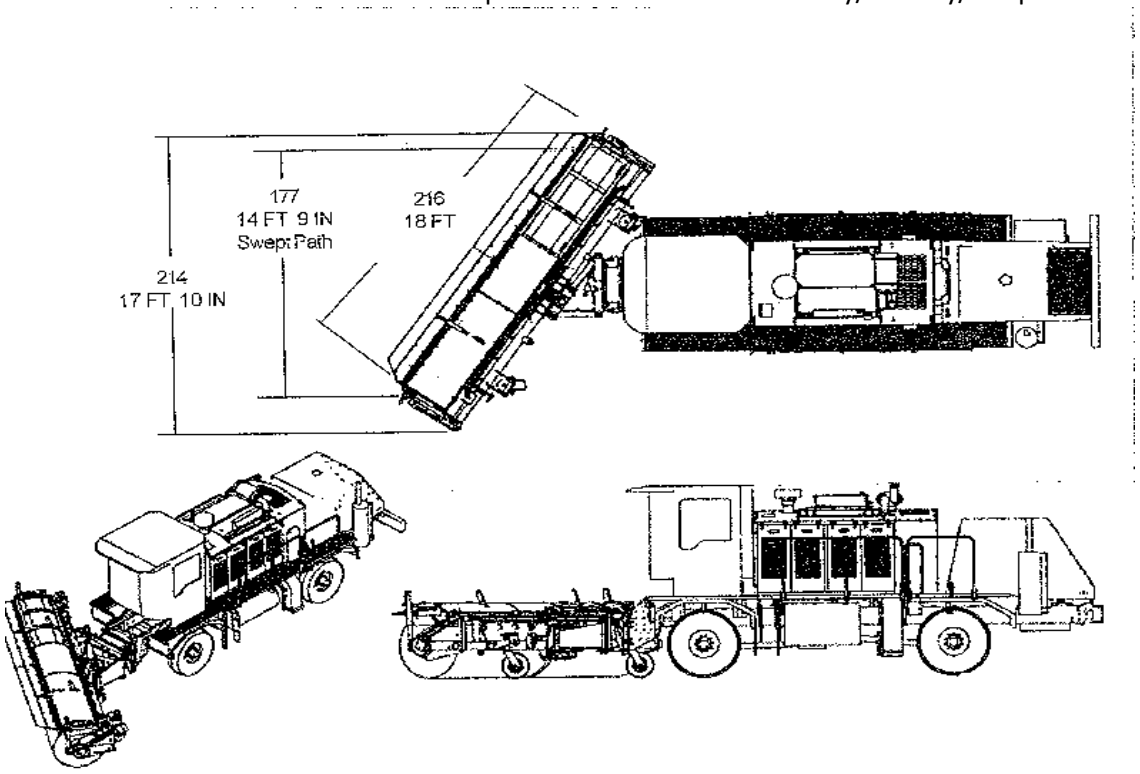
   The FAA provides excellent written guidance in an Advisory Circular on broom operation: "Most special purpose carrier vehicles are equipped with hydrostatically driven large diameter high speed high capacity brooms that are capable of clearing much of a runway well before displacement or rotary plows are committed", and "…[a broom] clears snow before passing wheels or displacement plow blades have a chance to compact it [snow], they provide a cleared path having maximum braking traction."

   Wittman Airport's previous broom was constructed in-house by piecing together components from various sources; recall that in our presentation in 2010 we noted the balance problem with the broom head that plagued us from the beginning (little ground contact when brooming to the left). The broom and broom drive engine have been scrapped due to significant failures in both units. Consequently, we currently lack this important piece of equipment.

2. **Why is Wittman Airport seeking a large, dedicated broom?**
   The simple answers to this are "efficiency and productivity;" in other words, it's the proper, right-sized, tool for the job.

   Recall that in a previous handout with a listing of larger General Aviation (GA) airports in Wisconsin and the brooms they own/operate, many were tractor-mounted units with 14-ft brooms. These units work sufficiently for smaller runways than what we have at Wittman Regional Airport, and for the lower amounts of aircraft traffic that these airports experience. True, they are cheaper to purchase, but in terms of output, a tractor-mounted broom lacks the ability to remove the amount of snow required for runways, taxiways and ramp areas of the size we have at Wittman. And remember that Wittman is also the fourth-busiest airport in the state of Wisconsin, even without the EAA traffic numbers.

   In terms of productivity and efficiency, notice on the drawing below how, as the sweep angle increases, the amount of effective broom width also decreases. In the illustration, an 18-foot broom is depicted; with a 35 degree deflection, it brings the effective brooming width down to 14.75 feet, an 18% reduction. Combined with that percentage decrease, one must also factor in overlap of the previous portion of pavement that was broomed (just as with using a snow plow). Figuring in a 2-3-foot overlap, the effective width is now 12-13 feet. Using the same percentages, a 14-foot broom at the 30 degree deflection, plus overlap, will yield an 8.5-9.0-foot effective width. That translates to more passes and time on the runway/taxiway/ramp.



   A good comparison of operating a large, dedicated broom versus a tractor-mounted broom would be analogous to attempt to plow snow on US Highway 41 with a pickup truck utilizing an

8-foot plow blade. Using a large tri-axle dump truck with a 12-foot blade and ice-control product in the dump box is much more cost effective and productive.

Additionally, the dedicated broom can achieve an operational speed of up to 40 mph depending on snow conditions and depth; a tractor-mounted broom will achieve only approximately 10 mph operational speed.

Other advantages of the dedicated broom versus the tractor-mounted broom include (these numbers are averaged for various manufacturers):

- 46" diameter broom vs. 26" diameter broom (longer life and more effective snow removal)
- 400+ rpm broom head vs. 300+ rpm broom head
- 2400+ ft.lbs torque broom head vs. 1600+ ft.lbs. torque broom head (greater ability to remove more snow)
- Heated broom hood vs. non-heated hood (prevents snow/ice buildup on head)
- Forced air blower at 17,000+ cubic feet/minute (CFM) vs. 7,400+ CFM

3. Why is the requested amount perceived to be so high?

First, specialized equipment for airport use is usually not cheap; the market for such equipment is much smaller than road maintenance vehicles. That said, we want to ensure sufficient funds are requested to allow room for all bids on the ultimate RFP for the vehicle we feel will meet our needs. Will the ultimate bids come in less than our requested amount? The answer to that is an easy, "yes," but it is much easier to ensure we have the sufficient funds, which may not all be used, than to come back to the board to request more funds when we discover that the original amount requested will not match the bids submitted. Remember that any funds not spent will be returned to the airport's undesignated fund balance and the bond issue will not be as great as anticipated. Furthermore, to suggest that manufacturers will bid close to the amount we budgeted goes against basic business practices. In competitive bidding, a bidder will submit a bid as low as possible to still make a profit and yet price his unit better than the competition. Most manufacturers know each others price ranges already. Submitting a bid at or near the purchaser's budgeted amount, when all other bidders are submitting much lower bids, will certainly result in lost business for that manufacturer.

There are numerous manufacturers of brooms, but contrary to expressed statements, not all vehicles with broom attachments or the brooms themselves are designed or constructed to handle the rigors of airport use. In our RFP (not yet published, by the way), we've studied the vehicles from various manufacturers that we know will be able to meet our needs and compiled them into the request.

Responding to requests by several supervisors, we contacted three broom manufacturers. We asked for a no-commitment, estimate of the cost of their typical runway broom. Their responses are listed below. Again, these estimates are not in response to an RFP. They may not meet or may exceed specifications for Wittman's broom.

Company A – around $550,000
Company B – between $610,000 and $660,000
Company C – between $525,000 and $575,000

ADDITONAL ALTERNATIVES EXPLORED

At the recommendation of a number of supervisors, we investigated other potential alternatives to a dedicated broom.

First, however, we feel compelled to report on, and eliminate from debate, the airport's existing Broce ® broom, which we use for cleaning small areas, such as around and between hangars, portions of the perimeter road, and minor areas on operational surfaces.

As one can see in the photo below, this vehicle is a one-person unit which has an 8-foot broom and a small plow blade. Much like a farm-type tractor mounted unit, there are several severe drawbacks to this vehicle for use in a snow removal scenario. Those include:

1. Limited sweep width
2. Slow speed (top speed of 10 mph when in sweeping operation)
3. Non-heated broom head to prevent snow/ice buildup
4. Most importantly, unit is not designed for snow removal operations, but rather road/construction debris removal.

In essence, the Broce® broom does a good job of removing debris and performing the sweeping duties for which we employ it, but won't help the airport at all with performing the snow removal duties for which we need.

FRONT-END LOADER MOUNTED BROOM

It was also recommended that we investigate, as a potential cost-saving alternative, a front-end loader mounted broom. Units such as these are available, but are not commonly in use for several reasons.

Wittman Airport's existing front-end loader would be incapable of using a broom attachment for number of reasons, including (but not limited to):

1. Insufficient engine size/horsepower
2. Additional costs required to add controls and hydraulics for the broom (if loader were of sufficient size)
3. Undesirable operational characteristics (elaborated on below)

To even consider a front-end loader mounted broom, we would need to purchase a loader capable of employing a 5-yard bucket (our current loader uses a 3-yard bucket). The investigated and verified base costs would then be:

Front-end loader - $333,000
Broom/drive engine - $180,000
Estimated total - $513,000

While a bit more expensive than the proposed unit on the resolution, there are other significant disadvantages to operating such a combination. To get an accurate picture of what the advantages and disadvantages might be, we contacted several airports who have recently purchased a front-end loader with a broom head combination.

Hibbing, Minnesota, an air carrier airport, purchased this combination approximately two years ago, has put 25 hours on the loader, and has since ceased using the broom and purchased a dedicated Oshkosh® broom. Their arguments against purchasing the loader-mounted unit include:

1. The excessive weight of the broom/drive engine made it nearly impossible to keep the unit level, even with the automatic leveling feature they purchased, particularly when "carrying" the unit to the runway. Even raising the entire unit to a height sufficient to clear the ground, the loader bounce would cause the unit to still bottom out at times.

2. The unit under operation was “slower than molasses in winter.” Hibbing’s primary runway is 6,758’ x 150’; Wittman’s primary runway is 8,002’ x 150’. It took their crew nearly an entire 8 hour shift to clear their main runway because of the reduced operating speed. Notice the excessive weight in the front of the loader with this unit; that weight requires a lot of force by the loader to push the broom as it operates.
3. With their new Oshkosh ® dedicated broom, they now clear the runway in about one hour.

Thief River Falls, Minnesota, also an air carrier airport that serves small commuter aircraft, purchased a loader and broom combination with FAA AIP funds (allowable for air carrier airports) and is seeking permission now from the FAA to sell/trade this unit for a dedicated broom. The airport manager related to us that this is quite possibly the worst piece of snow removal equipment any airport could purchase. His reasons for this are:

1. Slow operating speed (top speed with the broom attached, but <u>not optimal operational</u> speed) is 17 mph.
2. No forward visibility for the driver; the drive engine blocks his view of the broom and the runway.
3. The extended length of the combination unit (nearly 52’) combined with the articulation of the loader, made for a bad combination. Like a pendulum, the farther out from the articulation point, the wider the end of the arm is going to swing. The manager at Thief River Falls indicated that a slight turn of the steering wheel would result in at least a 5’ swing of the broom head.
4. The loader and broom bounces up and down at all but the slowest speeds, because of the excessive weight placed on the front end of the loader. This results in the broom head lifting off the surface, consequently skipping portions of the runway being broomed.

<u>PROPOSED UNIT TO PURCHASE</u>

Below is a photo of the runway broom Wittman Regional Airport proposes to purchase under the Resolution to which this report is attached.

As before, questions prior to the county board meeting are welcomed and encouraged. You may call, e-mail, or visit our office to discuss your questions.

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