REDAC Subcommittee on Airports | MINUTES

Meeting date & time: September 7-8, 2022

Meeting location: Virtual meeting

Purpose: To provide advice and recommendations to the FAA on its airport technology research and development program.

Facilitator: Chris Oswald

Note taker: Dominique Khan & Alex Tsalyuk

Timekeeper: Chris Oswald

DAY 1 – September 8, 2023

Presentations 1 & 2: Introduction & Opening Remarks | Presenter Chris Oswald & Shelly Yak

Chris Oswald informed the committee about the absence of a few members due to existing conflicts and provided a high-level walk-through of the conference agenda.

Shelly Yak announced personnel updates, including Jim Layton's new role as Acting Branch Manager for the Airport Technology R&D (ATR) Branch.

She also reviewed COVID updates and shared that the William J. Hughes Technical Center is still in the "red" level, meaning that personnel are at maximum telework.

Ms. Yak acknowledged that ATR is mostly funded by the Airport Improvement Program (AIP), but shared updates on the Research Engineering budget area for overall awareness. The total amount in 2022 is $149M, primarily climate related. The 2023 budget submissions are $260M for primarily climate, workforce development and training, Unmanned Aircraft Systems (UAS) and resiliency.

Ms. Yak shared a presentation on the focus for the Tech Center regarding messaging, planning and strategies.

Mr. Oswald opened the floor for introductions to Subcommittee members and ATR personnel.

Presentation 3: HQ ARP Update | Presenter: John Dermody

John Dermody started his presentation on the Office of Airport Safety & Standards by discussing the restructuring in the Airports Safety and Operations Division. It has been split into two new branches, Airport Safety Policy (AAS-310), and Airport Operations (AAS-320), managed by Tony Butters and Kelvin Ampofo respectively.

A new structure in the Office of Airport Safety & Standards is the Airports Emerging Entrants Division (AAS-200). Due to the strong focus on emerging entrants, the Airport Safety and Operations Division

decided that it's best to consolidate and create a focus area to manage this work more effectively. Mr. Dermody shared that a vacancy announcement for a manager position was recently closed, so hopefully they will have someone in place very soon.

Chris Griswold, the legacy branch manager for the Airport Airspace and Data Branch (AAS-120) is on a 60-to-90-day detail assignment with Mr. Dermody right now. Mr. Griswold is working on enterprise information management tasks within the FAA and assessing what need to be done with the data. Mr. Griswold is also working to finalize UAS coordination items as well.

Mr. Dermody reported there are two new Aeronautical Information Specialists in AAS-120, a new contractor serving as an Administrative Assistant, and that they are in the hiring process for an administrative officer as well. He also shared retirement announcements and additional vacancy announcements. Mr. Dermody announced that Elliot Black will return to the Office of Airports (ARP) in the fall as Director of Policy. Mr. Black will work on their strategic plan as well as various legislative work. They are working on staffing up for the new Infrastructure Law to ensure having the correct level of support.

Mr. Dermody reported on the work in sustainability: research in pavements, solar lighting, and focus in other areas such as better recycling of materials. They are exploring how technology such as artificial intelligence (AI) and machine learning can be used to develop automation.

Presentation 4: Airport Technology Program Update | Presenter: Jim Layton

Jim Layton began with an overview of ATR personnel and an update on recruitment efforts. These efforts include an updated ATR website with a new careers page and a job benefits sheet based on current staff perspectives. One of the Tech Center goals is workforce development. Mr. Layton also shared two key recruiting efforts accomplished since last REDAC: the Florida Institute of Technology alumni article – featuring profiles on alumni working at ATR and their research projects; and the intern summer project run by Murphy Flynn.

Mr. Layton proceeded to report on ATR laboratories and assets. He shared that a primary challenge centers on the Materials Pavement Laboratory, which is under development. Construction costs are rising 30-40% due to supply chain issues, inflation, and labor and materials costs, driving up expenditure on the project.

Mr. Layton confirmed that ATR's work is in alignment with the Department of Transportation's (DOT) strategic goals. ATR is currently working on the Branch's 10-year plans, with the Pavement 2030 Research Plan available on the ATR website, and modular versions of the Pavement and Safety plans

coming soon. Mr. Layton emphasized how ATR is aligned with safety and transformation goals. ATR is researching the use of UAS for situational awareness for incident managers responding to Aircraft Rescue and Firefighting (ARFF) events on an airfield. Regarding transformation, ATR has maintained flexibility and adaptability responding to emerging challenges.

Mr. Layton concluded by sharing key accomplishments from the past year. Dr. David Brill and Dr. Navneet Garg presented at the Bearing Capacity of Roads, Railways and Airfields (BCRRA) conference; Dr. Brill was awarded Government Engineer of the Year under the New Jersey section of the American Society of Civil Engineers (ASCE); ATR participated in Atlantic City International Airport (ACY)'s triennial emergency response exercise with the UAS team providing additional situational awareness; Dr. Garg was selected as a Fellow of the ASCE; and ATR has published nine reports and hopes to have three new reports published soon.

Presentation 5: Review of Outstanding REDAC Recommendations | Presenter: Subcommittee Members & FAA

Jim Patterson recapped the two recommendations that were closed during the Spring 2022 REDAC meeting:

- Alternative Firefighting Agent Research (slides 106 & 107)
- Airport Sustainability & Resiliency (slide 108)

Mr. Patterson also reviewed the recommendation that came out of the Spring 2022 REDAC: *Construction Cost Inflation* regarding the amount of airport funding available versus the spiking cost of construction materials and labor. The FAA Response to the Recommendation was reviewed. Mr. Oswald moved to approve the FAA's Response. Al Pollard (Martin State Airport) seconded. None opposed. Chinita Roundtree confirmed that FAA has formally released the Response. The Recommendation is officially closed.

Presentation 7: REDAC Membership/Subcommittee Representation | Presenter: Chris Oswald

Chris Oswald asked for status updates about the qualifications and skills the Subcommittee is looking for in its members. Ms. Roundtree shared that REDAC is being looked at for "revitalization" at the Senior Executive level. She explained that this includes the action to submit names for the full REDAC. Additionally, there will be a Federal Register notice solicitation that will be released formally through DOT after it has been approved at the Executive level. They will also ask for REDAC to revisit their subcommittee as well.

Mr. Oswald asked if it would be beneficial for the group to have discussions now regarding how they pull new members into the Subcommittee, or if that would be a premature discussion? Ms. Roundtree suggested that it would be a proactive step. She also mentioned that they want to reinforce the need to have appropriate representation of subject matter experts that will help the REDAC implement, execute, and contribute to the advice for the airport environment. REDAC is encouraged to look at membership from a perspective that promotes diversity and succession planning of subject matter experts.

Ms. Roundtree explained that they were asked by the FAA Executives to ensure that there was fair and open solicitation for REDAC. Regarding the membership that this REDAC already has in place: there are membership renewals every two years. That process would remain the same.

Ms. Roundtree also reminded the group that a requirement of serving in the full REDAC is participation in a Subcommittee. She reviewed the three membership categories and required vetting and training for each: Representative, Subject Matter Experts, and other Governmental Agency representatives.

Mr. Oswald asked for volunteers to help put together an onboarding process document for membership. Mr. Pollard with Martin State Airport volunteered, as well as Andrew Pantino with American Association of Airport Executives (AAAE).

Presentation 9: Overview of Safety Projects | Presenter: Ryan King

Ryan King briefed the Subcommittee on the safety projects underway at the Tech Center.

Research on solar lighting consists of decentralized lighting fixtures and signs that can be individually powered with photovoltaic cells.

Work continues on several airport safety databases. A FY 2020 report was submitted last week for the Airport Safety Database. Steps are being taken to improve data for the Foreign Object Debris Database by improving data reporting. Additionally, they are working to make it faster and easier to report wildlife strikes. In line with this work, ATR is working with Purdue University to better understand how geese respond to light to minimize incidents. They are investigating how to improve the clarity of lighted X's and are preparing to undergo flight testing.

The Safety team is also working with industry and government partners to investigate vertiport infrastructure needs and working on new vertiport designs.

CHAT

From Sarah Brammell to Everyone 11:23 AM

Happy to help with the wildlife strike/reporting topic you just mentioned.

Presentation 10: Alternative Aircraft Fire-Fighting Agent Research Update | Presenter: Keith Bagot

Keith Bagot provided an update on the Safety team's work in firefighting foam research. They conducted live-fire testing of several firefighting agents to try to find replacements of existing fluorine foams. Over 36 fluorine free products were tested, including both prototypes and those from the BAA program. There were over 500 fire tests conducted, tracking the performance of products against current and draft military specification (MilSpec) test protocols as well as testing capabilities of different nozzles, tubes, and compressed air foam systems (CAFS) and dry chemical (DC) compatibility. Work is ongoing to see how different nozzle and tube types can affect foam performance.

The products were tested to a higher performance standard than what they have been developed for, excluding MilSpec AFFF (Aqueous Film Forming Foam) and ICAO C certified foams. A report has been published testing all commercially available firefighting foams and protocol modifications. Prototype foams are not included in this report. 7 of 11 commercially available products tested are in the report and the remaining four did not perform well enough to complete the test series.

ATR has been collaborating with the Department of Defense (DOD)'s Strategic Environmental Research & Development Program (SERDP) and Environmental Security Technology Certification Program (ESTCP) on the development of an updated MilSpec for firefighting foams. They have also participated on draft reviews of the coming specification. Adjudications of all comments have been completed, and resolutions are being distributed back to commentors. The specification will only be for 3 percent foam using fresh water. There will be no sea water requirements in this version of the specification. There have been difficulties in creating a test protocol to accurately track fluorine content in the solution. The DOD is on track for the deadline to publish by January 31, 2023. The hope is for products to be approved by April 2023. The FAA and DOD will continue to research new formulations.

Mr. Bagot also spoke about the transition to these new foams. They need to see how the MilSpec rollout goes and see how many products pass certification to get an understanding of how long a transition will take for all airports and the DOD. Disposal of fluorine foams will also need to be determined. The regulation of cleaning vehicles will be determined by state governments. The recommendation will be for airports to switch over all of their fire apparatus at once, but it could take some time. States can potentially buy foam in large quantities rather than individual airports to increase buying power. Fluorine free Foam products will not be cross compatible.

Presentation 11: Emerging Entrants Update | Presenter: Jonathan Torres

The Office of Airports has created a New & Emerging Entrants team, which Jonathan Torres is a part of. Mr. Torres provided updates on the various work the ARP is undertaking:

Advanced Air Mobility (AAM): Mr. Torres noted the strong emergence of vertical take-off and landing vehicles (VTOL) aircraft and short take-off and landing (STOL) aircraft.

- AAM is not a single technology, but rather a collection
- FAA needs to determine how these technologies can be safely integrated. ARP is looking specifically at infrastructure considerations. What standards are going to be used for the site selection, design, and operation of vertiports and support infrastructure?

The FAA used to have a Vertiport Advisory Circular, but it was canceled in 2010. To develop new vertiport standards, ARP and ATR initiated a multi-year vertiport design & operation research project in 2019:

- Draft version of the Vertiport Design Engineering Brief released in February 2022 for public comment → over 700 comments received
- FAA hosted an Industry Day with over 800 participants
- New Advisory Circular anticipated by late 2024/early 2025

Unmanned Aircraft Systems (UAS): As UAS continues to expand, new regulations, policies and procedures are needed for safe integration into the NAS (National Airspace System). The FAA assesses integration based on risk: low risk operations are integrated first.

Mr. Torres briefly mentioned the UAS Applications research, as well as Detection and Mitigation research, which will be reported on at a later session during this REDAC.

Commercial Space: Airports are increasingly interested in hosting spaceports. There are eight licensed spaceports on NPIAS airports.

Safe integration and appropriate infrastructure use are key. ARP coordinated with Office of Commercial Space Transportation (AST) to ensure operational safety.

Mr. Torres also reported that another area ARP is keeping an eye on is Super Sonic Aircraft. At the moment, they are waiting to see how the technology matures.

QUESTIONS/COMMENTS

Jeff Sedin: He heard that L.A. is getting a drone detection system funded by the Department of Homeland Security for research. Is FAA coordinating with them?

John Dermody: They have their own purposes for doing testing for UAS detection, focused on Security. FAA is collaborating with them and making sure no one is duplicating efforts.

Jim Patterson: The biggest differences between the Transportation Security Administration (TSA)'s testing and FAA's testing: 1) TSA is not testing systems with the levels of complexity that FAA is 2) They are not flying UAS targets against any of these systems. It is more an evaluation of the native environment around airports. FAA and TSA do have meetings every few weeks to connect on these efforts.

Presentation 12: Completed Evaluations of UAS Applications | Presenters: Jim Patterson & Mike DiPilato

Note: The Subcommittee also asked for a report on UAS Detection and Mitigation, so there were two report outs for UAS.

A) Airport Applications Report by Mike DiPilato

Mr. DiPilato provided a status overview of the UAS Airport Application research, which started in 2018 with outreach to different airport sponsors and aviation stakeholders to find out what those parties were doing with UAS. Those insights helped determine how ATR framed the research and prioritization for the development of guidance.

Research has been completed for five core applications: Obstruction Analysis; Pavement Inspections; Perimeter Security Inspections; ARFF – Live Monitoring, and Wildlife Dispersal. Research on these applications began in 2019 to determine minimum performance specifications and guidance.

Research is in process for four applications: ARFF Accident Documentation (will be completed in FY23); Wildlife Monitoring (in coordination with USDA); Airport Lighting Inspections; and Foreign Object Debris (FOD) Detection (research initiated February 2022; working with Memphis Airport and FedEx).

Future research will be conducted for Construction Monitoring (research will begin this year with the Literature Review), Integration Pilot Programs for specific applications, and other application areas.

Mr. DiPilato shared when the research will be published for the five core applications. The ARFF Live Monitoring report was published on August 23, 2022. To date, 200 individuals have downloaded the report.

Publications for Wildlife Dispersal and Pavement Inspections will be released in December 2022.

Reports for the remaining applications will be published January – February 2023.

QUESTIONS/COMMENTS

Shailesh Gongal: I've heard it's easier and faster to do aerial survey, but the granularity of the data is not as good. What is your finding?

Mike DiPilato: "That's correct. UAS is not meant to replace any type of traditional inspection or means of collecting data. UAS surveys are a longer process. It's not for every airport. For every manned aircraft image that's collected, there are about 350 UAS images that are collected that need to be analyzed, so it's a longer process. As a result, in the report, we identified some use cases for smaller scale surveys, or in some instances, to supplement the images from manned aircrafts."

B) UAS Detection and Mitigation Research Program Update by Jim Patterson

Mr. Patterson provided an overview of the Section 383 congressional mandate for UAS Detection and Mitigation. The FAA's security group, ASH (Security and Hazardous Materials Safety), has overall control for Section 383 – they oversee the mitigation aspect. Mr. Patterson and ATR's work relates to the testing and evaluating of detection and mitigation technologies. (ATR is solely responsible for the detection evaluation, but ASH is running the mitigation side. ATR is guiding them through the proper channels and processes to work with airports.) The congressional mandate deadline is September 30, 2023.

Last year, the program focus was on selecting airport testing sites and coordinating the site preparations, as well as selecting the technologies and systems to test. Testing started this year and will continue into 2023.

During the overview of the vendor status, Mr. Patterson explained the identification coding for the vendors. The coding identifies which vendors have services related to detection, mitigation, and/or remote ID. He provided a short summary on the capacity of each vendor technology.

Of the eleven detection vendors selected for evaluation, four have been installed at ACY (first airport testing site). Of those four, testing has been completed for two. Those two vendors have now graduated to installation at second airport site locations. He provided status updates for all 11 detection vendors. They have also started evaluating the first mitigation vendor.

The project has more than enough content to exceed the minimum congressional requirements, but they will continue striving to evaluate all 12 vendors.

Chris Oswald: "Going back to 383, on the ARC (Aviation Rulemaking Committee) piece, is that moving forward under ASH?"

John Dermody: "Yes, planning for the ARC is underway. They're looking to try and convene the ARC before the end of the calendar year, but it might go into January. It is ASH run."

Chris Oswald: "We already raised the question on managing the interaction with TSA or DHS."

Jim Patterson: "Yes, the relationships have been great with the other federal partners. Just two weeks ago we had an entourage from the FCC (Federal Communication Commission) visit. They've been involved behind the scenes helping us get approvals, so it was great to have them up."

John Dermody: "We received high praise from the Federal Communications Commission (FCC). They said this was the best testing program they've seen, and all the boxes have been checked."

Mr. Patterson continued to report that the Atlantic City UAS detection team was approached by the Remote ID Program Office and asked if the team could help conduct a demonstration – a proof of concept – of what Remote ID could look like in the airport environment. This could be helpful for detection, so we are actively working on it with a total of three vendors. Testing will hopefully be completed in October – November 2022.

He provided status updated for each of the airport testing locations and shared pictures of preparing the sites.

Presentation 13: EMAS Signage | Presenter: Russ Gorman

The primary research focus is to evaluate how effective signage is during normal operations to alert pilots to the presence of engineered materials arresting system (EMAS). The secondary research focus is to determine how well the same signage performed during an actual overrun event.

Mr. Gorman explained that EMAS was developed for runways that could not accommodate the runway safety area program. Currently, EMAS is installed at approximately 121 runways ends in the US. There have been 18 incidents where it has safely stopped an aircraft.

However, there have been incidents where a pilot will choose to veer away from EMAS. Some pilots have reported that they veer away due to not realizing that EMAS is present and available to use. Because of this, ATR has been tasked with developing and testing EMAS signage. In 2013, different EMAS sign prototypes were investigated and narrowed down to six different concepts. In 2016, one sign design was chosen from the six: two yellow signs on either side of the runways with chevrons pointing inward. It is this signage that is being further evaluated.

ATR worked with FedEx and FSI (Flight Safety International) to conduct the evaluations. The simulations were adjusted to capture different scenarios. They also implemented pilot surveys to gather additional feedback on the simulation experiences. (102 participants completed the surveys.)

Mr. Gorman provided an overview of the research findings. The project met the original deliverable, but the data set was small (due to COVID). A report was published last week.

They are going to augment the original report with the new, larger data set. It will follow the original report structure. The original data set is too small to draw conclusions from, however Mr. Gorman did share items that stood out to him from the raw data:

- None of the pilots avoided EMAS – regardless of whether they knew what EMAS was or not (They maintained a straight course and did not veer off)
- Most pilots did not see the signage during the emergency overrun (tunnel vision), so it seems to be more helpful during normal operations rather than during an overrun
- The evaluation of sign location is still TBD

A great outcome of this research is that more pilots now know what EMAS is and how to use it.
The new, augmented report is expected by Q1 CY2023.

Murphy Flynn: The findings you shared at the end are really in alignment with Nick Subbotin's experience with EMAS as well, so that's good to hear.

Jeff Sedin: I'm glad that your findings show what we've been saying all along: 1) there should be some EMAS signs, 2) it would be great to have it on the approach plans, not just the airport diagram. It would be another helpful reminder to bring that up. I'm glad some pilots knew about EMAS because most airlines don't include it in training. Hopefully we can get with Flight Standards to get some training out about EMAS.

Presentation 14: Airport Pavement Design for Seasonal Frost & Permafrost Conditions | Presenter: Dr. David Brill

Dr. Brill discussed the work that has gone into researching pavement design for seasonal frost and permafrost. This project was created in 2020 due to several reports from the Alaska region of degradation of airport pavement that is believed to be due to changes in seasonal frost and/or permafrost due to global warming as well as improper design, construction, and materials use. The goal of the project is to find the issues that led to these failures and to recommend new design procedures to address this. The existing procedures were written in the 1970s.

The project kicked off in July 2020 and a phase 1 report with data collected from Nome, Kotzebue, Barrow, and Noorvik and an initial analysis of the data was produced in December 2020 by a support contractor. Over the next 5 months the design review was underway with draft recommendations presented in the end of 2021. The final published report is now underway. The key recommendations to the FAA are to account for warming trend in thaw depth calculations, clarifying risks of solutions short of

complete frost protection, guidance on the use and installation of insulating panels, and recommendations on snow removal.

Presentation 15: Airport Environmental Projects | Presenter: Lauren Vitagliano

Lauren Vitagliano provided updates regarding the Neighborhood Environmental Survey, which was last briefed at REDAC in September 2021. The Noise Policy Review has begun with the partner agency, but since this phase is no longer considered research, the content is no longer being briefed out at REDACs. The project is moving along. There is a main Noise Working Group team, along with three subgroups that were initiated last month. There is no firm date for completion yet.

Ms. Vitagliano then introduced a new FY23 Noise Research project which focuses on Best Practices on Communicating Noise to the Public. The research will build on ACRP Report 15, which was the FAA Community Involvement Manual. The efforts from this research will be incorporated into Advisory Circulars for the Part 150 process and into the Community Engagement Officer Handbook "Guide to the Galaxy". This contract will likely be awarded in October-November.

The second noise project focuses on the influence FAA has on local land-use decisions. The issue is that FAA really has no influence. The research purpose is to understand the current policies, practices, and limitations FAA has and the agency's involvement in land-use planning surrounding airports. The research will be converted into improved guidance for airports to use when working with their local jurisdictions during the Part 150 process. This contract is expected to begin early next fiscal year.

The third project is the Standardization of Noise Abatement Aircraft Operations. There is no guidance for airports when it comes to determining the impacts and capability of implementing noise abatement procedures that were identified during the Part 150 process. This leads to inconsistent results across the country. The project seeks to standardize a method for looking at all noise abatement and mitigation alternatives that would be incorporated into FAA policies and procedures and the Part 150 Guidance.

Ms. Vitagliano proceeded on to report on the research regarding resilience at vulnerable National Plan of Integrated Airport Systems (NPIAS) airports with respect to climate change and severe weather. The research is the result of Executive Order 14008. They are one year into the five-year project:

There are a number of airports being impacted by climate change. Ms. Vitagliano raised a main question of the research "how much protection is needed? Is it realistic for all airports to be 100% protected, 24/7? Not really, and we know it's not affordable." Ms. Vitagliano then explained the need to develop recommendations that will address all the infrastructure impacts (engineering, drainage, pavement, electrical availability) versus rapid recovery and then prioritize those projects between the airports and

the FAA. The project also aims to develop tools that will help FAA decide which airports are most vulnerable and which projects will get priority funding.

The project will also develop a framework to assist airports with integrating resilience into their Airport Master Plans. The research will also update the Airport Master Plan Advisory Circular. This work is also connected to FAA's Sustainability Grant Program that began in 2011. Since 2011, FAA has given 48 airports grants to create Sustainability Master Plans.

Ms. Vitagliano reiterated the two outcomes of the research:

1. Airport Resilience Analysis Framework (ARAF): Develop a framework that airports and consultants can use when conducting resilience assessments. The ARAF will address threats such as extreme weather, flooding, storm surge, permafrost collapse, high temperatures, etc. over varying time scales and scenarios and the projected impact to the performance of the infrastructure and to aviation access.
2. Develop a Resiliency Project Prioritization Framework (RPPF) to help FAA prioritize those projects and determine the best use of funding.

Currently, the project team is considering different research locations.

Ms. Vitagliano also shared workflow graphs demonstrating how ARAF and FAA prioritization selection work.

Jim Mack: "When using the ARAF, is there a way for the airports to indicate what their solution options are, and the risk associated with the various options? To ensure the best options are truly selected for funding?"

Lauren Vitagliano: "That will be part the FAA's assessment. Airports will be categorized in many ways."

Presentation 16: Airport Resiliency Roundtable Discussion | Presenter: All – Chris Oswald

Mr. Oswald raised the question of clarifying terms: resiliency and sustainability tend to blend together. Is there a way to clarify and frame these, and also identify how and where climate sits in the mix?

Mr. Flynn stated that resiliency needs to occur regardless of climate change. Climate change is just accelerating our need to address it. Sustainability is long-term looking at resources and affordability through the life cycle as we look to the future.

Jim Mack (CEMEX) agreed with Mr. Flynn's statement. He shared that resiliency is having to deal with not having a sustainable approach in the past. He remarked that as we build more resilient systems, it should by default be a more sustainable system also. He also raised the need to understand that resiliency is dealing with all the things we never thought we would have to deal with because some

natural disaster happened and created a major issue. It raised the question of if the proper risk assessments are being done.

Mr. Oswald broached the topic of Net Zero systems and the potentially higher costs to build resilient systems.

Shailesh Gongal stated that the way we adapt to the new environment effects both the sustainability and resiliency of the systems. We are dealing with a new level of environmental impacts across the nation. Essentially, we need to be smart about separating the concepts of resiliency and sustainability, but also know when to connect them.

Mr. Oswald marked the need to clarify how are we characterizing project resiliency, especially when it comes to evaluating FAA grant issuance. Mr. Dermody suggested Mr. Oswald lay out some thoughts in an email so that Mr. Dermody could share those ideas with others on his team and get feedback.

Mr. Oswald asked if any of the organizations represented on the call have resiliency plans developed or under development. Scott Marsh shared that they are looking into resiliency plans for all of their projects. It is a big part of their project planning process.

To conclude the session, Mr. Oswald circled back to action items for the Subcommittee. He asked that everyone read through the UAS Research & Development plan that he shared that morning. Mr. Oswald also asked to get a meeting scheduled to facilitate getting comments back on the UAS Research & Development Plan, and for volunteers to participate. Meeting scheduled for September 22 at 1:00-2:00pm EST to review concerns and comments. Volunteers: Shailesh Gongal and Sarah Hubbard). Mr. Oswald will send the meeting invite to the subcommittee so members can join based on their availability.

Ms. Roundtree needs comments back from the Subcommittee for the full REDAC meeting by September 27.

CHAT:

From Jim Mack, CEMEX to Everyone 03:18 PM The below comments are from Airport Resiliency Roundtable

Chris - can you share GSA Audit review you were just showing?

From Chris Oswald (ACI-NA) to Everyone 03:19 PM

https://www.oig.dot.gov/sites/default/files/FAA's%20Oversight%20of%20Resiliency%20Planning%20in%20Airport%20Infrastructure%20Grant%20Projects%20-%20Announcement%20Letter%2006-29-22.pdf

From David Brill to Everyone 03:22 PM

Resiliency can sometimes conflict with sustainability. Case in point is Barrow. If all materials used in reconstruction of the runway met strict FAA standards for non-frost-susceptibility, crushing, etc., and not sourced nearby, it would be more resilient. But bringing those materials in from afar would have a high environmental cost - not sustainable.

From Navneet Garg to Everyone 03:22 PM

There will be a paper presented in poster session at 2023 TRB titled "Development and Scoring of Flexible Airport Service Resilience Performance Measures". It was funded through ACRP student grant.

From Jim Mack, CEMEX to Everyone 03:27 PM

While I agree with Dr Brill, that is the reason that we need to take a Risk based, Life cycle perspective to review alternatives. It may not be completely sustainable to make the Barrow pavement completely resilient, but there could be a middle ground where we add some resilient aspects and that is enough to pay for it from a sustainability aspect. But again, that requires looking over the life and doing the trade-off analysis.

DAY 2 – September 8, 2023

Presentation 1: Airport Pavement R&D Program Updates | Presenter: Murphy Flynn

Mr. Flynn provided an overview of the ATR Pavement personnel. Key updates included Mr. Flynn stepping into the role of Acting Manager in July 2022, and a review of the open positions within the section.

Mr. Flynn provided an overview of the eight Pavement Research Program Areas and the four main contracts that the research is conducted under. Key updates included:

Pavement Consultant Support contract: close to reaching the contract ceiling so they are working on developing the next contract (five-year timespan). Presently, the statement of work is under review. The goal is to get this out by first or second quarter of FY23.

Airport Asphalt Pavement Technology Program (AAPTP) and Airport Concrete Pavement Technology Program (ACPTP): has been funded for the past three years and no issues are anticipated for securing FY23 funding. Mr. Flynn flagged that any contract exceeding $10M does require CFO approval. That approval should be given easily since this is work under a congressional earmark.

Mr. Flynn also provided an update on the Ten-Year Plan. As announced during the Spring REDAC, the Pavement Ten Year Plan has been published and is available on the ATR website. It is a 115-page document and text heavy. To make it more accessible, and to make ongoing updates easier, ATR is

developing a Modular Ten-Year Plan. Mr. Flynn shared screenshots of the Modular plan. It has not been published but is anticipated soon.

Mr. Flynn closed the presentation with updates to capital expenditures.

- ATR is in the process of purchasing materials for the repair of the NAPMRC roof (damaged in a storm during 2020). The contract should be signed in the upcoming weeks.
- Work will begin in November 2022 to replace the Subgrade Process Facility roof.
- The Cape May Research Taxiway has significant opening joints that need to be sealed.

Mr. Flynn circled back to the Nondestructive Testing (NDT) program. Dr. Richard Ji is now leading the work following the resignation of the previous program lead. Mr. Flynn shared that they are taking this opportunity to refocus the program. Significant dialogue has been opened with HQ Pavement personnel. They are drilling into what the HQ team will need to issue updated Advisory Circulars and other necessary guidance.

Chris Oswald: "Is there any particular reason the contract ceiling is being approached so quickly on the Pavement Consultant Support contract?"

Murphy Flynn: "Tapering off from the previous contract, there was work that had been put off. Between the carryover of work, and the longer time it took to the get the new contract approved, we had a bigger backlog of work to get through, so a lot of work was issued right away when this was awarded. Additionally this was meant to be a stop gap contract and only had a ceiling of $10M. The future contract will be much larger. Also, with the capabilities of having this contract more focused, we started lining up a number of future construction items. The process in the Contracts Office has become significantly longer to get approval but we are working on a significantly larger contract."

Chris Oswald: "Would it be helpful to show our (REDAC Subcommittee) support for the required funding for the AAPTP and ACPTP work? Perhaps as a noted Observation. Would that help?"

Murphy Flynn: "Potentially. But I want to clarify that I don't anticipate *not* getting the funding. It's just a longer process with CFO approval."

John Dermody: "If there's industry support, it can't hurt to show."

Chris Oswald: "Any concerns with including this as an Observation? I'll open that to the floor, especially those on the Pavement side."

Jim Mack: "I think it's important and it's extremely helpful to the industry. It helps us stay focused and it helps us address our issues. There's always more we can do, so yes, having the Tech Center operate as efficiently as possible is important, so yes, we support that."

Brett Williams: "I second that. I think it's a good program that has brought industry and FAA into a situation where we're working together to answer questions and move the needle on some things. I think it's a really positive program and supporting it is a good thing. I also have a question for Murphy about the budget aspect. Is it that when any balance hits above the $10M that the extra CFO approval is needed?"

Murphy Flynn: "Yes, it's total funding. I'm anxious to show some invoices and expenditures on the AAPTP program because I don't want kick-back on requesting new funding when none of the previous allocation has been spent at all. I wouldn't be surprised if raise that question. You've recently provided the number of projects you have under way and updates on billing process, so that should help."

Chris Oswald: "Information on that might be good to include when we craft either a recommendation or observation offline."

Brett Williams: "Absolutely, I can share some information on that. And I'm on the agenda to give an update today."

Chris Oswald: "Is billing is on track for the concrete program (ACPTP)?"

Murphy Flynn: "The concrete program is doing well as far as number of projects. I think they're invoicing quarterly."

Peter Taylor: "I think we have projects underway that are committed to about $7M of that $9.5M. So even though the money isn't invoiced yet, it is under contract. So, we'd be very keen to get the next round of funding."

Chris Oswald: "Great, we'll need to discuss exactly how we want to represent our support. Brett, I think working with you on how to frame that up for the contract, invoicing, and spend situation would be helpful."

CHAT

From Jim Mack, CEMEX to Everyone 08:40 AM

are the modular version available yet?

From Dominique Khan to Everyone 08:41 AM

Not yet, but it's coming soon!

Presentation 2: Section 744 Update – Airport Concentrate Technology Program (ACPTP) | Presenter: Peter Taylor

Peter Taylor updated the committee on progress in the Airport Concrete Technology Program. The idea of the program is to identify pavement issues and problems, solve problems, and to pursue the technology transfer of new solutions and practices.

Six projects are currently underway. The first project, awarded to Oregon State University, is to investigate mitigation procedures for alkali-silica reaction (ASR) expansion in concrete aggregate. The next project discussed, awarded to Oklahoma State University, is researching performance engineered mixtures for airfield pavements. The third project, awarded to ARA with Scott Murrell taking the lead, is to develop updated rapid repair and rehabilitation guidelines and documentation for airport pavements. The fourth project, awarded to the University of North Carolina, is to develop documentation and guidance for quality control and quality acceptance of airport pavement. The next project, with an open Request for Proposal (RFP), documents best practices for rubber removal from pavement. The last project currently underway, RFP in development with a target of December or January, researches the effects of diamond grinding on airfield pavements and possible limitations.

The program coordination group (PCG) is hoping to discuss fatigue/stress measurement, a failure analysis of pavements, an investigation of curing practices, tracking the bonds of pavement on top of lean concrete bases, and potential innovative materials.

Multiple tech transfer products are currently under development. This includes limestone cements, strength measurements, admixtures, and approaches to reduce our carbon footprint. Sustainable products in development include environmental product declaration (EPD) primer/life cycle analysis, clinker reduction, electric vehicles, and recycled concrete aggregates.

Of the RFPs put out by the program, 60 different entities have responded. This is an excellent result, and the challenge ahead is staying on top of the work ahead.

CHAT

From Chris Oswald to Everyone 09:18 AM **(Comments from D1. S2. Section 744 (Peter Taylor)**

Peter, would it be helpful for ACI-NA and maybe AAAE to promote the rubber removal RFP?

From ptaylor to Everyone 09:26 AM

Yes, please Chris

From Navneet Garg to Everyone 09:28 AM

Peter - I can share it with ASCE Airfields Pavement Committee.

Presentation 3: Section 744 Update – Airport Asphalt Pavement Technology Program (AAPTP) | Presenter: Brett Williams

Mr. Williams navigated the National Asphalt Pavement Association (NAPA) website to review the various projects updates (https://www.asphaltpavement.org/expertise/engineering/airports). During the Spring REDAC, Mr. Williams went through some of the structure information that Mr. Taylor shared. Their structure is very similar to the Airport Concrete Pavement Technology Program (ACPTP) structure.
Mr. Williams shared that Airport Asphalt Pavement Technology Program (AAPTP) also has a Project Coordination Group, like ACPTP. The members of the group are shown on the website. They prioritize the project ideas that are submitted. Mr. Williams also shared that you could submit project ideas to himself or his Direct Supervisor, Dr. Willis.
He also recommended signing up for the AAPTP email list to receive project updates, or alerts for RFPs
Mr. Williams walked through the information on the Current Projects page. Since last REDAC meeting, a lot of the projects are now under contract. The Panel members for each of the projects are listed, as well as the timeline and the contract dollars that are allocated.
He also reviewed the current proposals that are out (RFP page). Mr. Williams shared that another project will be released on Monday, looking at Gradation Bands under P-401.
Beyond submitting ideas to the program for research, Mr. Williams reminded Subcommittee that there is the opportunity to serve on project panels or in other capacities.
Chris Oswald: "Looking at some of this information in advance of the next meeting would be helpful."
Murphy Flynn: "When I came into Pavement, the Asphalt Mixtures Paving Handbook was my Bible, so it's an invaluable resource for young engineers. I really support that manual being updated. It consolidates so much information into one resource, so I look forward to that update. I think that's a great project. For the High-speed Exits project, we did some work. Navneet was the lead on that we came up with a novel way to detect delamination. This would dovetail very well with the work we did – very interesting project."
Brett Williams: "Thank you, Murphy. We're working and communicating really closely with FAA in terms of some of these projects needing materials, getting access for researchers, or helping with some of the communication. As you saw, Navneet is on some of those Panels. We're going to be working very closely with you all on a lot of these efforts."

CHAT

From Brett Williams to Everyone 09:42 AM

https://www.asphaltpavement.org/expertise/engineering/airports/

Presentation 4: Airport Pavement Design Update – FAA Rigid and Flexible Iterative Elastic Layered Design (FAARFIELD) | Presenter: Dr. David Brill

Dr. Brill discussed progress on FAA Rigid and Flexible Iterative Elastic Layered Design (FAARFIELD) 2.0. FAARFIELD 2.0 is the end product of considerable research from National Airport Pavement Test Facility (NAPTF), released along with Advisory Circulars 150/5320-6g and 150/5335-5D. The current version is FAARFIELD 2.0.18 which was released in May 2018. This release converted the library to use the universal X gear format which is consistent with user-defined gears.

FAARFIELD 2.0 can be used to generate pavement classification rating (PCR) reporting. This directly uses the FAARFIELD structure and traffic list. This acts as a replacement for COMFAA 3.0 (a program for computing flexible and rigid Aircraft Classification Numbers) and support spreadsheets. This is a one-step procedure that yields uniquely defined PCRs, computes PCR for mixed traffic, and seamlessly handles hot mix asphalt (HMA) overlays on rigid pavements.

New online functionality has been tested on an internal version of FAARFIELD that adds integration of FAA PAVEAIR (a web-based airport pavement management system that provides users with historic and current information about airport pavement construction, maintenance and management. This allows users to use their PAVEAIR login for library updates and provides access to user-owned databases, as well as allowing users to upload FAARFIELD job files directly to PAVEAIR.

New machine learning models are under development for simulating concrete pavement top-down cracking and reflection cracking. This new approach using neural networks will quickly simulate many more cracks than the previous method which could only simulate a bottom-up crack. Phase one is complete with a report coming in December, and a Phase two contract has been awarded to ARA on May 25, 2022. Phase two will include light aircraft and thinner slabs.

ATR has also worked with Texas A&M university and the University of Kansas to develop software for pavement analysis using nonlinear damage. This model's failure mechanisms in asphalt and granular materials. It supplements FAARFIELD for remaining life analysis.

Presentation 5: National Airport Pavement Test Facility (NAPTF) & National Airport Pavement and Materials Research Center (NAPMRC) Ongoing Projects | Presenter: Dr. Navneet Garg

Dr. Garg discussed progress with ongoing projects at NAPTF and NAPMRC. They are currently testing

Construction Cycle 9 (CC 9) with the objective of refining the existing FAARFIELD fatigue model based on new data, tracking the effects of P-209 layer thickness on pavement life, tracking the effects of geosynthetics on flexible pavement performance, looking at the effect of cement treated permeable bases, and determining the strain criteria for allowable overload. A cooling system was installed this summer allowing for pavement testing at precise temperatures regardless of outside temperatures. Testing was done with a French ovalization device for testing delamination at high-speed exits at airports.

Another project in progress is the development of an FAA Life Cycle Assessment (LCA) web-based tool using publicly available data that can be used by airports in the US to determine the environmental impact of a pavement project. This will hopefully be available by the end of fiscal year 2023.

Presentation 6: Pavement Surface Treatments | Presenter: Matthew Brynick

Mr. Brynick explained Surface Treatments can be applied relatively quickly to a pavement to help make the pavement last longer. The research on Surface Treatments will be used to recommend any sort of performance restrictions or remove some that may exist. Research began earlier this year with a Literature Review and a Survey. Currently, the project team has identified test sites and are working on specifications and drawings. Next step is an analysis of the cost for building the test sites and running them.

Mr. Brynick shared key findings from the survey that was distributed earlier in the year. While 75% of airport operators and consultants reported satisfaction with Surface Treatment performance, only 22% of respondents were satisfied with FAA Guidance. He reviewed the current FAA Guidance points, which is limited to AC150/5370-10H.

He previewed the tentatively selected test site locations, with two sites in each of the four climatic zones around the country. The sites will be monitored to see not just if the pavement is being preserved, but also if friction is changing. The type of aircrafts using the surface will also be monitored to determine if that is a factor. When monitoring the sites, the project team will also keep in mind the survey results and questions that they received from responders.

Jim Mack: Are you going to include a cost effectiveness analysis?

Mat Brynick: "Without knowing how long they last and the effectiveness, we can't really speak to the cost effectiveness. We know the cost piece for the different areas, but we don't know that matched to the performance piece yet. That's what we're trying to figure out. Then you can develop some kind of

guide where you can say 'for X dollars spent on this product, it will extend your pavement out X many years.' That's kind of the idea."

Jim Mack: "Yes, I think that guidance will be needed. Not all the agencies know how to do that analysis."

Shailesh Gongal: "When this treatment is applied, what staves off the pavement distress? Is there guidance on that?"

Mat Brynick: "Not currently, but we hope to provide guidance on that. With our case studies that we performed and from some the survey studies received, we created criteria for our test sites, so we don't want any load related distresses on the pavement for our test sites. We want the pavement to not have received a surface treatment prior. So, we could have an area that we could use as a control."

Brett Williams: "Are you doing surveys of the pavement in terms of what their performance is? And are there control sections paired with these areas as well?"

Mat Brynick: "For the test sites, we want at least 2,500 feet, so that gives us a runup before and after the test items. Within that 2,500 feet, we're going to have a control and four different materials placed and each of their test items. So, you'll have five test items: one control and four different materials. The different materials cross over our FAA construction items that we have, so like a Microsurface or a Rejuvenator – those type of surface treatments. It does vary from test site to test site because we have found that the products vary in regions, so not every site is going to be identical. And then for the observation of the test sites: we will be there before construction, during and after. We will be there every three months for the next five years."

Brett Williams: "NCAT (National Center for Asphalt Technology) and another agency are doing some pavement preservation studies that are along this line. I was curious with some of their double and triple application treatments, how that can impact performance and life extension as well."

Mat Brynick: "Yes, we actually had a call to connect on this topic and talked through how our projects are different, beside road traffic vs. aircraft traffic. We have FOD to worry about more than they do, so we can't always use the same materials and gradations of materials that they have."

Mr. Brynick closed the session with a reminder that Surface Treatments can have a huge positive environmental impact if you make pavement last longer. It can also have a positive monetary impact on AIP funding if we can make aging pavements last.

Jim Mack, CEMEX: "What are the thoughts on following up for second applications or third applications?

Mat Brynick: "We're definitely considering that, but we've got to learn a little bit more before we start addressing that. A lot of the airports we've talked to perform routine applications."

Presentation 7: Reflective Cracking: Establish & Incorporate Reflective Cracking Model into FAARFIELD | Presenter: Dr. Richard Ji

Dr. Ji explained the Reflective Cracking research objective is to develop a set of fully validated equations that can be directly implemented in the overlay design procedure for all upcoming versions of FAARFIELD. This research is needed due to the lack of reliable models of reflection cracking for airfield asphalt overlays.

Dr. Ji walked through an overview of the Indoor Reflective Cracking (IDRC) Full Scale Testing, for which six phases have been completed. He also provided an update on the Outdoor Reflective Cracking (ORDC) Full Scale Testing (phase four of this testing will begin in 2023) and a Material Characterization Overview.

The expected completion date for the RC model application in FAARFIELD is 2024 – 2025.

Murphy Flynn: "This is an important addition to the FAARFIELD program. Our indoor test rig really is unique, as Richard mentioned. It's two 15-foot slabs that are chilled internally to simulate cold ground that an asphalt overlay would be on top of. Those slabs are moved to simulate the daily expansion and contraction through thermal cycling. Normally the only way to do this kind of testing is on a very small scale in a lab. Basically, we've made a giant version of the lab test. The device itself is quite impressive. As Richard mentioned, we've done several iterations to examine the rate of crack propagation and variation of thickness."

Presentation 8: Airport Cooperative Research Program (ACRP) Update | Presenter: Matt Griffin

Note: Rescheduled from Day 1 agenda

Matt Griffin provided updates on projects underway at the Airport Cooperative Research Program (ACRP). An important project underway is pushing towards transitioning from lead free AvGas and a panel is being put together so that can get kicked off. There are multiple important ARFF projects underway reviewing the performance of these programs. Another project underway is research into how airports must prepare for electric vehicles at airports.

Recently ACRP has published two reports. One report presented possible ways to move airports towards a touchless future. Additionally, they developed a framework for assessing the costs of airport noise and operations monitoring systems. They have published all out projects on trb.org and have moved away from IdeaHub for problem statement submissions.

Presentation 9: Subcommittee Findings & Recommendations | Presenters: Subcommittee Members

Mr. Oswald recapped the **Observations** that were flagged throughout the REDAC session:

1. The positive and rapid pace at which the UAS work is being done. Provides a beneficial foundation for the use of UAS.
2. Recognition of the contributions of Michel Hovan
3. Appreciation of the work that is underway to develop a better understanding of how we can focus and strengthen resiliency efforts. This is essential research.
4. Value of the comprehensive informational briefings that we are continuing to have from the affiliated programs – from both the asphalt and pavement sides – as well as the tie back into ACRP.

Mr. Oswald asked for any additional comments that should be included with the Observations:

Jim Mack: Recognition of Dr. Brill's work on FAARFIELD. New functionality around top-down cracking is a huge bonus.

Brett Williams expanded on Jim Mack's comment: The efforts that are being made to expand the pavement design software is impressive. It's important to continue to improve the software and ensure pavements perform as expected.

Observation/Recommendation: Support of the AAPTP and ACPTP programs

Chris Oswald then moved to **Findings & Recommendations:**

1. Comments forthcoming on the UAS Research & Development Plan. Point made to confirm Jim Patterson's input.
2. Resiliency: Need for additional and ongoing collaboration with the stakeholder community in defining and developing guidance to airport operators/sponsors regarding resiliency and what constitutes valid resiliency projects from an FAA programmatic perspective. Chris Oswald will provide John Dermody with better defined thoughts on what the Subcommittee thinks that will involve and how it will build off of existing work.
3. Advocacy: Support of the AAPTP and ACPTP programs and continuing with funding. Frank Fee spoke up in support. Ms. Roundtree suggested that as the Subcommittee crafts this advocacy statement, they can simply state that they would like for the FAA to continue to work in that direction. (While it may not be definitive, it captures the support.) Ms. Roundtree also suggested the inclusion of an impact statement. The impact statement would describe the results/repercussions of not continuing the work.

Brett Williams agreed that this should be a Recommendation not an Observation since the Subcommittee is requesting that ACPTP and AAPTP's Quarterly Reports included in the Read-Ahead package.

4. Need for clarification on the types of guidance that industry needs from FAA to support the Fluorine-free Foam (FFF) transition. Some level of minimum guidance is needed to keep industry informed. Also, clarification regarding no changes to the Indexing Requirements. Murphy Flynn raised the point that ATR is the research arm and not the policy arm. Policy guidance needs to come from Headquarters.

Mr. Oswald also reviewed the recap meetings that are being scheduled:

- Meeting to discuss UAS R&D (documents are for official use only)
- Meeting to discuss Resiliency comments and what the request to FAA is: Chris Oswald, Jim Mack, Sarah Hubbard, Shailesh Gongal (and/or additional representatives), Scott Marsh (and/or additional representatives), Brett Williams (and/or additional representatives)

Next Meetings – Location & Agenda Items TBD

- March 7 – 8, 2023
- September 6 – 7, 2023

Adjourned at 12:45 pm on Thursday, September 8, 2022.

Attachment 1: Meeting Agenda

Attachment 2: Meeting Participants

Attachment 3: Definitions of Acronyms and Technical Terms