MASTER PLAN 2050

Appendix 1-A | Public and Stakeholder Involvement Program

CVG
CINCINNATI/NORTHERN KENTUCKY INTERNATIONAL AIRPORT

L&B TEAM

Contents

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1 Public and Stakeholder Involvement Program

The goal of a public and stakeholder involvement program is to provide appropriate information to the public and obtain meaningful input from key stakeholder groups and the public that may be affected by any proposed airport development, expansion, or enhancement. Throughout the Cincinnati/Northern Kentucky International Airport (CVG) Master Plan 2050 process, the Kenton County Airport Board (KCAB) executed a public/stakeholder involvement plan designed to inform, educate, and engage residents, airport users and related businesses, local and federal agencies, and city planners. Wherever possible, the CVG staff and consultants designed and facilitated interactive meeting formats to ensure a balanced and fair discussion of issues from all perspectives.

This appendix includes the information related to the public and stakeholder involvement program for the CVG Master Plan. This outreach adhered to Federal Aviation Administration (FAA) guidance in FAA Advisory Circular (AC) 150/5070-6B, *Airport Master Plans*.

Stakeholders were organized and mobilized into the following groups:

- Project Coordination Team (PCT)
- Planning Advisory Committee (PAC)
- Public Outreach

Each of these efforts facilitated the active and direct participation of local officials, airline and airport tenant representatives, and members of the public. Opportunity was provided for them to submit comments during the course of the Master Plan Update Study.

1.1 Project Coordination Team (PCT)

The PCT was comprised of various CVG and Landrum & Brown (L&B) staff. Bi-weekly teleconference coordination calls and regular progress meetings were conducted throughout the Master Plan to solicit input, feedback, and direction on each stage of the Master Plan 2050.

1.2 Planning Advisory Committee (PAC)

The PAC was formed to provide the KCAB with visioning/ideas for the expansion of the CVG facilities and services, as well as detailed technical input into the Master Plan 2050 process and recommendations, by both key internal and external stakeholders. The PAC included CVG staff, federal and state agencies (i.e. FAA, Kentucky Transportation Cabinet, etc.), airlines, airport tenants, Kentucky government, Ohio government, Indiana government, local planning agencies, area business leaders, and other partners. The CVG Master Plan 2050 was also coordinated with local planning studies, including the Boone County Transportation Plan and Our Boone County Plan 2040. The PAC was consulted for input on each stage of the Master Plan 2050. Information was also provided to PAC members through a private website.

1.2.1 PAC Meetings

PAC meetings were held on September 14, 2017, May 22, 2018, and November 14, 2018. A final in-person PAC meeting was not held in the spring of 2020 due to the COVID-19 pandemic. In order to keep the PAC appraised of the Master Plan, a video presentation was distributed in May of 2020.

- **September 14, PAC Meeting**: The first PAC meeting served as a kick-off to the study. General information about the stakeholders, CVG staff, consultant team, CVG facilities, reasons for updating the Master Plan, areas of focus, and a tentative project schedule were reviewed with the PAC. A total of 70 people attended the first PAC meeting.
- **May 22, 2018 PAC Meeting**: The second meeting of the PAC provided a summary of the master planning process, a status of the CVG Master Plan, the draft forecast of aviation activity, and a summary of the initial terminal concepts development and evaluation. A total of 47 people attended this PAC meeting.
- **November 14, 2018 PAC Meeting**: The third PAC meeting included an update on study progress, more refined terminal concepts and evaluation information, and a discussion of on-airport land use. Twenty-eight people attended the November 2018 PAC meeting.
- **May 2020 PAC Video Distribution**: The final PAC update included information on study progress, a summary of the final FAA-approved forecast, the preferred terminal concept, the recommended development plan through 2050 (with a focus on near-term projects), and the land use plan. The video presentation was distributed to all PAC members in May of 2020.

1.2.2 PAC Goals and Objectives Survey

In addition to the PAC meetings, input on the Master Plan goals and objectives was solicited from the stakeholders in a survey. The results of that survey are presented on the following pages.

CVG Master Plan 2050 - Goals and Objectives SurveyMonkey

Q1 What does CVG do well in terms of Safety/Security?

Answered: 6 Skipped: 1

ANSWER CHOICES	RESPONSES	
1	100.00%	6
2	83.33%	5
3	83.33%	5

#	1	DATE
1	Security is high priority	8/14/2017 12:36 PM
2	Winter operations - airfield maintenance	8/11/2017 4:39 PM
3	the right equipment	8/11/2017 7:55 AM
4	Adquate checkpoint for passenger screening	8/10/2017 3:22 PM
5	Strong on front of airport	8/10/2017 3:17 PM
6	Engagement from all departments to help elevate compliance	8/10/2017 3:04 PM
#	2	DATE
1	Access Control & CCTV	8/14/2017 12:36 PM
2	Police patrol visibility	8/11/2017 4:39 PM
3	enforcement capability	8/11/2017 7:55 AM
4	Maintenance is well equiped to maintain safety areas	8/10/2017 3:22 PM
5	Well trained police for response and deterrance	8/10/2017 3:17 PM
#	3	DATE
1	Safety Programs that promote safe work place	8/14/2017 12:36 PM
2	Participation in Safety Act	8/11/2017 4:39 PM
3	proactive approach	8/11/2017 7:55 AM
4	Concourse well maintained to minimize passenger injuries	8/10/2017 3:22 PM
5	Strong security plan	8/10/2017 3:17 PM

Q2 Are there any Safety/Security issues related to the airfield that should be addressed by the Master Plan?

Answered: 4 Skipped: 3

ANSWER CHOICES	RESPONSES	
1	100.00%	4
2	75.00%	3
3	75.00%	3

#	1	DATE
1	Intrustion detection for fence	8/14/2017 12:36 PM
2	no	8/11/2017 7:55 AM
3	Operations staff lack quick access to the airfield for inspections and incidents	8/10/2017 3:22 PM
4	Improve the physical security at gates leading to airfield	8/10/2017 3:17 PM
#	2	DATE
1	Fiber installed for CCTV to cover airfield	8/14/2017 12:36 PM
2	There inadequate space in the EOC	8/10/2017 3:22 PM
3	Better situational awareness of what is happening on airfield	8/10/2017 3:17 PM
#	3	DATE
1	PIDS Alarms for AOA's	8/14/2017 12:36 PM
2	Improve runway/taxiway design for Group VI aircraft	8/10/2017 3:22 PM
3	Perimeter security/awareness to protect the airfield	8/10/2017 3:17 PM

Q3 How can the Master Plan further CVG in achieving the goal of "Meeting/Exceeding Safety & Security Best Practices?"

Answered: 5 Skipped: 2

ANSWER CHOICES	RESPONSES	
1	100.00%	5
2	80.00%	4
3	60.00%	3

#	1	DATE
1	Access control on all doors and entry points to know who enters or exits secure area	8/14/2017 12:36 PM
2	Consider new and best ways to keep front of Terminal safe from explosives/active shooter	8/11/2017 4:39 PM
3	make sure any development includes a review by decision makers in safety/security	8/11/2017 7:55 AM
4	Include space for an Operations department with airfield access	8/10/2017 3:22 PM
5	Develop plans/standards to harden the entry gates (both future and existing) onto the airfield	8/10/2017 3:17 PM
#	2	DATE
1	Develop employee screening areas for future security directives	8/14/2017 12:36 PM
2	Concourses have the optimal number of exits for emergency situations for passengers and it is communicated	8/11/2017 4:39 PM
3	Improve access roads to allow airport vehicles to avoid the hot spot	8/10/2017 3:22 PM
4	Install integration software to give situational awareness for future and existing buildings	8/10/2017 3:17 PM
#	3	DATE
1	ID Office that is centrally located for Airport tenants and employees	8/14/2017 12:36 PM
2	Replace aging ARFF training facility.	8/10/2017 3:22 PM
3	Ensure vital emergency response and montioring areas (ACC, EOC & PD) are separate yet accessible in multiple ways and are hardened	8/10/2017 3:17 PM

CVG Master Plan 2050 - Goals and Objectives SurveyMonkey

Q4 What elements/traits of the existing terminal/concourse facility should NOT change?

Answered: 6 Skipped: 1

ANSWER CHOICES	RESPONSES	
1	100.00%	6
2	50.00%	3
3	16.67%	1

#	1	DATE
1	tunnel system to access concourses	8/14/2017 12:47 PM
2	One security checkpoint	8/11/2017 4:45 PM
3	Advertising	8/10/2017 4:22 PM
4	Main terminal building is in good shape and doesn't need replaced	8/10/2017 3:32 PM
5	AGTS	8/10/2017 3:26 PM
6	availability of concessions / diversification of concessions	8/10/2017 3:12 PM
#	2	DATE
1	Large food court area in Concourse B	8/14/2017 12:47 PM
2	One main exit/Welcome Point area	8/11/2017 4:45 PM
3	Ease of use - wayfinding	8/10/2017 3:12 PM
#	3	DATE
1	Ease to navigate	8/11/2017 4:45 PM

CVG Master Plan 2050 - Goals and Objectives SurveyMonkey

Q5 What are the most important needs of the terminal/concourse facility to better serve primarily origin/destination (O&D) passenger traffic?

Answered: 7 Skipped: 0

ANSWER CHOICES	RESPONSES	
1	100.00%	7
2	85.71%	6
3	85.71%	6

#	1	DATE
1	Roadway system for ticketing a baggage to handle the increase passengers	8/14/2017 12:47 PM
2	Walk to end of Concourse A seems to be a trigger/unpleasant point for passengers	8/11/2017 4:45 PM
3	security checkpoint	8/11/2017 8:24 AM
4	Better signage and directions	8/10/2017 4:22 PM
5	Redesign terminal layout for more curb front	8/10/2017 3:32 PM
6	More ticket counter space	8/10/2017 3:26 PM
7	Efficient Security processing	8/10/2017 3:12 PM
#	2	DATE
1	Baggage and Ticketing too small for passenger loads	8/14/2017 12:47 PM
2	More concession and experiential opportunities for passengers	8/11/2017 4:45 PM
3	shorter walks to the gates from the terminal	8/11/2017 8:24 AM
4	Remove Satellite concources and move to a Pier or Linear design	8/10/2017 3:32 PM
5	Larger or additional checkpoints (queueing & redundancy)	8/10/2017 3:26 PM
6	Technology	8/10/2017 3:12 PM
#	3	DATE
1	Need multiple checkpoints instead of one	8/14/2017 12:47 PM
2	Quicker train in the Transportation tunnel	8/11/2017 4:45 PM
3	conveyance reliability, if they are out it is hard to get people in and out of the AGTS	8/11/2017 8:24 AM
4	Remove existing crosswalks from baggage delivery to the parking Garage	8/10/2017 3:32 PM
5	Additional airline gates & move FIS to streetside	8/10/2017 3:26 PM
6	Efficient and quick baggage system	8/10/2017 3:12 PM

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CVG Master Plan 2050 - Goals and Objectives SurveyMonkey

Q6 Are there any issues related to the terminal apron that should be addressed by the Master Plan?

Answered: 6 Skipped: 1

ANSWER CHOICES	RESPONSES	
1	100.00%	6
2	50.00%	3
3	0.00%	0

#	1	DATE
1	Parking around concourses. Need parking area	8/14/2017 12:47 PM
2	lack of parking areas around the facilties	8/11/2017 8:24 AM
3	Please address the need to better direct passengers from Con A to Baggage Claim	8/10/2017 4:22 PM
4	Redesign deice pads into a more compact organized design	8/10/2017 3:32 PM
5	Upgrade pavement on all apron to carry the biggest planes	8/10/2017 3:26 PM
6	VSRs which address both airline operational needs and ensure clear and safe distance to aircraft parking positions	8/10/2017 3:12 PM
#	2	DATE
1	Re-enforce report parking areas north of old C Concourse	8/10/2017 3:32 PM
2	Well designed de-icing area to allow efficient flow	8/10/2017 3:26 PM
3	Sufficient support space for vehicle parking, vendor deliveries, compactors/recycling bins etc.,	8/10/2017 3:12 PM
#	3	DATE
	There are no responses.	

Q7 How can the Master Plan further CVG in meeting the goal of "Optimizing the Terminal/Concourse Facilities for an Origin & Destination Airport?"

Answered: 6 Skipped: 1

ANSWER CHOICES	RESPONSES	
1	100.00%	6
2	66.67%	4
3	50.00%	3

#	1	DATE
1	Add International Terminal that exits into public area	8/14/2017 12:47 PM
2	Determine room for growth of air service	8/11/2017 4:45 PM
3	new concourse with no tunnel, direct access	8/11/2017 8:24 AM
4	Replace older facilities with newer Pier or linear design	8/10/2017 3:32 PM
5	Design for new or expanded terminal (ticket/baggage) and checkpoint)	8/10/2017 3:26 PM
6	Evaluate the use of a more common use technology system to increase the ability to maximize gate usage	8/10/2017 3:12 PM

#	2	DATE
1	Add additional Terminal for baggage and Ticketing	8/14/2017 12:47 PM
2	Determine room for growth of concessions and experiential activities	8/11/2017 4:45 PM
3	open public stairs to back up any conveyance failures	8/11/2017 8:24 AM
4	Design new or expanded concourses	8/10/2017 3:26 PM

#	3	DATE
1	Expand or redesign Concourse A so it is not so crowded	8/14/2017 12:47 PM
2	Determine how to minimize longest walk to end of Concourse A and ends of Concourse B	8/11/2017 4:45 PM
3	Design aircraft flow for all weather to movement area & arrange needed support facilities	8/10/2017 3:26 PM

Q8 What currently works well on the landside roadway and parking network?

Answered: 6 Skipped: 1

ANSWER CHOICES	RESPONSES	
1	100.00%	6
2	66.67%	4
3	16.67%	1

#	1	DATE
1	STL parking garage	8/14/2017 12:51 PM
2	Entry way to the airport is welcoming and isn't confusing	8/11/2017 4:50 PM
3	parking garages close to the terminal	8/11/2017 8:28 AM
4	Easy to get in and get out	8/10/2017 4:23 PM
5	Ky 212	8/10/2017 4:09 PM
6	Not sufficient for O&D market	8/10/2017 3:47 PM
#	2	DATE
1	Rental Car shuttles at GTC	8/14/2017 12:51 PM
2	Currently only two options for parking so passengers aren't confused: long-term and short-term	8/11/2017 4:50 PM
3	simple roadway system for customers	8/11/2017 8:28 AM
4	Ease of access and egress to STL & LTL	8/10/2017 4:09 PM
#	3	DATE
1	A couple of exits along the loop around the Terminal	8/11/2017 4:50 PM

CVG Master Plan 2050 - Goals and Objectives SurveyMonkey

Q9 What improvements to the landside roadway and parking network should the Master Plan Update address?

Answered: 7 Skipped: 0

ANSWER CHOICES	RESPONSES	
1	100.00%	7
2	85.71%	6
3	71.43%	5

#	1	DATE
1	Roadways system does not support O&D market	8/14/2017 12:51 PM
2	Solutions for curbside congestion	8/11/2017 4:50 PM
3	curb traffic is terrible	8/11/2017 8:28 AM
4	Wider parking spaces	8/10/2017 4:23 PM
5	Expanded STL	8/10/2017 4:09 PM
6	Expand South Airfield Road and extend Wendel Ford for increased traffic	8/10/2017 3:47 PM
7	Increased traffic on Donaldson and terminal drive	8/10/2017 3:15 PM
#	2	DATE
1	Commercial Vehicles need to move from passenger curb	8/14/2017 12:51 PM
2	Additional long-term parking	8/11/2017 4:50 PM
3	the GTC/Lincoln Rd intersection is confusing and needs reworked	8/11/2017 8:28 AM
4	More curbside ability for commercial enterprises	8/10/2017 4:09 PM
5	Expand Long term parking to the north and east	8/10/2017 3:47 PM
6	Increased access to non garage parking (different cost levels for our diversified O&D market	8/10/2017 3:15 PM
#	3	DATE
1	More parking for customers- Lots are full	8/14/2017 12:51 PM
2	Traffic predictions for cargo operators and solutions for minimizing delays	8/11/2017 4:50 PM
3	increase remote parking areas	8/11/2017 8:28 AM
4	Take over current rental car lot when CONRAC is built for parking	8/10/2017 3:47 PM
5	Increased curb capacity	8/10/2017 3:15 PM

Q10 How can the Master Plan further CVG in meeting the goal of "Developing a Landside Roadway & Parking to Support CONRAC/Terminal/Cargo?"

Answered: 3 Skipped: 4

ANSWER CHOICES	RESPONSES	
1	100.00%	3
2	100.00%	3
3	33.33%	1

#	1	DATE
1	Add additional Parking lots	8/14/2017 12:51 PM
2	Expand the STL	8/10/2017 4:09 PM
3	Add light rail option to Cincinnati	8/10/2017 3:47 PM
#	2	DATE
1	Change roadway system to get all commercial vehicles from passenger area	8/14/2017 12:51 PM
2	Expand curbside	8/10/2017 4:09 PM
3	Expand terminal building(s) to the west to extend curbfront space	8/10/2017 3:47 PM
#	3	DATE
1	Move Valet and Cell Lot	8/14/2017 12:51 PM

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Q11 Do you have any airline facility use and lease ideas/issues that should be considered in the upcoming use-agreement renegotiation?

Answered: 6 Skipped: 1

ANSWER CHOICES	RESPONSES	
1	100.00%	6
2	16.67%	1
3	0.00%	0

#	1	DATE
1	Exclusive use agreements for security	8/14/2017 12:54 PM
2	Airline branding be done digitally because it's better for long-term to keep updated and fresh	8/11/2017 4:54 PM
3	need a better way to fund smaller CIP projects	8/11/2017 9:02 AM
4	Allow for KCAB space within hold rooms for concession development	8/10/2017 4:23 PM
5	No	8/10/2017 4:10 PM
6	KCAB should create Minimum Standards for tenants	8/10/2017 3:47 PM
#	2	DATE
1	Sky caps are needed to help passengers	8/14/2017 12:54 PM
#	3	DATE
	There are no responses.	

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Q12 How can the Master Plan further CVG in meeting the goal of "Supporting the Use-Agreement Renegotiation?"

Answered: 2 Skipped: 5

ANSWER CHOICES	RESPONSES	
1	100.00%	2
2	50.00%	1
3	50.00%	1

#	1	DATE
1	Airlines lease a gate they must sign exclusive use agreements	8/14/2017 12:54 PM
2	NA	8/10/2017 4:10 PM
#	2	DATE
1	Expand or build concourses so Airlines can grow	8/14/2017 12:54 PM
#	3	DATE
1	Expand or build new Terminal so Airlines can grow	8/14/2017 12:54 PM

Q13 What are the positives that you see at CVG with regards to cargo development?

Answered: 6 Skipped: 1

ANSWER CHOICES	RESPONSES	
1	100.00%	6
2	50.00%	3
3	33.33%	2

#	1	DATE
1	Cargo has expanded to 50% of our operation	8/14/2017 1:02 PM
2	Increased landed weight	8/11/2017 4:59 PM
3	everything	8/11/2017 9:05 AM
4	Amazon	8/10/2017 4:13 PM
5	Amazon....	8/10/2017 3:52 PM
6	Growth and opportunities	8/10/2017 3:21 PM
#	2	DATE
1	Cargo has help CVG grow	8/14/2017 1:02 PM
2	Exposure to new technology and innovation	8/11/2017 4:59 PM
3	Multiuse cargo facility when developed	8/10/2017 3:52 PM
#	3	DATE
1	Cargo is a direct result of land development	8/14/2017 1:02 PM
2	Additional infrastructure, but need to ensure it is multi-use facilities	8/11/2017 4:59 PM

Q14 What improvements (if any) are needed at CVG to better support existing and planned Cargo Development?

Answered: 5 Skipped: 2

ANSWER CHOICES	RESPONSES	
1	100.00%	5
2	80.00%	4
3	40.00%	2

#	1	DATE
1	New Cargo facilty to support growth	8/14/2017 1:02 PM
2	traffic management in cargo areas for employee access	8/11/2017 9:05 AM
3	Roadways to South Airfield facilities	8/10/2017 4:13 PM
4	Improved road network on south side	8/10/2017 3:52 PM
5	Roadway improvements to meet the new and upcoming demands	8/10/2017 3:21 PM
#	2	DATE
1	Roadway system must support tractor trailer activity for cargo	8/14/2017 1:02 PM
2	Replace cargo buildings on N. side of airport	8/10/2017 4:13 PM
3	Create another access to 275	8/10/2017 3:52 PM
4	Additional Hangars	8/10/2017 3:21 PM
#	3	DATE
1	Ensure roadways meet development needs	8/10/2017 4:13 PM
2	Expand 36C to make it more usable for Group VI	8/10/2017 3:52 PM

Q15 What improvements (if any) are needed at CVG to better attract additional Cargo opportunities?

Answered: 4 Skipped: 3

ANSWER CHOICES	RESPONSES	
1	100.00%	4
2	50.00%	2
3	0.00%	0

#	1	DATE
1	Increase ramp size and build cargo facility	8/14/2017 1:02 PM
2	none	8/11/2017 9:05 AM
3	Roadways	8/10/2017 4:13 PM
4	Extending 36C	8/10/2017 3:52 PM
#	2	DATE
1	Improve roadways to help tractor trailer activity	8/14/2017 1:02 PM
2	Improving taxiways for group VI	8/10/2017 3:52 PM
#	3	DATE
	There are no responses.	

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Q16 Are there any issues related to the cargo apron that should be addressed by the Master Plan?

Answered: 3 Skipped: 4

ANSWER CHOICES	RESPONSES	
1	100.00%	3
2	33.33%	1
3	0.00%	0

#	1	DATE
1	Cargo aircraft are larger and need more ramp space	8/14/2017 1:02 PM
2	none	8/11/2017 9:05 AM
3	Not enough on Northside	8/10/2017 4:13 PM
#	2	DATE
1	Maintenance Hangars	8/14/2017 1:02 PM
#	3	DATE
	There are no responses.	

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CVG Master Plan 2050 - Goals and Objectives SurveyMonkey

Q17 How can the Master Plan further CVG in meeting the goal of "Supporting/Enhancing Cargo Development?"

Answered: 6 Skipped: 1

ANSWER CHOICES	RESPONSES	
1	100.00%	6
2	33.33%	2
3	16.67%	1

#	1	DATE
1	Multi tenant cargo facitly	8/14/2017 1:02 PM
2	Ensuring cargo facilities that are built are long-term and are multi-functional if possible. Don't want to be stuck with unusable infrastructure that is short lived..	8/11/2017 4:59 PM
3	none	8/11/2017 9:05 AM
4	Buy houses on NW side and create cargo aprons and support facilities	8/10/2017 4:13 PM
5	Relocate the Stormwater plant to allow growth in the southwest quadrant	8/10/2017 3:52 PM
6	Identification of locations to support road to aircraft operations (non secure to secure)	8/10/2017 3:21 PM
#	2	DATE
1	Continue develop land for trucking operations	8/14/2017 1:02 PM
2	Deeper look at safe drone activity within the airfield - what does it look like? how will it work?	8/11/2017 4:59 PM
#	3	DATE
1	Keep cargo operations away from passenger operations	8/14/2017 1:02 PM

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CVG Master Plan 2050 - Goals and Objectives SurveyMonkey

Q18 What has the Airport done to improve their financial position?

Answered: 7 Skipped: 0

ANSWER CHOICES	RESPONSES	
1	100.00%	7
2	71.43%	5
3	57.14%	4

#	1	DATE
1	Diversified with land, passengers and cargo	8/14/2017 1:06 PM
2	Reduced debt	8/11/2017 5:04 PM
3	pay off bonds	8/11/2017 9:09 AM
4	Developed nonaeronautical revenue by lease airport land	8/10/2017 4:26 PM
5	Lease land	8/10/2017 4:15 PM
6	Lease non-aeronautical land	8/10/2017 3:53 PM
7	New use and lease agreement	8/10/2017 3:23 PM

#	2	DATE
1	Passenger operation is not dominated by one carrier	8/14/2017 1:06 PM
2	Diversified revenues	8/11/2017 5:04 PM
3	diversify revenue	8/11/2017 9:09 AM
4	Improve concourses for airlines	8/10/2017 4:15 PM
5	Attract new carriers and increased cargo operations	8/10/2017 3:23 PM

#	3	DATE
1	Adjusted to an O&D airport	8/14/2017 1:06 PM
2	Increased passenger traffic	8/11/2017 5:04 PM
3	develop and lease airport property	8/11/2017 9:09 AM
4	involve community/businesses to help attract airlines	8/10/2017 4:15 PM

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Q19 What initiatives could be taken to improve the Airport's financial position?

Answered: 6 Skipped: 1

ANSWER CHOICES	RESPONSES	
1	100.00%	6
2	33.33%	2
3	33.33%	2

#	1	DATE
1	Expand Parking	8/14/2017 1:06 PM
2	Uncap PFC, although that has to be done legislatively. Continue to advocate for that.	8/11/2017 5:04 PM
3	increase parking, buy off airport parking facilities to corner the market	8/11/2017 9:09 AM
4	NA	8/10/2017 4:15 PM
5	Lease more non-aeronautical land	8/10/2017 3:53 PM
6	Address aging infrastructure and increasing maintenance cost	8/10/2017 3:23 PM
#	2	DATE
1	More concessions in baggage and ticketing	8/14/2017 1:06 PM
2	Increase Parking lot	8/10/2017 3:53 PM
#	3	DATE
1	Expand Concourses so Airlines can grow	8/14/2017 1:06 PM
2	Redistribute gates to improve concessions viability	8/10/2017 3:53 PM

Q20 How can the Master Plan further CVG in meeting the goal of "Ensuring Financial Sustainability?"

Answered: 3 Skipped: 4

ANSWER CHOICES	RESPONSES	
1	100.00%	3
2	33.33%	1
3	33.33%	1

#	1	DATE
1	Build/expand concourses	8/14/2017 1:06 PM
2	Determine what is most fiscally sound for future of facilities	8/11/2017 5:04 PM
3	NA	8/10/2017 4:15 PM
#	2	DATE
1	Build/expand ticketing and baggage	8/14/2017 1:06 PM
#	3	DATE
1	Continue to develop land	8/14/2017 1:06 PM

Q21 What does CVG do well in maintaining their relationships with the community?

Answered: 7 Skipped: 0

ANSWER CHOICES	RESPONSES	
1	100.00%	7
2	71.43%	5
3	57.14%	4

#	1	DATE
1	Outreach programs	8/14/2017 1:14 PM
2	Share information	8/11/2017 5:08 PM
3	open dialogue	8/11/2017 9:11 AM
4	Developing relationships with area entities but need to stop giving advertising opportunities and instead have them go through our advertising concessionaire	8/10/2017 4:27 PM
5	Business partnership	8/10/2017 4:19 PM
6	CEO spends a lot of time out with the community	8/10/2017 3:55 PM
7	Active leadership	8/10/2017 3:29 PM
#	2	DATE
1	Marketing CVG brand	8/14/2017 1:14 PM
2	Collaborate	8/11/2017 5:08 PM
3	diversify airlines which brings down ticket pricing	8/11/2017 9:11 AM
4	Improved airport viewing area	8/10/2017 4:19 PM
5	Solid External Affairs	8/10/2017 3:29 PM
#	3	DATE
1	Be visible	8/11/2017 5:08 PM
2	employ a lot of people	8/11/2017 9:11 AM
3	Let the community know what we are doing	8/10/2017 4:19 PM
4	Outreach with the arts, museum, and other community centric organizaitons	8/10/2017 3:29 PM

CVG Master Plan 2050 - Goals and Objectives SurveyMonkey

Q22 What opportunities does CVG have to strengthen relationships with the community?

Answered: 5 Skipped: 2

ANSWER CHOICES	RESPONSES	
1	100.00%	5
2	40.00%	2
3	0.00%	0

#	1	DATE
1	Expand from the tri state area into other markets	8/14/2017 1:14 PM
2	Continue to grow air service	8/11/2017 5:08 PM
3	Partner with coummunity for common goals - airport walking/biking trail	8/10/2017 4:19 PM
4	Invite more groups into the airport to see it's inner workings	8/10/2017 3:55 PM
5	Participate on local committes and charitable organizations outside of senior leadership	8/10/2017 3:29 PM
#	2	DATE
1	Continue to be active and participate with the important community organizations that are driving positive change.	8/11/2017 5:08 PM
2	Engage local high schools to provide for and gain interest in the aviation industry	8/10/2017 3:29 PM
#	3	DATE
	There are no responses.	

CVG Master Plan 2050 - Goals and Objectives SurveyMonkey

Q23 How can the Master Plan further CVG in being a good neighbor and a leader in environmental stewardship?

Answered: 4 Skipped: 3

ANSWER CHOICES	RESPONSES	
1	100.00%	4
2	75.00%	3
3	25.00%	1

#	1	DATE
1	Utilize solar energy and other renewable sources	8/11/2017 5:08 PM
2	Every new road we build should have walking/biking trail to attach to surrounding community	8/10/2017 4:19 PM
3	Add recycling facility	8/10/2017 3:55 PM
4	Ensure sustainability options are included	8/10/2017 3:29 PM
#	2	DATE
1	Incorporate more aggressive recycling programs	8/11/2017 5:08 PM
2	Add walking biking trails around exterior of airport	8/10/2017 4:19 PM
3	Add solar panels on top of existing/new buildings	8/10/2017 3:55 PM
#	3	DATE
1	Partner with local universities for environmental opportunities on our unused land	8/10/2017 3:55 PM

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Q24 In terms of non-aeronautical development at or around CVG, what does CVG offer that other area airports do not?

Answered: 4 Skipped: 3

ANSWER CHOICES	RESPONSES	
1	100.00%	4
2	50.00%	2
3	0.00%	0

#	1	DATE
1	Land to lease	8/14/2017 1:18 PM
2	Available land	8/11/2017 5:09 PM
3	large footprint of un developed land	8/10/2017 4:21 PM
4	Lots of land and decent highway access	8/10/2017 3:57 PM
#	2	DATE
1	Land to expand	8/14/2017 1:18 PM
2	Willingness to develop and lease land	8/11/2017 5:09 PM
#	3	DATE
	There are no responses.	

Q25 In terms of non-aeronautical development at or around CVG, what should the Airport do to encourage this type of development?

Answered: 3 Skipped: 4

ANSWER CHOICES	RESPONSES	
1	100.00%	3
2	0.00%	0
3	0.00%	0

#	1	DATE
1	Market logistics operations to be closer to Airport	8/14/2017 1:18 PM
2	We are doing it	8/10/2017 4:21 PM
3	Build an office park	8/10/2017 3:57 PM
#	2	DATE
	There are no responses.	
#	3	DATE
	There are no responses.	

CVG Master Plan 2050 - Goals and Objectives SurveyMonkey

Q26 How can the Master Plan further CVG in meeting the goal of "Supporting/Enhancing Non-Aeronautical Development?"

Answered: 2 Skipped: 5

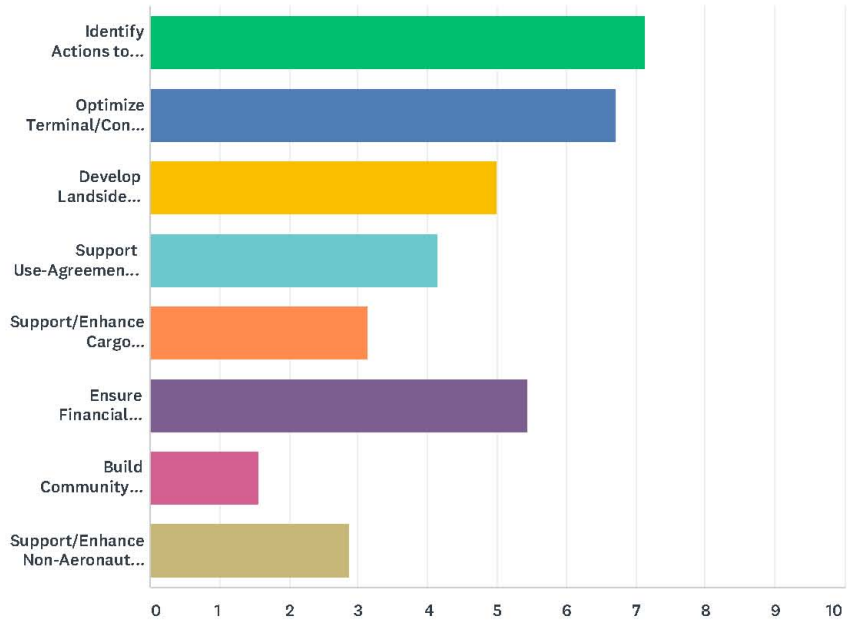
ANSWER CHOICES	RESPONSES	
1	100.00%	2
2	50.00%	1
3	0.00%	0

#	1	DATE
1	Ability to buid up and not out for future land development	8/14/2017 1:18 PM
2	develop infrastructure (roads & utilities) to support growth	8/10/2017 4:21 PM
#	2	DATE
1	Truck stop for tractor trailers that support the cargo operation	8/14/2017 1:18 PM
#	3	DATE
	There are no responses.	

CVG Master Plan 2050 - Goals and Objectives SurveyMonkey

Q27 Of the eight goals you have been asked about, please prioritize them in the order in which you feel they should be considered (highest priority first):

Answered: 7 Skipped: 0



	1	2	3	4	5	6	7	8	TOTAL	SCORE
Identify Actions to Meet/Exceed Safety & Security Best Practices	57.14% 4	28.57% 2	0.00% 0	0.00% 0	14.29% 1	0.00% 0	0.00% 0	0.00% 0	7	7.14
Optimize Terminal/Concourse Facilities for an Origin & Destination Airport	28.57% 2	28.57% 2	28.57% 2	14.29% 1	0.00% 0	0.00% 0	0.00% 0	0.00% 0	7	6.71
Develop Landside Roadway & Parking to Support CONRAC/Terminal/Cargo	0.00% 0	0.00% 0	42.86% 3	42.86% 3	0.00% 0	0.00% 0	14.29% 1	0.00% 0	7	5.00
Support Use-Agreement Renegotiation (2020)	0.00% 0	0.00% 0	14.29% 1	42.86% 3	0.00% 0	28.57% 2	14.29% 1	0.00% 0	7	4.14
Support/Enhance Cargo Development	0.00% 0	0.00% 0	0.00% 0	0.00% 0	71.43% 5	0.00% 0	0.00% 0	28.57% 2	7	3.14
Ensure Financial Sustainability	14.29% 1	28.57% 2	14.29% 1	0.00% 0	14.29% 1	28.57% 2	0.00% 0	0.00% 0	7	5.43
Build Community Support for Future Airport Development	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	14.29% 1	28.57% 2	57.14% 4	7	1.57
Support/Enhance Non-Aeronautical Development	0.00% 0	14.29% 1	0.00% 0	0.00% 0	0.00% 0	28.57% 2	42.86% 3	14.29% 1	7	2.86

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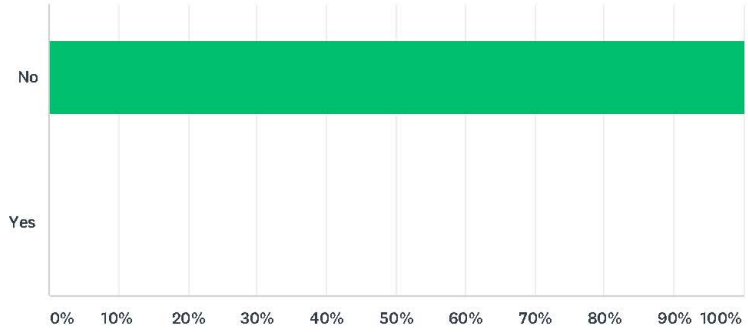
CVG Master Plan 2050 - Goals and Objectives SurveyMonkey

Q28 In this process, do you feel we are missing any goals that should be considered for the Master Plan?

Answered: 7 Skipped: 0



ANSWER CHOICES	RESPONSES	
No	100.00%	7
Yes	0.00%	0
TOTAL		7

#	YES	DATE
	There are no responses.	

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1.3 Public Outreach

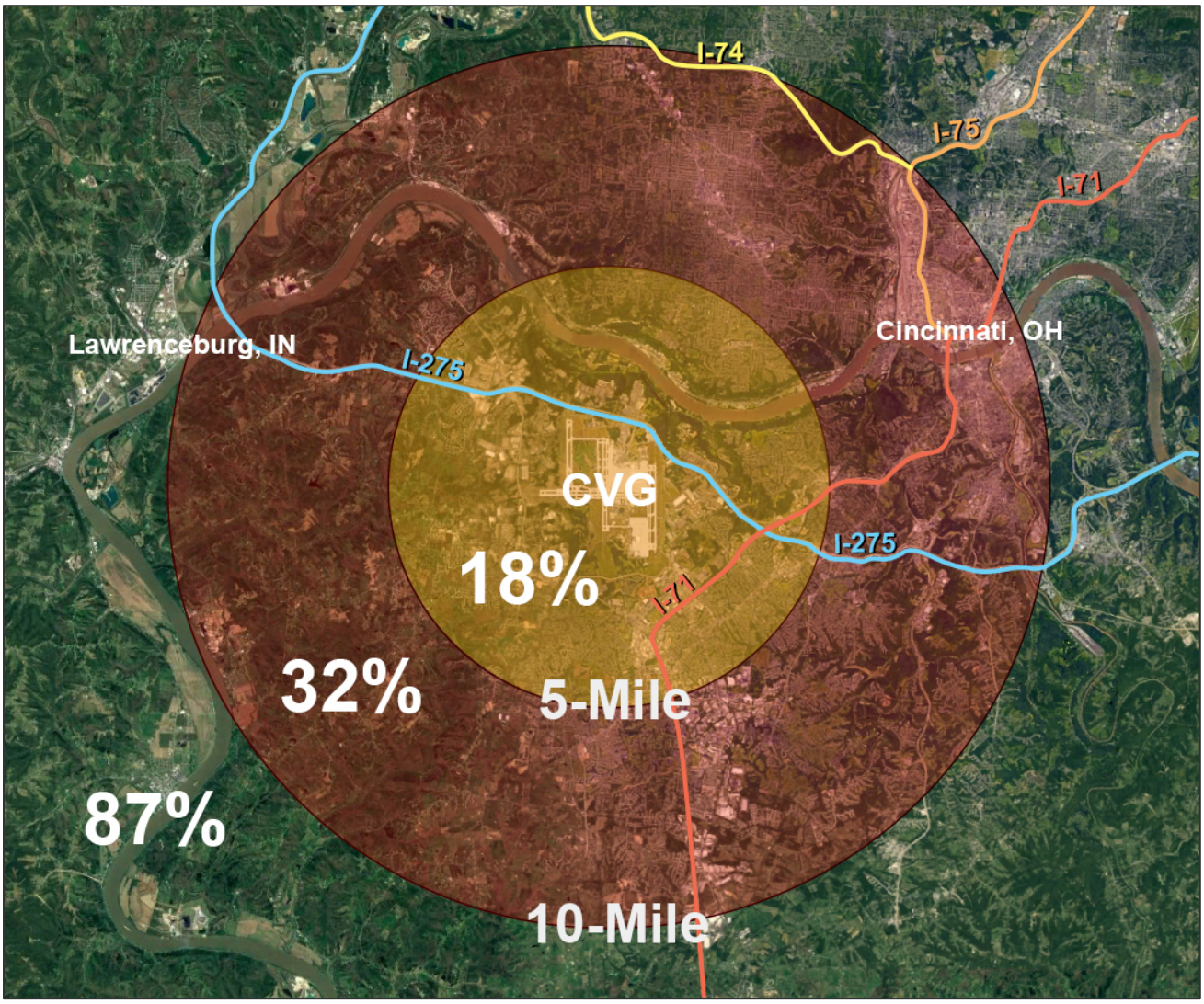
In order to make sure that interested parties had access to the Master Plan information, a public website was created with details about the CVG Master Plan 2050. This website includes information on meetings and study progress (see https://www.airportprojects.net/cvg-mpu/).

Two publicly posted public workshops on the proposed CVG Master Plan 2050 were held during the study period to provide information about the preliminary visioning and potential community impacts, as well as to solicit public comments, feedback, and suggestions. These public workshops served to provide the public an opportunity to comment and participate in the master plan process.

- The first public workshop was held on August 7, 2018. At this first workshop, information was provided on the master planning process, the draft forecast, and the initial terminal concepts development and evaluation.
- The second public workshop was hosted online due to the COVID-19 pandemic. The workshop materials were made available online from June 4, 2020 to June 17, 2020. At this workshop, information was provided on the final FAA-approved forecast, facility requirements, the recommended development plan through 2050 (with a focus on near-term projects), the land use plan, and sustainability.

In order to solicit public input on the CVG Master Plan 2050, a survey was offered at the first public workshop and online. A total of 268 people responded. The survey included 12 questions; three were open-ended responses and nine were multiple choice. The results of that survey are presented in the subsections that follow.

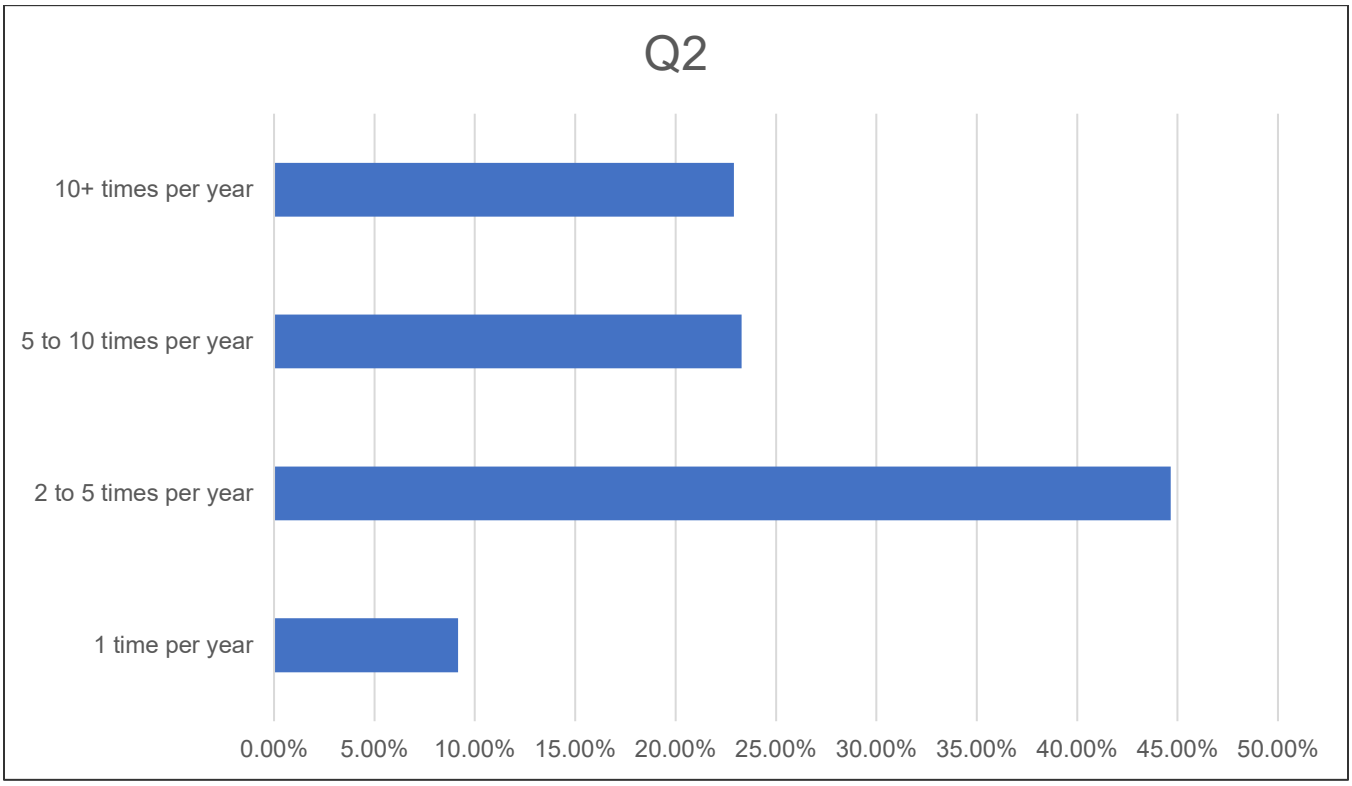
1.3.1 Question 1: What is your zip code?



Sources: Google Earth, Landrum & Brown analysis

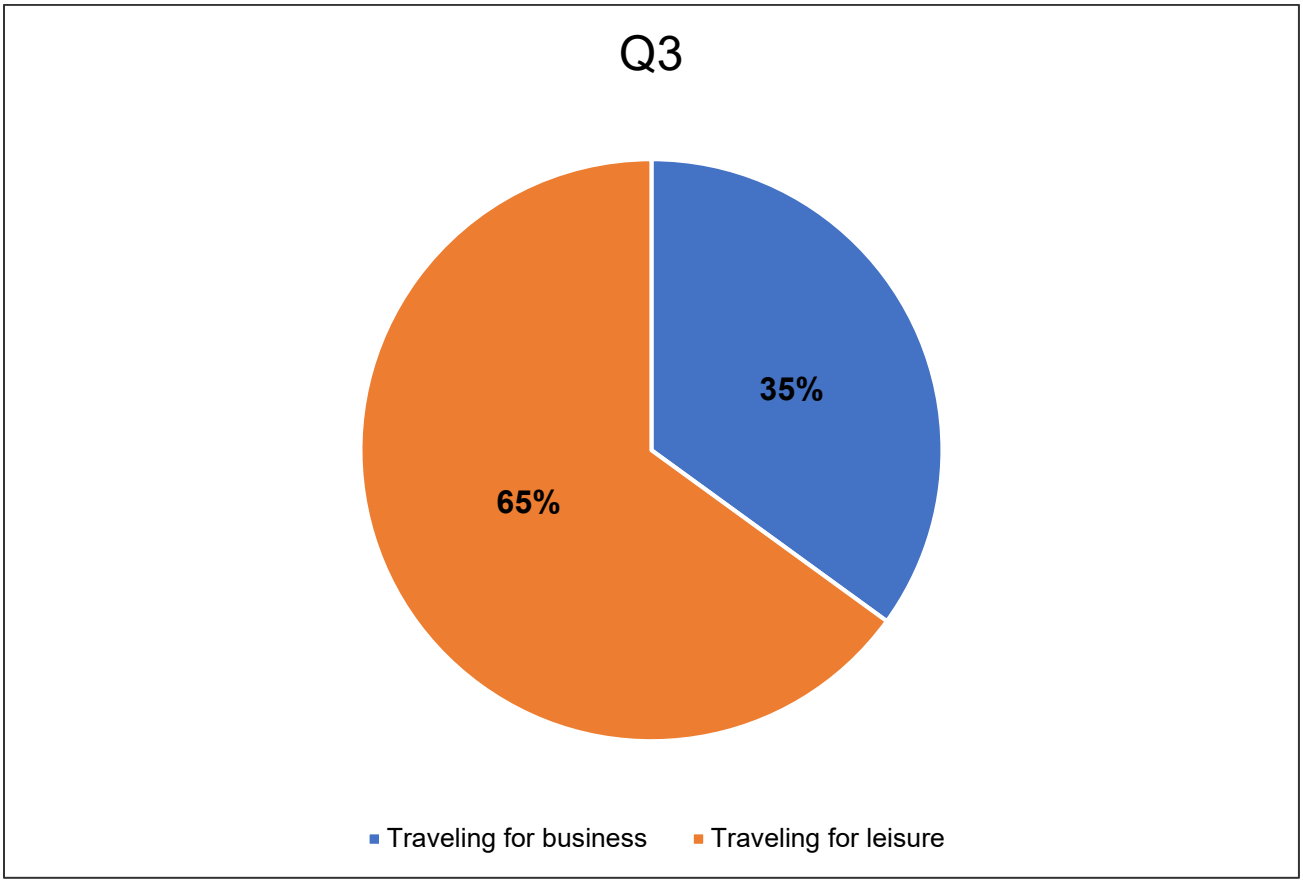
- 197 answered, 71 skipped.
- 18 percent of responders live within a five-mile radius of CVG.
- 32 percent live within a 10-mile radius.
- 87 percent within a 25-mile radius.
- The rest of those who were responded live outside this region.

1.3.2 Question 2: How often do you fly into/out of CVG?



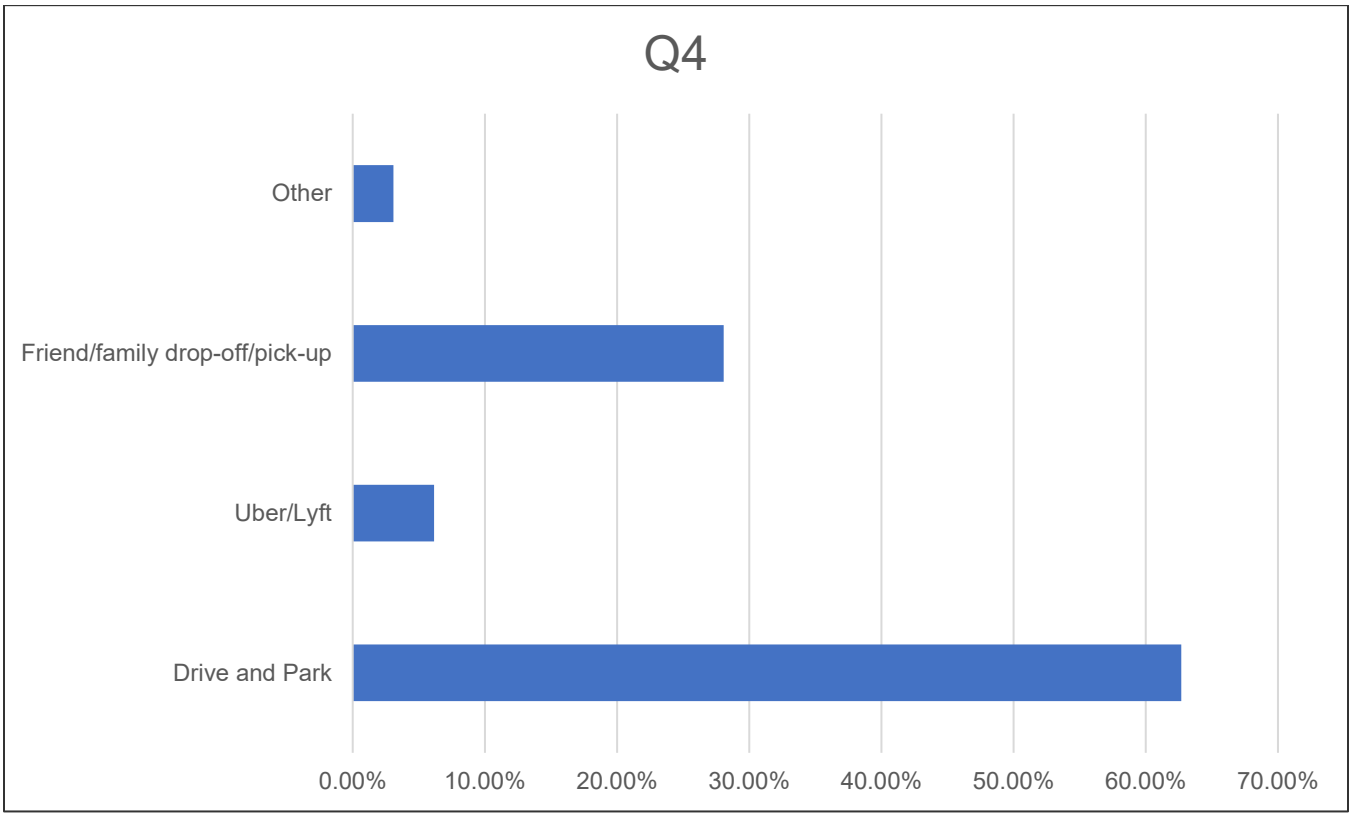
- 262 answered, 6 skipped.
- 44.66 percent said they fly two to five times per year; only 9.16 percent said they fly only once per year.
- 23.28 percent said they fly between 5 to 10 times per year and 22.90 percent said they fly 10 times or more per year.

1.3.3 Question 3: Typically, would you classify yourself as: traveling for leisure or traveling for business?



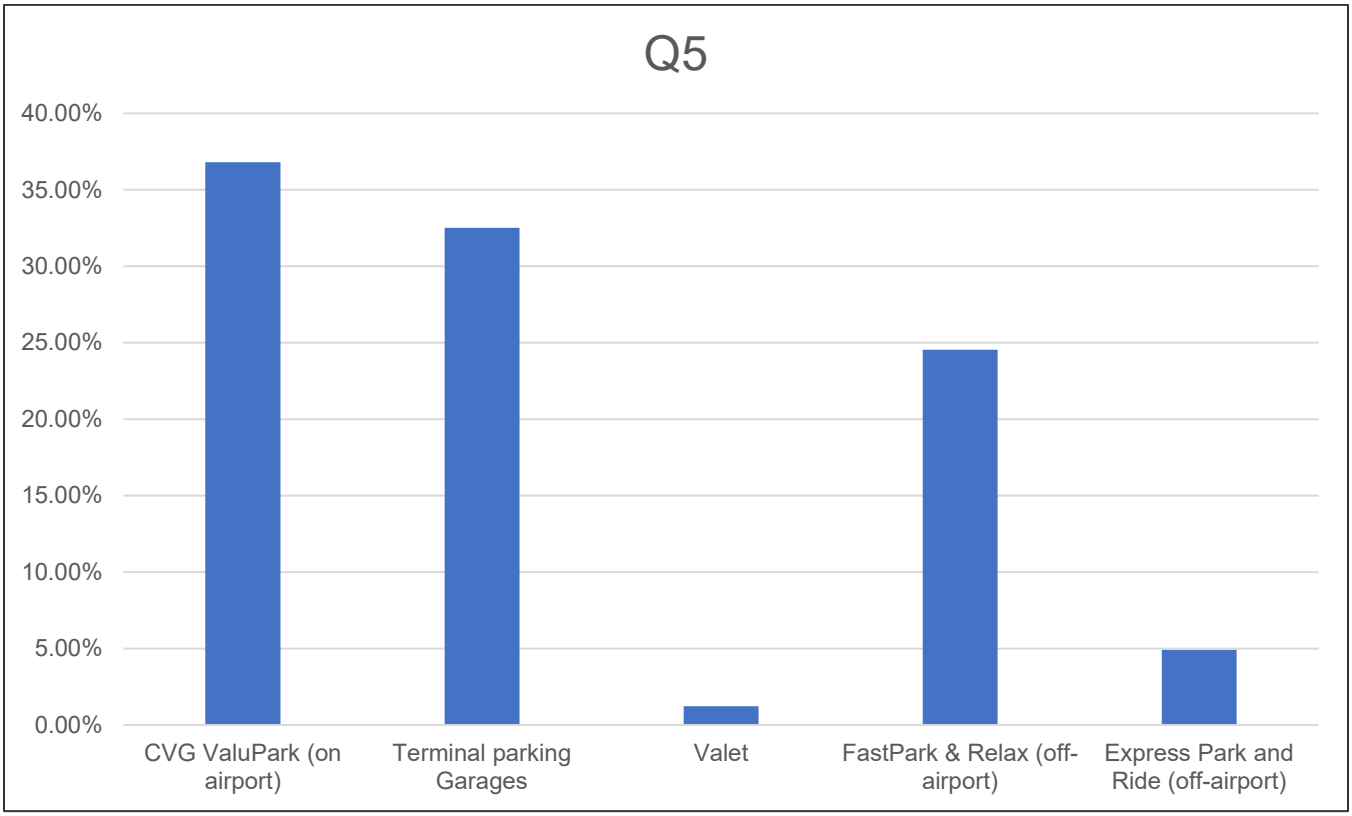
- 260 answered, 8 skipped.
- 65 percent said they typically travel for leisure whereas 35 percent said they travel for business.

1.3.4 Question 4: How do you typically get to and from the Airport?



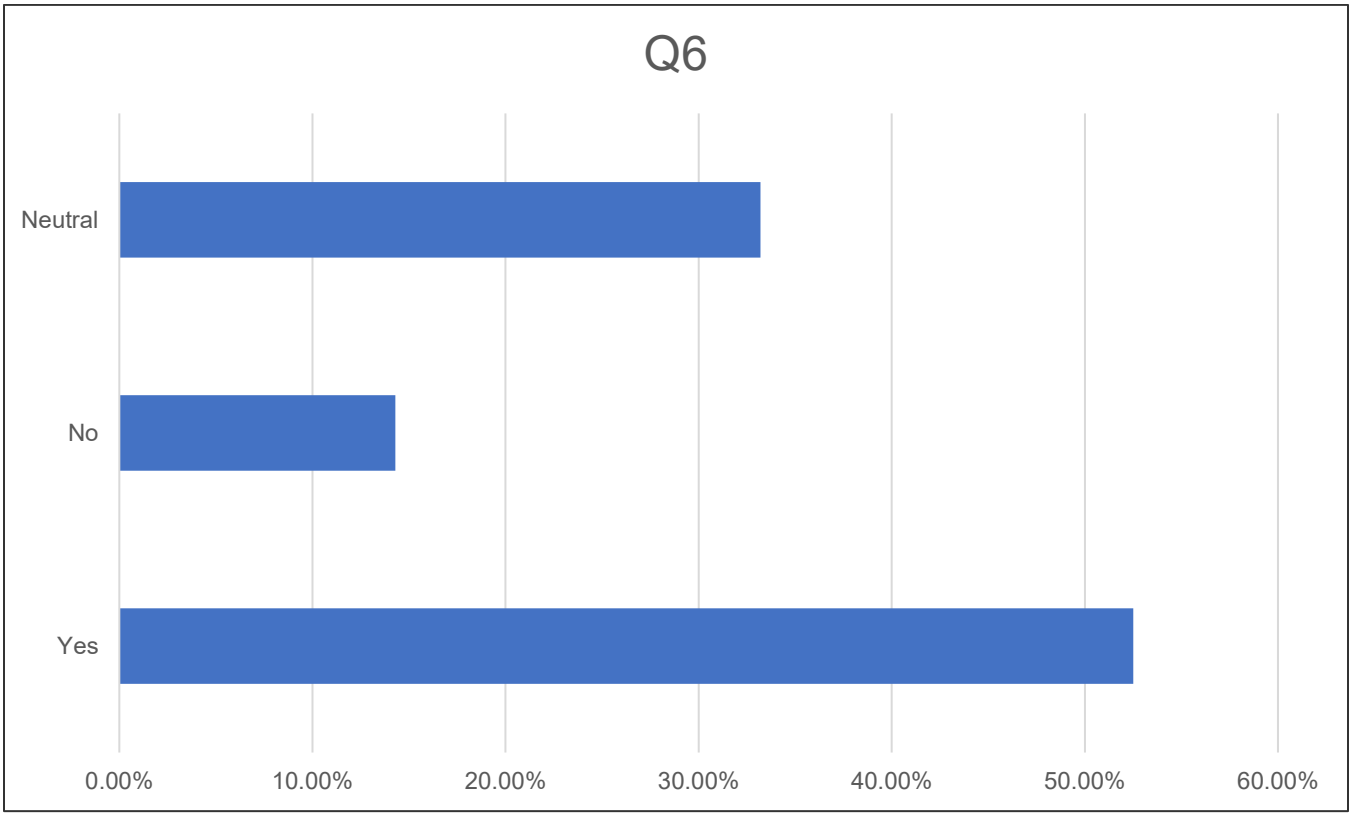
- 260 answered, 8 skipped.
- 62.69 percent said they drive and park at CVG whereas 28.08 percent were dropped off or picked up by their family or friend.
- 6.15 percent took and Uber or Lyft service and 3.08 percent had other means of transportation.

1.3.5 Question 5: You indicated that you typically drive to the Airport and park, please indicate where you prefer to park.



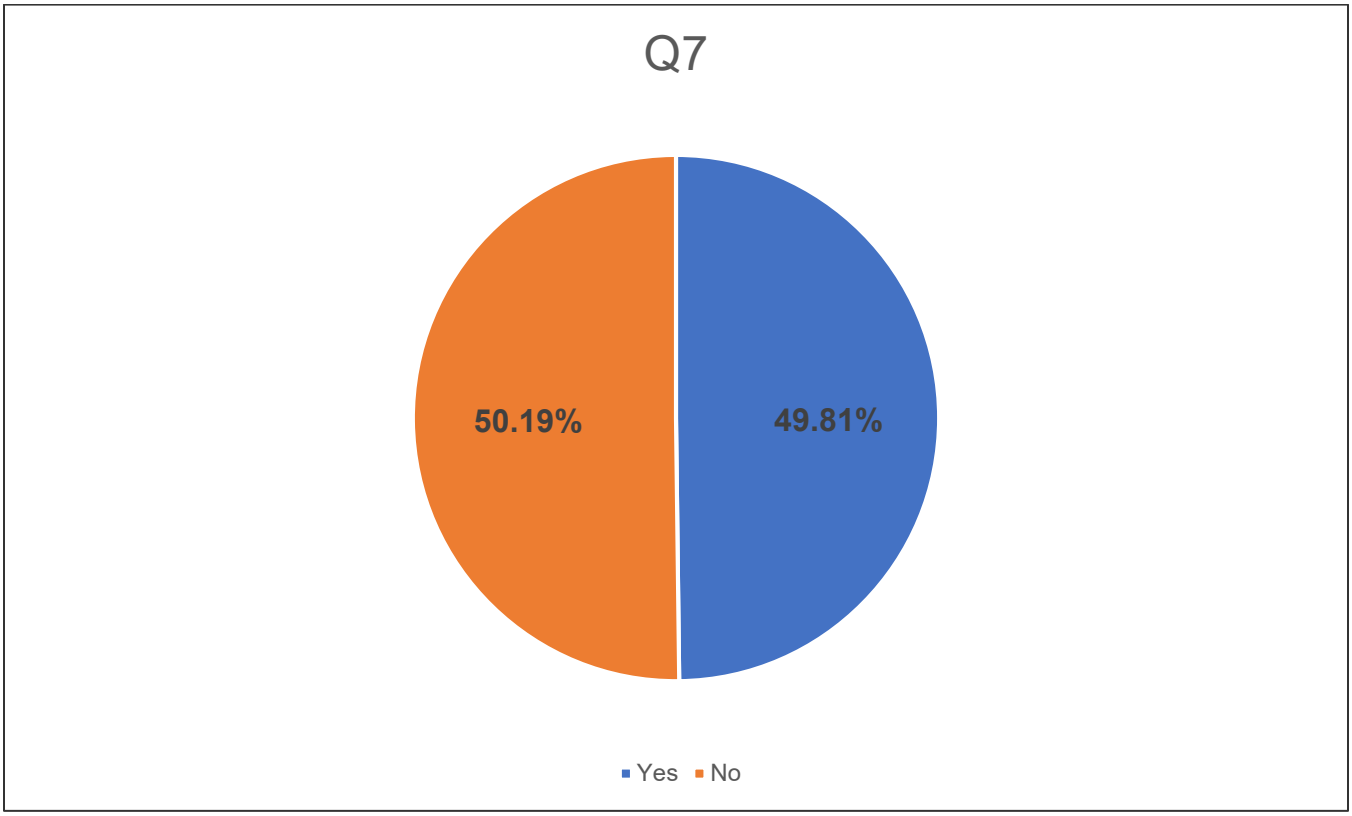
- 163 answered, 105 skipped.
- The preferred parking destinations at CVG are CVG ValuPark (36.81 percent), the terminal parking garages (32.52 percent) and FastPark & Relax (24.54 percent).
- Less popular parking includes Valet (1.23 percent) and Xpress Park and Ride (4.91 percent).

1.3.6 Question 6: If CVG built a new concourse would it be a better passenger experience if the gates were closer?



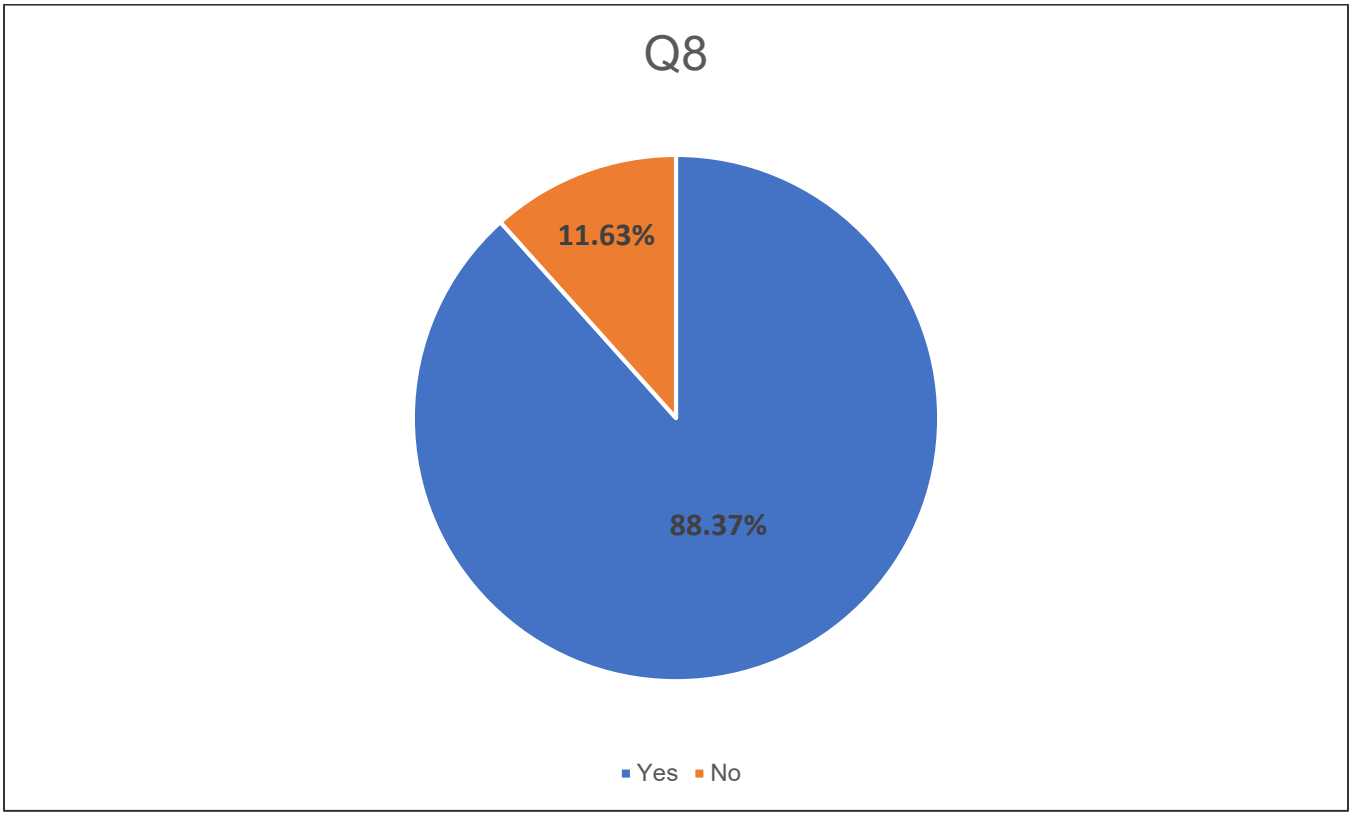
- 259 answered, 9 skipped.
- 52.51 percent said they felt the new concourse would provide a better passenger experience whereas 14.29 percent felt the new concourse would not provide a better passenger experience.
- 33.20 percent were neutral on the prospect of building a new concourse.

1.3.7 Question 7: Have you ever arrived to CVG directly from an international departure point and been required to proceed through the Immigration/Customs (Passport Control) process at CVG?



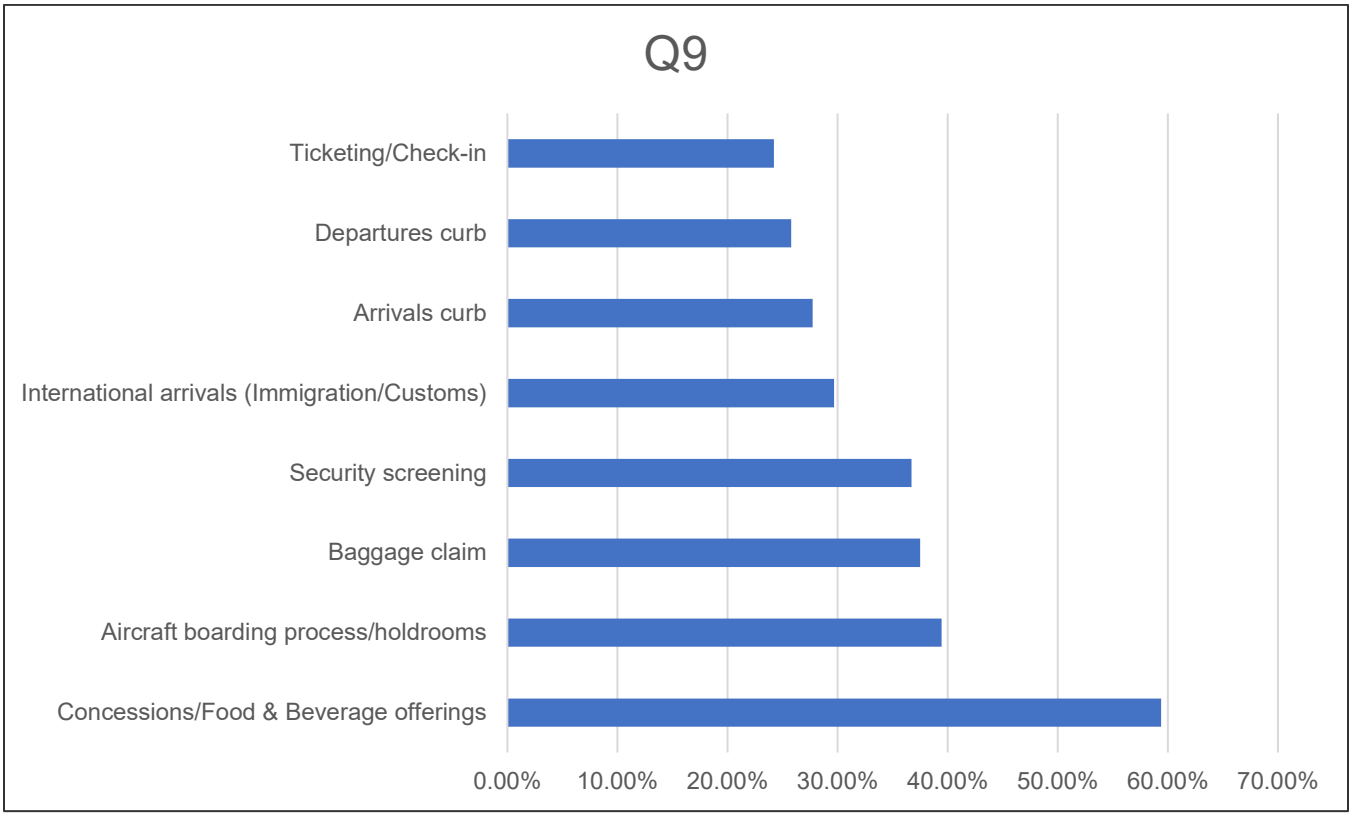
- 257 answered, 11 skipped.
- Half of those who answered have been required to proceed through passport control process at CVG while the other half have not.

1.3.8 Question 8: Should the Airport invest in reconfiguring the passenger terminal complex to allow for international arrivals to exit directly to the public curb without having to be re-screened through security?



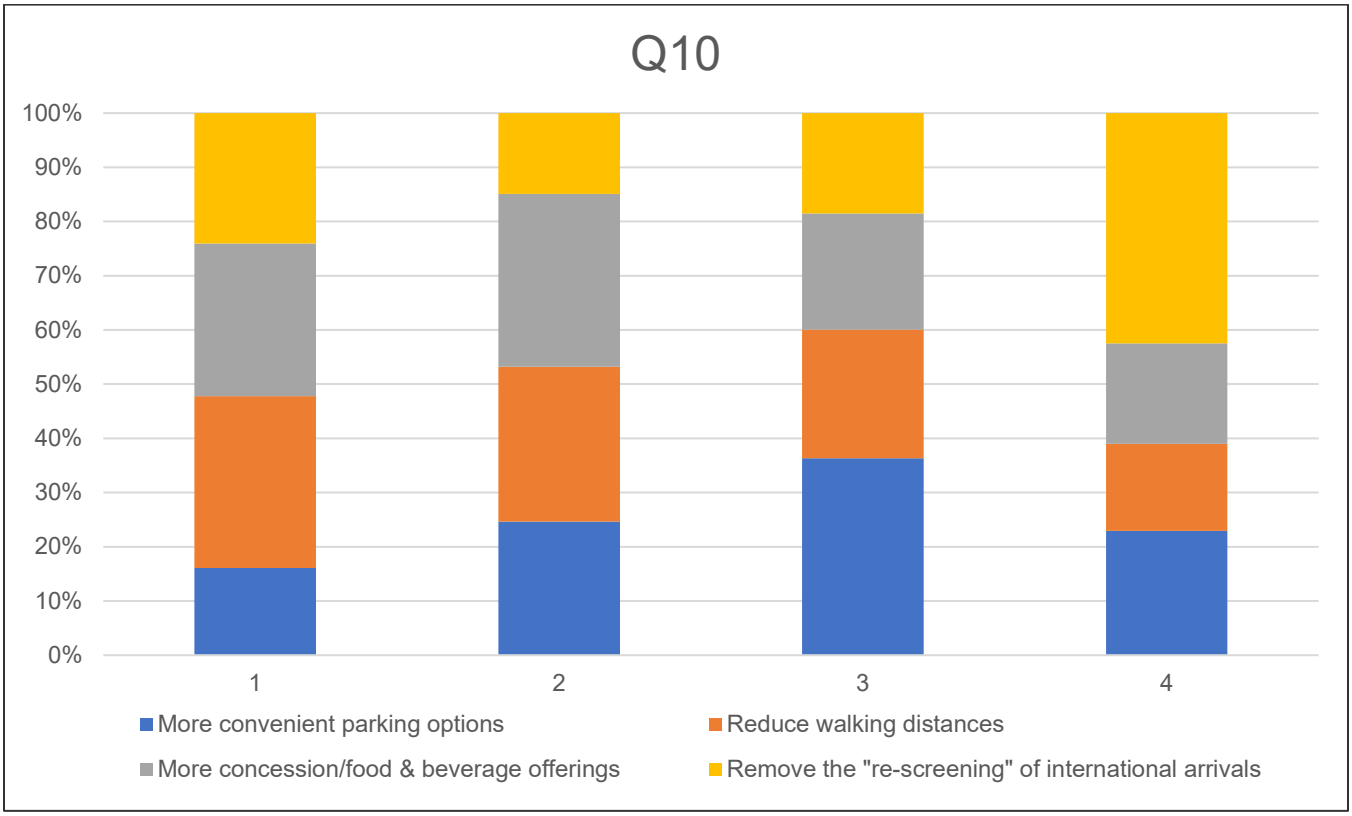
- 129 answered, 139 skipped.
- 88.38 percent felt CVG should invest in reconfiguring the passenger terminal complex whereas 11.63 percent did not feel CVG should invest in reconfiguring the passenger terminal complex.

1.3.9 Question 9: What areas of your passenger experience would you like to see improved?



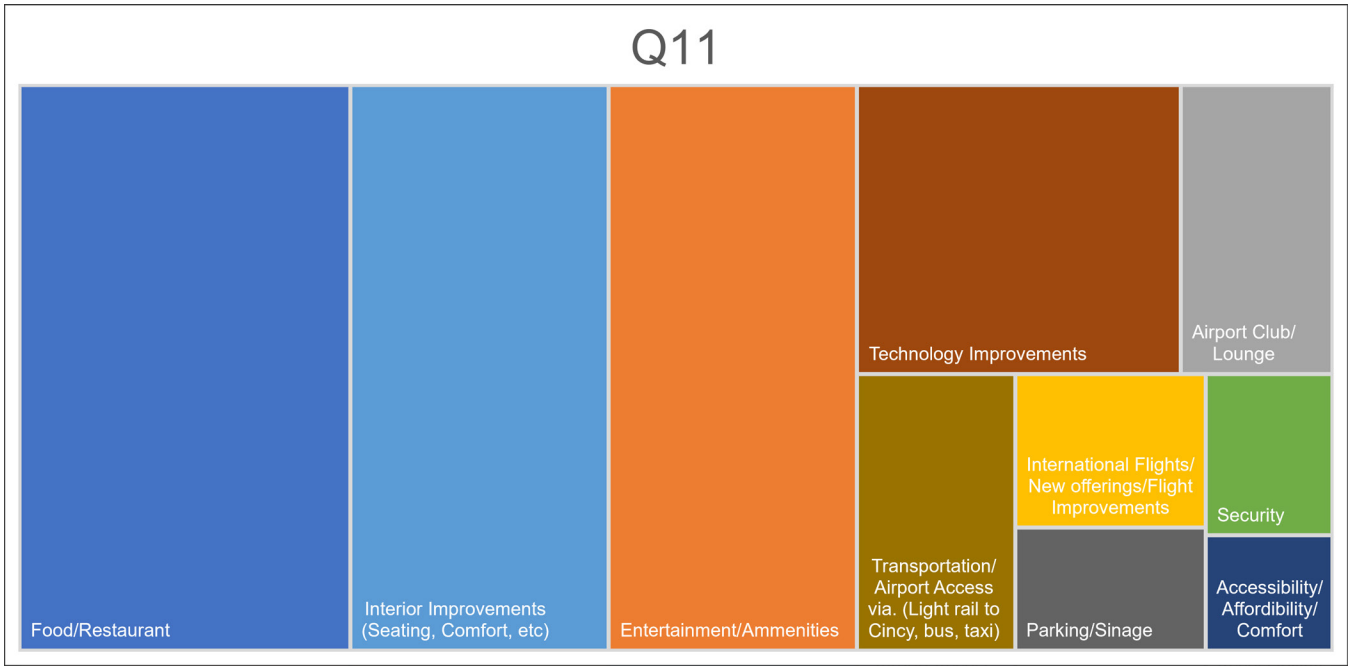
- 256 answered, 12 skipped.
- 59.38 percent want to see concessions/food & beverage offerings improved.
- Aircraft boarding (38.45 percent), baggage claim (37.50 percent), and security screening (36.72 percent) were other items CVG's passengers would like to see improved.
- Lower response items included: international arrivals (29.69 percent), arrivals curb (27.73 percent), departures curb (25.78 percent), and ticketing/checking (24.22 percent).

1.3.10 Question 10: Please re-order or rank the following Passenger Terminal Improvements at CVG from highest priority to lowest priority from your perspective as a passenger.



- 250 responded, 18 skipped.
- 31.73 percent ranked reduced walking distances as their highest priority of the four options.
- 31.85 percent ranked more concession/food & beverage as their 2nd highest priority.
- 36.29 percent ranked more convenient parking options as their 2nd lowest priority.
- 42.57 percent ranked removal of the “re-screening” of international arrivals as their lowest priority.

1.3.11 Question 11: What amenities/offerings do you like at other airports that you would like to see at CVG?



- 184 answered, 84 skipped.
- Of the 184 who answered, 34.8 percent of the responses mentioned adding a greater variety of restaurants throughout CVG.
- Additionally, 27.2 percent of responses included improving the interior of concourses with more comfortable seating
- 26.1 percent mentioned adding more entertainment and amenity options throughout the concourses.
- 17.4 percent suggested CVG should improve on technology improvements within the concourses.

1.3.12 Question 12: Are there any other comments you would like to provide regarding the Master Plan Update?

A total of 133 answered; 135 skipped.

Key concerns to consider moving forward that were identified by the respondents:

Cargo heavy focus, accessibility of the airport, international carriers, concourse experience, baggage claim, and customs re-screening.

Key comments from question 12:

> *"I like the current layout of the airport. Especially love concourse B and more food options with American moving there will help. Concourses A may need to be expanded/upgraded in the future, but I like the plane train going from the terminal to concourse A to concourse B. I primarily fly on Delta and the time it takes to get to concourse B does not bother me as much as the time I wait in the security line. Security lines during the peak travel season at some other airports that serve a similar number of passengers (CMH as an example) are shorter. Is it possible to increase the size of the security area to accommodate for additional lanes?"*
>
> *"I hope there is a plan to expand the main terminal building. Dropping off and picking up is a hassle because of the increased passenger traffic. I know you're building the new rental car garage but I hope you can expand the terminal toward the old T2 so there is more room for drop off pick up baggage and ticketing."*
>
> *"I live directly under the flight path for many planes. I am very concerned about the increase in planes flying over my neighborhood. Please take that into consideration when increasing airplane traffic."*
>
> *"Definitely reference the Skytrax World Airport Awards criteria of what makes a good airport. It's one thing to gather local input but another to gain an outside perspective. Also, this is a chance to make an architectural statement; make the place aesthetically pleasing, an interesting place to spend time waiting - but of course form must follow function - talk to UC DAAP Architecture and/or Planning dept - get students involved in finalizing the plans - let them build into it as well. One final note - plan on utilization of what is now the bleeding edge of technology as it will be common place by the time this thing's built - plan for integrations of smart-connected devices, AI, VR even (perhaps in arrival/departure screens) connect to devices with push notifications of flight details, gate changes, etc. - all to augment the customer experience. Hire some futurists to do a trend analysis and some scenario planning (I work for a global innovation consulting firm called Kalypso, so of course I'm going to say that!)."*

“Overall I like flying through CVG. The central security area generally flows quickly, and most spaces are large enough to be comfortable. I can see that individuals with mobility issues may have problems with the up-and-down and the long trek out to the concourses. I enjoy the Museum Center exhibits, and hope something similar continues after those move back downtown. Parking improvements could include signage to help locate aisles with free spaces.”

“CVG is a car-heavy facility today (partly because it relies so much on it for revenue through parking, rentals, and car-share fees), but I'd like to see all the valuable land it uses for parking repurposed for freight and refocused towards job creation. I think providing better public transport for workers and passengers/visitors is important as an alternative to be able to accomplish this goal.”

MASTER PLAN 2050

Appendix 1-B | Alternative Forecasts

CVG
CINCINNATI/NORTHERN KENTUCKY
INTERNATIONAL AIRPORT

L&B
TEAM

Contents

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List of Exhibits

1 Introduction

The alternative forecasts presented in this appendix were developed in 2017. Rather than using traditional forecasting methods, the alternative forecasts relied on airline/cargo carrier input and assumptions about short-term air service additions. This type of forecast was created because the Cincinnati/Northern Kentucky International Airport (CVG) is currently in a unique position. It is in the midst of significant changes in a variety of sectors: a market evolution from a connecting hub to an origin and destination (O&D) hub, the introduction of low-cost and ultra-low-cost service, and the potential for rapid cargo growth unlike any airport has experienced. Because this combination of events is occurring at the same time, the Kenton County Airport Board (KCAB) wanted to create a forecast that would allow it to understand the upper bounds of development that could be needed through the planning period. High, baseline, and low forecasts were developed for passenger enplanements, cargo throughput, and aircraft operations to test various growth scenarios. Ultimately, a composite of the baseline passenger forecast and high cargo forecast was combined to create a "recommended forecast" for use in identifying potential future facility needs. This forecast was used to develop the requirements presented in Chapter 4, *Facility Requirements*.

After the facility requirements were developed, the Federal Aviation Administration (FAA) requested that CVG develop a forecast that relied on traditional forecasting techniques. That forecast is presented in Chapter 3, *Aviation Activity Forecast*, and was approved by the FAA in 2019. The FAA-approved forecast results in lower growth rates over the forecast period. Having both the FAA-approved forecasts and the more aggressive air service-based forecasts available allows CVG officials to be prepared for the maximum potential level of growth, while at the same time understanding a lower end of potential activity.

2 Passenger Activity Forecast

This section presents the forecast of enplaned passengers for CVG through the forecast period as well as a discussion of the methodology used. The enplaned passenger forecast reflects the historical airline activity trends, the economic base for air travel demand, and other factors that may affect the demand for air travel.

2.1 Short-Term Forecast Methodology (2017-2023)

Typically, passenger activity forecasts are developed using a demand-side approach, such as using an econometric regression modeling. This approach projects the underlying demand, the number of enplaned passengers, and then derives the number of operations based on the projected number of enplaned passengers. However, given the reduction of Delta Air Line hub operations and the relatively short existence of low-cost carriers at CVG, it is not possible to accurately estimate the future demand based on the historical trends. Therefore, a supply-side, or bottom-up, approach was utilized to determine the enplaned passenger forecast in the near-term. This approach examines potential new service based on empirical knowledge of the markets served and the information provided by CVG during on-site meetings. Based on the information gathered the following assumptions regarding new service will occur within the next five years.

2.1.1 Domestic

- Southwest Airlines is assumed to grow to levels seen at other regional peer airports. Currently, Southwest Airlines has about 1.3 million enplaned passengers at both CMH and IND. It is assumed that Southwest Airlines would reach this level of service by 2023.
- A new full-service entrant is assumed to begin service in the 2020/2021 timeframe. The new entrant will likely utilize a narrow-body aircraft such as a Boeing 737-800. It is assumed that this airline will initially serve two destinations daily on the west coast.
- A new low-cost carrier is assumed to enter the market by 2019. The airline is assumed to operate with a smaller narrow-body aircraft, the Embraer E190, with three daily flights to two destinations by 2023.
- Incumbent ultra-low-cost-carriers are assumed to add 13 new markets by 2023.[1] Flights to these new markets are assumed to occur three times a week and utilize each of the airlines' most predominate aircraft (Airbus A320 aircraft Airbus A319)

[1] Seven of the 13 new markets have already been announced

2.1.2 International

- WOW Air began service to Keflavík International Airport (KEF) in the spring of 2018. The new service occurs four times a week during the summer season and utilizes a 208-220-seat Airbus A321 aircraft.
- Two additional transoceanic destinations are assumed to be added over the next five years. These flights are assumed to utilize wide-body aircraft such as the Boeing 787-8 and 787-9 aircraft. They are assumed to operate between three and five times a week.
- An ultra-low-cost carrier is assumed to begin service to the Caribbean in 2020. The flight is assumed to utilize the Airbus A320 aircraft, assumed to have a seating configuration of 186 passengers.

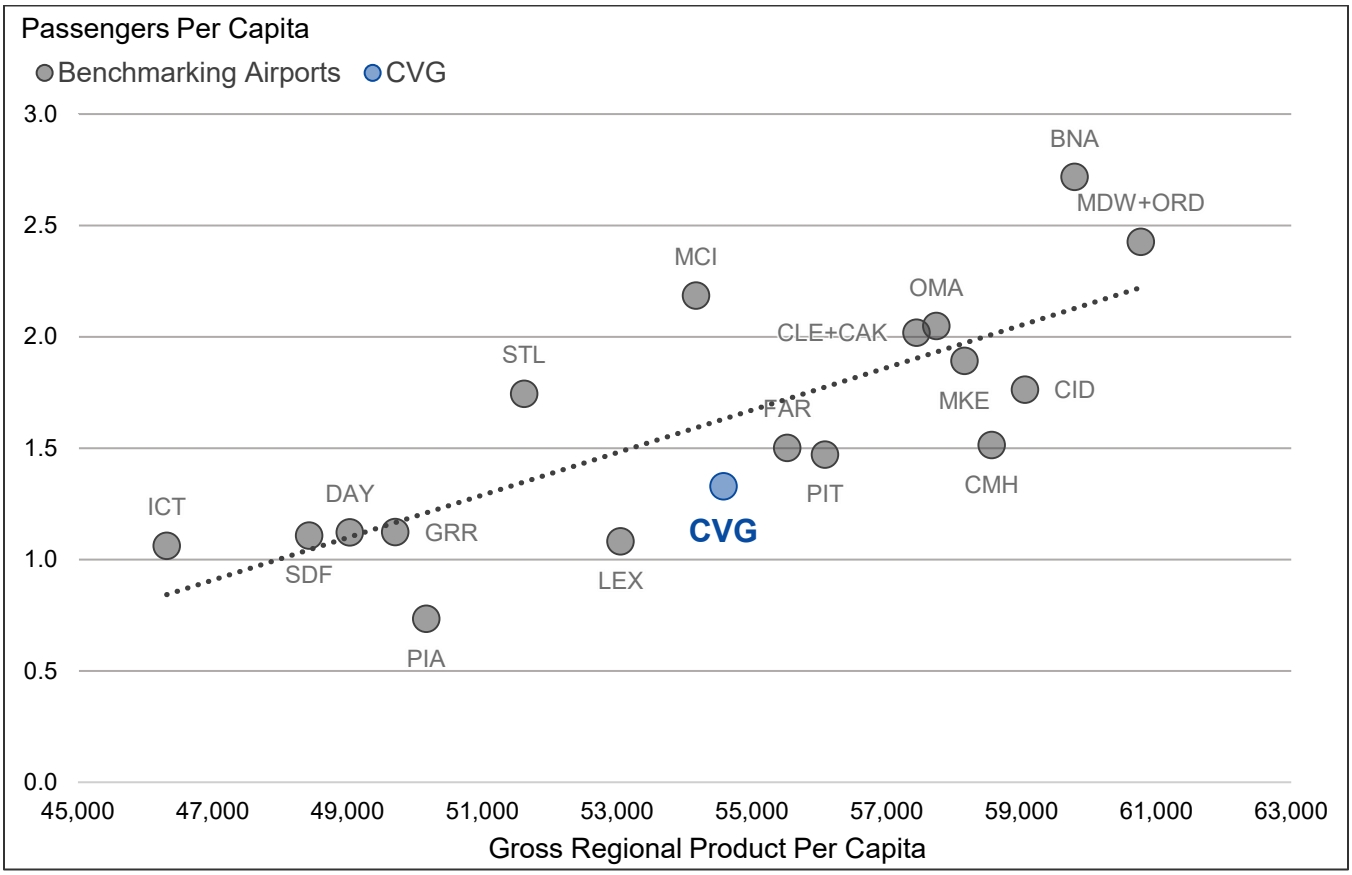
Load factors for the assumed flights were applied to the seating configuration for these flights to determine the forecasted enplaned passengers. The increased competition resulting from the new service will result in the cannibalization of some the existing service, particularly with the legacy carriers. This cannibalization was accounted for in the near-term forecast through the application of assumed cannibalization factors.

2.2 Long-Term Domestic Forecast Methodology (2023-2050)

In order to project the long-term domestic enplaned passenger demand, a benchmarking exercise of peer airport regions was conducted. Peer airport regions were selected based on their geographic relationship to CVG as well as the socio-economic characteristics of the metropolitan statistical area (MSA) served. Twenty regions served by twenty-two primary commercial airports[2] were used in this analysis. The domestic O&D enplaned passengers per capita for the airports within each region was plotted against the region's gross regional product (GRP) per capita in order to distinguish any trends that may result. The results of this analysis are displayed in **Exhibit 2-1, *Enplaned Passenger Benchmarking***.

[2] Chicago MSA is served by O'Hare International Airport and Chicago Midway International Airport. Cleveland MSA is served by Cleveland Hopkins and Akron-Canton Airport.

EXHIBIT 2-1 ENPLANED PASSENGER BENCHMARKING



Sources: Woods & Poole, *The Complete Economic and Demographic Data Source (CEDDS) 2017*; USDOT, *Air Passenger Origin-Destination Survey*; Landrum & Brown analysis

It is evident from the analysis that enplaned passenger per capita is correlated with the GRP per capita of a region. CVG's average 1.3 O&D enplaned passengers per capita is currently underperforming when compared to the other peer airport regions. The benchmarking data was fitted with the logarithmic model presented below:

Model:
Passengers Per Capita = 4.924*GRP/Population$_{MSA}$-52.050
Where: GRP/Population$_{MSA}$ = MSA Gross Regional Product Per Capita

The projected values for population and GRP provided by Woods & Poole were used in the model and the result was adjusted for CVG's underperformance. Based on this analysis, it was determined that domestic O&D enplaned passengers per capita will increase from 1.3 in 2016 to 3.1 in 2050. This factor was multiplied by the projected population in the Cincinnati MSA to determine the future domestic O&D enplaned passengers. Connecting domestic passengers were forecasted by assuming that the connecting rate will remain at a constant level from 2023 through 2050.

2.3 Long-Term International Forecast Methodology

The international operations added at CVG in the near-term are expected to be a catalyst for growth in the international demand at CVG. Therefore, a linear trend model based on the international enplaned passengers projected in the near-term forecast was used to determine the long-term international enplaned passengers.

2.4 Passenger Activity Forecast Summary

Based on the assumptions used in the near-term forecast, domestic enplaned passengers are projected to increase from 3.8 million in 2017 to 5.3 million in 2022, representing an average annual growth rate (AAGR) of 6.8 percent. According to the long-term domestic forecast, enplaned domestic passengers are projected to increase from 5.3 million in 2022 to 8.5 million 2050, representing an AAGR of 1.7 percent over that time. According to the FAA Aerospace Forecast, [3] domestic revenue passenger enplanements are projected to increase nationally at an AAGR between 1.6 percent under baseline conditions and 2.0 percent under optimistic conditions from 2022 to 2037. Over this same time-period, the projections presented herein assume an AAGR of 1.7 percent, slightly higher than the baseline forecast scenario but below the optimistic forecast in the FAA Aerospace Forecast. This validates the growth projected over the long-term at CVG.

Based on the assumptions used in the near-term forecast, international enplaned passengers are projected to increase from 135,918 in 2017 to 270,600 in 2022, representing an AAGR of 14.8 percent. The long-term international forecast enplaned passengers are projected to increase from 270,600 in 2022 to 1.1 million in 2050, representing an AAGR of 5.0 percent over that time.

Overall, total enplaned passengers at CVG are projected to increase from 3.9 million in 2017 to 9.6 million in 2050, representing an AAGR of 2.7 percent. **Table 2-1*, Enplaned Passenger Forecast Results***, provides a summary of the enplaned passenger forecast by segment.

[3] Federal Aviation Administration, *FAA Aerospace Forecast*, Fiscal Years 2017-2037.

TABLE 2-1 ENPLANED PASSENGER FORECAST RESULTS

Year	Domestic	International	Total
Historical			
2007	7,510,083	333,876	7,843,959
2008	6,486,132	315,479	6,801,611
2009	5,084,751	216,042	5,300,792
2010	3,861,264	126,675	3,987,938
2011	3,415,975	109,511	3,525,486
2012	2,921,586	111,839	3,033,424
2013	2,758,658	116,130	2,874,788
2014	2,841,462	123,196	2,964,657
2015	3,033,597	126,652	3,160,248
2016	3,260,049	123,889	3,383,938
2017	3,790,240	135,918	3,926,158
Forecast			
2022	5,271,600	270,600	5,542,200
2027	6,007,290	404,600	6,411,890
2032	6,575,140	547,100	7,122,240
2037	7,164,680	689,600	7,854,280
2050	8,523,640	1,060,100	9,583,740
Average Annual Growth Rates			
2007-17	-6.7%	-8.6%	-6.7%
2017-22	6.8%	14.8%	7.1%
2022-27	2.6%	8.4%	3.0%
2027-32	1.8%	6.2%	2.1%
2032-37	1.7%	4.7%	2.0%
2037-50	1.3%	3.4%	1.5%
2017-50	2.5%	6.4%	2.7%

Sources: KCAB; Woods & Poole, *The Complete Economic and Demographic Data Source (CEDDS) 2017*; USDOT, *Air Passenger Origin-Destination Survey*; Landrum & Brown analysis

2.5 Passenger Activity Forecast Scenarios

In addition to the baseline enplaned passenger forecast presented thus far, high and low scenarios were developed to account for the uncertainty associated with a long-term forecast. The alternative scenarios are described in the following sections.

2.5.1 High Case Scenario

Under the baseline forecast, the MSA's GRP is forecast to increase at an AAGR of 1.8 percent and the MSA's population is forecast to increase at an AAGR of 0.6 percent. The high case scenario assumes higher economic growth and a faster rate of population growth for the Cincinnati region. The national growth rates for these parameters (1.9 percent AAGR for GRP and 0.8 percent AAGR for population) were used to reflect the higher growth rates. Under this scenario, it is assumed that the slightly higher growth rate for domestic enplanements would be partially the result of a shift in the operational profile of CVG. It is evident that low-cost and ultra-low-cost carrier have been the catalyst for growth in the domestic market over recent years, particularly for O&D traffic. This scenario examines the potential that CVG would shift from an airport served by a mix of full-service carriers and low-cost and ultra-low-cost carriers to a one where a majority of passengers are served by low-cost and ultra-low-cost carriers. Additionally, the high case scenario assumes that a transpacific flight would be added in the near-term. The higher economic and demographic growth combined with the new transpacific flight results in an increase in enplaned passengers of 355,840 by 2050 when compared to the baseline. This increase in enplaned passengers is relatively small because the true purpose of this scenario is not to test the system at a higher level of activity but to test the system based on a different mix of carrier options. For example, should Delta Air Lines no longer be the dominate carrier at CVG, how should the facilities be constructed to allow for adequate growth by low-cost and ultra-low-cost carriers.

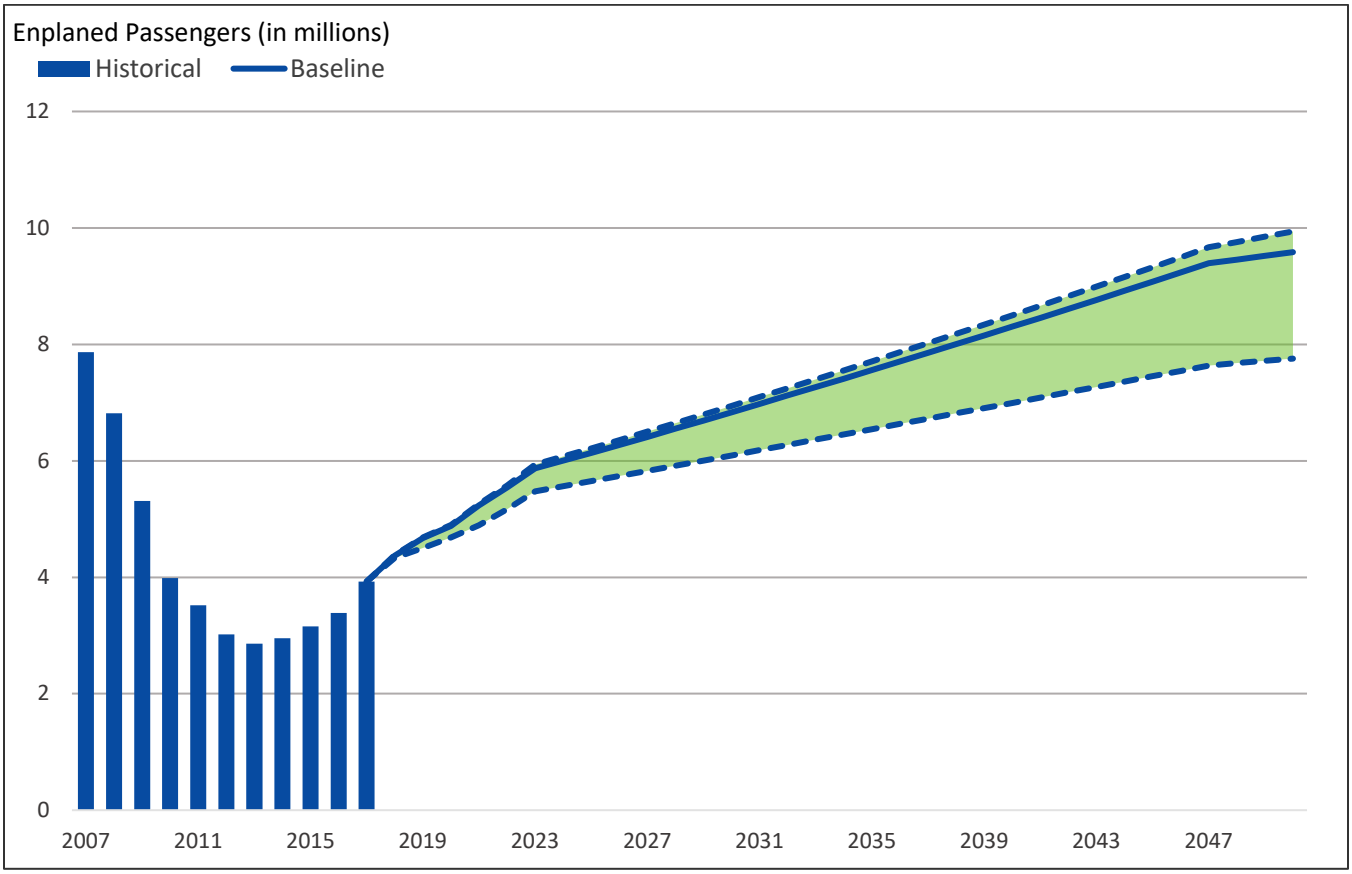
2.5.2 Low Case Scenario

The low case scenario assumes the Cincinnati region will not meet the current GRP and population forecasts. Under the low case scenario, the MSA's GRP is assumed to increase at an AAGR of 1.3 percent and population is assumed to increase at an AAGR of 0.4 percent through 2050. The low case scenario assumes the new full-service and low-cost entrants assumed under the baseline will not begin service in the near-term. Additionally, the low case scenario assumes that only one transoceanic service will begin in the near-term. Finally, the low case also assumes that there will be a higher rate of cannibalization resulting from the introduction of new markets served by low-cost carriers. The result is a decrease in enplaned passengers of 1.8 million by 2050 when compared to the baseline.

2.5.3 Summary of Scenario Forecasts

The enplaned passenger forecast scenarios provide a range of 7.8 million to 9.9 million. **Exhibit 2-2, *Comparison of Enplaned Passenger Forecast Scenarios***, provides a comparison of the forecast scenarios and more detailed overview of the scenarios is provided in **Table 2-2, *Summary of Enplaned Passenger Forecast Scenarios***.

EXHIBIT 2-2 COMPARISON OF ENPLANED PASSENGER FORECAST SCENARIOS



Sources: KCAB; Woods & Poole, *The Complete Economic and Demographic Data Source (CEDDS) 2017*; USDOT, *Air Passenger Origin-Destination Survey*; Landrum & Brown analysis

TABLE 2-2 SUMMARY OF ENPLANED PASSENGER FORECAST SCENARIOS

Year	High			Baseline			Low		
	Domestic	International	Total	Domestic	International	Total	Domestic	International	Total
Historical									
2012	2,921,586	111,839	3,033,424	2,921,586	111,839	3,033,424	2,921,586	111,839	3,033,424
2013	2,758,658	116,130	2,874,788	2,758,658	116,130	2,874,788	2,758,658	116,130	2,874,788
2014	2,841,462	123,196	2,964,657	2,841,462	123,196	2,964,657	2,841,462	123,196	2,964,657
2015	3,033,597	126,652	3,160,248	3,033,597	126,652	3,160,248	3,033,597	126,652	3,160,248
2016	3,260,049	123,889	3,383,938	3,260,049	123,889	3,383,938	3,260,049	123,889	3,383,938
2017	3,790,240	135,918	3,926,158	3,790,240	135,918	3,926,158	3,790,240	135,918	3,926,158
Forecast									
2018	4,209,800	171,200	4,381,000	4,199,300	171,200	4,370,500	4,161,800	171,200	4,333,000
2019	4,509,400	175,400	4,684,800	4,495,500	175,400	4,670,900	4,329,300	175,400	4,504,700
2020	4,706,400	191,900	4,898,300	4,687,700	191,900	4,879,600	4,492,600	191,900	4,684,500
2021	5,032,600	223,700	5,256,300	5,007,900	223,700	5,231,600	4,693,400	201,800	4,895,200
2022	5,304,600	270,600	5,575,200	5,271,600	270,600	5,542,200	4,943,200	226,600	5,169,800
2027	6,057,560	443,200	6,500,760	6,007,290	404,600	6,411,890	5,508,610	317,400	5,826,010
2032	6,640,880	606,700	7,247,580	6,575,140	547,100	7,122,240	5,867,660	405,900	6,273,560
2037	7,251,480	770,200	8,021,680	7,164,680	689,600	7,854,280	6,229,250	494,400	6,723,650
2050	8,744,280	1,195,300	9,939,580	8,523,640	1,060,100	9,583,740	7,030,850	724,500	7,755,350
Average Annual Growth Rates									
2007-17	-6.7%	-8.6%	-6.7%	-6.7%	-8.6%	-6.7%	-6.7%	-8.6%	-6.7%
2017-22	7.0%	14.8%	7.3%	6.8%	14.8%	7.2%	5.5%	10.8%	5.7%
2022-27	2.7%	10.4%	3.1%	2.6%	8.4%	3.0%	2.2%	7.0%	2.4%
2027-32	1.9%	6.5%	2.2%	1.8%	6.2%	2.1%	1.3%	5.0%	1.5%
2032-37	1.8%	4.9%	2.1%	1.7%	4.7%	2.0%	1.2%	4.0%	1.4%

Year	High			Baseline			Low		
	Domestic	International	Total	Domestic	International	Total	Domestic	International	Total
2037-50	1.5%	3.4%	1.7%	1.3%	3.4%	1.5%	0.9%	3.0%	1.1%
2017-50	2.6%	6.8%	2.9%	2.5%	6.4%	2.7%	1.9%	5.2%	2.1%

Sources: KCAB; Woods & Poole, *The Complete Economic and Demographic Data Source (CEDDS) 2017*; USDOT, *Air Passenger Origin-Destination Survey*; Landrum & Brown analysis

3 Air Cargo Throughput Forecast

This section presents the forecast of air cargo throughput for CVG through the forecast period as well as a discussion of the methodology used to develop this forecast. In a similar fashion to the enplaned passenger forecast, the air cargo throughput forecast provides the basis for the all-cargo, or freighter, aircraft operations forecast.

3.1 Methodology

Future cargo throughput is dependent on the growth of two categories of cargo operators: traditional operators and non-traditional operators. A forecast for each category was created and the results were aggregated to provide a total cargo throughput forecast.

In order to project cargo throughput for traditional operators, such as DHL, it was determined that an economic regression model was most appropriate to forecast this category of cargo operators. Economic regression modeling quantifies the relationship between cargo throughput and socio-economic variables. This methodology recognizes that the key independent variables will change over time but assumes that their fundamental relationships to the dependent variables will remain.

The first step in developing the appropriate model was to test the independent, or explanatory, variables against the dependent variable, cargo throughput. In order for an econometric model to be considered appropriate, the following must be true:

- Adequate test statistics (i.e. high coefficient of determination (R^2) values and low p-value statistics), which indicate that the independent variables are good predictors of CVG traffic.
- Does not result in theoretical contradictions (e.g., the model indicates that gross domestic product (GDP) growth is negatively correlated with traffic growth).
- The results are not overly aggressive or conservative that are incompatible with historical averages.

Through the testing of multiple sets of independent variables, a multivariate linear model using the U.S. GDP and a set of dummy variables to indicate DHL's short absence was selected to forecast cargo throughput for existing operators. The model exhibits strong regression statistics when compared to models with other combinations of independent variables. The model formula and relevant test statistics are provided below:

Model:
Cargo Throughput = $0.11*GRP_{US}-508{,}475.12*Dummy_1-289{,}482*Dummy_2-1108425.86$
Where: GRP_{US} = U.S. GDP
$Dummy_1$ = Full Years without DHL
$Dummy_2$ = Partial Years without DHL

Test Statistics:	**Independent Variables P-Values:**
R^2 = 97.7 percent	Intercept = 0.00
DF = 13	GRP_{US} = 0.00
P-Value = 0.00	$Dummy_1$ = 0.00
	$Dummy_1$ = 0.00

The R^2 indicates that 97.7 percent of the variation in the cargo throughput at CVG can be explained by the model.

Cargo throughput for the non-traditional operator, Amazon Air, was developed based primarily on input from the operator. Amazon Air provided annual aircraft operations through the ultimate build-out, which is assumed to be completed by 2028. The operator also provided a fleet mix of likely aircraft types. An assumed load factor was applied to the max payload for the individual aircraft types and then was annualized to estimate the future cargo throughput through 2028. Growth beyond 2028 is assumed to mirror the rate of the existing operators without constraints, i.e. the growth rates provided by the regression model were applied.

3.2 Cargo Throughput Forecast Summary

Air cargo throughput at CVG is forecast to increase from 1.0 million tons in 2017 to 4.5 million tons in 2050, representing an AAGR of 4.5 percent. **Table 3-1** ***Air Cargo Throughput Results***, provides a summary of the air cargo throughput forecast.

TABLE 3-1 AIR CARGO THROUGHPUT FORECAST RESULTS

Year	Short Tons
Historical	
2007	43,759
2008	48,721
2009	152,970
2010	415,692
2011	537,139
2012	599,778
2013	655,479
2014	722,431
2015	804,088
2016	818,364
2017	1,041,890
Forecast	
2022	1,914,967
2027	2,594,792
2032	3,107,253
2037	3,463,378
2050	4,485,251
Average Annual Growth Rates	
2007-17	37.3%
2017-22	12.9%
2022-27	6.3%
2027-32	3.7%
2032-37	2.2%
2037-50	2.0%
2017-50	4.5%

Sources: KCAB; Woods & Poole, *The Complete Economic and Demographic Data Source (CEDDS) 2017*; Landrum & Brown analysis

3.3 Cargo Throughput Forecast Scenarios

In addition to the baseline cargo throughput forecast presented thus far, high and low scenarios were developed to account for the uncertainty associated with a long-term forecast. The alternative scenarios are described in the following sections.

3.3.1 High Case Scenario

The high case scenario assumes that Amazon Air will continue growth at the rate estimated during the construction of their facilities. Additionally, the high case assumes that higher than expected economic growth will result in faster long-term growth in cargo throughput by the traditional carriers. The result is an increase in air cargo throughput of 2.3 million tons when compared to the baseline.

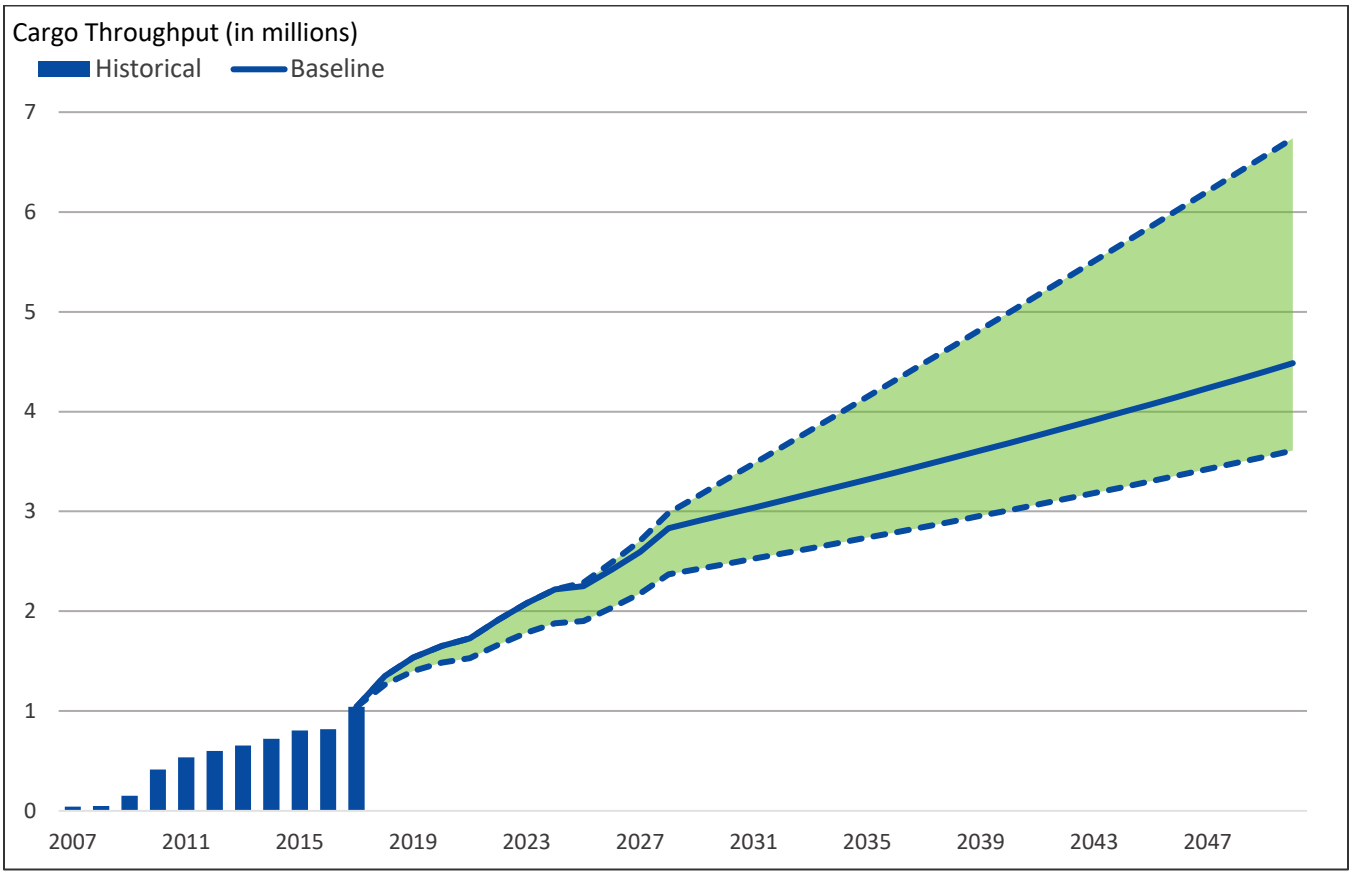
3.3.2 Low Case Scenario

The low case scenario assumes lower growth by traditional cargo carriers, particularly DHL, as a result of an effort to diversify their operations to other U.S. airports. Additionally, the low case scenario assumes that Amazon Air will take longer to reach the planned ultimate build-out of their facilities due to less than anticipated demand. The result is a decrease in air cargo throughput of 875,000 tons when compared to the baseline.

3.3.3 Summary of Scenario Forecasts

The cargo throughput forecast scenarios provide a range of 3.6 million to 6.7 million tons of cargo in 2050. **Exhibit 3-1, *Comparison of Cargo Throughput Forecast Scenarios***, provides a comparison of the forecast scenarios and a more detailed overview of the scenarios is provided in **Table 3-2, *Summary of Cargo Throughput Forecast Scenarios***.

EXHIBIT 3-1 COMPARISON OF CARGO THROUGHPUT FORECAST SCENARIOS



Sources: KCAB; Woods & Poole, *The Complete Economic and Demographic Data Source (CEDDS) 2017*; Landrum & Brown analysis

TABLE 3-2 SUMMARY OF CARGO THROUGHPUT FORECAST SCENARIOS

Year	High	Baseline	Low
Historical			
2007	43,759	43,759	43,759
2008	48,721	48,721	48,721
2009	152,970	152,970	152,970
2010	415,692	415,692	415,692
2011	537,139	537,139	537,139
2012	599,778	599,778	599,778
2013	655,479	655,479	655,479
2014	722,431	722,431	722,431
2015	804,088	804,088	804,088
2016	818,364	818,364	818,364
2017	1,041,890	1,041,890	1,041,890
Forecast			
2018	1,350,009	1,350,009	1,262,955
2019	1,536,254	1,536,254	1,402,640
2020	1,653,203	1,653,203	1,483,614
2021	1,729,299	1,729,299	1,528,483
2022	1,914,967	1,914,967	1,665,095
2027	2,707,565	2,594,792	2,177,998
2032	3,646,599	3,107,253	2,577,894
2037	4,484,507	3,463,378	2,845,420
2050	6,737,542	4,485,251	3,610,244
Average Annual Growth Rates			
2007-17	37.3%	37.3%	37.3%
2017-22	12.9%	12.9%	9.8%
2022-27	7.2%	6.3%	5.5%
2027-32	6.1%	3.7%	3.4%
2032-37	4.2%	2.2%	2.0%
2037-47	3.2%	2.0%	1.8%
2017-47	5.8%	4.5%	3.8%

Sources: KCAB; Woods & Poole, *The Complete Economic and Demographic Data Source (CEDDS) 2017*; Landrum & Brown analysis

4 Aircraft Operations Forecast

This section describes the methodology and the results of the aircraft operations forecast at CVG. Aircraft operations, defined as aircraft arrivals plus departures, were projected separately for four major categories: (1) passenger; (2) freighter; (3) general aviation (GA) and air taxi; and (4) military. These components are then aggregated to derive a total aircraft operations forecast for CVG.

4.1 Passenger Aircraft Operations

4.1.1 Methodology

The number of passenger aircraft operations at an airport depends on three factors: (1) total passengers, (2) average aircraft size, and (3) average load factor (percent of seats occupied). The relationship is shown in the equation below:

$$\text{Passenger Aircraft Operations} = \frac{\text{Total Passengers}}{\text{Average Load Factor} * \text{Average Aircraft Size}}$$

This relationship permits an infinite set of load factors, average aircraft size, and operations to accommodate a given number of passengers.

The short-term passenger aircraft operations forecast for new operations was developed by including those assumed flights to be added as part of the enplaned passenger forecast. However, it was assumed that legacy carriers would be negatively affected by the new service provided by the low-cost and ultra-low-cost carriers. While legacy carriers will continue to grow at CVG, their potential for growth will be limited. As such, the number of enplaned passengers attributed to these carriers would decrease. Additionally, United Airlines and American Airlines are currently increasing the average seating configuration of the aircraft utilized at CVG opting to use some narrow-body aircraft on routes that have typically been operated using regional jets. In order to estimate the aircraft operations of the legacy carriers, the formula above was modified. The enplaned passenger forecast for the individual legacy carriers, after accounting for some cannibalization by the low-cost and ultra-low-cost carriers, was multiplied by assumed load factors to determine the total seats required to handle the passengers. The total seats were then divided by assumed average seating configurations by airline, accounting for changes in the fleets. The result was the passenger aircraft operations for the legacy carriers.

Beyond 2023, the enplaned passenger forecast was used as the numerator in the formula above with assumed values for load factors and average aircraft size to determine passenger aircraft departures. To calculate total passenger operations, the total number of departures was multiplied by two.

In order to develop reasonable load factor and average number of seats per aircraft assumptions, enplaned passengers and passenger aircraft departures were disaggregated into categories of activity (i.e., air carrier and regional activity for both domestic and international service). Load factors and the average aircraft size, or average seats per departure (ASPD), at every airport are inherently different due to difference in how airlines choose to serve the demand for air travel to, from, and over each airport. These differences may result from a strategic focus on unit revenue versus unit costs or an emphasis on a hub and spoke system versus a point-to-point operation.

A number of sources were used to develop the historical passenger aircraft operations, load factors, and the ASPD for CVG. The Official Airline Guide (OAG); FAA, Operations Network (OPSNET); and the United States Department of Transportation (USDOT), Air Carrier Statistics database (T-100) were used to develop the total departures and seats for each segment. ASPD for each of the major groups of passenger activity was calculated from total departures and total departing seats. Average load factors were calculated for each group of passenger aircraft operations by dividing the total enplaned passengers by total departing seats.

4.1.2 Passengers Per Operation

4.1.2.1 Domestic

The average number of seats per aircraft is directly related to the type of aircraft being utilized at CVG. The majority of the domestic passenger traffic at CVG is currently handled by six mainline carriers. Therefore, in order to estimate the future average number of seats per aircraft, the fleet plans for each carrier were examined. The following is a description of the current fleet plans for each of the mainline carriers with a focus on potential changes at CVG:

- **Delta Air Lines:** Delta Air Lines uses a mix of the McDonnell Douglas MD-80, Boeing 737-800, Airbus A320-200, and Boeing 717-200 aircraft at CVG. The McDonnell Douglas MD-80 is expected to be retired in the near future with the Boeing 737-800 acting as its replacement. The Boeing 717-200 aircraft are relatively old by aircraft standards. It is assumed that the Bombardier CS100 will be the Boeing 717-200s replacement with the shift occurring as orders are delivered. Delta Air Lines has 97 Airbus A321s on order. These aircraft will be added to the fleet where applicable.
- **American Airlines:** Currently, American Airlines utilizes the McDonnell Douglas MD-80 aircraft for air carrier operations at CVG. The McDonnell Douglas MD-80 aircraft are expected to be retired by the end of 2018. These aircraft will initially be replaced with American Airlines' existing Boeing 737-800 and Airbus A319 aircraft. American Airlines has placed 100 orders for the Boeing 737 Max8 aircraft with five of the aircraft already delivered in 2017. The aircraft will likely be utilized interchangeably with the Boeing 737-800 aircraft.
- **United Airlines:** United Airlines deploys an even mix of the Airbus A319 and Airbus A320 aircraft with the occasional operation performed by the Boeing 737-900 aircraft at CVG. United Airlines has orders for the Boeing 737 Max9 aircraft, which will be utilized at CVG as the aircraft are delivered.
- **Southwest Airlines:** Nearly all of Southwest Airlines' flights at CVG utilize the Boeing 737-700 aircraft. Currently, Southwest Airlines has a number of Boeing 737 Max8 and Boeing 737 Max7 aircraft on order. It is expected these aircraft will handle the service at CVG as deliveries are made which are expected to begin in 2017 for the Boeing 737 Max8 and 2019 for the Boeing 737 Max7.
- **Frontier Airlines:** Frontier Airlines uses a mix of Airbus A319, Airbus A320, and Airbus A321 aircraft at CVG. Frontier Airlines has a number of Airbus A320 Neo and Airbus A319 aircraft on order. It is expected the Airbus A320 Neo will handle some of the flights at CVG currently being operated by the current model Airbus A320.

- **Allegiant Air:** Allegiant Air currently uses a mix of McDonnell Douglas MD-80 and Airbus A319 aircraft at CVG. The McDonnell Douglas MD-80 is expected to be replaced by the end of 2018 with the Airbus A320 aircraft.

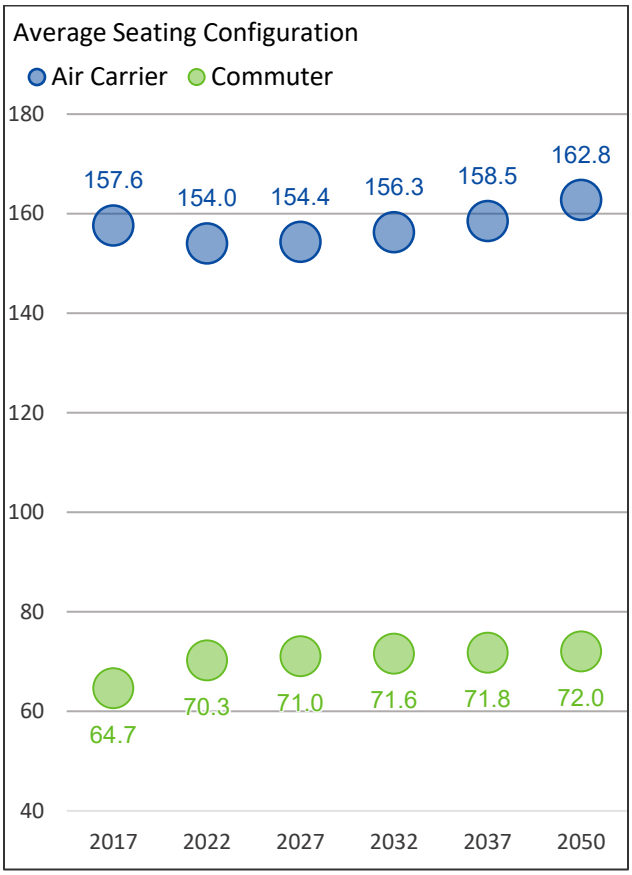
Delta Air Lines, United Airlines, and American Airlines all use regional affiliates to accommodate a majority of their passenger traffic. These regional airlines exclusively use aircraft with fewer than 76 seats, which are called regional jets. Small regional jets (aircraft with 50 or fewer seats) are being retired at an accelerated rate as airlines believe these aircraft are too expensive to fly. A significant portion of the small regional aircraft have already been eliminated from routes at CVG. It is expected that all of the regional partners of the mainline carrier will replace the majority of the small regional aircraft with larger regional aircraft (aircraft with at least 65 seats) at CVG within the next five years.

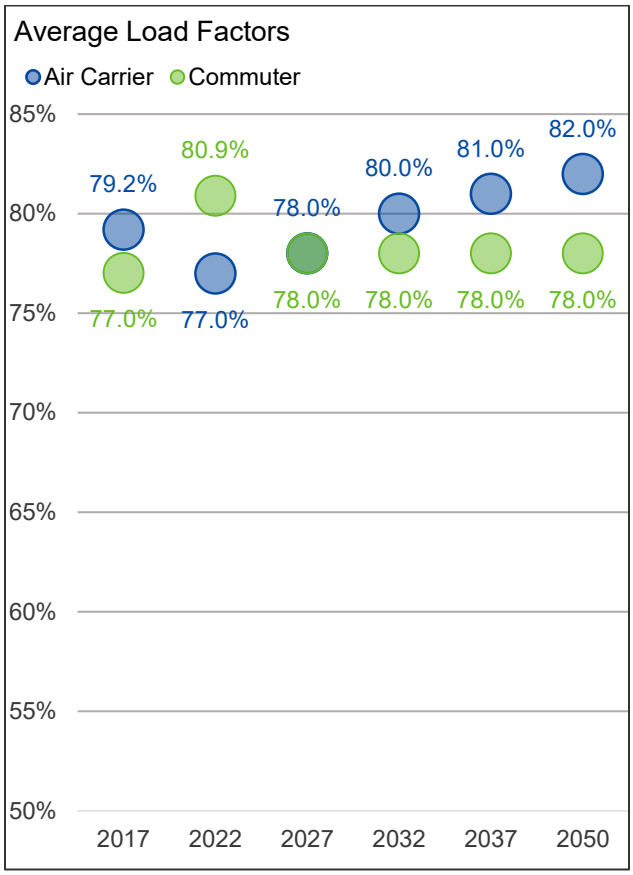
In 2017, domestic air carrier aircraft operations had a scheduled ASPD of 157.6 and an estimated average load factor of 79.2 percent. Based on the fleet plans for airlines providing domestic service at CVG, the ASPD for domestic air carrier flights is projected to increase to 162.8 by 2050 and average load factors are expected to increase to an average of 82.0 percent.

In 2017, domestic commuter aircraft operations had a scheduled ASPD of 64.7 and an estimated average load factor of 77.0 percent. Based on the anticipated reduced utilization of small regional aircraft utilized for domestic service at CVG, the ASPD for domestic commuter flights is project to increase to 72.0 by 2050 and average load factors for domestic commuter flights are expected to increase to 78.0 percent.

Exhibit 4-1, *Domestic Passengers Per Operation Assumptions*, presents ASPD and load factors used to calculate domestic aircraft operations.

EXHIBIT 4-1 DOMESTIC PASSENGERS PER OPERATION ASSUMPTIONS





Sources: USDOT, *Air Carrier Statistics database (T-100)*; OAG Aviation Worldwide Ltd, *OAG Schedules Analyser;* Landrum & Brown analysis

4.1.2.2 International

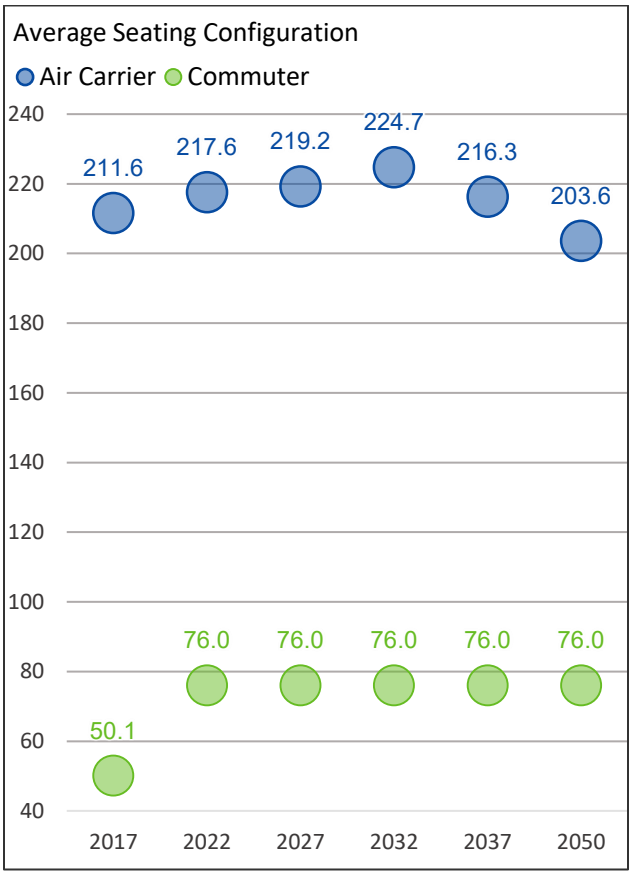
Currently, the Paris Charles de Gaulle Airport (CDG) flight operated by Delta Air Lines utilizes a Boeing 767-300 aircraft. It is assumed that the Airbus A350-900 Neo will act as its replacement. Additional transoceanic international flights in the future will also primarily use wide-body aircraft such as variants of the Boeing 787 aircraft. Flights to and from Canada will almost exclusively use regional aircraft such as the Embraer 175 and Canadair Regional Jet CRJ900. Latin American service, including Mexico, will continue to utilize narrow-body aircraft.

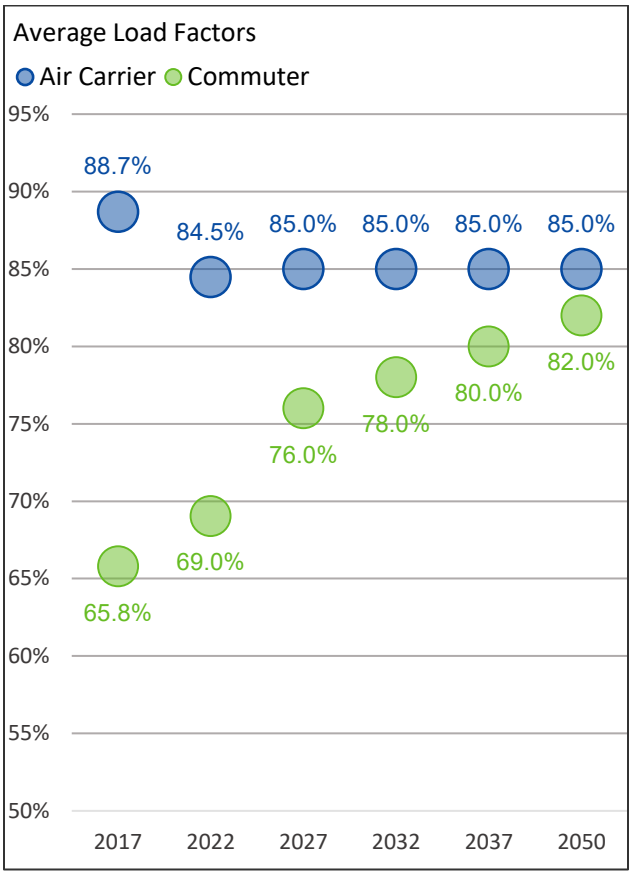
In 2017, international air carrier aircraft operations have a scheduled ASPD of 211.6 and an estimated average load factor of 88.7 percent. Based on the likely destinations for international service at CVG, including additional Canadian and Latin American flights, the ASPD for international air carrier flights is projected to decrease to 203.6 by 2050 and average load factors are expected to decrease to an average of 85.0 percent.

In 2017, international commuter aircraft operations have a scheduled ASPD of 50.1 and an estimated average load factor of 65.8 percent. Based on the fleet plans for airlines providing international service at CVG, the ASPD for international commuter flights is projected to increase to 76.0 by 2050 and average load factors for international commuter flights are expected to increase to 82.0 percent.

Exhibit 4-2, *International Passengers Per Operation Assumptions*, presents ASPD and load factors used to calculate international aircraft operations by air carrier airlines.

EXHIBIT 4-2 INTERNATIONAL PASSENGERS PER OPERATION ASSUMPTIONS





Sources: USDOT, *Air Carrier Statistics database (T-100)*; OAG Aviation Worldwide Ltd, *OAG Schedules Analyser*; Landrum & Brown analysis

4.1.3 Passenger Aircraft Operations Forecast Summary

Based on the foregoing assumptions regarding load factors and ASPD, domestic air carrier aircraft operations will increase from 33,906 in 2017 to 87,860 in 2050, representing an AAGR of 2.9 percent. Domestic commuter aircraft operations are forecast to increase 1.0 percent per annum from 67,248 in 2017 to 94,660 in 2050. International air carrier aircraft operations are forecast to increase significantly from 938 in 2017 to 9,100 in 2050, representing an AAGR of 7.1 percent. Through the forecast period, international commuter aircraft operations are forecast to increase at an AAGR of 3.4 percent, increasing from 2,886 in 2017 to 8,760 in 2050. **Table 4-1, *Passenger Aircraft Operations***, presents the results of the domestic and international passenger aircraft operations forecast.

4.1.4 Fleet Mix

The fleet mix forecasts were developed to match the ASPD assumptions for each segment. The fleet mix forecasts allowed for the calibration of the ASPD and load factor assumptions and, where appropriate, modifications were made prior to finalizing the average ASPD and load factor assumptions. The allocation of passenger departures by aircraft type is shown in **Table 4-2, *Domestic Passenger Fleet Mix***, for domestic departures and **Table 4-3, *International Passenger Fleet Mix***, for international departures.

TABLE 4-1 PASSENGER AIRCRAFT OPERATIONS

Year	Domestic			International			Total
	Air Carrier	Commuter	Total	Air Carrier	Commuter	Total	
Historical							
2007			296,400			8,574	**304,974**
2008			258,512			7,900	**266,412**
2009			196,772			5,384	**202,156**
2010			142,442			4,052	**146,494**
2011			125,824			4,486	**130,310**
2012			107,640			3,804	**111,444**
2013			102,642			3,574	**106,216**
2014			97,048			3,778	**100,826**
2015			94,130			3,302	**97,432**
2016	22,458	74,288	96,746	880	2,706	3,586	**100,332**
2017	33,906	67,248	101,154	938	2,886	3,824	**104,978**
Forecast							
2022	59,020	62,320	121,340	2,152	2,778	4,930	**126,270**
2027	68,660	67,640	136,300	3,220	3,600	6,820	**143,120**
2032	72,360	73,460	145,820	4,260	4,740	9,000	**154,820**
2037	76,780	79,840	156,620	5,580	5,840	11,420	**168,040**
2050	87,860	94,660	182,520	9,100	8,760	17,860	**200,380**
Average Annual Growth Rates							
2007-17			-10.2%			-7.8%	**-10.1%**
2017-22	11.8%	-1.6%	3.7%	18.0%	-0.7%	5.2%	**3.8%**
2022-27	3.1%	1.7%	2.4%	8.4%	5.3%	6.7%	**2.5%**
2027-32	1.1%	1.7%	1.4%	5.8%	5.7%	5.7%	**1.6%**
2032-37	1.2%	1.7%	1.4%	5.5%	4.3%	4.9%	**1.7%**
2037-50	1.0%	1.3%	1.2%	3.8%	3.2%	3.5%	**1.4%**
2017-50	2.9%	1.0%	1.8%	7.1%	3.4%	4.8%	**2.0%**

Sources: KCAB; USDOT, *Air Carrier Statistics database (T-100)*; OAG Aviation Worldwide Ltd, *OAG Schedules Analyser*; Landrum & Brown analysis

TABLE 4-2 DOMESTIC PASSENGER FLEET MIX

Aircraft		Seating Configuration	Departures						
			2016	2017	2022	2027	2032	2037	2050
Air Carrier			**11,229**	**16,953**	**29,510**	**34,330**	**36,180**	**38,390**	**43,930**
Narrow-body			**11,229**	**16,953**	**29,510**	**34,330**	**36,180**	**38,390**	**43,930**
321	Airbus A321	219	602	669	1,235	1,575	1,639	1,714	1,901
757	Boeing 757-200,-300	188	210	56	2	0	0	0	0
7M9	Boeing 737Max 9	185	0	0	38	90	93	99	104
3N0	Airbus A320neo	186	0	0	388	845	1,851	4,084	4,758
739	Boeing 737-900	180	129	206	185	275	415	486	562
7M8	Boeing 737Max 8	174	0	5	124	439	1,915	3,797	8,611
320	Airbus A320-200	176	2,661	3,639	5,663	5,739	5,366	3,661	4,323
738	Boeing 737-800	163	1,417	2,491	6,100	6,491	6,587	6,931	8,215
M90	Boeing (Douglas) MD-90	160	166	57	0	0	0	0	0
3N9	Airbus A319neo	156	0	0	251	751	799	855	995
M80	Boeing (Douglas) MD-80,-82,-83	154	4,968	4,437	266	0	0	0	0
319	Airbus A319	150	1,014	2,647	2,874	2,385	2,381	2,599	3,159
7M7	Boeing 737Max 7	150	0	0	17	269	733	1,519	3,514
737	Boeing 737-700	143	1	1,617	9,116	12,055	10,824	8,876	3,544
CS1	Bombardier CS100	110	0	0	496	1,062	1,066	1,072	1,084
717	Boeing 717-200	110	61	1,129	529	0	0	0	0
E90	Embraer E190	100	0	0	2,226	2,354	2,511	2,697	3,160
Commuter			**37,144**	**33,625**	**31,160**	**33,820**	**36,730**	**39,920**	**47,330**
Large Regional			**20,072**	**21,916**	**28,459**	**31,846**	**35,305**	**38,589**	**46,082**
CR9	Canadair Regional Jet 900	76	11,859	10,239	11,412	13,255	15,030	16,515	19,854
E75	Embraer 175	76	2,082	3,723	6,102	6,653	7,225	7,853	9,310

Aircraft		Seating Configuration	Departures						
			2016	2017	2022	2027	2032	2037	2050
E70	Embraer 170	70	1,438	1,871	1,988	2,196	2,384	2,592	3,073
CR7	Canadair Regional Jet 700	67	4,693	6,083	8,957	9,742	10,666	11,629	13,845
Small Regional			**17,072**	**11,709**	**2,701**	**1,974**	**1,425**	**1,331**	**1,248**
CRJ	Canadair Regional Jet 200	50	9,049	6,397	1,328	995	542	448	365
ERJ	Embraer 135/140/145	50	7,644	4,795	855	461	365	365	365
FRJ	Fairchild Dornier 328jet	30	256	0	0	0	0	0	0
BE4	Hawker 400 Beechjet	7	123	517	518	518	518	518	518
Grand Total			**48,373**	**50,578**	**60,670**	**68,150**	**72,910**	**78,310**	**91,260**

Sources: KCAB; USDOT, *Air Carrier Statistics database (T-100)*; OAG Aviation Worldwide Ltd, *OAG Schedules Analyser*; Landrum & Brown analysis

TABLE 4-3 INTERNATIONAL PASSENGER FLEET MIX

Aircraft		Seating Configuration	Departures						
			2016	2017	2022	2027	2032	2037	2050
Air Carrier			**440**	**469**	**1,076**	**1,610**	**2,130**	**2,790**	**4,550**
Wide-body			**337**	**329**	**667**	**953**	**1,214**	**1,320**	**1,474**
789	Boeing 787-900	291	0	0	78	364	520	626	777
33N	Airbus A330-900 Neo	270	0	0	0	0	329	329	329
788	Boeing 787-800	214	0	0	260	260	365	365	368
763	Boeing 767-300	226	337	329	329	329	0	0	0
Narrow-body			**103**	**140**	**409**	**657**	**916**	**1,470**	**3,076**
321	Airbus A321	200	25	48	208	208	274	348	368
320	Airbus A320	184	30	26	155	220	289	373	606
738	Boeing 737-800	160	0	4	8	167	271	641	1,911
319	Airbus A319	156	48	62	38	62	82	108	191
M80	Boeing (Douglas) MD-80,-88	153	25	48	0	0	0	0	0
Commuter			**1,353**	**1,444**	**1,387**	**1,800**	**2,370**	**2,920**	**4,380**
Large Regional			**0**	**6**	**1,387**	**1,800**	**2,370**	**2,920**	**4,380**
CR9	Canadair Regional Jet 900	76	0	5	447	580	763	940	1,410
E75	Embraer E175	76	0	1	940	1,220	1,607	1,980	2,970
Small Regional			**1,353**	**1,438**	**0**	**0**	**0**	**0**	**0**
CRJ	Canadair Regional Jet	50	1,353	1,438	0	0	0	0	0
Grand Total			**1,793**	**1,912**	**2,463**	**3,410**	**4,500**	**5,710**	**8,930**

Sources: KCAB; USDOT, *Air Carrier Statistics database (T-100)*; OAG Aviation Worldwide Ltd, *OAG Schedules Analyser*; Landrum & Brown analysis

4.2 Freighter Aircraft Operations

4.2.1 Methodology

The freighter aircraft operations are a product of the cargo throughput forecast and assumed average air cargo tons per operation. Nearly all of the air cargo (99.5 percent in 2017) is handled by dedicated freighter carriers.

For non-traditional operators, such as Amazon Air, the aircraft operations through 2028 are based on the input provided by cargo operators. The remaining freighter aircraft operations forecast was derived from the air cargo throughput forecast in a similar fashion as the passenger aircraft operations.

4.2.2 Tons Per Operation

In 2017, three-fourths all of the freighter aircraft operations were conducted by DHL or their affiliates. The airline uses a mix of variants of the Boeing 737, Boeing 757, Boeing 747, Boeing 777, and Boeing 767 aircraft. It is assumed that some of the older aircraft such as the Boeing 757-200 and the Boeing 737-400 will be retired at some point during the forecast period. These aircraft will likely be replaced by aircraft of similar size and payload. Traditional operators, including DHL, are handling approximately 28.1 tons per aircraft operation, which is well below the average available payload. It is assumed that the average tons per aircraft of the current cargo operations will increase to 32.0 tons by 2050.

Amazon Air is expected to use primarily wide-body aircraft such as the Airbus A330-200 and Boeing 767-300 during the early stages of operations but introduce narrow-bodies such as the Airbus A321 and Boeing 737-800 by the ultimate build-out of their facilities at CVG. As such, the tons per aircraft operation for the airline is expected to decrease from an estimated 39.1 tons per operation in 2017 to 25.0 tons by 2050.

4.2.3 Freighter Aircraft Operations Forecast Summary

Freighter aircraft operations are forecast to increase from 36,004 in 2017 to 165,290 in 2050, representing an AAGR of 4.7 percent.

4.2.4 Fleet Mix

As outlined above, outside of some replacements, the existing cargo operators at CVG will not likely change their fleet materially. However, the construction of Amazon Air's hub does result in an increased share of air carrier freighters at CVG. The allocation of freighter aircraft departures by aircraft type is presented in **Table 4-4, *Freighter Fleet Mix***.

TABLE 4-4 FREIGHTER FLEET MIX

Aircraft		Departures						
		2016	2017	2022	2027	2032	2037	2050
Air Carrier		**12,482**	**16,440**	**31,245**	**49,759**	**58,434**	**64,015**	**79,936**
Wide-body		**9,734**	**13,584**	**27,197**	**35,877**	**42,165**	**46,383**	**57,236**
306	Airbus A300-600	887	921	1,254	1,357	1,404	1,449	1,599
310	Airbus A310	6	6	8	9	9	10	10
748	Boeing 747-800	697	724	985	1,066	1,102	1,139	1,256
747	Boeing 747-200,-400	1,183	1,230	1,988	2,497	2,737	2,910	3,417
767	Boeing 767-200,-300	6,544	10,270	19,870	21,000	24,505	26,954	32,766
332	Airbus A330-200	0	0	1,719	8,077	10,192	11,486	15,127
777	Boeing 777	417	433	1,373	1,871	2,216	2,435	3,061
Narrow-body		**2,748**	**2,856**	**4,048**	**13,882**	**16,269**	**17,632**	**22,700**
722	Boeing 727-200	165	172	234	253	261	270	298
321	Airbus A321	0	0	313	5,339	6,737	7,592	10,000
738	Boeing 737-800	0	0	369	899	1,446	2,029	2,401
737	Boeing 737-400	1,332	1,384	1,827	6,478	7,398	7,741	10,001
757	Boeing 757-200	1,251	1,300	1,305	913	427	0	0
Commuter		**1,503**	**1,562**	**2,123**	**2,298**	**2,375**	**2,458**	**2,710**
Small Regional		**1,503**	**1,562**	**2,123**	**2,298**	**2,375**	**2,458**	**2,710**
BEH	Beechcraft 1900	343	357	485	525	543	561	620
CN1	Cessna 208 Caravan	20	21	28	31	32	33	36
EM2	Embraer EMB 120 Brasilia	243	252	343	186	192	199	219
SH6	Shorts 360	329	342	465	252	260	269	297
SW4	Fairchild Swearingen Merlin	506	526	715	387	400	414	456
CRJ	Canadair Regional Jet CRJ 200	0	0	32	885	915	946	1,043
Other Commuter		**62**	**64**	**73**	**55**	**32**	**33**	**36**
Grand Total		**13,985**	**18,002**	**33,368**	**52,057**	**60,809**	**66,473**	**82,646**

Sources: KCAB; Landrum & Brown analysis

4.3 Aircraft Operations

4.3.1 Air Taxi and General Aviation

There are a number of approaches to developing GA and air taxi aircraft operations forecasts ranging from economic, trend or time series, and market share forecasts. During the forecast development, there was no reasonable fit of the GA and air taxi aircraft operations to time series or socio-economic variables.

It was assumed that GA and air taxi aircraft operations would increase at a rate consistent with the national trends. Therefore, the AAGR for active GA and air taxi hours flown from the FAA Aerospace Forecast was applied to the number of aircraft operations in 2017 for GA and air taxi aircraft operations at CVG. GA and air taxi aircraft operations at CVG are projected to increase from 9,349 in 2017 to 12,720 in 2050, representing an AAGR of 0.9 percent.

Jet aircraft account for a majority (91.4 percent) of the GA and air taxi aircraft activity at CVG. It was assumed that the current categorization of aircraft types (jet, turboprop, piston, and helicopter) for GA and air taxi aircraft operations would be remain consistent through the forecast period. **Table 4-5, *Air Taxi and General Aviation Fleet Mix***, presents the GA and air taxi forecast by aircraft type.

TABLE 4-5 AIR TAXI AND GENERAL AVIATION FLEET MIX

Type	Representative Aircraft	Departures						
		2016	2017	2022	2027	2032	2037	2050
Jet	CRJ9, CRJ7, CRJ2	3,994	4,283	4,478	4,689	4,917	5,145	5,813
Turboprop	BE2, BE9L, P180	152	159	170	178	187	196	221
Piston	C310, C172, SR22	220	229	247	258	271	284	320
Helicopter	EC35	4	4	5	5	5	5	6
Total		**4,370**	**4,675**	**4,900**	**5,130**	**5,380**	**5,630**	**6,360**

Sources: KCAB; *Flight Track Data for 2017*; Landrum & Brown analysis

4.3.2 Based Aircraft Forecast

In 2017, there were 13 based aircraft at CVG. Currently, the FBO does not include facilities to process arriving international GA passengers. The new general aviation facility (GAF) that includes CBP capabilities is scheduled to be constructed in 2018. It is assumed that the construction of such facilities would attract some companies to base their aircraft at CVG which are presumed to be exclusively jet aircraft. These Cincinnati bound flights currently clear customs and immigration at other airports before arriving at CVG. Therefore, with the ability to clear customs and immigration at CVG, it was assumed that based aircraft jets would increase 25.0 percent over the next five years. Afterwards, it was assumed that growth of based jets would increase at the national average of 2.2 percent as presented in the FAA Aerospace Forecast. The remaining based aircraft, comprised of piston and turboprop aircraft, will remain at the 2017 level throughout the forecast period. The result of the based aircraft forecast is that based aircraft at CVG will increase from 13 in 2017 to 27 in 2050. **Table 4-6, *Based Aircraft Forecast***, presents the based aircraft forecast.

TABLE 4-6 BASED AIRCRAFT FORECAST

Type	Based Aircraft					
	2017	2022	2027	2032	2037	2050
Jet	10	13	15	16	18	24
Multi-Engine	1	1	1	1	1	1
Single-Engine	2	2	2	2	2	2
Total	**13**	**16**	**18**	**19**	**21**	**27**

Sources: *FAA Form 5010*; Landrum & Brown 2017

4.3.3 Military

Military aircraft operations make up a very small share of the aircraft operations at CVG. There were 132 military aircraft operations in 2017, representing 0.1 percent of the total aircraft operations. Military operations were held flat over the forecast period, equal to the 2017 aircraft operations.

4.4 Total Aircraft Operations

The total aircraft operations forecast is the aggregation of the passenger, freighter, air taxi/GA, and military aircraft operations forecasts. Total aircraft operations are projected to increase from 150,463 in 2017 to 378,520 in 2050, representing an AAGR of 2.8 percent. **Table 4-7, *Total Aircraft Operations Forecast***, presents the aircraft operations forecast by segment through the forecast period.

TABLE 4-7 TOTAL AIRCRAFT OPERATIONS FORECAST

Year	Passenger		Cargo	Air Taxi/ General Aviation	Military	Grand Total
	Domestic	International				
Historical						
2007	296,400	8,574	7,938	15,005	152	328,069
2008	258,512	7,900	5,452	13,457	163	285,484
2009	196,772	5,384	10,820	9,540	161	222,677
2010	142,442	4,052	20,212	10,767	124	177,597
2011	125,824	4,486	21,564	9,909	129	161,912
2012	107,640	3,804	23,440	8,342	221	143,447
2013	102,642	3,574	23,592	7,673	190	137,671
2014	97,048	3,778	24,598	8,005	89	133,518
2015	94,130	3,302	26,308	9,350	135	133,225
2016	96,746	3,586	27,970	8,740	183	137,225
2017	101,154	3,824	36,004	9,349	132	150,463
Forecast						
2022	121,340	4,930	66,740	9,800	130	202,940
2027	136,300	6,820	104,110	10,260	130	257,620
2032	145,820	9,000	121,620	10,760	130	287,330
2037	156,620	11,420	132,950	11,260	130	312,380
2050	182,520	17,860	165,290	12,720	130	378,520
Average Annual Growth Rates						
2007-17	-10.2%	-7.8%	16.3%	-4.6%	-1.4%	-7.5%
2017-22	3.7%	5.2%	13.1%	0.9%	-0.3%	6.2%
2022-27	2.4%	6.7%	9.3%	0.9%	0.0%	4.9%
2027-32	1.4%	5.7%	3.2%	1.0%	0.0%	2.2%
2032-37	1.4%	4.9%	1.8%	0.9%	0.0%	1.7%
2037-50	1.2%	3.5%	1.7%	0.9%	0.0%	1.5%
2017-50	1.8%	4.8%	4.7%	0.9%	0.0%	2.8%

Sources: KCAB; USDOT, *Air Carrier Statistics database (T-100)*; OAG Aviation Worldwide Ltd, *OAG Schedules Analyser*; Landrum & Brown analysis

4.5 Aircraft Operations Forecast Scenarios

The results of the enplaned passenger and cargo throughput scenarios were used to develop high and low scenarios for the aircraft operations forecast. The alternative scenarios are described in the following sections.

4.5.1 High Case Scenario

The high case scenarios for the enplaned passenger and cargo throughput forecasts were used to develop the high case aircraft operations forecast. The high case assumes that low-cost and ultra-low-cost carriers will have an increased presence at CVG when compared to the baseline. These carriers operate with fleets that are entirely comprised of narrow-body aircraft. Additionally, these narrow-body aircraft have a higher capacity than the full-service carriers' counterparts have and are generally operated with a higher percentage of occupancy. Therefore, the average number of persons per aircraft will increase under the high case scenario resulting in a small decrease in passenger aircraft operations. No changes were made to the assumptions regarding cargo tonnage per operations. The cargo freighter operations are higher beginning in 2027. The result is that there will be an additional 77,170 aircraft operations by 2050 when compared to the baseline.

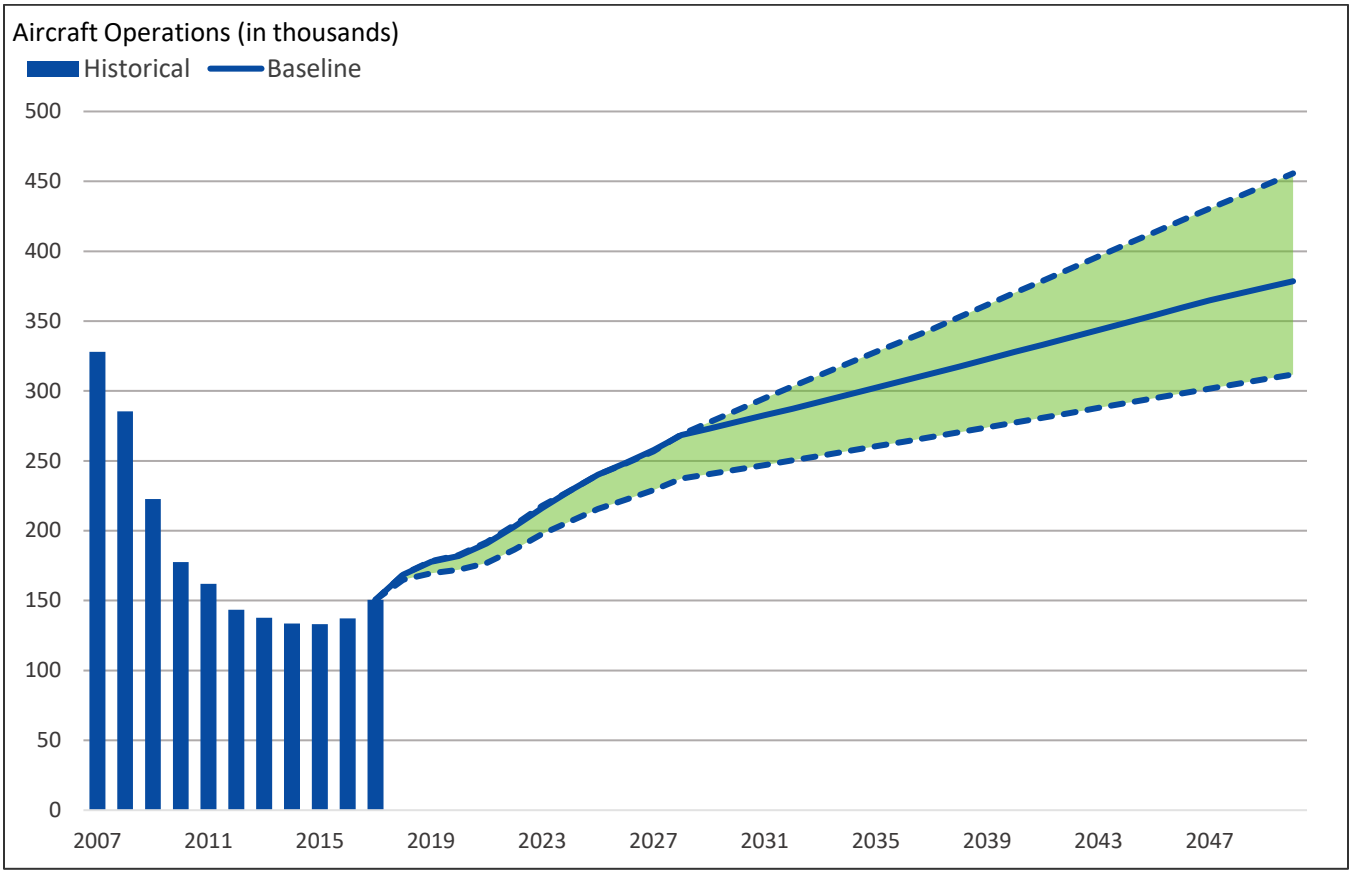
4.5.2 Low Case Scenario

The low case scenarios for the enplaned passenger and cargo throughput forecasts were used to develop the low case aircraft operations forecast. No changes were made to the assumptions regarding ASPD, load factor, or cargo tonnage per operations. The result is that there will be 66,710 fewer aircraft operations by 2050 when compared to the baseline.

4.5.3 Summary of Scenario Forecasts

The aircraft operations forecast scenarios provide a range of 311,810 to 455,690 in 2050. **Exhibit 4-3, *Comparison of Aircraft Operations Forecast Scenarios***, provides a comparison of the forecast scenarios and a more detailed overview of the scenarios is provided in **Table 4-8, *Summary of Aircraft Operations Forecast Scenarios***.

EXHIBIT 4-3 COMPARISON OF AIRCRAFT OPERATIONS FORECAST SCENARIOS



Sources: KCAB; USDOT, *Air Carrier Statistics database (T-100)*; OAG Aviation Worldwide Ltd, *OAG Schedules Analyser*; Landrum & Brown analysis

TABLE 4-8 SUMMARY OF AIRCRAFT OPERATIONS FORECAST SCENARIOS

Year	High				Baseline				Low			
	Passengers	Cargo	Other	Total	Passengers	Cargo	Other	Total	Passengers	Cargo	Other	Total
Historical												
2007	304,974	7,938	15,157	328,069	304,974	7,938	15,157	328,069	304,974	7,938	15,157	328,069
2008	266,412	5,452	13,620	285,484	266,412	5,452	13,620	285,484	266,412	5,452	13,620	285,484
2009	202,156	10,820	9,701	222,677	202,156	10,820	9,701	222,677	202,156	10,820	9,701	222,677
2010	146,494	20,212	10,891	177,597	146,494	20,212	10,891	177,597	146,494	20,212	10,891	177,597
2011	130,310	21,564	10,038	161,912	130,310	21,564	10,038	161,912	130,310	21,564	10,038	161,912
2012	111,444	23,440	8,563	143,447	111,444	23,440	8,563	143,447	111,444	23,440	8,563	143,447
2013	106,216	23,592	7,863	137,671	106,216	23,592	7,863	137,671	106,216	23,592	7,863	137,671
2014	100,826	24,598	8,094	133,518	100,826	24,598	8,094	133,518	100,826	24,598	8,094	133,518
2015	97,432	26,308	9,485	133,225	97,432	26,308	9,485	133,225	97,432	26,308	9,485	133,225
2016	100,332	27,970	8,923	137,225	100,332	27,970	8,923	137,225	100,332	27,970	8,923	137,225
2017	104,978	36,004	9,481	150,463	104,978	36,004	9,481	150,463	104,978	36,004	9,481	150,463
Forecast												
2018	109,590	49,640	9,570	168,800	109,340	49,640	9,570	168,550	109,040	46,250	9,570	164,860
2019	114,290	54,310	9,660	178,260	113,790	54,310	9,660	177,760	110,240	49,560	9,660	169,460
2020	116,880	56,070	9,750	182,700	116,150	56,070	9,750	181,970	111,970	50,420	9,750	172,140
2021	122,700	59,310	9,840	191,850	121,740	59,310	9,840	190,890	114,480	52,450	9,840	176,770
2022	127,470	66,740	9,930	204,140	126,270	66,740	9,930	202,940	118,570	58,000	9,930	186,500
2027	138,620	107,870	10,390	256,880	143,120	104,110	10,390	257,620	131,320	87,280	10,390	228,990
2032	150,380	141,910	10,890	303,180	154,820	121,620	10,890	287,330	138,420	100,970	10,890	250,280
2037	161,540	171,200	11,390	344,130	168,040	132,950	11,390	312,380	146,200	109,470	11,390	267,060
2050	197,000	245,840	12,850	455,690	200,380	165,290	12,850	378,520	165,200	133,760	12,850	311,810
Average Annual Growth Rates												
2007-17	-10.1%	16.3%	-4.6%	-7.5%	-10.1%	16.3%	-4.6%	-7.5%	-10.1%	16.3%	-4.6%	-7.5%
2017-22	4.0%	13.1%	0.9%	6.3%	3.8%	13.1%	0.9%	6.2%	2.5%	10.0%	0.9%	4.4%
2022-27	1.7%	10.1%	0.9%	4.7%	2.5%	9.3%	0.9%	4.9%	2.1%	8.5%	0.9%	4.2%
2027-32	1.6%	5.6%	0.9%	3.4%	1.6%	3.2%	0.9%	2.2%	1.1%	3.0%	0.9%	1.8%
2032-37	1.4%	3.8%	0.9%	2.6%	1.7%	1.8%	0.9%	1.7%	1.1%	1.6%	0.9%	1.3%
2037-50	1.5%	2.8%	0.9%	2.2%	1.4%	1.7%	0.9%	1.5%	0.9%	1.6%	0.9%	1.2%
2017-50	1.9%	6.0%	0.9%	3.4%	2.0%	4.7%	0.9%	2.8%	1.4%	4.1%	0.9%	2.2%

Sources: KCAB; USDOT, *Air Carrier Statistics database (T-100)*; OAG Aviation Worldwide Ltd, *OAG Schedules Analyser*; Landrum & Brown analysis

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4.5.3.1 Critical Aircraft Determination

In June 2017, FAA published Advisory Circular (AC) 150-5000-17, *Critical Aircraft and Regular Use Determination,* to provide guidance on the use of the design aircraft or critical aircraft in facility planning and design studies, and related FAA decision making for federally obligated airports. This AC establishes a common, uniform threshold for the number of annual aircraft operations required to identify the critical aircraft for all deliberations of the FAA Office of Airports, inclusive of planning and environmental, design and engineering, and financial decision-making regarding airport development. Section 1.2.1 of the AC states the following in regard to critical aircraft determination:

"The critical aircraft is the most demanding aircraft type, or group of aircraft with similar characteristics, that make use of the airport. Regular use is 500 annual operations, including both itinerant and local operations but excluding touch-and-go operations. An operation is either a takeoff or landing."

AC 150/5300-13A Change 1, *Airport Design*, provides a definition for an aircraft's airport reference code (ARC). ARC has two components; the aircraft approach category (AAC) and the airplane design group (ADG). The AAC is depicted by a letter and is determined by the reference landing speed (V_{REF}) or approach speed of the aircraft. The ADG is depicted by a Roman numeral and is based on the physical characteristics of the aircraft, i.e. wingspan and tail height of the aircraft, whichever is more restrictive. The freighter variant of the Boeing 747-800 had over 500 annual operations in 2017. The Boeing 747-800 has an approach speed of 161 knots which categorizes the aircraft as an AAC Code D. The Boeing 747-800 has a length of 250 feet and 2 inches; a wingspan of 224 feet and 5 inches; and a tail height of 63 feet and 1 inch. Based on these dimensions the Boeing 747-800 is categorized as ADG Code VI. No other aircraft with more than 500 annual operations, either existing or forecasted, is more restrictive in terms of runways requirements or for airport design purposes. Therefore, the Boeing 747-800 is the critical aircraft or design aircraft for CVG.

5 Peak Period Forecasts

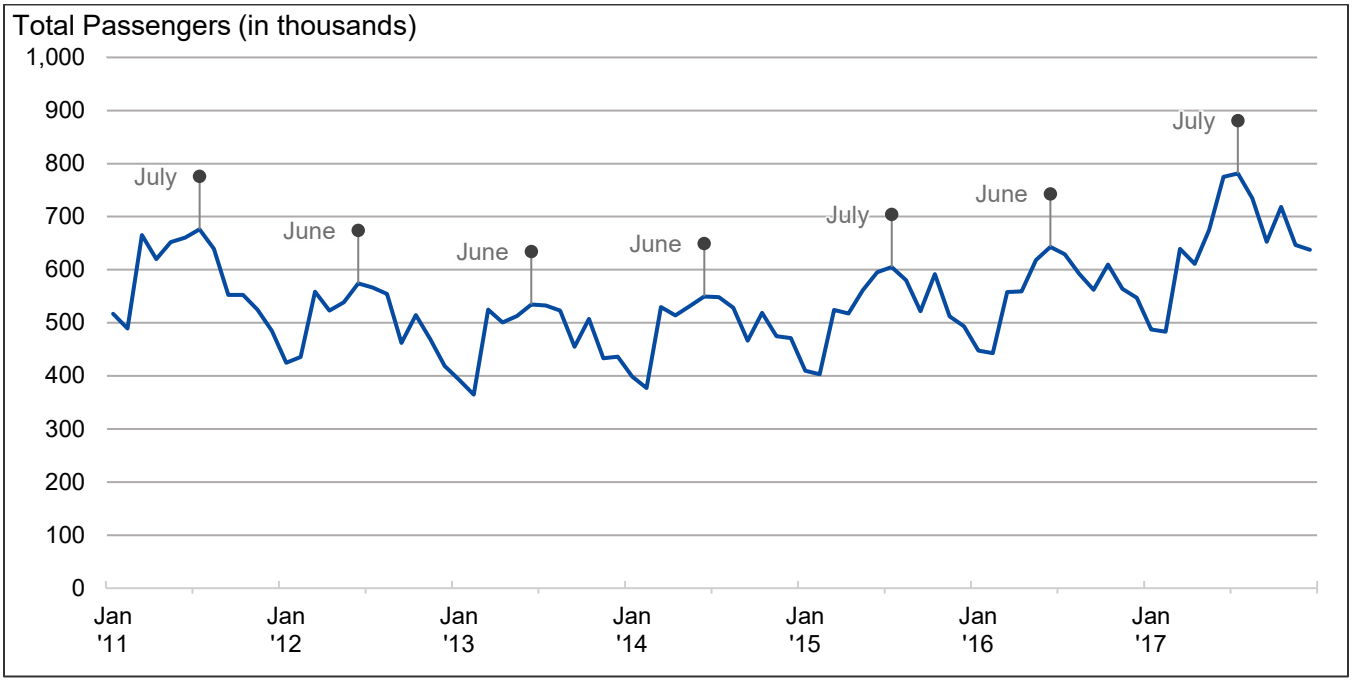
The traffic demand patterns imposed upon an airport are subject to seasonal, monthly, daily, and hourly variations. Peaking characteristics are critical in the assessment of existing facilities and airfield components to determine their ability to accommodate forecast increases in passenger and operational activity throughout the forecast period.

The annual passenger and aircraft operations forecasts for CVG were converted into month, daily, and peak hour equivalents. The peak hour aircraft operations were developed for passenger; freighter; air taxi and general aviation; military; and total aircraft operations.

5.1 Monthly Seasonality

Monthly enplaned passenger data from CVG was used to determine the peak month for enplaned passengers. CVG's busy period for enplaned passengers occurs during the summer months of June and July. Over the past five years, both June and July have had 9.4 percent of the total annual enplaned passengers. **Exhibit 5-1, *Monthly Enplaned Passengers***, graphically depicts the monthly seasonality for enplaned passengers at CVG.

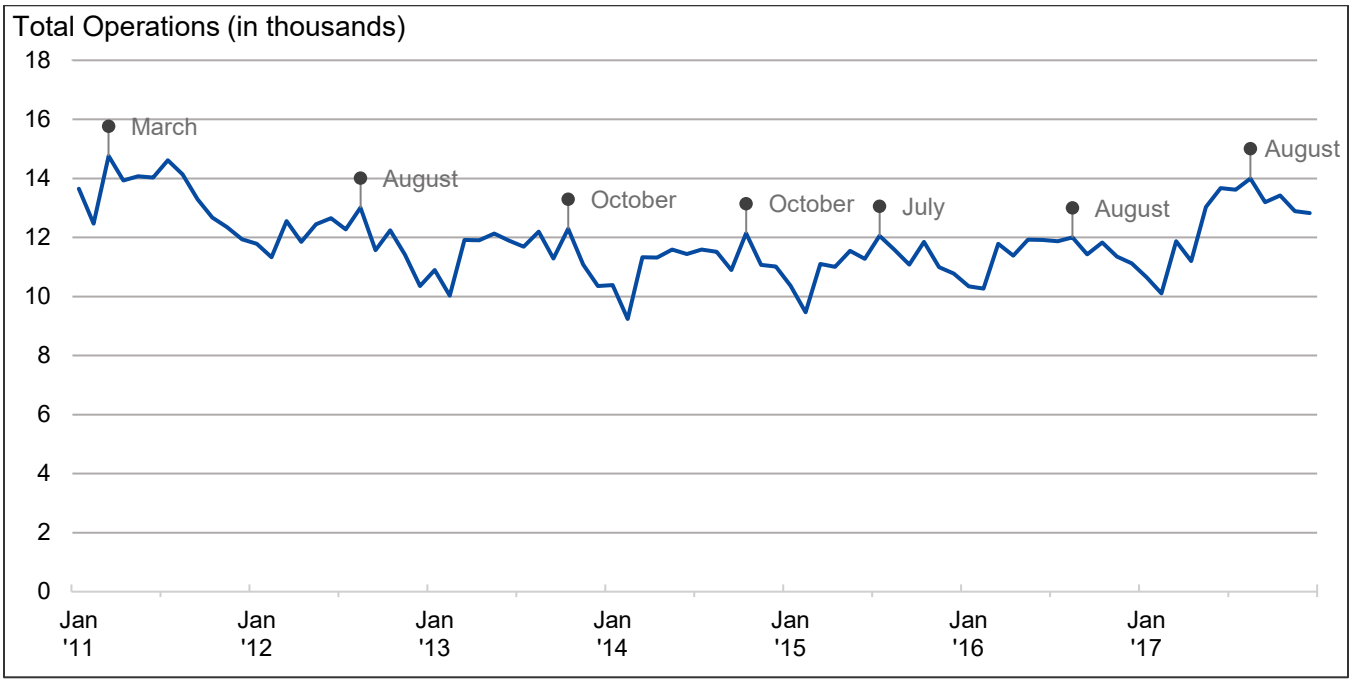
EXHIBIT 5-1 MONTHLY ENPLANED PASSENGERS



Source: KCAB

Although June and July are the peak months for enplaned passengers, they are rarely the peak months for aircraft operations. Total aircraft operations tend to be more random than enplaned passengers. In the fourth quarter, freighter operations tend to increase in order to meet demand for the holiday season. GA and air taxi service tends to be more random than commercial service, so although they make up a smaller percent of the overall traffic, they tend to have a more significant impact in the seasonality of aircraft operations. **Exhibit 5-2, *Monthly Aircraft Operations***, graphically depicts the monthly seasonality for aircraft operations at CVG.

EXHIBIT 5-2 MONTHLY AIRCRAFT OPERATIONS



Source: KCAB

5.2 Daily Patterns

The FAA recommends the use of the average day of the peak month, typically referred to as the peak month average day (PMAD), for purposes of physical planning. As an alternative, the peak month average weekday (PMAWD) can be used at airports that have domestic service as the predominant activity and at airports where weekend activity is consistently less than weekday activity.

As demonstrated above, June and July are the peak months for enplaned passengers. From 2014 through 2016, July had more passenger operations than June. Additionally, although July typically has slightly less than June in terms of monthly-enplaned passengers, in 2016 it had more enplaned passengers per average weekday when excluding the Fourth of July holiday. In 2017, July was the peak month in terms of passengers. Therefore, July was selected as the peak month for CVG.

Seating information is included in the scheduling data from OAG. This data was used as a proxy to determine the 2017 PMAWD as passenger data was not available at the daily level. PMAWD was used as the design day at CVG because the average weekday had 6.8 percent more seats than the average weekend. Operations at CVG were significantly lower on the Fourth of July holiday than the rest of the month and was removed from the analysis for determining the PMAWD. Wednesday, July 19, 2017 was selected because it most closely resembles the average weekday for the month.

5.3 Design Day Flight Schedules

A design day flight schedule (DDFS) for 2017 was developed to determine the hourly profile of traffic at CVG. In order to develop a DDFS that was representative of the traffic at CVG to include scheduled and unscheduled service, a combination of OAG schedules and historical radar data was used.

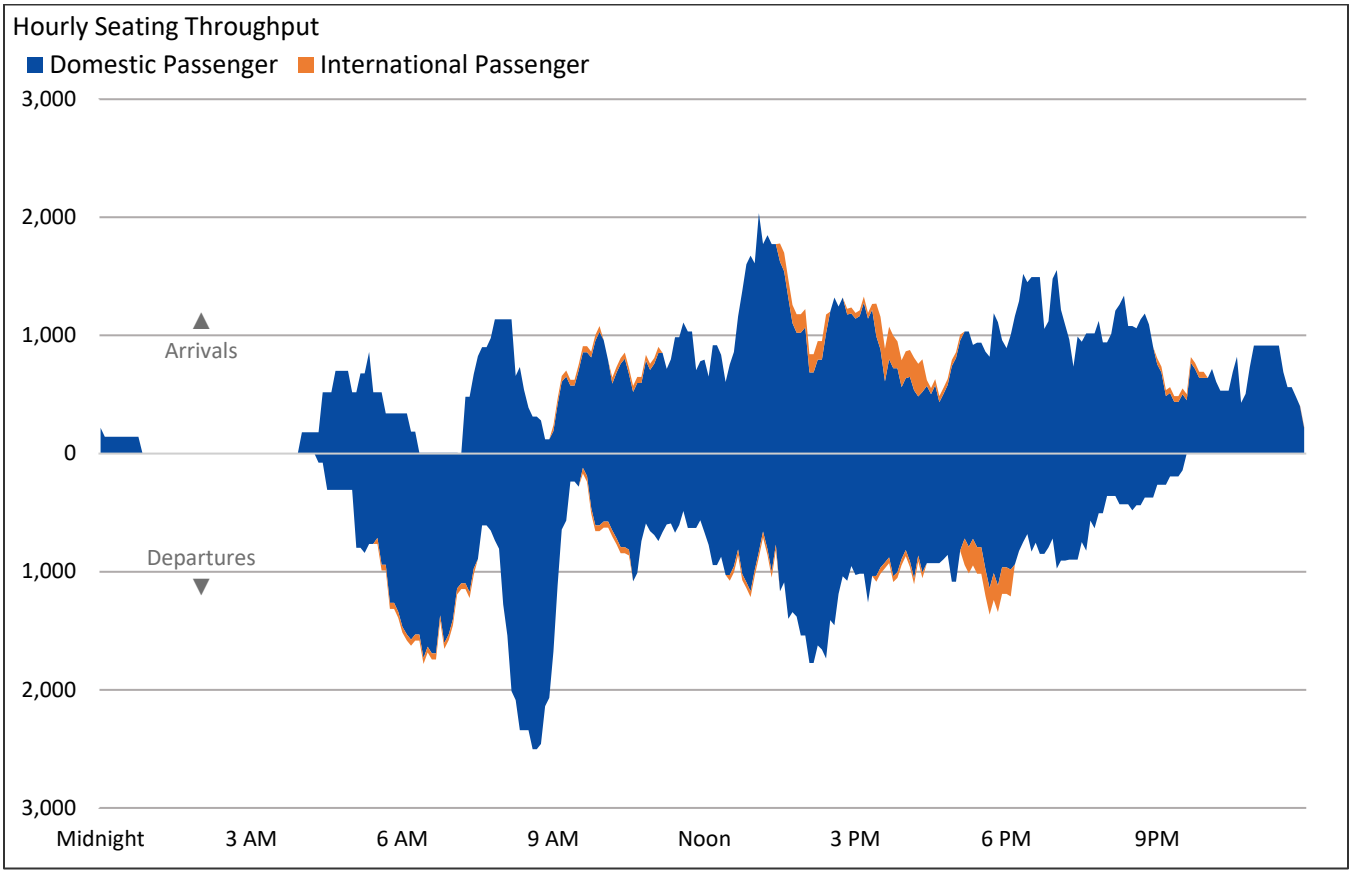
OAG data for the design day provided the scheduled passenger aircraft operations. The passenger aircraft operations from OAG were supplemented with radar data for cargo, air taxi, and GA aircraft operations. Accurate military data was not available in the radar data so additional flights were added to the DDFS to account for the average day.

5.4 Hourly Profiles

The DDFS was analyzed to determine the hourly profile at CVG to identify the periods of time that traffic is most concentrated. Using a clock hour as the basis for peak periods does not allow for peak periods of traffic that occurs across clock hours to be identified, i.e. traffic occurring late in the first hour combined with the traffic at the beginning of the next hour. Therefore, a rolling 60-minute hour approach was used to determine the design day profile. In this case, aircraft operations were categorized into one of 288 five-minute buckets, or bins, that occur during the given day. The sum of twelve sequential buckets represents a rolling 60-minute hour. In 2017, the peak for departing seats occurred during the second morning departure push while the arrival peak occurs during the midday. **Exhibit 5-3, *Rolling 60-Minute Seating Profile, July 19, 2017***, graphically presents the rolling 60-minute hour profile for scheduled passenger seats in the DDFS for 2017.

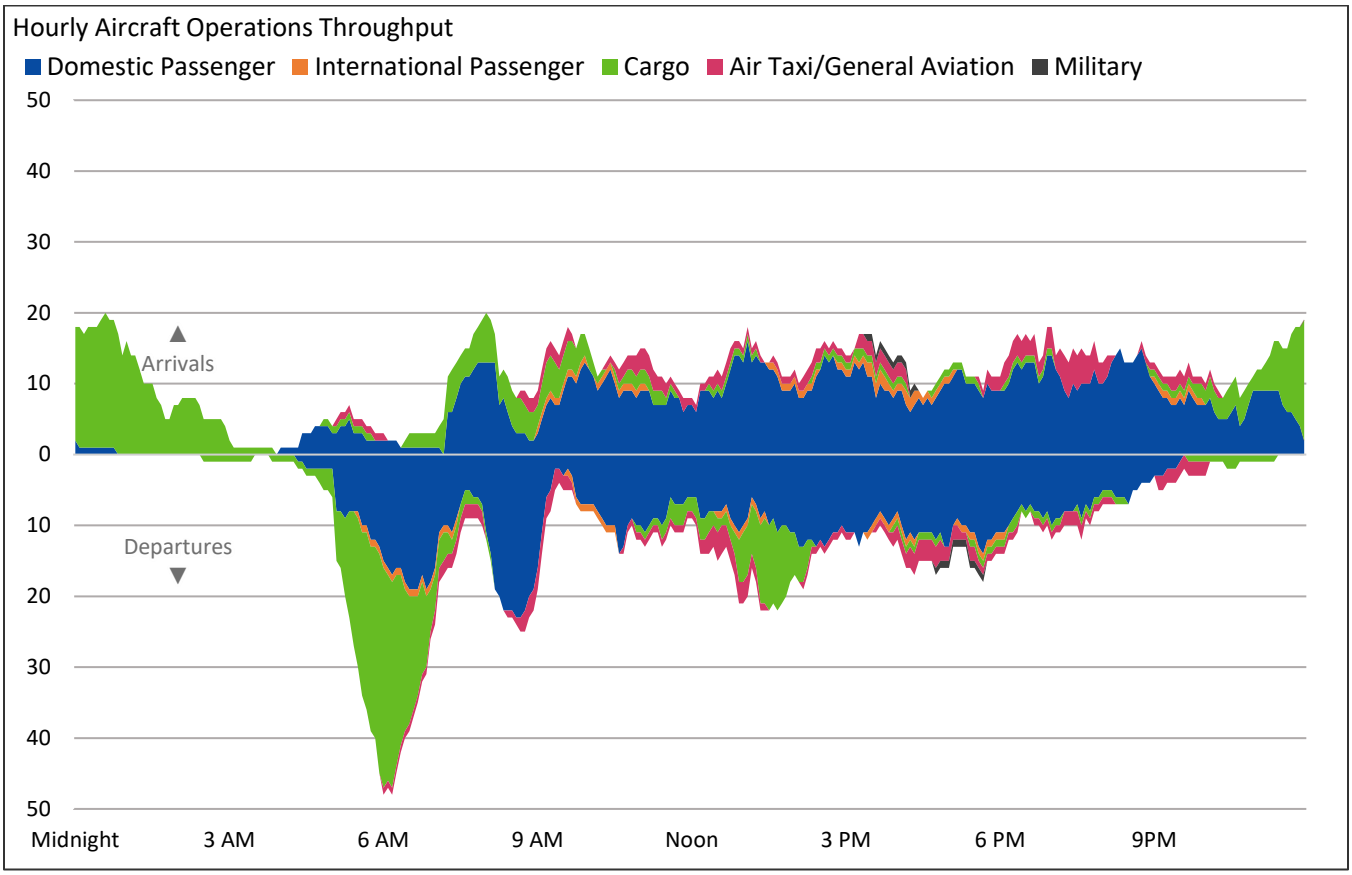
Exhibit 5-4, *Rolling 60-Minute Aircraft Operations Profile, July 19, 2017*, graphically presents the total aircraft operations (including scheduled passengers, cargo, air taxi, GA, and military) for the rolling 60-minute hours for the 2017 DDFS. As shown in the profile, the peaks for aircraft operations are dependent on freighter operations as the arrival peak occurs just past midnight and the departure peak is during the first morning departure peak.

EXHIBIT 5-3 ROLLING 60-MINUTE SEATING PROFILE, JULY 19, 2017



Sources: OAG Aviation Worldwide Ltd, *OAG Schedules Analyser*; Landrum & Brown analysis

EXHIBIT 5-4 ROLLING 60-MINUTE AIRCRAFT OPERATIONS PROFILE, JULY 19, 2017



Sources: OAG Aviation Worldwide Ltd, *OAG Schedules Analyser*; *Flight Track Data for 2017*; Landrum & Brown analysis

5.5 Derivative Forecast

Information regarding the peak month, average day, and peak hour from the DDFS was used to formulate metrics to determine the peak period forecast. These metrics include the peak month as a percent of the annual, the design day as a percent of the peak month, and the peak hour as a percent of the design day. These peak period metrics were adjusted based on scheduling data for Southwest Airlines at peer airports and information provided by Amazon Air. It should be noted that peak hour metrics are specific to CVG's design day. All peak period forecast presented in this section represent the baseline forecasts.

5.5.1 Aircraft Operations Forecast

Annual aircraft operations were divided by the peak month aircraft operations, peak month aircraft operations were divided by the design day aircraft operations, and the design day aircraft operations were divided by the peak hour aircraft operations to determine the peak period factors. Peak period factors were expressed for each of the segments (scheduled passenger, cargo, GA and air taxi, and military).

It was assumed that the peak month and design day factors would remain relatively unchanged through the forecast period. However, the expansion of low-cost and ultra-low-cost carriers and Amazon Air with their unique operational profiles will have a dramatic impact on the hourly profile of aircraft operations at CVG. Therefore, the peak hour factors were adjusted to account for these changes. **Table 5-1, *Peak Period Aircraft Operations Factors***, presents the peak period factors associated with aircraft operations.

The annual, monthly, daily, and hour peak aircraft operations forecasts are presented in **Table 5-2, *Peak Period Aircraft Operations Forecast***. The total of annual, monthly, and design day aircraft operations is the aggregation of the individual segments. However, each of the individual segments peak at different period of the day. As a result, peak hour total aircraft operations are not equal to the sum of the categories.

5.5.2 Passenger Forecast

Peak hour passengers were calculated using a similar methodology as peak hour aircraft operations. The annual and monthly passengers were determined from CVG's records. The design day passengers are based on the scheduled seats for the design day as a share of the scheduled seats for the month. Peak hour passengers were calculated from the aircraft seating configurations in the DDFS and assumed load factors from the annual passenger aircraft operations forecast. Peak hour passengers as a percent of the day are expected to change mostly due to the new service provided by low-cost and ultra-low-cost carriers. **Table 5-3, *Peak Period Passengers Factors*** provides the peak period factors associated with passenger activity. **Table 5-4, *Peak Period Passenger Forecast***, presents the peak hour passenger forecasts for CVG.

TABLE 5-1 PEAK PERIOD AIRCRAFT OPERATIONS FACTORS

Segment	Level	2017	2022	2027	2032	2037	2050
Domestic Passenger	Peak Month % of Annual	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%
	Design Day % of Peak Month	3.6%	3.6%	3.6%	3.6%	3.6%	3.6%
	Peak Hour Arrivals % of Design Day	9.7%	8.2%	8.7%	8.9%	9.1%	9.2%
	Peak Hour Departures % of Design Day	13.9%	11.8%	11.9%	11.9%	11.9%	11.9%
	Peak Hour Total % of Design Day	9.7%	9.0%	8.9%	8.8%	8.7%	8.7%
International Passenger	Peak Month % of Annual	10.1%	10.1%	10.1%	10.1%	10.1%	10.1%
	Design Day % of Peak Month	3.4%	3.6%	3.8%	3.8%	3.8%	3.8%
	Peak Hour Arrivals % of Design Day	30.8%	33.3%	23.1%	17.6%	14.0%	14.7%
	Peak Hour Departures % of Design Day	15.4%	22.2%	15.4%	17.6%	18.6%	17.6%
	Peak Hour Total % of Design Day	23.1%	22.2%	19.2%	17.7%	16.3%	16.3%
Total Passenger	Peak Month % of Annual	9.1%	9.1%	9.1%	9.1%	9.1%	9.1%
	Design Day % of Peak Month	3.6%	3.6%	3.6%	3.6%	3.6%	3.6%
	Peak Hour Arrivals % of Design Day	9.3%	7.8%	8.6%	8.7%	8.8%	8.8%
	Peak Hour Departures % of Design Day	13.4%	11.3%	11.6%	11.5%	11.4%	11.3%
	Peak Hour Total % of Design Day	9.3%	8.6%	8.6%	8.6%	8.4%	8.4%
Freighter	Peak Month % of Annual	9.0%	8.6%	8.6%	8.6%	8.6%	8.6%
	Design Day % of Peak Month	4.2%	3.8%	3.8%	3.8%	3.7%	3.7%
	Peak Hour Arrivals % of Design Day	28.1%	26.6%	27.6%	27.6%	27.1%	27.0%
	Peak Hour Departures % of Design Day	45.9%	32.1%	28.3%	26.6%	24.8%	24.8%
	Peak Hour Total % of Design Day	23.0%	16.5%	14.5%	14.0%	13.6%	13.6%
Air Taxi/ General Aviation	Peak Month % of Annual	8.8%	8.8%	8.8%	8.8%	8.8%	8.8%
	Design Day % of Peak Month	5.2%	5.2%	5.2%	5.2%	5.2%	5.2%
	Peak Hour Arrivals % of Design Day	23.3%	22.2%	21.3%	20.0%	19.2%	20.7%

Segment	Level	2017	2022	2027	2032	2037	2050
	Peak Hour Departures % of Design Day	18.6%	17.8%	17.0%	16.0%	19.2%	20.7%
	Peak Hour Total % of Design Day	16.3%	17.8%	17.0%	16.2%	15.4%	15.4%
Military	Peak Month % of Annual	7.6%	7.6%	7.6%	7.6%	7.6%	7.6%
	Design Day % of Peak Month	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%
	Peak Hour Arrivals % of Design Day	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	Peak Hour Departures % of Design Day	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	Peak Hour Total % of Design Day	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Grand Total	Peak Month % of Annual	9.1%	8.9%	8.9%	8.9%	8.9%	8.9%
	Design Day % of Peak Month	3.8%	3.8%	3.8%	3.8%	3.8%	3.8%
	Peak Hour Arrivals % of Design Day	7.6%	9.5%	10.8%	11.1%	12.0%	12.3%
	Peak Hour Departures % of Design Day	18.4%	16.0%	15.7%	15.9%	15.6%	15.9%
	Peak Hour Total % of Design Day	9.8%	8.6%	8.2%	8.4%	8.1%	8.3%

Sources: KCAB; OAG Aviation Worldwide Ltd, *OAG Schedules Analyser*; *Flight Track Data for 2017*; Landrum & Brown analysis

TABLE 5-2 PEAK PERIOD AIRCRAFT OPERATIONS FORECAST

Segment	Level	2017	2022	2027	2032	2037	2050
Domestic Passenger	Annual Operations	101,154	121,340	136,300	145,820	156,620	182,520
	Peak Month Operations	9,154	10,980	12,330	13,200	14,170	16,520
	Design Day Operations	330	390	438	469	503	587
	Peak Hour Arrivals	16	16	19	21	23	27
	Peak Hour Departures	23	23	26	28	30	35
	Peak Hour Operations	32	35	39	42	45	53
International Passenger	Annual Operations	3,824	4,930	6,820	9,000	11,420	17,860
	Peak Month Operations	386	500	690	910	1,150	1,800
	Design Day Operations	13	18	26	34	43	68
	Peak Hour Arrivals	2	3	3	3	3	5
	Peak Hour Departures	1	2	2	3	4	6
	Peak Hour Operations	3	4	5	6	7	11
Total Passenger	Annual Operations	104,978	126,270	143,120	154,820	168,040	200,380
	Peak Month Operations	9,540	11,480	13,020	14,110	15,320	18,320
	Design Day Operations	343	408	464	503	546	655
	Peak Hour Arrivals	16	16	20	22	24	29
	Peak Hour Departures	23	23	27	29	31	37
	Peak Hour Operations	32	35	40	43	47	56
Freighter	Annual Operations	36,004	66,740	104,110	121,620	132,950	165,290
	Peak Month Operations	3,242	5,730	8,936	10,440	11,410	14,190
	Design Day Operations	135	218	304	392	422	525
	Peak Hour Arrivals	19	30	42	55	59	73
	Peak Hour Departures	31	37	43	53	54	67

Segment	Level	2017	2022	2027	2032	2037	2050
	Peak Hour Operations	31	38	44	56	59	73
Air Taxi/ General Aviation	Annual Operations	9,349	9,800	10,260	10,760	11,260	12,720
	Peak Month Operations	825	860	910	950	990	1,120
	Design Day Operations	43	45	47	50	52	58
	Peak Hour Arrivals	5	5	5	5	5	6
	Peak Hour Departures	4	4	4	4	5	6
	Peak Hour Operations	7	8	8	8	8	9
Military	Annual Operations	132	130	130	130	130	130
	Peak Month Operations	10	10	10	10	10	10
	Design Day Operations	2	2	2	2	2	2
	Peak Hour Arrivals	1	1	1	1	1	1
	Peak Hour Departures	1	1	1	1	1	1
	Peak Hour Operations	1	1	1	1	1	1
Total	Annual Operations	150,463	202,940	257,620	287,330	312,380	378,520
	Peak Month Operations	13,617	18,080	22,876	25,510	27,730	33,640
	Design Day Operations	523	673	817	947	1,022	1,240
	Peak Hour Arrivals	20	33	44	54	62	78
	Peak Hour Departures	48	56	64	77	81	101
	Peak Hour Operations	51	59	67	81	84	105

Sources: KCAB; OAG Aviation Worldwide Ltd, *OAG Schedules Analyser*; *Flight Track Data for 2017*; Landrum & Brown analysis

TABLE 5-3 PEAK PERIOD PASSENGERS FACTORS

Segment	Level	2017	2022	2027	2032	2037	2050
Domestic Passenger	Peak Month % of Annual	9.9%	9.9%	9.9%	9.9%	9.9%	9.9%
	Design Day % of Peak Month	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%
	Peak Hour Arriving % of Design Day	12.7%	9.9%	10.2%	10.1%	9.9%	10.0%
	Peak Hour Departing % of Design Day	15.6%	12.1%	12.0%	11.5%	11.1%	11.1%
	Peak Hour Total % of Design Day	9.8%	8.5%	8.7%	8.8%	9.0%	9.0%
International Passenger	Peak Month % of Annual	11.6%	10.0%	9.9%	9.9%	9.9%	9.9%
	Design Day % of Peak Month	3.6%	3.9%	4.0%	4.0%	4.0%	4.0%
	Peak Hour Arriving % of Design Day	50.4%	44.7%	30.2%	23.5%	19.6%	20.7%
	Peak Hour Departing % of Design Day	41.7%	38.1%	25.7%	24.7%	22.6%	21.4%
	Peak Hour Total % of Design Day	29.6%	25.5%	22.7%	18.9%	16.3%	16.2%
Total Passenger	Peak Month % of Annual	10.0%	9.9%	9.9%	9.9%	9.9%	9.9%
	Design Day % of Peak Month	3.5%	3.5%	3.5%	3.5%	3.5%	3.6%
	Peak Hour Arriving % of Design Day	12.2%	9.3%	10.9%	9.7%	10.1%	9.5%
	Peak Hour Departing % of Design Day	15.0%	11.5%	11.2%	11.6%	10.7%	10.4%
	Peak Hour Total % of Design Day	9.5%	8.3%	9.2%	8.8%	9.7%	8.6%

Sources: KCAB; OAG Aviation Worldwide Ltd, *OAG Schedules Analyser*; *Flight Track Data for 2017*; Landrum & Brown analysis

TABLE 5-4 PEAK PERIOD PASSENGER FORECAST

Segment	Level	2017	2022	2027	2032	2037	2050
Domestic Passenger	Annual Passengers	7,570,313	10,543,200	12,014,580	13,150,280	14,329,360	17,047,280
	Peak Month Passengers	749,808	1,044,260	1,189,800	1,302,790	1,419,580	1,688,320
	Design Day Passengers	26,560	36,560	41,600	45,620	49,690	59,110
	Peak Hour Arriving	1,680	1,802	2,114	2,297	2,473	2,961
	Peak Hour Departing	2,070	2,222	2,503	2,630	2,749	3,273
	Peak Hour Passengers	2,600	3,121	3,635	3,996	4,484	5,301
International Passenger	Annual Passengers	271,836	541,200	809,200	1,094,200	1,379,200	2,120,200
	Peak Month Passengers	31,585	53,880	80,370	108,600	136,340	209,960
	Design Day Passengers	1,150	2,074	3,240	4,340	5,450	8,480
	Peak Hour Arriving	290	465	482	504	528	866
	Peak Hour Departing	240	397	411	530	607	896
	Peak Hour Passengers	340	530	725	807	874	1,352
Total Passenger	Annual Passengers	7,842,149	11,084,400	12,823,780	14,244,480	15,708,560	19,167,480
	Peak Month Passengers	781,393	1,098,140	1,270,170	1,411,390	1,555,920	1,898,280
	Design Day Passengers	27,710	38,634	44,840	49,960	55,140	67,590
	Peak Hour Arriving	1,690	1,802	2,434	2,432	2,796	3,207
	Peak Hour Departing	2,080	2,222	2,503	2,899	2,947	3,519
	Peak Hour Passengers	2,620	3,211	4,104	4,400	5,335	5,793

Sources: KCAB; OAG Aviation Worldwide Ltd, *OAG Schedules Analyser*; *Flight Track Data for 2017*; Landrum & Brown analysis

6 Recommended Forecast

A composite forecast developed by combining aspects of the baseline forecast and the high case forecast was selected as the basis for determining future facility requirements. This recommended forecast will help to ensure that facilities are in place to meet the future demand.

The baseline forecast is the most likely scenario for enplaned passengers given current trends at CVG. Additionally, the associated baseline forecast for passenger aircraft operations provides a conservative estimate for gating requirements for two reasons. First, the baseline forecast has more passenger aircraft operations than the other scenarios. Second, under the baseline, full-service carriers, such as Delta Air Lines, maintain a similar market share throughout the forecast. These full-service carriers typically have longer ground times than low-cost and ultra-low-cost carriers and therefore have a lower gate utilization rate that increase future gate requirements. The recommended enplaned passenger forecast is provided in **Table 6-1, *Recommended Enplaned Passenger Forecast***.

The ultimate build-out of the Amazon Air worldwide cargo hub at CVG is estimated to be completed by 2028. However, there is uncertainty revolving around the airline's operations after the construction is completed. Based on current sorting and shipping technology, the ultimate build-out represents a threshold for daily aircraft operations. However, given potential advances in this field, it is possible to exceed this threshold. Therefore, the high case cargo throughput forecast was selected as the recommended forecast. **Table 6-2, *Recommended Air Cargo Throughput Forecast***, provides a summary of the recommended air cargo throughput forecast.

TABLE 6-1 RECOMMENDED ENPLANED PASSENGER FORECAST

Year	Domestic	International	Total
Historical			
2007	7,534,234	333,876	7,843,959
2008	6,499,743	315,479	6,801,611
2009	5,095,051	216,042	5,300,792
2010	3,862,120	126,675	3,987,938
2011	3,407,621	109,511	3,525,486
2012	2,907,459	111,839	3,033,424
2013	2,742,998	116,130	2,874,788
2014	2,831,160	123,196	2,964,657
2015	3,031,515	126,652	3,160,248
2016	3,263,064	123,889	3,383,938
2017	3,790,240	135,918	3,926,158
Forecast			
2022	5,271,600	270,600	5,542,200
2027	6,007,290	404,600	6,411,890
2032	6,575,140	547,100	7,122,240
2037	7,164,680	689,600	7,854,280
2050	8,523,640	1,060,100	9,583,740
Average Annual Growth Rates			
2007-17	-6.7%	-8.6%	-6.7%
2017-22	6.8%	14.8%	7.1%
2022-27	2.6%	8.4%	3.0%
2027-32	1.8%	6.2%	2.1%
2032-37	1.7%	4.7%	2.0%
2037-50	1.3%	3.4%	1.5%
2017-50	2.5%	6.4%	2.7%

Sources: KCAB; Woods & Poole, *The Complete Economic and Demographic Data Source (CEDDS) 2017*; USDOT, *Air Passenger Origin-Destination Survey*; Landrum & Brown analysis

TABLE 6-2 RECOMMENDED AIR CARGO THROUGHPUT FORECAST

Year	Short Tons
Historical	
2007	43,759
2008	48,721
2009	152,970
2010	415,692
2011	537,139
2012	599,778
2013	655,479
2014	722,431
2015	804,088
2016	818,364
2017	1,041,890
Forecast	
2022	1,914,967
2027	2,707,565
2032	3,646,599
2037	4,484,507
2050	6,737,542
Average Annual Growth Rates	
2007-17	37.3%
2017-22	12.9%
2022-27	7.2%
2027-32	6.1%
2032-37	4.2%
2037-50	3.3%
2017-50	6.1%

Sources: KCAB; Woods & Poole, *The Complete Economic and Demographic Data Source (CEDDS) 2017*; Landrum & Brown analysis

The recommended aircraft operations forecast is the aggregation of the passenger aircraft operations forecast associated with the baseline passenger forecast; the freighter aircraft operations forecast associated with the high case cargo throughput forecast; and the baseline air taxi, general aviation, and military aircraft operations. The result of the aggregation of these aircraft operation forecasts is presented in **Table 6-3, *Recommend Aircraft Operations Forecast***.

TABLE 6-3 RECOMMENDED AIRCRAFT OPERATIONS FORECAST

Year	Passenger		Cargo	Air Taxi/ General Aviation	Military	Grand Total
	Domestic	International				
Historical						
2007	296,400	8,574	7,938	15,005	152	328,069
2008	258,512	7,900	5,452	13,457	163	285,484
2009	196,772	5,384	10,820	9,540	161	222,677
2010	142,442	4,052	20,212	10,767	124	177,597
2011	125,824	4,486	21,564	9,909	129	161,912
2012	107,640	3,804	23,440	8,342	221	143,447
2013	102,642	3,574	23,592	7,673	190	137,671
2014	97,048	3,778	24,598	8,005	89	133,518
2015	94,130	3,302	26,308	9,350	135	133,225
2016	96,746	3,586	27,970	8,740	183	137,225
2017	101,154	3,824	36,004	9,349	132	150,463
Forecast						
2022	121,340	4,930	66,740	9,800	130	202,940
2027	136,300	6,820	107,870	10,260	130	261,380
2032	145,820	9,000	141,910	10,760	130	307,620
2037	156,620	11,420	171,200	11,260	130	350,630
2050	182,520	17,860	245,840	12,720	130	459,070
Average Annual Growth Rates						
2007-17	-10.2%	-7.8%	16.3%	-4.6%	-1.4%	-7.5%
2017-22	3.7%	5.2%	13.1%	0.9%	-0.3%	6.2%
2022-27	2.4%	6.7%	10.1%	0.9%	0.0%	5.2%
2027-32	1.4%	5.7%	5.6%	1.0%	0.0%	3.3%
2032-37	1.4%	4.9%	3.8%	0.9%	0.0%	2.7%
2037-50	1.2%	3.5%	2.8%	0.9%	0.0%	2.1%
2017-50	1.8%	4.8%	6.0%	0.9%	0.0%	3.4%

Sources: KCAB; USDOT, *Air Carrier Statistics database (T-100)*; OAG Aviation Worldwide Ltd, *OAG Schedules Analyser*; Landrum & Brown analysis

The passenger aircraft fleet mix utilized under the recommended forecast would be the same as the baseline forecast presented in a prior section. The mix of freighter aircraft under the recommended forecast fleet mix would remain the same as the baseline scaled to the level of the increased number of operations. The allocation of freighter aircraft departures by aircraft type for the recommended forecast is presented in **Table 6-4, *Recommended Forecast Freighter Fleet Mix***.

Similar to the recommended aircraft operations forecast, the peak hour aircraft operations forecast include elements of the baseline forecast and the high forecast. Namely, the peak period for freighter operations represent the high case while the other segments represent the baseline. The total peak operations are heavily impacted by the freighter aircraft operations due to the short window of time that the aircraft operate. Therefore, the recommended peak hour aircraft operations forecast results in a higher total aircraft operations peak when compared to the base case. The annual, monthly, daily, and hour peak aircraft operations forecasts are presented in **Table 6-5, *Recommended Peak Period Aircraft Operations Forecast***.

Peak hour passengers forecast is the same as the baseline forecast. The result of the peak hour passenger forecast is provided in **Table 6-6, *Recommended Peak Period Passenger Forecast***.

TABLE 6-4 FREIGHTER FLEET MIX

Aircraft		Departures						
		2016	2017	2022	2027	2032	2037	2050
Air Carrier		**12,482**	**16,253**	**31,245**	**51,436**	**68,031**	**82,256**	**118,375**
Wide-body		**9,734**	**13,055**	**27,197**	**37,273**	**49,346**	**59,943**	**85,764**
306	Airbus A300-600	887	1,032	1,254	1,475	1,719	1,967	2,677
310	Airbus A310	6	7	8	10	11	13	18
748	Boeing 747-800	697	811	985	1,159	1,353	1,548	2,106
747	Boeing 747-200,-400	1,183	1,377	1,988	2,656	3,277	3,850	5,379
767	Boeing 767-200,-300	6,544	9,342	19,870	21,969	28,878	35,086	49,837
332	Airbus A330-200	0	0	1,719	8,077	11,537	14,360	21,244
777	Boeing 777	417	486	1,373	1,927	2,571	3,119	4,503
Narrow-body		**2,748**	**3,198**	**4,048**	**14,163**	**18,685**	**22,313**	**32,611**
722	Boeing 727-200	165	192	234	275	321	367	500
321	Airbus A321	0	0	313	5,339	7,627	9,493	14,043
738	Boeing 737-800	0	0	369	978	1,775	2,758	4,024
737	Boeing 737-400	1,332	1,550	1,827	6,578	8,438	9,695	14,044
757	Boeing 757-200	1,251	1,456	1,305	993	524	0	0
Commuter		**1,503**	**1,749**	**2,123**	**2,501**	**2,922**	**3,343**	**4,545**
Small Regional		**1,503**	**1,749**	**2,123**	**2,501**	**2,922**	**3,343**	**4,545**
BEH	Beechcraft 1900	343	399	485	572	667	764	1,038
CN1	Cessna 208 Caravan	20	23	28	33	39	45	61
EM2	Embraer EMB 120 Brasilia	243	282	343	202	236	271	368
SH6	Shorts 360	329	383	465	274	320	366	498
SW4	Fairchild Swearingen Merlin	506	589	715	421	491	562	764
CRJ	Canadair Regional Jet CRJ 200	0	0	32	962	1,123	1,285	1,749
Other Commuter		62	73	55	37	46	50	67
Grand Total		**13,985**	**18,002**	**33,368**	**53,937**	**70,953**	**85,599**	**122,920**

Sources: KCAB; OAG Aviation Worldwide Ltd, *OAG Schedules Analyser*; *Flight Track Data for 2017*; Landrum & Brown analysis

TABLE 6-5 RECOMMENDED PEAK PERIOD AIRCRAFT OPERATIONS FORECAST

Segment	Level	2017	2022	2027	2032	2037	2050
Domestic Passenger	Annual Operations	101,154	121,340	136,300	145,820	156,620	182,520
	Peak Month Operations	9,154	10,980	12,330	13,200	14,170	16,520
	Design Day Operations	330	390	434	466	501	584
	Peak Hour Arrivals	16	16	19	21	23	27
	Peak Hour Departures	23	23	26	28	30	35
	Peak Hour Operations	32	35	39	42	45	53
International Passenger	Annual Operations	3,824	4,930	6,820	9,000	11,420	17,860
	Peak Month Operations	386	500	690	910	1,150	1,800
	Design Day Operations	13	18	26	35	44	69
	Peak Hour Arrivals	2	3	3	3	3	5
	Peak Hour Departures	1	2	2	3	4	6
	Peak Hour Operations	3	4	5	6	7	11
Total Passenger	Annual Operations	104,978	126,270	143,120	154,820	168,040	200,380
	Peak Month Operations	9,540	11,480	13,020	14,110	15,320	18,320
	Design Day Operations	343	408	460	501	545	652
	Peak Hour Arrivals	16	16	20	22	24	29
	Peak Hour Departures	23	23	27	29	31	37
	Peak Hour Operations	32	35	40	43	47	56
Freighter	Annual Operations	36,004	66,740	107,870	141,910	171,200	245,840
	Peak Month Operations	3,924	6,967	10,570	13,651	16,410	23,484
	Design Day Operations	154	235	352	454	546	778
	Peak Hour Arrivals	21	36	50	65	77	111
	Peak Hour Departures	25	35	49	63	76	109

Segment	Level	2017	2022	2027	2032	2037	2050
	Peak Hour Operations	28	37	51	66	79	113
Air Taxi/ General Aviation	Annual Operations	9,349	9,800	10,260	10,760	11,260	12,720
	Peak Month Operations	825	860	910	950	990	1,120
	Design Day Operations	43	45	47	50	52	58
	Peak Hour Arrivals	5	5	5	5	5	6
	Peak Hour Departures	4	4	4	4	5	6
	Peak Hour Operations	7	8	8	8	8	9
Military	Annual Operations	132	130	130	130	130	130
	Peak Month Operations	10	10	10	10	10	10
	Design Day Operations	2	2	2	2	2	2
	Peak Hour Arrivals	1	1	1	1	1	1
	Peak Hour Departures	1	1	1	1	1	1
	Peak Hour Operations	1	1	1	1	1	1
Total	Annual Operations	150,463	202,940	261,380	307,620	350,630	459,070
	Peak Month Operations	14,299	19,317	24,510	28,721	32,730	42,934
	Design Day Operations	542	690	861	1,007	1,145	1,490
	Peak Hour Arrivals	22	39	52	67	80	110
	Peak Hour Departures	41	52	66	81	97	131
	Peak Hour Operations	46	56	71	87	102	136

Sources: KCAB; OAG Aviation Worldwide Ltd, *OAG Schedules Analyser*; *Flight Track Data for 2017*; Landrum & Brown analysis

TABLE 6-6 RECOMMENDED PEAK PERIOD PASSENGER FORECAST

Segment	Level	2017	2022	2027	2032	2037	2050
Domestic Passenger	Annual Passengers	7,570,313	10,543,200	12,014,580	13,150,280	14,329,360	17,047,280
	Peak Month Passengers	749,808	1,044,260	1,189,800	1,302,790	1,419,580	1,688,320
	Design Day Passengers	26,560	36,560	41,600	45,620	49,690	59,110
	Peak Hour Arriving	1,680	1,802	2,114	2,297	2,473	2,961
	Peak Hour Departing	2,070	2,222	2,503	2,630	2,749	3,273
	Peak Hour Passengers	2,600	3,121	3,635	3,996	4,484	5,301
International Passenger	Annual Passengers	271,836	541,200	809,200	1,094,200	1,379,200	2,120,200
	Peak Month Passengers	31,585	53,880	80,370	108,600	136,340	209,960
	Design Day Passengers	1,150	2,074	3,240	4,340	5,450	8,480
	Peak Hour Arriving	290	465	482	504	528	866
	Peak Hour Departing	240	397	411	530	607	896
	Peak Hour Passengers	340	530	725	807	874	1,352
Total Passenger	Annual Passengers	7,842,149	11,084,400	12,823,780	14,244,480	15,708,560	19,167,480
	Peak Month Passengers	781,393	1,098,140	1,270,170	1,411,390	1,555,920	1,898,280
	Design Day Passengers	27,710	38,634	44,840	49,960	55,140	67,590
	Peak Hour Arriving	1,690	1,802	2,434	2,432	2,796	3,207
	Peak Hour Departing	2,080	2,222	2,503	2,899	2,947	3,519
	Peak Hour Passengers	2,620	3,211	4,104	4,400	5,335	5,793

Sources: KCAB; OAG Aviation Worldwide Ltd, *OAG Schedules Analyser*; *Flight Track Data for 2017*; Landrum & Brown

MASTER PLAN 2050

Appendix 2-A | Traffic Counts

CVG
CINCINNATI/NORTHERN KENTUCKY
INTERNATIONAL AIRPORT

LEB
TEAM

CVG MASTER PLAN STUDY UPDATE

STUDY AREA TRAFFIC COUNTS

1. PETERSBURG ROAD (KY 20) AT TERMINAL DRIVE (KY 212)

Cummins Consulting Services

4661 Marlberry Place, Lexington, KY 40509

swcummins@windstream.net 859.361.2589

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Overcast and Cold - 45 Degrees
Schools in Session

File Name : KY20_at_KY212_464002_10-26-2017
Site Code : Site 1 - Thursday
Start Date : 10/26/2017
Page No : 1

Groups Printed- Cars - Buses - Trucks

	KY20 - Petersburg Road From East			KY212 - Terminal Drive From South			KY20 - Petersburg Road From West				
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
12:00 AM	8	2	10	19	5	24	0	1	48	49	83
12:15 AM	5	0	5	12	4	16	0	3	35	38	59
12:30 AM	4	1	5	17	3	20	0	2	31	33	58
12:45 AM	1	1	2	6	1	7	0	1	13	14	23
Total	18	4	22	54	13	67	0	7	127	134	223
01:00 AM	1	0	1	4	1	5	0	0	12	12	18
01:15 AM	2	0	2	10	2	12	0	0	5	5	19
01:30 AM	0	1	1	16	0	16	0	0	17	17	34
01:45 AM	0	0	0	7	0	7	0	0	5	5	12
Total	3	1	4	37	3	40	0	0	39	39	83
02:00 AM	1	0	1	9	0	9	0	2	10	12	22
02:15 AM	0	0	0	6	0	6	0	0	8	8	14
02:30 AM	0	0	0	10	0	10	0	0	15	15	25
02:45 AM	0	1	1	12	0	12	0	0	9	9	22
Total	1	1	2	37	0	37	0	2	42	44	83
03:00 AM	0	0	0	5	0	5	0	2	9	11	16
03:15 AM	2	0	2	11	0	11	0	1	16	17	30
03:30 AM	2	0	2	20	3	23	0	0	16	16	41
03:45 AM	2	1	3	19	6	25	0	0	11	11	39
Total	6	1	7	55	9	64	0	3	52	55	126
04:00 AM	2	2	4	24	3	27	0	2	18	20	51
04:15 AM	1	1	2	35	4	39	0	0	13	13	54
04:30 AM	5	1	6	63	3	66	0	2	30	32	104
04:45 AM	5	3	8	73	10	83	0	4	27	31	122
Total	13	7	20	195	20	215	0	8	88	96	331
05:00 AM	5	2	7	76	9	85	1	2	36	39	131
05:15 AM	6	3	9	95	13	108	0	2	51	53	170
05:30 AM	13	7	20	131	26	157	0	1	50	51	228
05:45 AM	11	8	19	156	21	177	0	1	58	59	255
Total	35	20	55	458	69	527	1	6	195	202	784
06:00 AM	15	6	21	115	18	133	0	7	50	57	211
06:15 AM	17	14	31	159	22	181	0	4	53	57	269
06:30 AM	17	15	32	246	25	271	0	11	75	86	389
06:45 AM	22	21	43	293	24	317	0	11	83	94	454
Total	71	56	127	813	89	902	0	33	261	294	1323
07:00 AM	18	15	33	182	39	221	0	36	79	115	369
07:15 AM	20	12	32	194	38	232	0	39	97	136	400
07:30 AM	18	21	39	196	40	236	0	39	110	149	424
07:45 AM	27	20	47	228	47	275	0	26	86	112	434
Total	83	68	151	800	164	964	0	140	372	512	1627
08:00 AM	22	15	37	207	42	249	0	36	92	128	414
08:15 AM	20	14	34	150	36	186	0	22	97	119	339
08:30 AM	24	16	40	120	32	152	0	26	94	120	312
08:45 AM	22	11	33	132	17	149	0	4	83	87	269
Total	88	56	144	609	127	736	0	88	366	454	1334
09:00 AM	17	8	25	111	26	137	0	6	68	74	236
09:15 AM	22	8	30	100	24	124	0	12	91	103	257
09:30 AM	13	6	19	100	21	121	0	7	77	84	224
09:45 AM	22	8	30	98	25	123	0	10	81	91	244
Total	74	30	104	409	96	505	0	35	317	352	961

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Groups Printed- Cars - Buses - Trucks

	KY20 - Petersburg Road From East			KY212 - Terminal Drive From South			KY20 - Petersburg Road From West				
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
10:00 AM	23	6	29	82	21	103	0	10	60	70	202
10:15 AM	25	7	32	58	27	85	0	9	80	89	206
10:30 AM	24	6	30	93	33	126	0	3	79	82	238
10:45 AM	41	9	50	83	30	113	0	11	76	87	250
Total	113	28	141	316	111	427	0	33	295	328	896
11:00 AM	44	15	59	72	30	102	0	13	106	119	280
11:15 AM	28	12	40	81	19	100	0	13	83	96	236
11:30 AM	35	13	48	103	33	136	0	9	87	96	280
11:45 AM	39	10	49	79	43	122	0	8	86	94	265
Total	146	50	196	335	125	460	0	43	362	405	1061
12:00 PM	38	13	51	95	34	129	0	25	113	138	318
12:15 PM	24	10	34	107	36	143	0	14	77	91	268
12:30 PM	32	7	39	111	34	145	0	12	88	100	284
12:45 PM	23	17	40	122	28	150	0	13	98	111	301
Total	117	47	164	435	132	567	0	64	376	440	1171
01:00 PM	27	15	42	115	33	148	0	7	105	112	302
01:15 PM	38	16	54	111	36	147	0	10	87	97	298
01:30 PM	24	9	33	107	25	132	0	17	83	100	265
01:45 PM	30	13	43	90	36	126	0	4	99	103	272
Total	119	53	172	423	130	553	0	38	374	412	1137
02:00 PM	37	9	46	100	36	136	0	12	123	135	317
02:15 PM	40	25	65	122	42	164	0	17	108	125	354
02:30 PM	33	15	48	107	50	157	0	16	197	213	418
02:45 PM	37	9	46	123	25	148	0	14	128	142	336
Total	147	58	205	452	153	605	0	59	556	615	1425
03:00 PM	47	12	59	116	46	162	0	20	156	176	397
03:15 PM	41	14	55	124	40	164	0	18	119	137	356
03:30 PM	44	6	50	118	50	168	0	33	238	271	489
03:45 PM	53	19	72	130	55	185	0	28	185	213	470
Total	185	51	236	488	191	679	0	99	698	797	1712
04:00 PM	31	21	52	125	47	172	0	26	181	207	431
04:15 PM	45	13	58	121	49	170	0	13	167	180	408
04:30 PM	45	18	63	120	38	158	0	33	229	262	483
04:45 PM	36	23	59	141	40	181	0	29	200	229	469
Total	157	75	232	507	174	681	0	101	777	878	1791
05:00 PM	38	16	54	135	44	179	0	25	237	262	495
05:15 PM	49	27	76	122	39	161	0	34	171	205	442
05:30 PM	36	22	58	118	41	159	0	24	184	208	425
05:45 PM	31	22	53	129	35	164	0	30	128	158	375
Total	154	87	241	504	159	663	0	113	720	833	1737
06:00 PM	40	23	63	95	36	131	0	23	129	152	346
06:15 PM	48	11	59	85	40	125	0	15	89	104	288
06:30 PM	44	14	58	81	24	105	0	19	95	114	277
06:45 PM	20	10	30	78	18	96	0	9	100	109	235
Total	152	58	210	339	118	457	0	66	413	479	1146
07:00 PM	19	15	34	61	12	73	0	11	72	83	190
07:15 PM	21	15	36	64	16	80	0	6	61	67	183
07:30 PM	11	11	22	73	10	83	0	5	61	66	171
07:45 PM	15	10	25	70	15	85	0	6	55	61	171
Total	66	51	117	268	53	321	0	28	249	277	715

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swcummins@windstream.net 859.361.2589

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Groups Printed- Cars - Buses - Trucks

	KY20 - Petersburg Road From East			KY212 - Terminal Drive From South			KY20 - Petersburg Road From West				
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
08:00 PM	23	10	33	73	21	94	0	16	73	89	216
08:15 PM	17	9	26	58	20	78	0	4	62	66	170
08:30 PM	14	10	24	52	12	64	0	7	40	47	135
08:45 PM	11	4	15	58	15	73	0	5	53	58	146
Total	65	33	98	241	68	309	0	32	228	260	667
09:00 PM	14	7	21	62	17	79	0	2	58	60	160
09:15 PM	21	6	27	45	14	59	0	2	59	61	147
09:30 PM	13	2	15	64	13	77	0	4	83	87	179
09:45 PM	11	2	13	54	6	60	0	5	52	57	130
Total	59	17	76	225	50	275	0	13	252	265	616
10:00 PM	6	3	9	29	6	35	0	6	76	82	126
10:15 PM	9	5	14	39	8	47	0	2	48	50	111
10:30 PM	9	1	10	61	12	73	0	3	52	55	138
10:45 PM	7	3	10	43	5	48	0	0	55	55	113
Total	31	12	43	172	31	203	0	11	231	242	488
11:00 PM	16	3	19	24	4	28	0	7	67	74	121
11:15 PM	4	1	5	35	7	42	0	0	44	44	91
11:30 PM	14	4	18	27	6	33	0	13	88	101	152
11:45 PM	10	1	11	21	5	26	0	1	35	36	73
Total	44	9	53	107	22	129	0	21	234	255	437
Grand Total	1947	873	2820	8279	2107	10386	1	1043	7624	8668	21874
Apprch %	69	31		79.7	20.3		0	12	88		
Total %	8.9	4	12.9	37.8	9.6	47.5	0	4.8	34.9	39.6	
Cars	1707	849	2556	6852	1838	8690	1	1021	6288	7310	18556
% Cars	87.7	97.3	90.6	82.8	87.2	83.7	100	97.9	82.5	84.3	84.8
Buses	77	0	77	249	161	410	0	1	135	136	623
% Buses	4	0	2.7	3	7.6	3.9	0	0.1	1.8	1.6	2.8
Trucks	163	24	187	1178	108	1286	0	21	1201	1222	2695
% Trucks	8.4	2.7	6.6	14.2	5.1	12.4	0	2	15.8	14.1	12.3

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File Name : KY20_at_KY212_464002_10-26-2017
Site Code : Site 1 - Thursday
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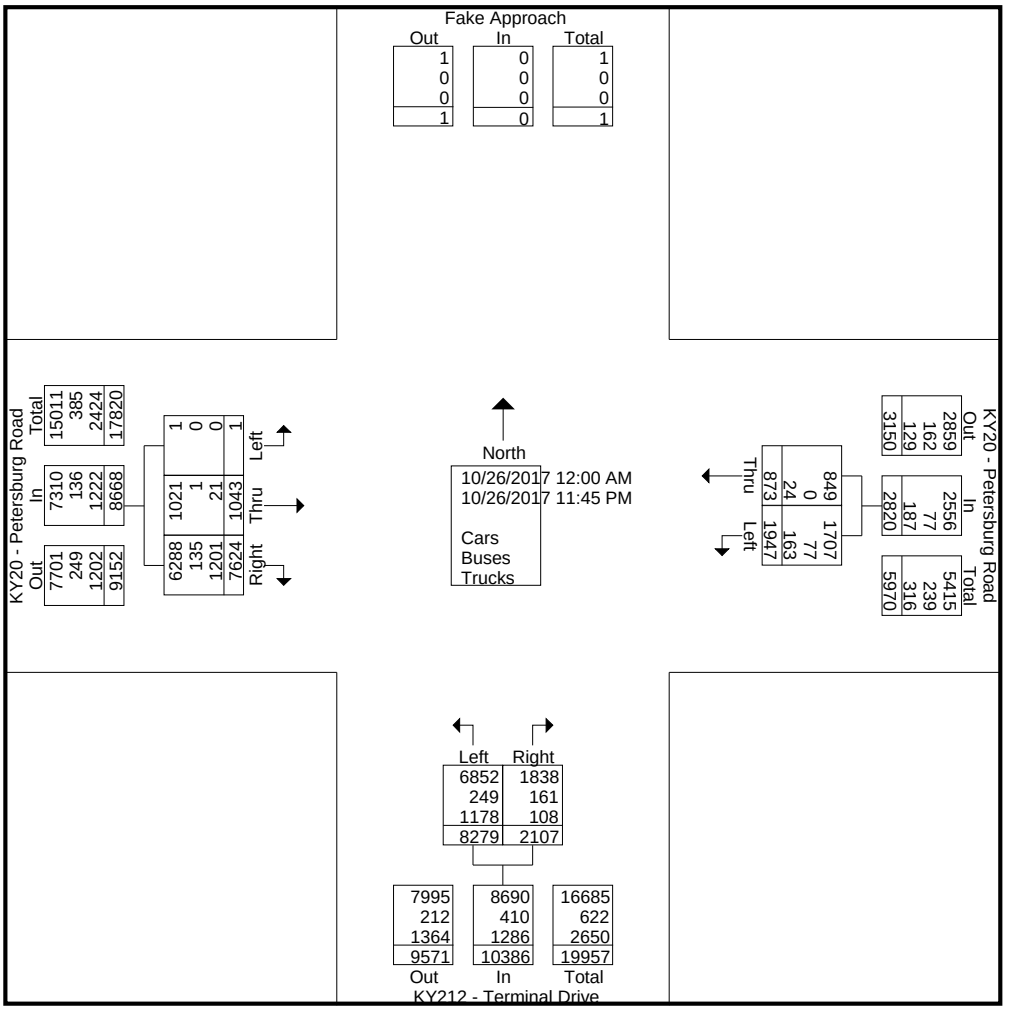

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File Name : KY20_at_KY212_464002_10-26-2017
Site Code : Site 1 - Thursday
Start Date : 10/26/2017
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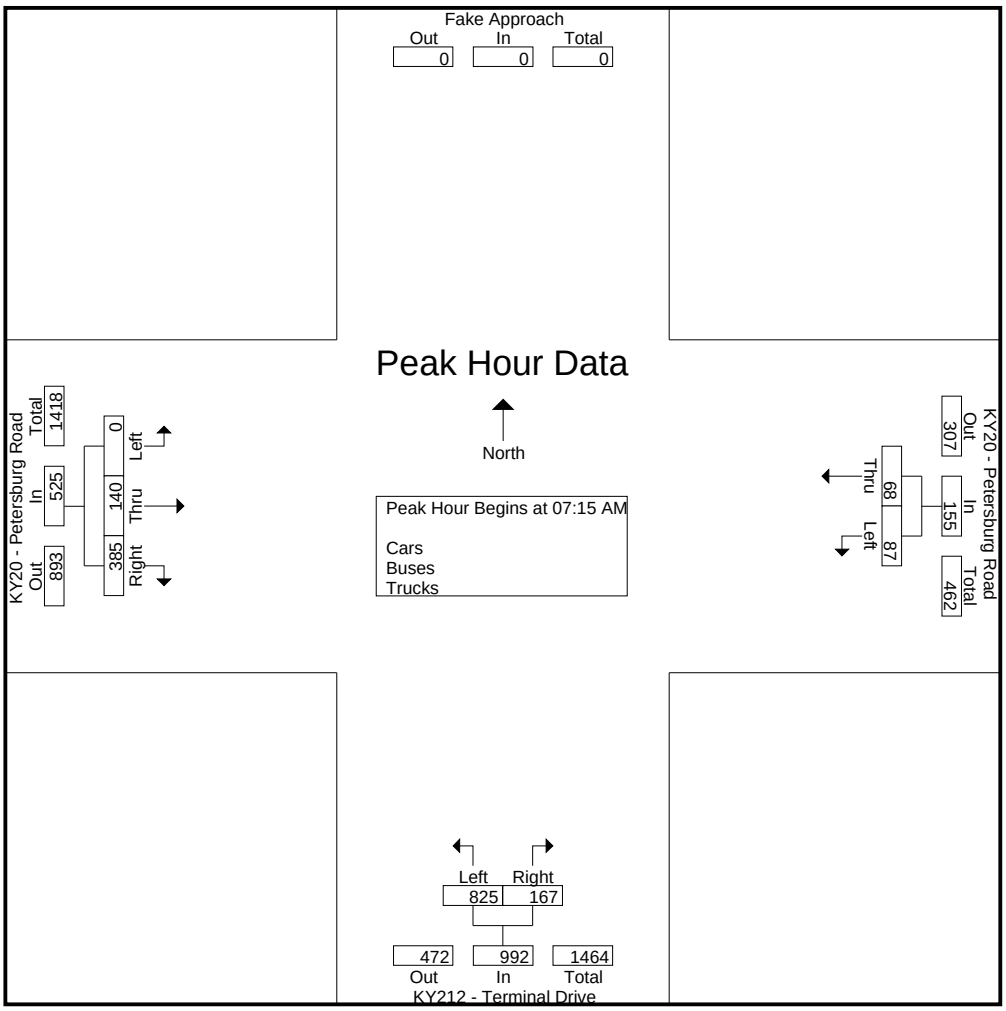
	KY20 - Petersburg Road From East			KY212 - Terminal Drive From South			KY20 - Petersburg Road From West				
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 12:00 AM to 09:45 AM - Peak 1 of 1											
Peak Hour for Entire Intersection Begins at 07:15 AM											
07:15 AM	20	12	32	194	38	232	0	**39**	97	136	400
07:30 AM	18	**21**	39	196	40	236	0	39	**110**	**149**	424
07:45 AM	**27**	20	**47**	**228**	**47**	**275**	0	26	86	112	**434**
08:00 AM	22	15	37	207	42	249	0	36	92	128	414
Total Volume	87	68	155	825	167	992	0	140	385	525	1672
% App. Total	56.1	43.9		83.2	16.8		0	26.7	73.3		
PHF	.806	.810	.824	.905	.888	.902	.000	.897	.875	.881	.963



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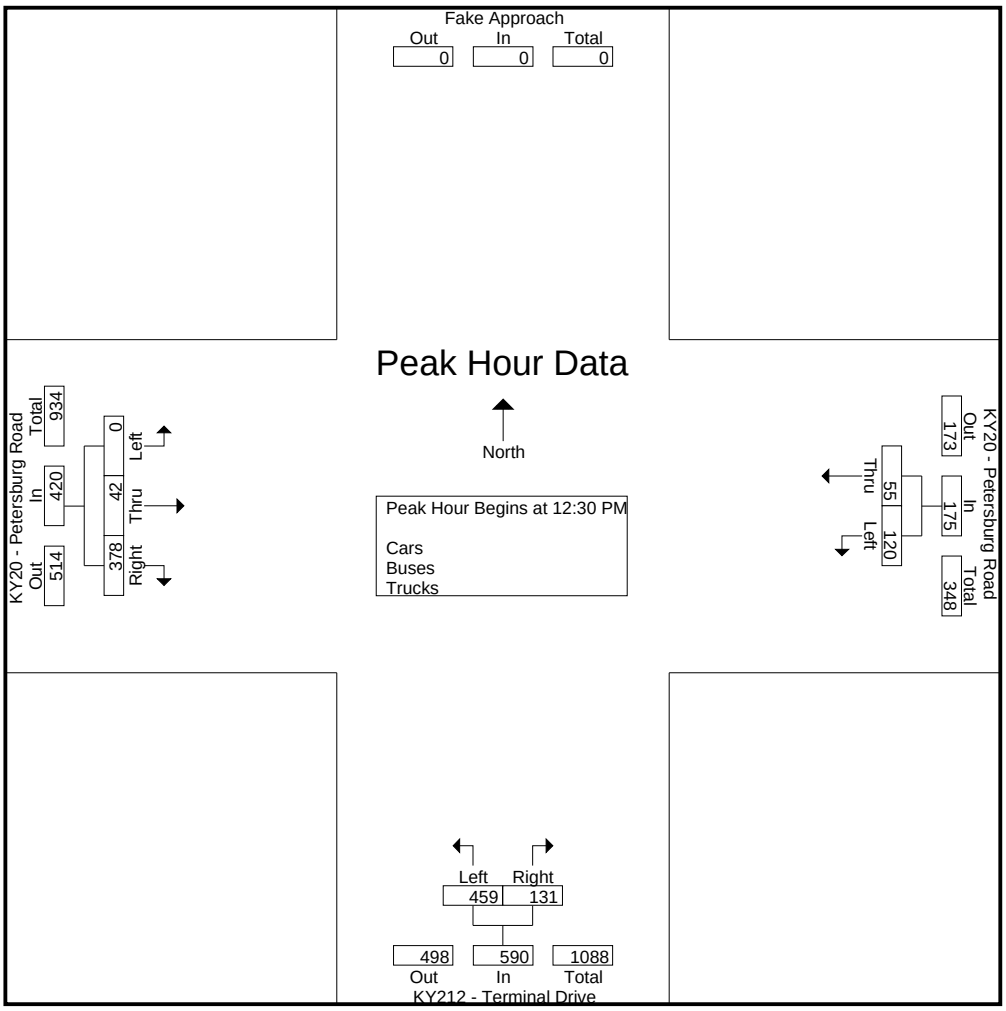
File Name : KY20_at_KY212_464002_10-26-2017
Site Code : Site 1 - Thursday
Start Date : 10/26/2017
Page No : 6

	KY20 - Petersburg Road From East			KY212 - Terminal Drive From South			KY20 - Petersburg Road From West				
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1											
Peak Hour for Entire Intersection Begins at 12:30 PM											
12:30 PM	32	7	39	111	34	145	0	12	88	100	284
12:45 PM	23	**17**	40	**122**	28	**150**	0	**13**	98	111	301
01:00 PM	27	15	42	115	33	148	0	7	**105**	**112**	**302**
01:15 PM	**38**	16	**54**	111	**36**	147	0	10	87	97	298
Total Volume	120	55	175	459	131	590	0	42	378	420	1185
% App. Total	68.6	31.4		77.8	22.2		0	10	90		
PHF	.789	.809	.810	.941	.910	.983	.000	.808	.900	.938	.981



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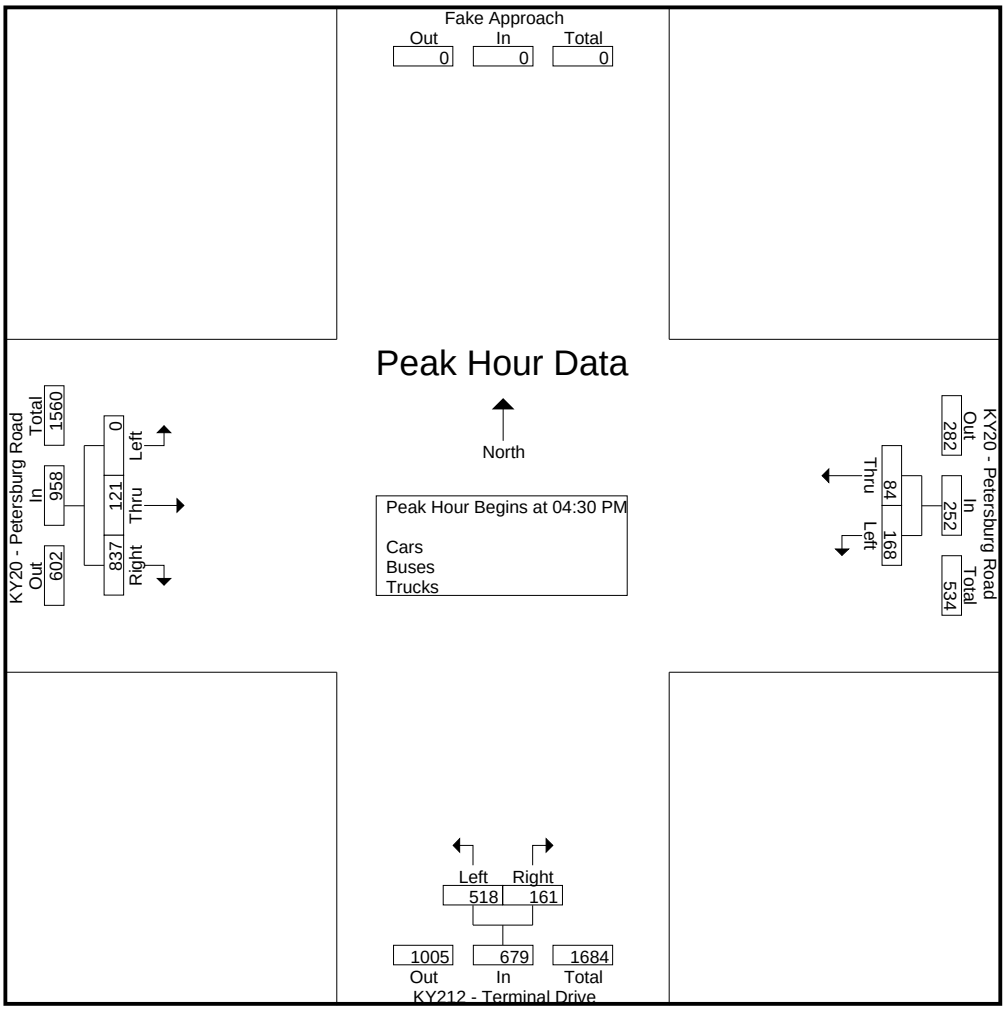
File Name : KY20_at_KY212_464002_10-26-2017
Site Code : Site 1 - Thursday
Start Date : 10/26/2017
Page No : 7

	KY20 - Petersburg Road From East			KY212 - Terminal Drive From South			KY20 - Petersburg Road From West				
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 02:00 PM to 11:45 PM - Peak 1 of 1											
Peak Hour for Entire Intersection Begins at 04:30 PM											
04:30 PM	45	18	63	120	38	158	0	33	229	**262**	483
04:45 PM	36	23	59	**141**	40	**181**	0	29	200	229	469
05:00 PM	38	16	54	135	**44**	179	0	25	**237**	262	**495**
05:15 PM	**49**	**27**	**76**	122	39	161	0	**34**	171	205	442
Total Volume	168	84	252	518	161	679	0	121	837	958	1889
% App. Total	66.7	33.3		76.3	23.7		0	12.6	87.4		
PHF	.857	.778	.829	.918	.915	.938	.000	.890	.883	.914	.954



2. I-275 WESTBOUND ENTRY RAMP FROM TERMINAL DRIVE (KY 212)

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Overcast and Cold - 45 Degrees
Schools in Session

File Name : I275_WB_Ramps_at_KY212_464004_10-26-2017
Site Code : Site 2 - Thursday
Start Date : 10/26/2017
Page No : 1

Groups Printed- Cars - Buses - Trucks

	KY212 - Terminal Drive From North				KY212 - Terminal Drive From South			I275 WB On Ramp From West			
Start Time	Left	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	Int. Total
12:00 AM	0	49	7	56	29	25	54	0	0	0	110
12:15 AM	0	36	7	43	13	13	26	0	0	0	69
12:30 AM	0	28	5	33	11	20	31	0	0	0	64
12:45 AM	0	13	0	13	2	8	10	0	0	0	23
Total	0	126	19	145	55	66	121	0	0	0	266
01:00 AM	0	12	1	13	3	4	7	0	0	0	20
01:15 AM	0	7	0	7	4	15	19	0	0	0	26
01:30 AM	0	15	2	17	3	13	16	0	0	0	33
01:45 AM	0	4	1	5	1	7	8	0	0	0	13
Total	0	38	4	42	11	39	50	0	0	0	92
02:00 AM	0	10	1	11	1	8	9	0	0	0	20
02:15 AM	0	6	2	8	5	7	12	0	0	0	20
02:30 AM	0	16	2	18	6	9	15	0	0	0	33
02:45 AM	0	5	1	6	1	12	13	0	0	0	19
Total	0	37	6	43	13	36	49	0	0	0	92
03:00 AM	0	9	1	10	0	5	5	0	0	0	15
03:15 AM	0	16	2	18	3	13	16	0	0	0	34
03:30 AM	0	16	2	18	3	23	26	0	0	0	44
03:45 AM	0	10	3	13	3	27	30	0	0	0	43
Total	0	51	8	59	9	68	77	0	0	0	136
04:00 AM	0	17	3	20	6	22	28	0	0	0	48
04:15 AM	0	13	1	14	4	43	47	0	0	0	61
04:30 AM	0	33	3	36	5	75	80	0	0	0	116
04:45 AM	0	31	5	36	6	73	79	0	0	0	115
Total	0	94	12	106	21	213	234	0	0	0	340
05:00 AM	0	36	2	38	11	84	95	0	0	0	133
05:15 AM	0	56	3	59	16	110	126	0	0	0	185
05:30 AM	0	56	8	64	20	158	178	0	0	0	242
05:45 AM	0	64	7	71	21	151	172	0	0	0	243
Total	0	212	20	232	68	503	571	0	0	0	803
06:00 AM	0	66	4	70	16	139	155	0	0	0	225
06:15 AM	0	64	12	76	17	187	204	0	0	0	280
06:30 AM	0	84	5	89	19	264	283	0	0	0	372
06:45 AM	0	100	13	113	22	290	312	0	0	0	425
Total	0	314	34	348	74	880	954	0	0	0	1302
07:00 AM	0	89	9	98	33	205	238	0	0	0	336
07:15 AM	0	102	11	113	25	224	249	0	0	0	362
07:30 AM	0	124	7	131	30	228	258	0	0	0	389
07:45 AM	0	100	6	106	41	279	320	0	0	0	426
Total	0	415	33	448	129	936	1065	0	0	0	1513
08:00 AM	0	99	22	121	30	240	270	0	0	0	391
08:15 AM	0	105	8	113	32	174	206	0	0	0	319
08:30 AM	0	105	14	119	39	159	198	0	0	0	317
08:45 AM	0	90	12	102	33	154	187	0	0	0	289
Total	0	399	56	455	134	727	861	0	0	0	1316
09:00 AM	0	75	13	88	36	128	164	0	0	0	252
09:15 AM	0	99	11	110	23	123	146	0	0	0	256
09:30 AM	0	80	13	93	24	123	147	0	0	0	240
09:45 AM	0	95	6	101	20	121	141	0	0	0	242
Total	0	349	43	392	103	495	598	0	0	0	990

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File Name : I275_WB_Ramps_at_KY212_464004_10-26-2017
Site Code : Site 2 - Thursday
Start Date : 10/26/2017
Page No : 2

Groups Printed- Cars - Buses - Trucks

	KY212 - Terminal Drive From North				KY212 - Terminal Drive From South			I275 WB On Ramp From West			
Start Time	Left	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	Int. Total
10:00 AM	0	81	6	87	39	103	142	0	0	0	229
10:15 AM	0	92	9	101	27	87	114	0	1	1	216
10:30 AM	0	100	7	107	24	123	147	0	0	0	254
10:45 AM	0	100	10	110	38	115	153	0	0	0	263
Total	0	373	32	405	128	428	556	0	1	1	962
11:00 AM	0	140	10	150	40	98	138	0	0	0	288
11:15 AM	0	101	15	116	42	102	144	0	0	0	260
11:30 AM	0	101	20	121	39	134	173	0	0	0	294
11:45 AM	0	117	11	128	45	124	169	0	0	0	297
Total	0	459	56	515	166	458	624	0	0	0	1139
12:00 PM	0	129	18	147	38	133	171	0	0	0	318
12:15 PM	0	89	13	102	35	141	176	0	0	0	278
12:30 PM	0	117	8	125	39	149	188	0	0	0	313
12:45 PM	0	100	20	120	41	141	182	0	0	0	302
Total	0	435	59	494	153	564	717	0	0	0	1211
01:00 PM	0	113	21	134	47	150	197	0	0	0	331
01:15 PM	0	112	11	123	52	155	207	0	0	0	330
01:30 PM	0	102	11	113	39	134	173	0	0	0	286
01:45 PM	0	112	19	131	59	114	173	0	0	0	304
Total	0	439	62	501	197	553	750	0	0	0	1251
02:00 PM	0	145	18	163	56	145	201	0	0	0	364
02:15 PM	0	128	24	152	65	163	228	0	0	0	380
02:30 PM	0	203	32	235	68	153	221	0	0	0	456
02:45 PM	0	140	29	169	79	142	221	0	0	0	390
Total	0	616	103	719	268	603	871	0	0	0	1590
03:00 PM	0	176	26	202	65	165	230	0	0	0	432
03:15 PM	0	136	24	160	91	162	253	0	0	0	413
03:30 PM	0	253	33	286	66	171	237	0	0	0	523
03:45 PM	0	217	24	241	106	175	281	0	0	0	522
Total	0	782	107	889	328	673	1001	0	0	0	1890
04:00 PM	0	178	41	219	89	179	268	0	0	0	487
04:15 PM	0	168	35	203	78	165	243	0	0	0	446
04:30 PM	0	240	39	279	69	157	226	0	0	0	505
04:45 PM	0	214	32	246	68	181	249	0	0	0	495
Total	0	800	147	947	304	682	986	0	0	0	1933
05:00 PM	0	228	46	274	78	197	275	0	0	0	549
05:15 PM	0	188	30	218	90	185	275	0	0	0	493
05:30 PM	0	187	38	225	80	173	253	0	0	0	478
05:45 PM	0	131	18	149	78	165	243	0	0	0	392
Total	0	734	132	866	326	720	1046	0	0	0	1912
06:00 PM	1	146	27	174	70	129	199	0	0	0	373
06:15 PM	0	113	25	138	58	121	179	0	0	0	317
06:30 PM	1	117	24	142	43	105	148	0	0	0	290
06:45 PM	0	96	19	115	38	93	131	0	0	0	246
Total	2	472	95	569	209	448	657	0	0	0	1226
07:00 PM	0	78	12	90	26	71	97	0	0	0	187
07:15 PM	0	69	14	83	28	81	109	0	0	0	192
07:30 PM	0	68	7	75	32	84	116	0	0	0	191
07:45 PM	0	68	4	72	30	80	110	0	0	0	182
Total	0	283	37	320	116	316	432	0	0	0	752

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File Name : I275_WB_Ramps_at_KY212_464004_10-26-2017
Site Code : Site 2 - Thursday
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Groups Printed- Cars - Buses - Trucks

	KY212 - Terminal Drive From North				KY212 - Terminal Drive From South			I275 WB On Ramp From West			
Start Time	Left	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	Int. Total
08:00 PM	0	86	12	98	40	50	90	0	0	0	188
08:15 PM	0	62	11	73	26	42	68	0	0	0	141
08:30 PM	0	54	4	58	18	24	42	0	0	0	100
08:45 PM	0	59	8	67	18	21	39	0	0	0	106
Total	0	261	35	296	102	137	239	0	0	0	535
09:00 PM	0	66	6	72	28	81	109	0	0	0	181
09:15 PM	0	69	12	81	43	60	103	0	0	0	184
09:30 PM	0	89	6	95	33	75	108	0	0	0	203
09:45 PM	0	57	10	67	25	61	86	0	0	0	153
Total	0	281	34	315	129	277	406	0	0	0	721
10:00 PM	0	73	9	82	15	33	48	0	0	0	130
10:15 PM	0	46	10	56	23	46	69	0	0	0	125
10:30 PM	0	58	7	65	36	71	107	0	0	0	172
10:45 PM	0	47	12	59	25	53	78	0	0	0	137
Total	0	224	38	262	99	203	302	0	0	0	564
11:00 PM	0	82	7	89	13	26	39	0	0	0	128
11:15 PM	0	38	8	46	28	43	71	0	0	0	117
11:30 PM	0	92	10	102	37	31	68	0	0	0	170
11:45 PM	0	43	2	45	26	26	52	0	0	0	97
Total	0	255	27	282	104	126	230	0	0	0	512
Grand Total	2	8449	1199	9650	3246	10151	13397	0	1	1	23048
Apprch %	0	87.6	12.4		24.2	75.8		0	100		
Total %	0	36.7	5.2	41.9	14.1	44	58.1	0	0	0	
Cars	2	7083	910	7995	3037	8646	11683	0	0	0	19678
% Cars	100	83.8	75.9	82.8	93.6	85.2	87.2	0	0	0	85.4
Buses	0	387	1	388	6	68	74	0	0	0	462
% Buses	0	4.6	0.1	4	0.2	0.7	0.6	0	0	0	2
Trucks	0	979	288	1267	203	1437	1640	0	1	1	2908
% Trucks	0	11.6	24	13.1	6.3	14.2	12.2	0	100	100	12.6

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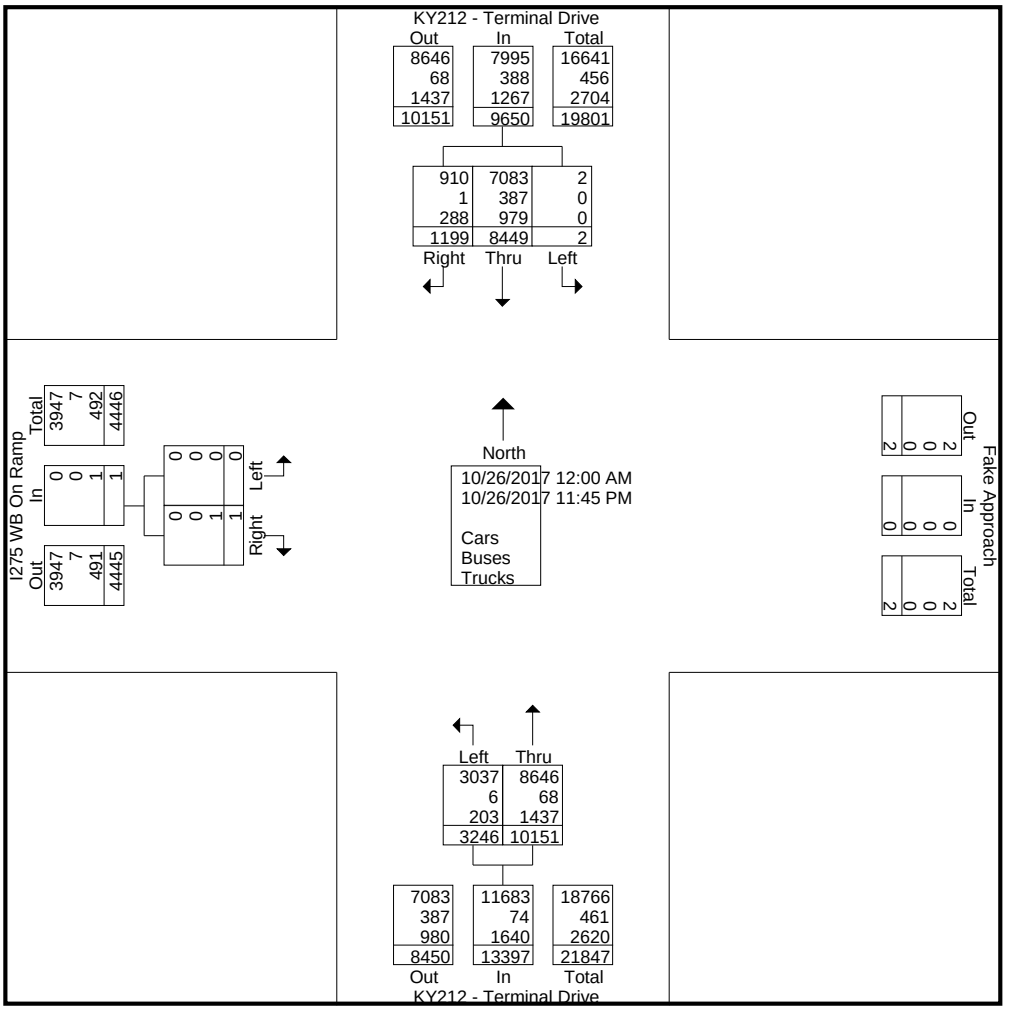

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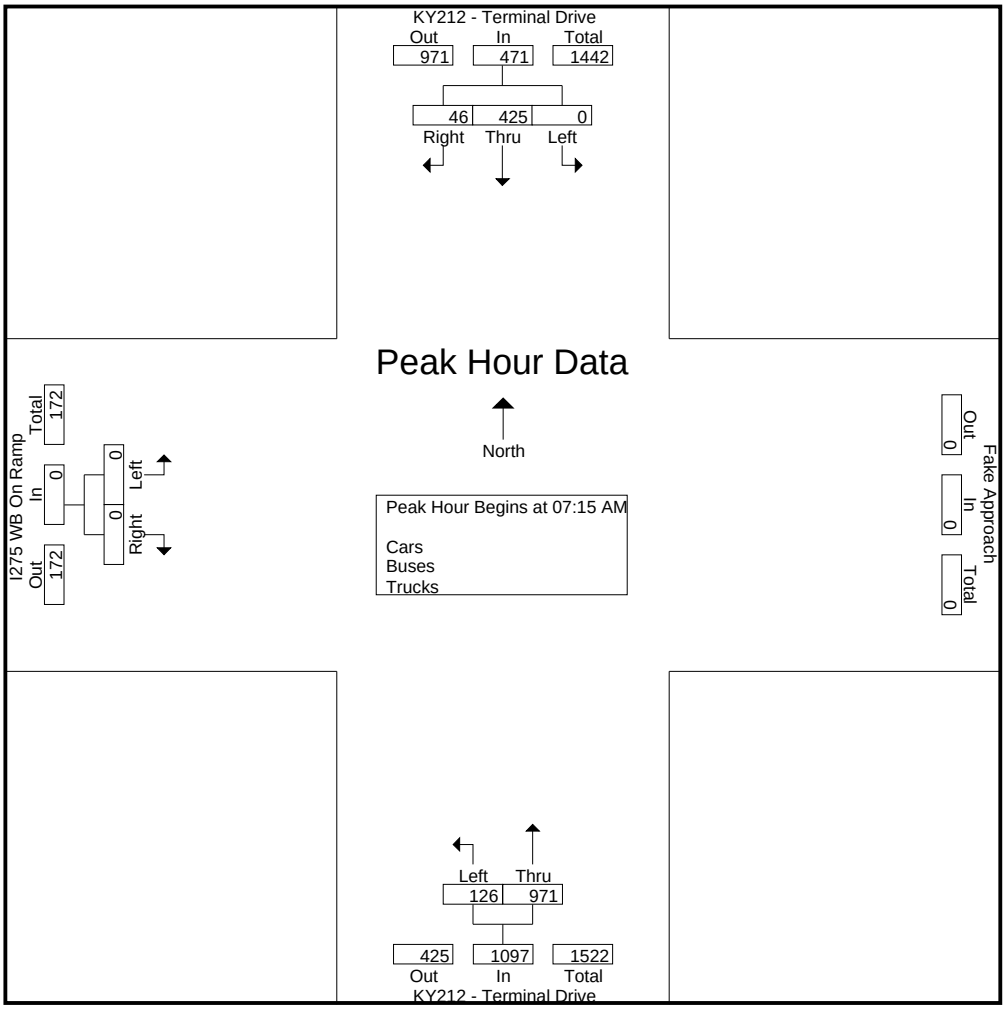
	KY212 - Terminal Drive From North				KY212 - Terminal Drive From South			I275 WB On Ramp From West			
Start Time	Left	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	Int. Total
Peak Hour Analysis From 12:00 AM to 09:45 AM - Peak 1 of 1											
Peak Hour for Entire Intersection Begins at 07:15 AM											
07:15 AM	0	102	11	113	25	224	249	0	0	0	362
07:30 AM	0	**124**	7	**131**	30	228	258	0	0	0	389
07:45 AM	0	100	6	106	**41**	**279**	**320**	0	0	0	**426**
08:00 AM	0	99	**22**	121	30	240	270	0	0	0	391
Total Volume	0	425	46	471	126	971	1097	0	0	0	1568
% App. Total	0	90.2	9.8		11.5	88.5		0	0		
PHF	.000	.857	.523	.899	.768	.870	.857	.000	.000	.000	.920



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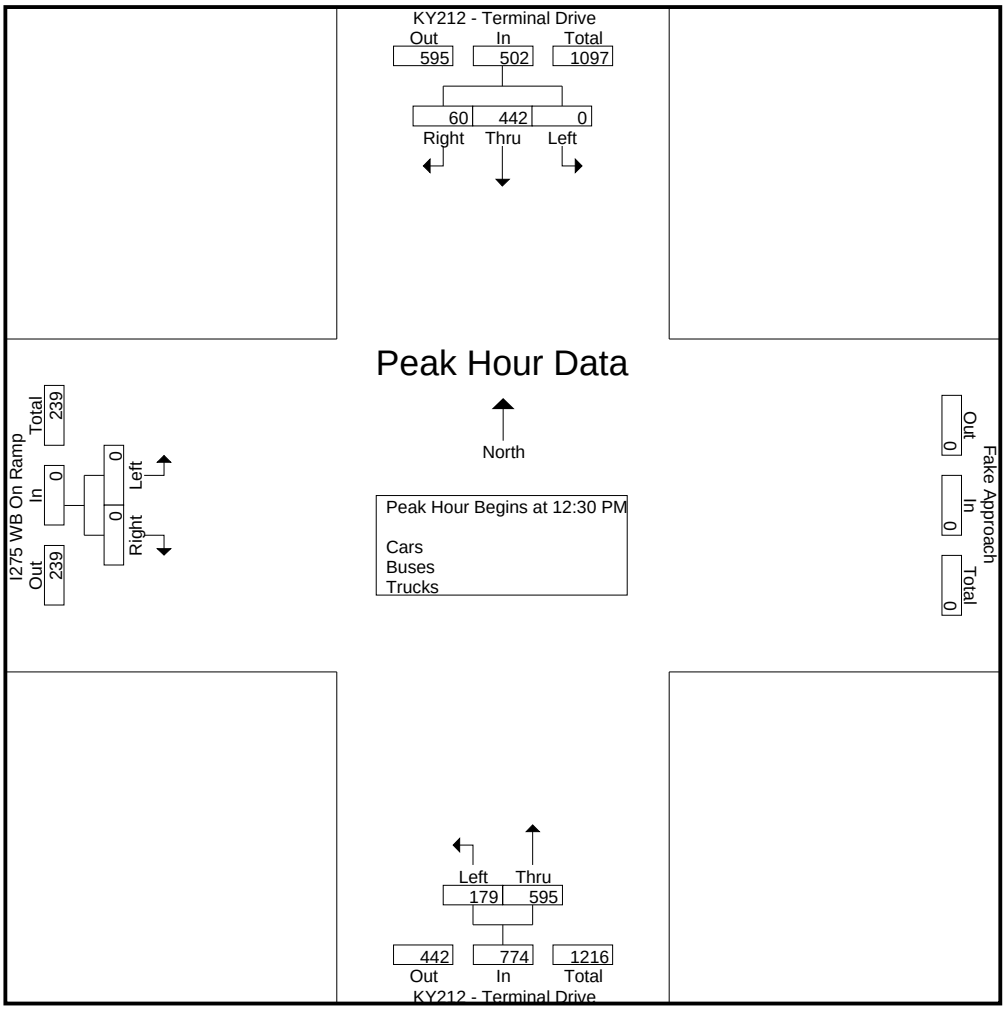
	KY212 - Terminal Drive From North				KY212 - Terminal Drive From South			I275 WB On Ramp From West			
Start Time	Left	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	Int. Total
Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1											
Peak Hour for Entire Intersection Begins at 12:30 PM											
12:30 PM	0	**117**	8	125	39	149	188	0	0	0	313
12:45 PM	0	100	20	120	41	141	182	0	0	0	302
01:00 PM	0	113	**21**	**134**	47	150	197	0	0	0	**331**
01:15 PM	0	112	11	123	**52**	**155**	**207**	0	0	0	330
Total Volume	0	442	60	502	179	595	774	0	0	0	1276
% App. Total	0	88	12		23.1	76.9		0	0		
PHF	.000	.944	.714	.937	.861	.960	.935	.000	.000	.000	.964



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4661 Marlberry Place, Lexington, KY 40509

swcummins@windstream.net 859.361.2589

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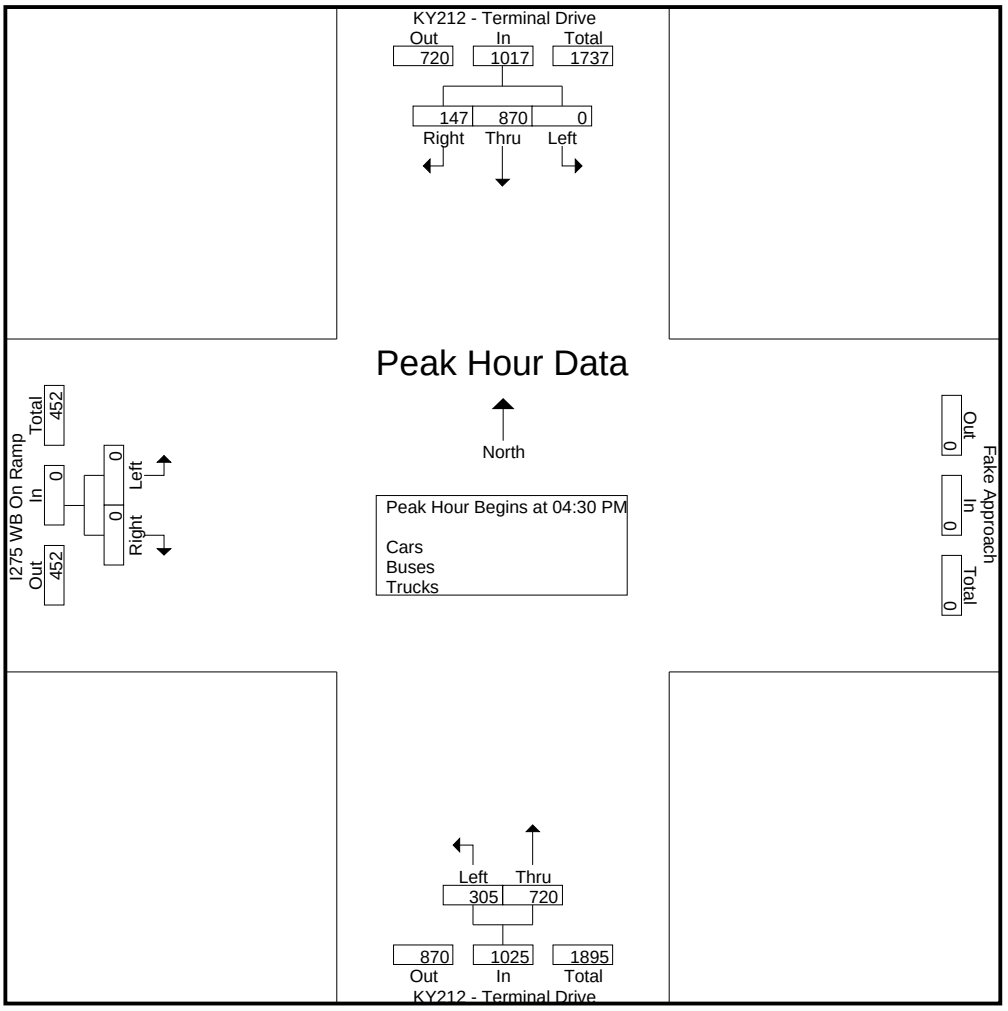
File Name : I275_WB_Ramps_at_KY212_464004_10-26-2017
Site Code : Site 2 - Thursday
Start Date : 10/26/2017
Page No : 7

	KY212 - Terminal Drive From North				KY212 - Terminal Drive From South			I275 WB On Ramp From West			
Start Time	Left	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	Int. Total
Peak Hour Analysis From 02:00 PM to 11:45 PM - Peak 1 of 1											
Peak Hour for Entire Intersection Begins at 04:30 PM											
04:30 PM	0	**240**	39	**279**	69	157	226	0	0	0	505
04:45 PM	0	214	32	246	68	181	249	0	0	0	495
05:00 PM	0	228	**46**	274	78	**197**	**275**	0	0	0	**549**
05:15 PM	0	188	30	218	**90**	185	275	0	0	0	493
Total Volume	0	870	147	1017	305	720	1025	0	0	0	2042
% App. Total	0	85.5	14.5		29.8	70.2		0	0		
PHF	.000	.906	.799	.911	.847	.914	.932	.000	.000	.000	.930



3. I-275 WESTBOUND EXIT RAMP TO TERMINAL DRIVE NORTH (KY 212)

Study Name I275 WB Off Ramp to KY212 NB
Start Date 10/26/2017
Start Time 12:00 AM
Site Code Site 3 - Thursday
Combined

Channel	Direction	Peak Hour
Direction	Northbound	
12:00 AM	5	
12:15 AM	1	
12:30 AM	5	
12:45 AM	2	13
1:00 AM	4	12
1:15 AM	10	21
1:30 AM	7	23
1:45 AM	5	26
2:00 AM	3	25
2:15 AM	3	18
2:30 AM	4	15
2:45 AM	6	16
3:00 AM	3	16
3:15 AM	6	19
3:30 AM	20	35
3:45 AM	15	44
4:00 AM	18	59
4:15 AM	27	80
4:30 AM	50	110
4:45 AM	57	152
5:00 AM	58	192
5:15 AM	90	255
5:30 AM	109	314
5:45 AM	124	381
6:00 AM	85	408
6:15 AM	123	441
6:30 AM	203	535
6:45 AM	223	634
7:00 AM	140	689
7:15 AM	155	721
7:30 AM	140	658
7:45 AM	182	617
8:00 AM	146	623
8:15 AM	98	566
8:30 AM	79	505
8:45 AM	96	419
9:00 AM	59	332
9:15 AM	65	299
9:30 AM	61	281
9:45 AM	51	236

10:00 AM	54	231
10:15 AM	43	209
10:30 AM	64	212
10:45 AM	56	217
11:00 AM	42	205
11:15 AM	61	223
11:30 AM	70	229
11:45 AM	59	232
12:00 PM	56	246
12:15 PM	75	260
12:30 PM	80	270
12:45 PM	82	293
1:00 PM	78	315
1:15 PM	77	317
1:30 PM	70	307
1:45 PM	57	282
2:00 PM	79	283
2:15 PM	79	285
2:30 PM	73	288
2:45 PM	83	314
3:00 PM	87	322
3:15 PM	87	330
3:30 PM	80	337
3:45 PM	91	345
4:00 PM	98	356
4:15 PM	88	357
4:30 PM	82	359
4:45 PM	99	367
5:00 PM	107	376
5:15 PM	100	388
5:30 PM	81	387
5:45 PM	102	390
6:00 PM	64	347
6:15 PM	64	311
6:30 PM	42	272
6:45 PM	43	213
7:00 PM	39	188
7:15 PM	36	160
7:30 PM	40	158
7:45 PM	44	159
8:00 PM	46	166
8:15 PM	38	168
8:30 PM	37	165
8:45 PM	44	165
9:00 PM	36	155
9:15 PM	22	139
9:30 PM	50	152
9:45 PM	23	131
10:00 PM	17	112
10:15 PM	16	106
10:30 PM	32	88
10:45 PM	33	98
11:00 PM	19	100

11:15 PM	17	101
11:30 PM	11	80
11:45 PM	5	52

4. I-275 WESTBOUND EXIT RAMP TO TERMINAL DRIVE SOUTH (KY 212)

Study Name I275 WB Loop Off Ramp to KY212 SB
Start Date 10/26/2017
Start Time 12:00 AM
Site Code Site 4 - Thursday
Combined

Channel	Direction	Peak Hour
Direction	Southbound	
12:00 AM	18	
12:15 AM	10	
12:30 AM	6	
12:45 AM	6	40
1:00 AM	1	23
1:15 AM	1	14
1:30 AM	2	10
1:45 AM	3	7
2:00 AM	4	10
2:15 AM	7	16
2:30 AM	4	18
2:45 AM	12	27
3:00 AM	9	32
3:15 AM	21	46
3:30 AM	35	77
3:45 AM	35	100
4:00 AM	47	138
4:15 AM	65	182
4:30 AM	92	239
4:45 AM	123	327
5:00 AM	147	427
5:15 AM	157	519
5:30 AM	178	605
5:45 AM	207	689
6:00 AM	169	711
6:15 AM	144	698
6:30 AM	156	676
6:45 AM	177	646
7:00 AM	140	617
7:15 AM	147	620
7:30 AM	165	629
7:45 AM	105	557
8:00 AM	124	541
8:15 AM	102	496
8:30 AM	111	442
8:45 AM	115	452
9:00 AM	112	440
9:15 AM	129	467
9:30 AM	147	503
9:45 AM	149	537

10:00 AM	132	557
10:15 AM	151	579
10:30 AM	151	583
10:45 AM	132	566
11:00 AM	129	563
11:15 AM	157	569
11:30 AM	162	580
11:45 AM	158	606
12:00 PM	160	637
12:15 PM	176	656
12:30 PM	192	686
12:45 PM	164	692
1:00 PM	174	706
1:15 PM	194	724
1:30 PM	155	687
1:45 PM	178	701
2:00 PM	159	686
2:15 PM	157	649
2:30 PM	178	672
2:45 PM	164	658
3:00 PM	159	658
3:15 PM	195	696
3:30 PM	182	700
3:45 PM	190	726
4:00 PM	168	735
4:15 PM	146	686
4:30 PM	124	628
4:45 PM	131	569
5:00 PM	120	521
5:15 PM	107	482
5:30 PM	96	454
5:45 PM	86	409
6:00 PM	78	367
6:15 PM	84	344
6:30 PM	64	312
6:45 PM	67	293
7:00 PM	55	270
7:15 PM	51	237
7:30 PM	55	228
7:45 PM	68	229
8:00 PM	75	249
8:15 PM	50	248
8:30 PM	47	240
8:45 PM	63	235
9:00 PM	62	222
9:15 PM	54	226
9:30 PM	37	216
9:45 PM	55	208
10:00 PM	64	210
10:15 PM	69	225
10:30 PM	60	248
10:45 PM	63	256
11:00 PM	62	254

11:15 PM	66	251
11:30 PM	61	252
11:45 PM	38	227

5. I-275 EASTBOUND EXIT RAMP TO TERMINAL DRIVE SOUTH (KY 212)

6. I-275 EASTBOUND ENTRY RAMP FROM TERMINAL DRIVE NORTH (KY 212)

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4661 Marlberry Place, Lexington, KY 40509

swcummins@windstream.net 859.361.2589

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Overcast and Cold - 45 Degrees
Schools in Session

File Name : I275_EB_Ramps_at_KY212_464008_10-26-2017
Site Code : Site 5 - Thursday
Start Date : 10/26/2017
Page No : 1

Groups Printed- Cars - Buses - Trucks

	KY212 - Terminal Drive From North				I275 EB On Ramp From East				KY212 - Terminal Drive From South				I275 EB Off Ramp From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
12:00 AM	40	30	0	70	0	0	0	0	0	44	155	199	4	0	0	4	273
12:15 AM	28	21	0	49	0	0	0	0	0	22	74	96	2	0	1	3	148
12:30 AM	27	9	0	36	0	0	0	0	0	20	26	46	4	0	3	7	89
12:45 AM	13	9	0	22	0	0	0	0	0	3	15	18	2	0	0	2	42
Total	108	69	0	177	0	0	0	0	0	89	270	359	12	0	4	16	552
01:00 AM	12	2	0	14	0	0	0	0	0	3	10	13	0	0	3	3	30
01:15 AM	5	3	0	8	0	0	0	0	0	5	7	12	0	0	3	3	23
01:30 AM	15	2	0	17	0	0	0	0	0	5	12	17	2	1	1	4	38
01:45 AM	2	7	0	9	0	0	0	0	0	1	4	5	1	0	1	2	16
Total	34	14	0	48	0	0	0	0	0	14	33	47	3	1	8	12	107
02:00 AM	9	11	0	20	0	0	0	0	0	2	15	17	4	0	4	8	45
02:15 AM	5	8	0	13	0	0	0	0	0	7	15	22	2	0	4	6	41
02:30 AM	10	10	0	20	0	0	0	0	0	8	22	30	3	0	5	8	58
02:45 AM	8	14	0	22	0	0	0	0	0	2	6	8	3	0	3	6	36
Total	32	43	0	75	0	0	0	0	0	19	58	77	12	0	16	28	180
03:00 AM	8	9	0	17	0	0	0	0	0	0	4	4	0	0	6	6	27
03:15 AM	13	24	0	37	0	0	0	0	0	6	4	10	1	0	7	8	55
03:30 AM	7	45	0	52	0	0	0	0	0	5	5	10	2	0	9	11	73
03:45 AM	6	38	0	44	0	0	0	0	0	5	8	13	6	0	11	17	74
Total	34	116	0	150	0	0	0	0	0	16	21	37	9	0	33	42	229
04:00 AM	7	55	0	62	0	0	0	0	0	11	14	25	0	0	13	13	100
04:15 AM	11	71	0	82	0	0	0	0	0	11	22	33	6	0	14	20	135
04:30 AM	17	106	0	123	0	0	0	0	0	18	22	40	6	0	24	30	193
04:45 AM	14	124	0	138	0	0	0	0	0	18	40	58	4	0	30	34	230
Total	49	356	0	405	0	0	0	0	0	58	98	156	16	0	81	97	658
05:00 AM	22	165	0	187	0	0	0	0	0	25	50	75	8	0	24	32	294
05:15 AM	37	173	0	210	0	0	0	0	0	29	72	101	10	0	25	35	346
05:30 AM	33	197	0	230	0	0	0	0	0	51	93	144	15	0	43	58	432
05:45 AM	32	237	0	269	0	0	0	0	0	43	88	131	16	0	43	59	459
Total	124	772	0	896	0	0	0	0	0	148	303	451	49	0	135	184	1531
06:00 AM	42	204	0	246	0	0	0	0	0	49	82	131	20	0	42	62	439
06:15 AM	37	172	0	209	0	0	0	0	0	46	68	114	25	0	49	74	397
06:30 AM	52	192	0	244	0	0	0	0	0	60	86	146	25	0	58	83	473
06:45 AM	64	214	0	278	0	0	0	0	0	62	61	123	38	0	41	79	480
Total	195	782	0	977	0	0	0	0	0	217	297	514	108	0	190	298	1789
07:00 AM	63	164	0	227	0	0	0	0	0	70	52	122	36	0	63	99	448
07:15 AM	75	178	0	253	0	0	0	0	0	66	40	106	33	0	68	101	460
07:30 AM	91	202	0	293	0	0	0	0	0	80	65	145	32	0	61	93	531
07:45 AM	65	147	0	212	0	0	0	0	0	94	62	156	39	0	61	100	468
Total	294	691	0	985	0	0	0	0	0	310	219	529	140	0	253	393	1907
08:00 AM	66	150	0	216	0	0	0	0	0	83	49	132	43	1	46	90	438
08:15 AM	82	133	0	215	0	0	0	0	0	79	48	127	22	0	58	80	422
08:30 AM	62	152	0	214	0	0	0	0	0	78	90	168	22	0	41	63	445
08:45 AM	60	149	0	209	0	0	0	0	0	61	100	161	16	0	54	70	440
Total	270	584	0	854	0	0	0	0	0	301	287	588	103	1	199	303	1745
09:00 AM	52	133	0	185	0	0	0	0	0	75	79	154	17	0	51	68	407
09:15 AM	68	166	0	234	0	0	0	0	0	47	99	146	14	0	34	48	428
09:30 AM	47	179	0	226	0	0	0	0	0	60	104	164	7	0	40	47	437
09:45 AM	70	181	0	251	0	0	0	0	0	67	106	173	17	0	40	57	481
Total	237	659	0	896	0	0	0	0	0	249	388	637	55	0	165	220	1753

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4661 Marlberry Place, Lexington, KY 40509

swcummins@windstream.net 859.361.2589

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File Name : I275_EB_Ramps_at_KY212_464008_10-26-2017
Site Code : Site 5 - Thursday
Start Date : 10/26/2017
Page No : 2

Groups Printed- Cars - Buses - Trucks

	KY212 - Terminal Drive From North				I275 EB On Ramp From East				KY212 - Terminal Drive From South				I275 EB Off Ramp From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
10:00 AM	53	156	0	209	0	0	0	0	0	60	102	162	8	0	29	37	408
10:15 AM	63	192	0	255	0	0	0	0	0	55	105	160	8	0	29	37	452
10:30 AM	58	188	0	246	0	0	0	0	0	58	141	199	5	0	43	48	493
10:45 AM	68	164	0	232	0	0	0	0	1	67	126	194	10	0	26	36	462
Total	242	700	0	942	0	0	0	0	1	240	474	715	31	0	127	158	1815
11:00 AM	95	175	0	270	0	0	0	0	0	76	150	226	10	0	40	50	546
11:15 AM	69	189	0	258	0	0	0	0	0	61	122	183	12	0	37	49	490
11:30 AM	63	202	0	265	0	0	0	0	0	68	158	226	19	0	43	62	553
11:45 AM	66	201	0	267	0	0	0	0	0	84	175	259	16	0	40	56	582
Total	293	767	0	1060	0	0	0	0	0	289	605	894	57	0	160	217	2171
12:00 PM	104	194	0	298	0	0	0	0	0	83	205	288	15	0	42	57	643
12:15 PM	56	198	0	254	0	0	0	0	0	75	118	193	22	0	50	72	519
12:30 PM	79	239	0	318	0	0	0	0	0	77	135	212	21	0	44	65	595
12:45 PM	73	192	0	265	0	0	0	0	0	83	148	231	14	0	44	58	554
Total	312	823	0	1135	0	0	0	0	0	318	606	924	72	0	180	252	2311
01:00 PM	79	207	0	286	0	0	0	0	0	84	190	274	15	0	39	54	614
01:15 PM	73	244	0	317	0	0	0	0	0	100	130	230	19	0	28	47	594
01:30 PM	65	182	0	247	0	0	0	0	0	74	122	196	13	0	31	44	487
01:45 PM	73	203	0	276	0	0	0	0	0	95	152	247	16	0	42	58	581
Total	290	836	0	1126	0	0	0	0	0	353	594	947	63	0	140	203	2276
02:00 PM	101	215	0	316	0	0	0	0	0	98	207	305	12	0	46	58	679
02:15 PM	77	200	0	277	0	0	0	0	0	113	234	347	18	0	42	60	684
02:30 PM	156	241	0	397	0	0	0	0	1	117	211	329	20	0	39	59	785
02:45 PM	82	203	0	285	0	0	0	0	0	114	146	260	14	0	49	63	608
Total	416	859	0	1275	0	0	0	0	1	442	798	1241	64	0	176	240	2756
03:00 PM	133	219	0	352	0	0	0	0	0	120	202	322	13	0	63	76	750
03:15 PM	71	254	0	325	0	0	0	0	0	136	224	360	14	0	44	58	743
03:30 PM	181	238	0	419	0	0	0	0	0	137	196	333	19	0	71	90	842
03:45 PM	170	249	0	419	0	0	0	0	1	138	189	328	23	0	53	76	823
Total	555	960	0	1515	0	0	0	0	1	531	811	1343	69	0	231	300	3158
04:00 PM	141	206	0	347	0	0	0	0	0	140	184	324	21	0	50	71	742
04:15 PM	119	205	0	324	0	0	0	0	0	125	188	313	18	1	62	81	718
04:30 PM	168	199	0	367	0	0	0	0	0	117	118	235	20	0	52	72	674
04:45 PM	151	186	0	337	0	0	0	0	0	121	95	216	25	0	44	69	622
Total	579	796	0	1375	0	0	0	0	0	503	585	1088	84	1	208	293	2756
05:00 PM	173	170	0	343	0	0	0	0	0	115	119	234	13	0	39	52	629
05:15 PM	128	182	0	310	0	0	0	0	0	132	148	280	14	0	59	73	663
05:30 PM	126	147	0	273	0	0	0	0	0	121	152	273	21	0	48	69	615
05:45 PM	99	137	0	236	0	0	0	0	0	113	164	277	18	0	31	49	562
Total	526	636	0	1162	0	0	0	0	0	481	583	1064	66	0	177	243	2469
06:00 PM	102	121	0	223	0	0	0	0	0	109	175	284	17	0	52	69	576
06:15 PM	78	122	0	200	0	0	0	0	0	99	146	245	12	0	42	54	499
06:30 PM	74	104	0	178	0	0	0	0	0	83	140	223	8	0	43	51	452
06:45 PM	60	102	0	162	0	0	0	0	0	65	66	131	16	0	26	42	335
Total	314	449	0	763	0	0	0	0	0	356	527	883	53	0	163	216	1862
07:00 PM	50	82	0	132	0	0	0	0	0	51	87	138	7	0	27	34	304
07:15 PM	51	79	0	130	0	0	0	0	0	56	79	135	6	0	21	27	292
07:30 PM	46	75	0	121	0	0	0	0	0	57	115	172	10	0	16	26	319
07:45 PM	43	91	0	134	0	0	0	0	0	53	165	218	6	0	19	25	377
Total	190	327	0	517	0	0	0	0	0	217	446	663	29	0	83	112	1292

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4661 Marlberry Place, Lexington, KY 40509

swcummins@windstream.net 859.361.2589

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File Name : I275_EB_Ramps_at_KY212_464008_10-26-2017
Site Code : Site 5 - Thursday
Start Date : 10/26/2017
Page No : 3

Groups Printed- Cars - Buses - Trucks

	KY212 - Terminal Drive From North				I275 EB On Ramp From East				KY212 - Terminal Drive From South				I275 EB Off Ramp From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
08:00 PM	61	99	0	160	0	0	0	0	0	70	204	274	9	0	7	16	450
08:15 PM	58	67	0	125	0	0	0	0	0	53	122	175	7	0	17	24	324
08:30 PM	35	65	0	100	0	0	0	0	0	33	39	72	6	0	15	21	193
08:45 PM	37	80	0	117	0	0	0	0	0	33	58	91	10	0	14	24	232
Total	191	311	0	502	0	0	0	0	0	189	423	612	32	0	53	85	1199
09:00 PM	46	88	0	134	0	0	0	0	0	61	168	229	8	0	17	25	388
09:15 PM	45	78	0	123	0	0	0	0	0	73	257	330	5	0	6	11	464
09:30 PM	70	63	0	133	0	0	0	0	0	50	212	262	5	0	13	18	413
09:45 PM	45	72	0	117	0	0	0	0	0	49	137	186	10	0	17	27	330
Total	206	301	0	507	0	0	0	0	0	233	774	1007	28	0	53	81	1595
10:00 PM	64	74	0	138	0	0	0	0	0	25	81	106	4	0	17	21	265
10:15 PM	36	82	0	118	0	0	0	0	0	43	130	173	6	0	23	29	320
10:30 PM	40	73	0	113	0	0	0	0	0	68	190	258	3	0	14	17	388
10:45 PM	34	77	0	111	0	0	0	0	0	36	109	145	3	0	12	15	271
Total	174	306	0	480	0	0	0	0	0	172	510	682	16	0	66	82	1244
11:00 PM	57	80	0	137	0	0	0	0	0	18	39	57	2	0	18	20	214
11:15 PM	29	81	0	110	0	0	0	0	0	46	139	185	7	0	13	20	315
11:30 PM	79	76	0	155	0	0	0	0	0	53	185	238	1	0	14	15	408
11:45 PM	34	51	0	85	0	0	0	0	0	40	139	179	3	0	4	7	271
Total	199	288	0	487	0	0	0	0	0	157	502	659	13	0	49	62	1208
Grand Total	5864	12445	0	18309	0	0	0	0	3	5902	10212	16117	1184	3	2950	4137	38563
Apprch %	32	68	0		0	0	0		0	36.6	63.4		28.6	0.1	71.3		
Total %	15.2	32.3	0	47.5	0	0	0	0	0	15.3	26.5	41.8	3.1	0	7.6	10.7	
Cars	5199	11547	0	16746	0	0	0	0	3	5034	10027	15064	912	2	2765	3679	35489
% Cars	88.7	92.8	0	91.5	0	0	0	0	100	85.3	98.2	93.5	77	66.7	93.7	88.9	92
Buses	38	450	0	488	0	0	0	0	0	355	40	395	4	0	8	12	895
% Buses	0.6	3.6	0	2.7	0	0	0	0	0	6	0.4	2.5	0.3	0	0.3	0.3	2.3
Trucks	627	448	0	1075	0	0	0	0	0	513	145	658	268	1	177	446	2179
% Trucks	10.7	3.6	0	5.9	0	0	0	0	0	8.7	1.4	4.1	22.6	33.3	6	10.8	5.7

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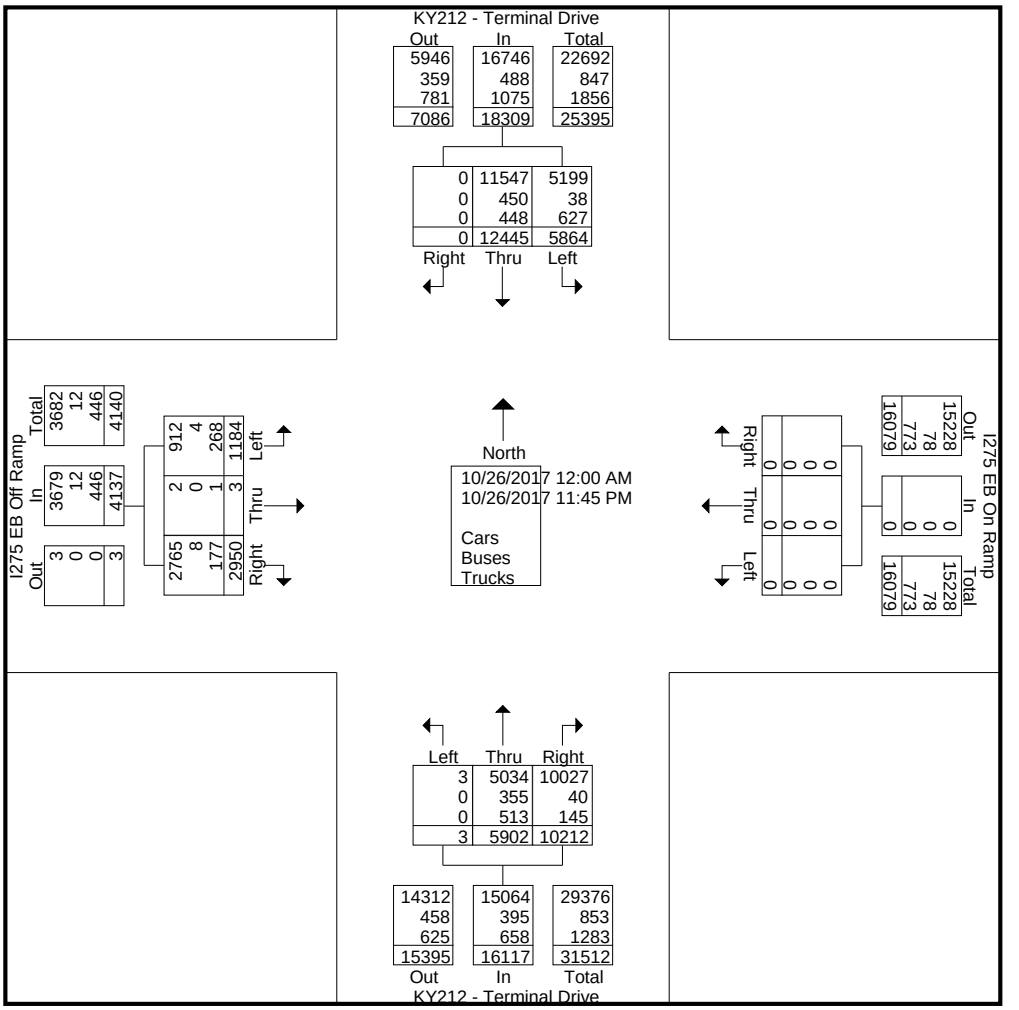
File Name : I275_EB_Ramps_at_KY212_464008_10-26-2017
Site Code : Site 5 - Thursday
Start Date : 10/26/2017
Page No : 4



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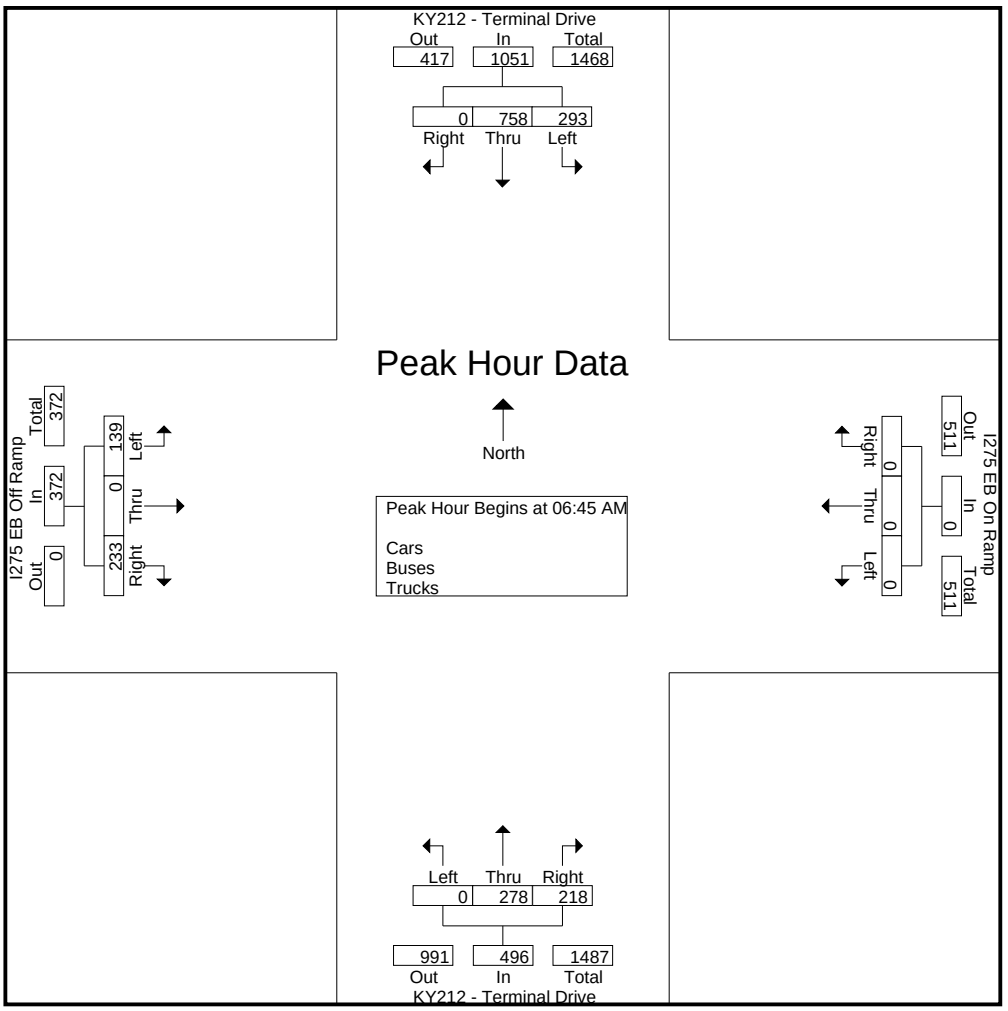
File Name : I275_EB_Ramps_at_KY212_464008_10-26-2017
Site Code : Site 5 - Thursday
Start Date : 10/26/2017
Page No : 5

	KY212 - Terminal Drive From North				I275 EB On Ramp From East				KY212 - Terminal Drive From South				I275 EB Off Ramp From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 12:00 AM to 09:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 06:45 AM																	
06:45 AM	64	**214**	0	278	0	0	0	0	0	62	61	123	**38**	0	41	79	480
07:00 AM	63	164	0	227	0	0	0	0	0	70	52	122	36	0	63	99	448
07:15 AM	75	178	0	253	0	0	0	0	0	66	40	106	33	0	**68**	**101**	460
07:30 AM	**91**	202	0	**293**	0	0	0	0	0	**80**	**65**	**145**	32	0	61	93	**531**
Total Volume	293	758	0	1051	0	0	0	0	0	278	218	496	139	0	233	372	1919
% App. Total	27.9	72.1	0		0	0	0		0	56	44		37.4	0	62.6		
PHF	.805	.886	.000	.897	.000	.000	.000	.000	.000	.869	.838	.855	.914	.000	.857	.921	.903



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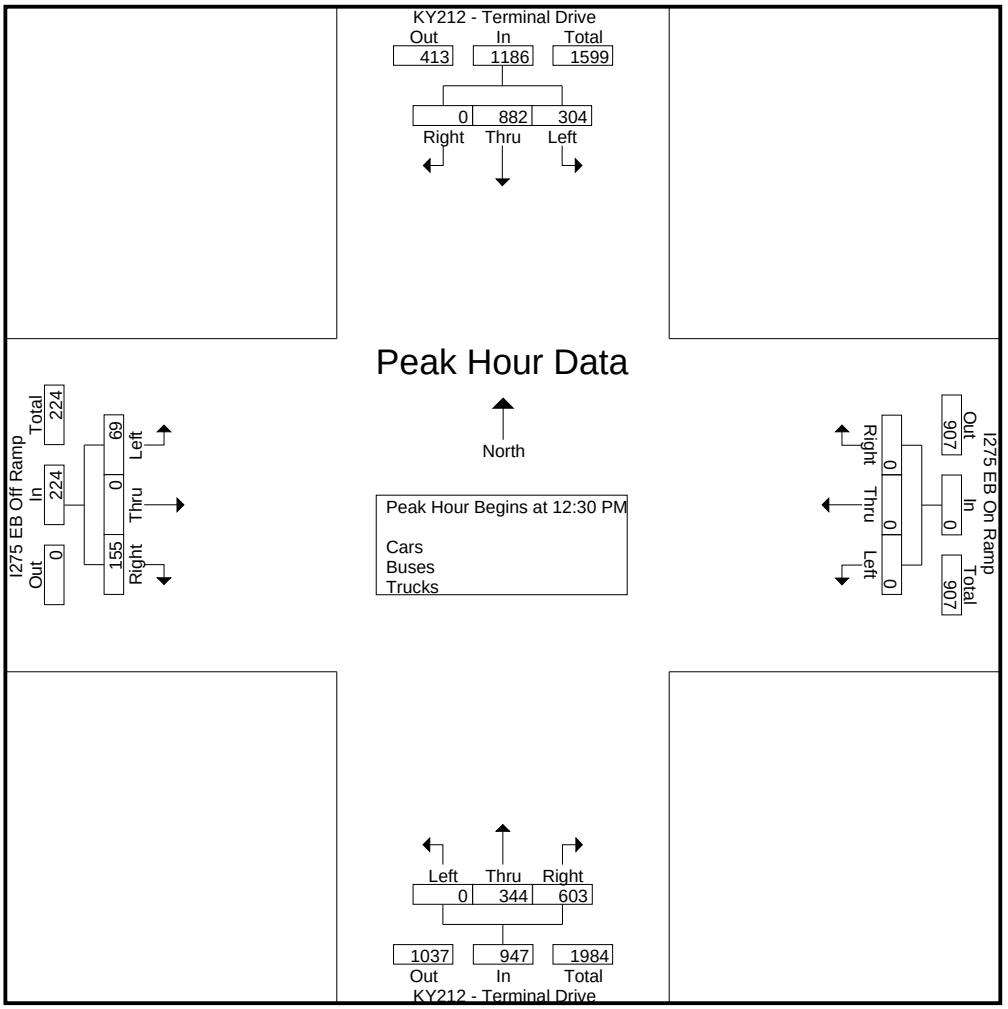
File Name : I275_EB_Ramps_at_KY212_464008_10-26-2017
Site Code : Site 5 - Thursday
Start Date : 10/26/2017
Page No : 6

	KY212 - Terminal Drive From North				I275 EB On Ramp From East				KY212 - Terminal Drive From South				I275 EB Off Ramp From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 12:30 PM																	
12:30 PM	**79**	239	0	**318**	0	0	0	0	0	77	135	212	**21**	0	**44**	**65**	595
12:45 PM	73	192	0	265	0	0	0	0	0	83	148	231	14	0	44	58	554
01:00 PM	79	207	0	286	0	0	0	0	0	84	**190**	**274**	15	0	39	54	**614**
01:15 PM	73	**244**	0	317	0	0	0	0	0	**100**	130	230	19	0	28	47	594
Total Volume	304	882	0	1186	0	0	0	0	0	344	603	947	69	0	155	224	2357
% App. Total	25.6	74.4	0		0	0	0		0	36.3	63.7		30.8	0	69.2		
PHF	.962	.904	.000	.932	.000	.000	.000	.000	.000	.860	.793	.864	.821	.000	.881	.862	.960



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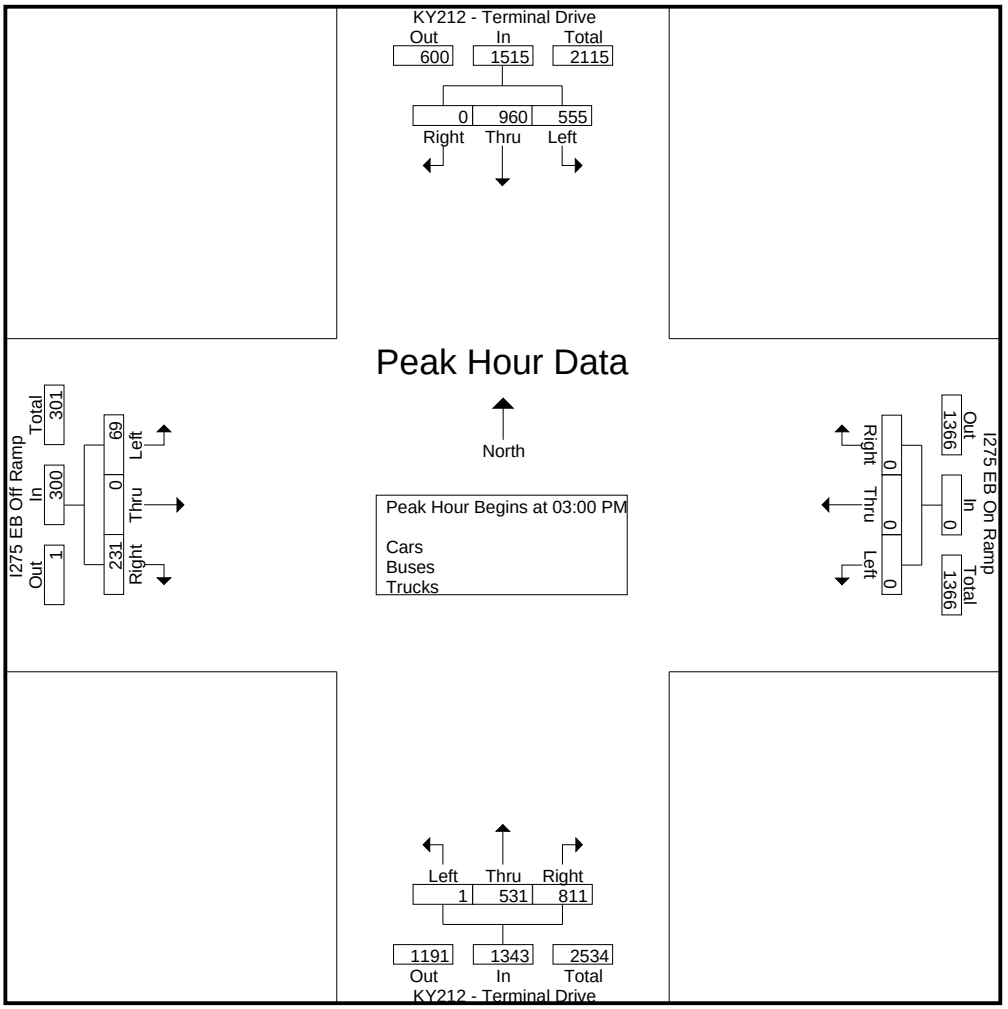
File Name : I275_EB_Ramps_at_KY212_464008_10-26-2017
Site Code : Site 5 - Thursday
Start Date : 10/26/2017
Page No : 7

	KY212 - Terminal Drive From North				I275 EB On Ramp From East				KY212 - Terminal Drive From South				I275 EB Off Ramp From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 02:00 PM to 11:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 03:00 PM																	
03:00 PM	133	219	0	352	0	0	0	0	0	120	202	322	13	0	63	76	750
03:15 PM	71	**254**	0	325	0	0	0	0	0	136	**224**	**360**	14	0	44	58	743
03:30 PM	**181**	238	0	**419**	0	0	0	0	0	137	196	333	19	0	**71**	**90**	**842**
03:45 PM	170	249	0	419	0	0	0	0	**1**	**138**	189	328	**23**	0	53	76	823
Total Volume	555	960	0	1515	0	0	0	0	1	531	811	1343	69	0	231	300	3158
% App. Total	36.6	63.4	0		0	0	0		0.1	39.5	60.4		23	0	77		
PHF	.767	.945	.000	.904	.000	.000	.000	.000	.250	.962	.905	.933	.750	.000	.813	.833	.938



7. DONALDSON HIGHWAY (KY 236) AT TERMINAL DRIVE RAMP (EAST RAMP)

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Sunny - 83 Degrees
SCU-45Q

File Name : KY212_NB_Ramps_at_KY236_436496_08-03-2017
Site Code : Site 7 - Thursday
Start Date : 8/3/2017
Page No : 1

Groups Printed- Cars - Buses - Trucks

	KY212 NB On Ramp From North				KY236 - Donaldson Hwy From East				KY212 NB Off Ramp From South				KY236 - Donaldson Hwy From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
12:00 AM	0	0	0	0	0	10	14	24	7	0	2	9	49	12	0	61	94
12:15 AM	0	0	0	0	0	2	7	9	5	0	1	6	30	6	0	36	51
12:30 AM	0	0	0	0	0	3	14	17	4	1	3	8	26	8	0	34	59
12:45 AM	0	0	0	0	0	4	12	16	2	0	3	5	12	5	0	17	38
Total	0	0	0	0	0	19	47	66	18	1	9	28	117	31	0	148	242
01:00 AM	0	0	0	0	0	5	4	9	2	0	2	4	18	5	0	23	36
01:15 AM	0	0	0	0	0	4	3	7	3	0	4	7	9	8	0	17	31
01:30 AM	0	0	0	0	0	2	9	11	1	0	2	3	10	13	0	23	37
01:45 AM	0	0	0	0	0	5	8	13	1	0	2	3	2	4	0	6	22
Total	0	0	0	0	0	16	24	40	7	0	10	17	39	30	0	69	126
02:00 AM	0	0	0	0	0	7	4	11	2	0	2	4	6	7	0	13	28
02:15 AM	0	0	0	0	0	1	5	6	1	0	3	4	2	6	0	8	18
02:30 AM	0	0	0	0	0	3	5	8	5	0	0	5	2	17	0	19	32
02:45 AM	0	0	0	0	0	4	3	7	1	0	1	2	3	11	0	14	23
Total	0	0	0	0	0	15	17	32	9	0	6	15	13	41	0	54	101
03:00 AM	0	0	0	0	0	6	7	13	0	0	0	0	0	19	0	19	32
03:15 AM	0	0	0	0	0	5	4	9	4	0	2	6	1	16	0	17	32
03:30 AM	0	0	0	0	0	10	6	16	7	0	2	9	4	22	0	26	51
03:45 AM	0	0	0	0	0	8	4	12	5	0	2	7	2	18	0	20	39
Total	0	0	0	0	0	29	21	50	16	0	6	22	7	75	0	82	154
04:00 AM	0	0	0	0	0	15	4	19	8	0	4	12	6	21	0	27	58
04:15 AM	0	0	0	0	0	13	3	16	12	0	6	18	1	19	0	20	54
04:30 AM	0	0	0	0	0	17	5	22	14	0	11	25	5	21	0	26	73
04:45 AM	0	0	0	0	0	8	7	15	13	0	6	19	9	39	0	48	82
Total	0	0	0	0	0	53	19	72	47	0	27	74	21	100	0	121	267
05:00 AM	0	0	0	0	0	19	7	26	9	0	8	17	5	30	0	35	78
05:15 AM	0	0	0	0	0	14	13	27	10	1	6	17	15	27	0	42	86
05:30 AM	0	0	0	0	0	27	25	52	11	0	9	20	11	46	0	57	129
05:45 AM	0	0	0	0	0	20	20	40	13	0	8	21	24	46	0	70	131
Total	0	0	0	0	0	80	65	145	43	1	31	75	55	149	0	204	424
06:00 AM	0	0	0	0	0	28	33	61	13	1	10	24	13	56	0	69	154
06:15 AM	0	0	0	0	0	16	36	52	15	1	7	23	32	64	0	96	171
06:30 AM	0	0	0	0	0	34	32	66	10	0	8	18	34	85	0	119	203
06:45 AM	0	0	0	0	0	20	22	42	14	0	5	19	16	74	0	90	151
Total	0	0	0	0	0	98	123	221	52	2	30	84	95	279	0	374	679
07:00 AM	0	0	0	0	0	23	19	42	11	1	14	26	24	70	0	94	162
07:15 AM	0	0	0	0	0	22	29	51	14	0	10	24	11	65	0	76	151
07:30 AM	0	0	0	0	0	41	35	76	18	0	15	33	12	97	0	109	218
07:45 AM	0	0	0	0	0	30	43	73	18	0	22	40	18	91	0	109	222
Total	0	0	0	0	0	116	126	242	61	1	61	123	65	323	0	388	753
08:00 AM	0	0	0	0	0	38	40	78	13	0	17	30	17	86	0	103	211
08:15 AM	0	0	0	0	0	22	36	58	10	0	13	23	22	69	0	91	172
08:30 AM	0	0	0	0	0	33	31	64	14	0	5	19	22	58	0	80	163
08:45 AM	0	0	0	0	0	22	20	42	8	0	14	22	27	65	0	92	156
Total	0	0	0	0	0	115	127	242	45	0	49	94	88	278	0	366	702

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File Name : KY212_NB_Ramps_at_KY236_436496_08-03-2017
Site Code : Site 7 - Thursday
Start Date : 8/3/2017
Page No : 2

Groups Printed- Cars - Buses - Trucks

	KY212 NB On Ramp From North				KY236 - Donaldson Hwy From East				KY212 NB Off Ramp From South				KY236 - Donaldson Hwy From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
09:00 AM	0	0	0	0	0	29	31	60	10	1	16	27	23	44	0	67	154
09:15 AM	0	0	0	0	0	20	21	41	16	0	7	23	29	53	0	82	146
09:30 AM	0	0	0	0	0	24	30	54	12	0	12	24	21	49	0	70	148
09:45 AM	0	0	0	0	0	29	15	44	12	1	14	27	38	63	0	101	172
Total	0	0	0	0	0	102	97	199	50	2	49	101	111	209	0	320	620
10:00 AM	0	0	0	0	0	26	30	56	17	0	14	31	45	39	0	84	171
10:15 AM	0	0	0	0	0	27	25	52	8	0	6	14	29	60	0	89	155
10:30 AM	0	0	0	0	0	30	26	56	12	0	13	25	30	61	0	91	172
10:45 AM	0	0	0	0	0	34	23	57	13	0	9	22	32	57	0	89	168
Total	0	0	0	0	0	117	104	221	50	0	42	92	136	217	0	353	666
11:00 AM	0	0	0	0	0	35	41	76	15	1	15	31	37	56	0	93	200
11:15 AM	0	0	0	0	0	21	31	52	12	1	14	27	30	70	0	100	179
11:30 AM	0	0	0	0	0	29	33	62	16	0	15	31	30	66	0	96	189
11:45 AM	0	0	0	0	0	51	37	88	14	2	17	33	34	89	0	123	244
Total	0	0	0	0	0	136	142	278	57	4	61	122	131	281	0	412	812
12:00 PM	0	0	0	0	0	42	38	80	11	0	22	33	37	77	0	114	227
12:15 PM	0	0	0	0	0	35	50	85	11	0	19	30	37	68	0	105	220
12:30 PM	0	0	0	0	0	51	41	92	12	0	29	41	42	71	0	113	246
12:45 PM	0	0	0	0	0	40	62	102	14	0	21	35	47	60	0	107	244
Total	0	0	0	0	0	168	191	359	48	0	91	139	163	276	0	439	937
01:00 PM	0	0	0	0	0	42	63	105	14	0	19	33	37	81	0	118	256
01:15 PM	0	0	0	0	0	38	44	82	16	0	16	32	38	54	0	92	206
01:30 PM	0	0	0	0	0	36	58	94	11	0	17	28	36	84	0	120	242
01:45 PM	0	0	0	0	0	57	60	117	15	0	13	28	42	79	0	121	266
Total	0	0	0	0	0	173	225	398	56	0	65	121	153	298	0	451	970
02:00 PM	0	0	0	0	0	47	62	109	12	1	27	40	62	67	0	129	278
02:15 PM	0	0	0	0	0	47	50	97	14	0	22	36	71	64	0	135	268
02:30 PM	0	0	0	0	0	48	64	112	16	0	22	38	56	79	0	135	285
02:45 PM	0	0	0	0	0	49	64	113	14	2	12	28	37	74	0	111	252
Total	0	0	0	0	0	191	240	431	56	3	83	142	226	284	0	510	1083
03:00 PM	0	0	0	0	0	51	83	134	12	1	12	25	38	68	0	106	265
03:15 PM	0	0	0	0	0	52	61	113	15	0	16	31	41	78	0	119	263
03:30 PM	0	0	0	0	0	44	70	114	12	0	23	35	59	103	0	162	311
03:45 PM	0	0	0	0	0	50	76	126	15	0	24	39	40	90	0	130	295
Total	0	0	0	0	0	197	290	487	54	1	75	130	178	339	0	517	1134
04:00 PM	0	0	0	0	0	57	63	120	12	0	26	38	46	100	0	146	304
04:15 PM	0	0	0	0	0	38	64	102	14	0	25	39	46	77	0	123	264
04:30 PM	0	0	0	0	0	50	76	126	11	0	16	27	35	102	0	137	290
04:45 PM	0	0	0	0	0	63	60	123	14	0	21	35	38	63	0	101	259
Total	0	0	0	0	0	208	263	471	51	0	88	139	165	342	0	507	1117
05:00 PM	0	0	0	0	0	63	67	130	11	3	19	33	46	104	0	150	313
05:15 PM	0	0	0	0	0	45	63	108	4	0	15	19	24	73	0	97	224
05:30 PM	0	0	0	0	0	51	57	108	14	3	18	35	25	83	0	108	251
05:45 PM	0	0	0	0	0	40	52	92	7	2	22	31	35	77	0	112	235
Total	0	0	0	0	0	199	239	438	36	8	74	118	130	337	0	467	1023
06:00 PM	0	0	0	0	0	37	51	88	11	2	12	25	55	67	0	122	235

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File Name : KY212_NB_Ramps_at_KY236_436496_08-03-2017
Site Code : Site 7 - Thursday
Start Date : 8/3/2017
Page No : 3

Groups Printed- Cars - Buses - Trucks

	KY212 NB On Ramp From North				KY236 - Donaldson Hwy From East				KY212 NB Off Ramp From South				KY236 - Donaldson Hwy From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
06:15 PM	0	0	0	0	0	37	44	81	17	1	19	37	52	53	0	105	223
06:30 PM	0	0	0	0	0	35	31	66	11	1	8	20	44	71	0	115	201
06:45 PM	0	0	0	0	0	34	35	69	11	0	8	19	40	56	0	96	184
Total	0	0	0	0	0	143	161	304	50	4	47	101	191	247	0	438	843
07:00 PM	1	0	0	1	0	31	36	67	12	0	12	24	55	36	0	91	183
07:15 PM	0	0	0	0	0	25	30	55	9	0	8	17	44	28	0	72	144
07:30 PM	0	0	0	0	0	27	23	50	7	2	9	18	35	32	0	67	135
07:45 PM	0	0	0	0	0	18	32	50	11	0	10	21	47	30	0	77	148
Total	1	0	0	1	0	101	121	222	39	2	39	80	181	126	0	307	610
08:00 PM	0	0	0	0	0	20	38	58	9	0	10	19	56	28	0	84	161
08:15 PM	0	0	0	0	0	15	34	49	7	0	5	12	36	32	0	68	129
08:30 PM	0	0	0	0	0	20	23	43	6	0	12	18	24	25	0	49	110
08:45 PM	0	0	0	0	0	27	33	60	9	0	8	17	28	23	0	51	128
Total	0	0	0	0	0	82	128	210	31	0	35	66	144	108	0	252	528
09:00 PM	0	0	0	0	0	22	27	49	5	0	8	13	42	24	0	66	128
09:15 PM	0	0	0	0	0	17	28	45	5	0	7	12	23	23	0	46	103
09:30 PM	0	0	0	0	0	14	25	39	9	1	8	18	23	19	0	42	99
09:45 PM	0	0	0	0	0	20	36	56	6	0	9	15	36	15	0	51	122
Total	0	0	0	0	0	73	116	189	25	1	32	58	124	81	0	205	452
10:00 PM	0	0	0	0	0	19	21	40	4	0	4	8	18	14	0	32	80
10:15 PM	0	0	0	0	0	14	28	42	5	1	8	14	18	25	0	43	99
10:30 PM	0	0	0	0	0	11	19	30	6	1	8	15	38	22	0	60	105
10:45 PM	0	0	0	0	0	13	24	37	10	1	11	22	46	28	0	74	133
Total	0	0	0	0	0	57	92	149	25	3	31	59	120	89	0	209	417
11:00 PM	0	0	0	0	0	15	15	30	7	0	2	9	50	23	0	73	112
11:15 PM	0	0	0	0	0	10	9	19	5	0	5	10	45	20	0	65	94
11:30 PM	0	0	0	0	0	8	16	24	6	0	6	12	31	14	0	45	81
11:45 PM	0	0	0	0	0	3	16	19	7	0	8	15	36	12	0	48	82
Total	0	0	0	0	0	36	56	92	25	0	21	46	162	69	0	231	369
Grand Total	1	0	0	1	0	2524	3034	5558	951	33	1062	2046	2815	4609	0	7424	15029
Apprch %	100	0	0		0	45.4	54.6		46.5	1.6	51.9		37.9	62.1	0		
Total %	0	0	0	0	0	16.8	20.2	37	6.3	0.2	7.1	13.6	18.7	30.7	0	49.4	
Cars	1	0	0	1	0	2370	2589	4959	318	33	1043	1394	2704	4061	0	6765	13119
% Cars	100	0	0	100	0	93.9	85.3	89.2	33.4	100	98.2	68.1	96.1	88.1	0	91.1	87.3
Buses	0	0	0	0	0	75	37	112	613	0	3	616	5	30	0	35	763
% Buses	0	0	0	0	0	3	1.2	2	64.5	0	0.3	30.1	0.2	0.7	0	0.5	5.1
Trucks	0	0	0	0	0	79	408	487	20	0	16	36	106	518	0	624	1147
% Trucks	0	0	0	0	0	3.1	13.4	8.8	2.1	0	1.5	1.8	3.8	11.2	0	8.4	7.6

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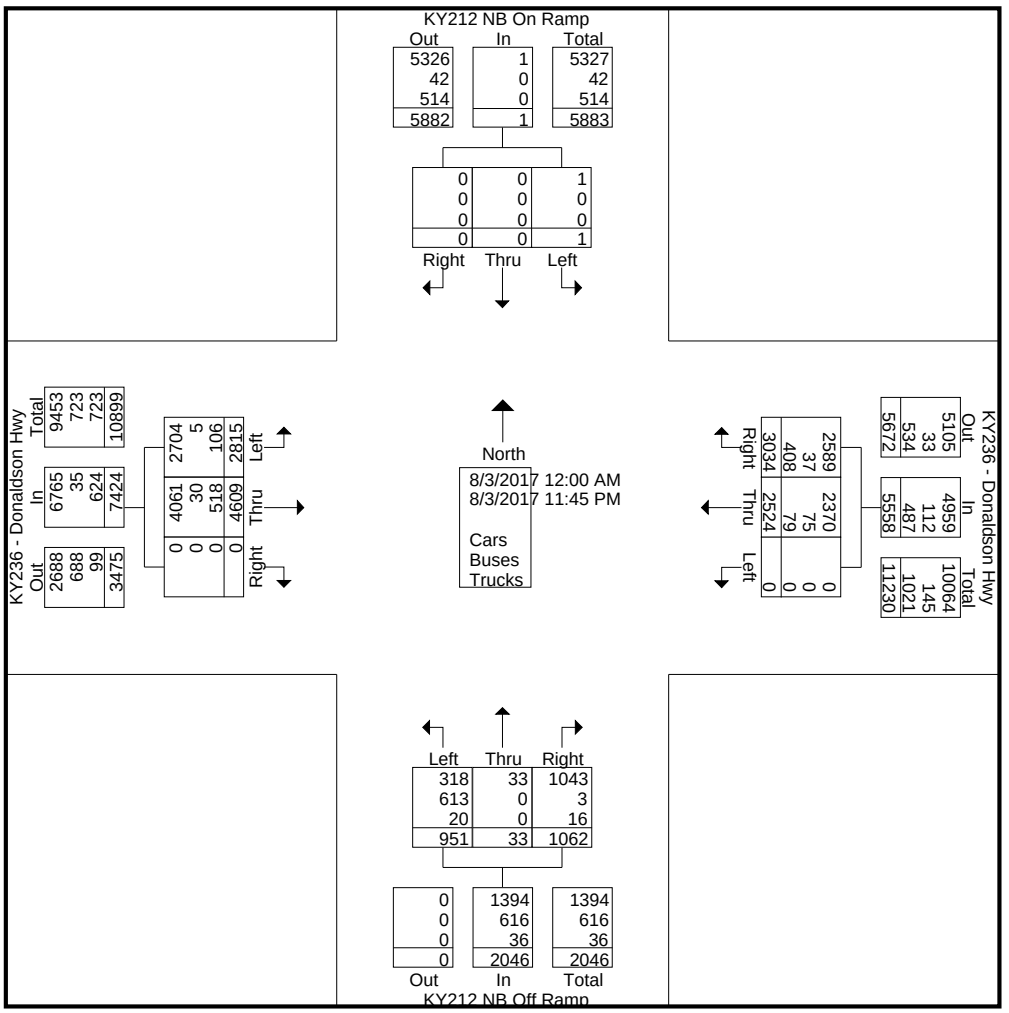
File Name : KY212_NB_Ramps_at_KY236_436496_08-03-2017
Site Code : Site 7 - Thursday
Start Date : 8/3/2017



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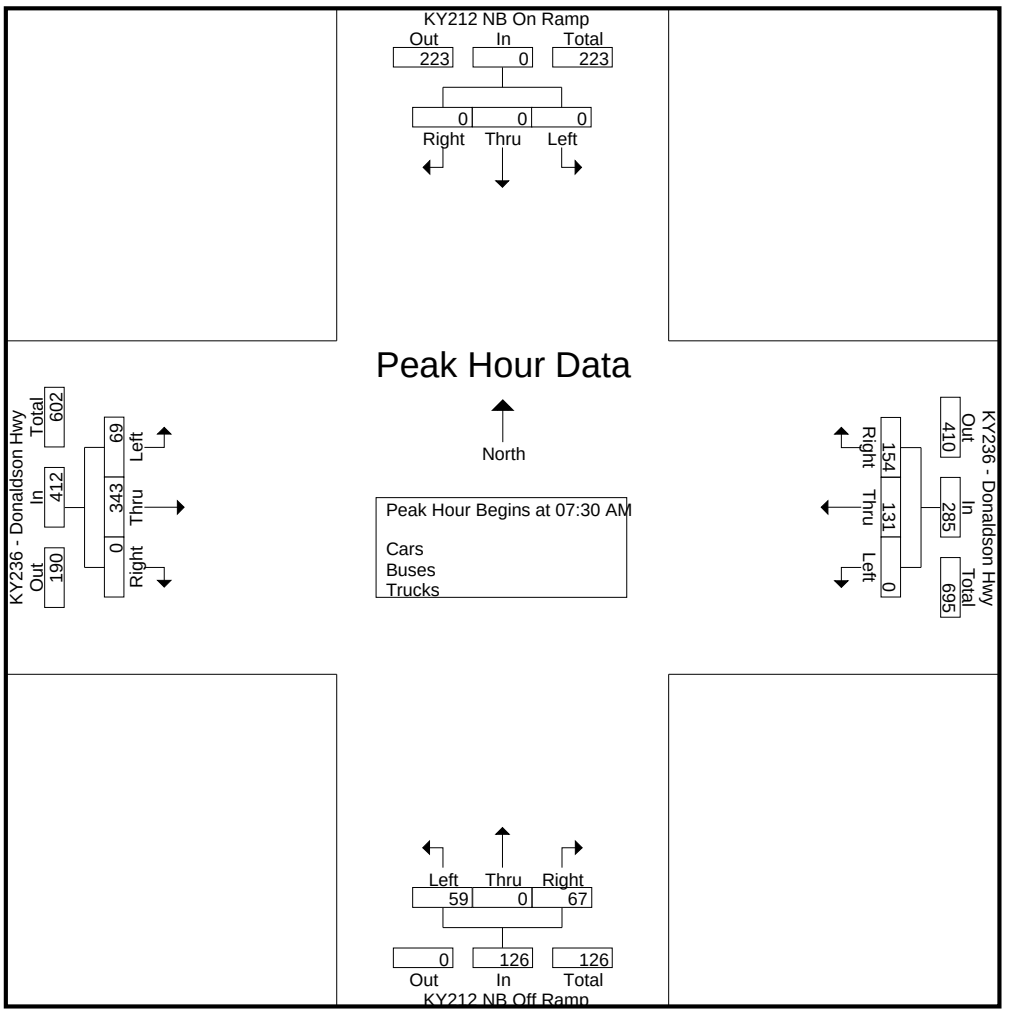
File Name : KY212_NB_Ramps_at_KY236_436496_08-03-2017
Site Code : Site 7 - Thursday
Start Date : 8/3/2017

	KY212 NB On Ramp From North				KY236 - Donaldson Hwy From East				KY212 NB Off Ramp From South				KY236 - Donaldson Hwy From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 12:00 AM to 09:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	0	0	0	0	0	**41**	35	76	**18**	0	15	33	12	**97**	0	**109**	218
07:45 AM	0	0	0	0	0	30	**43**	73	18	0	**22**	**40**	18	91	0	109	**222**
08:00 AM	0	0	0	0	0	38	40	**78**	13	0	17	30	17	86	0	103	211
08:15 AM	0	0	0	0	0	22	36	58	10	0	13	23	**22**	69	0	91	172
Total Volume	0	0	0	0	0	131	154	285	59	0	67	126	69	343	0	412	823
% App. Total	0	0	0		0	46	54		46.8	0	53.2		16.7	83.3	0		
PHF	.000	.000	.000	.000	.000	.799	.895	.913	.819	.000	.761	.788	.784	.884	.000	.945	.927



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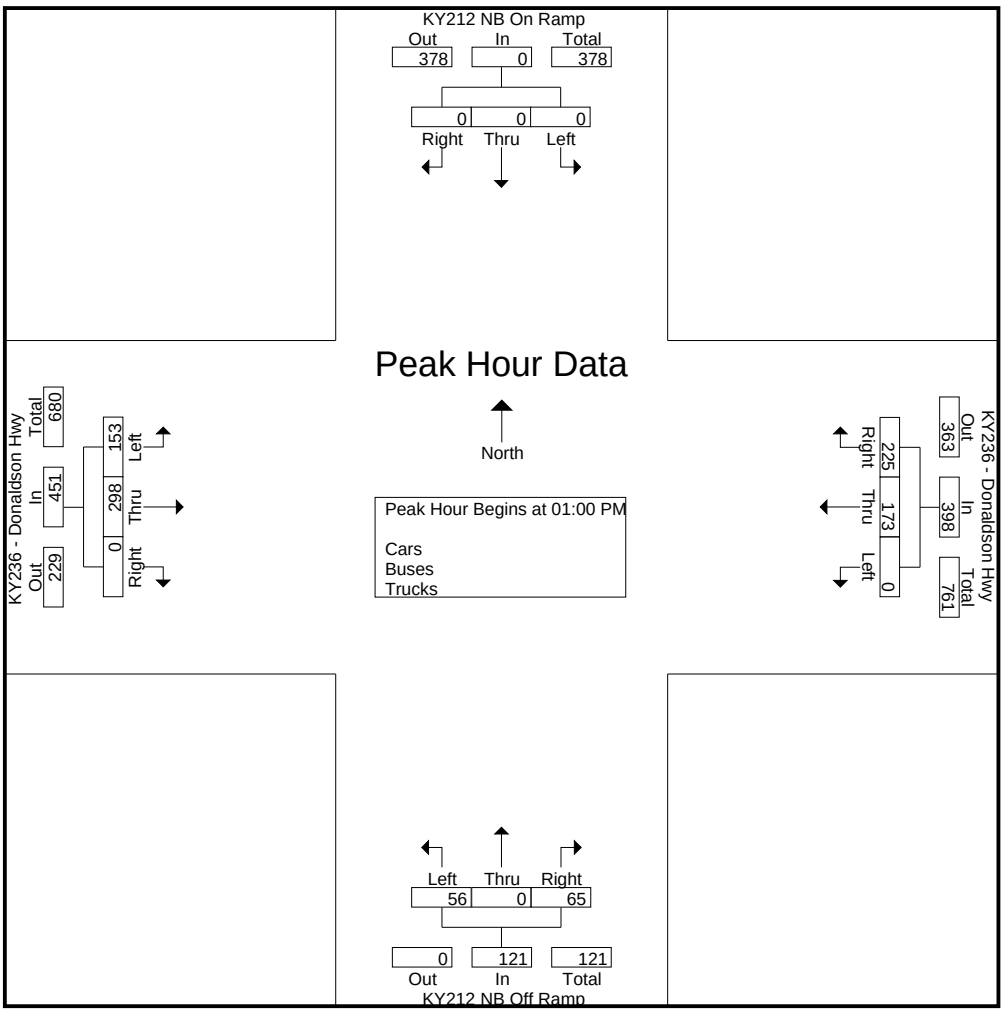
File Name : KY212_NB_Ramps_at_KY236_436496_08-03-2017
Site Code : Site 7 - Thursday
Start Date : 8/3/2017
Page No : 6

	KY212 NB On Ramp From North				KY236 - Donaldson Hwy From East				KY212 NB Off Ramp From South				KY236 - Donaldson Hwy From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 01:00 PM																	
01:00 PM	0	0	0	0	0	42	**63**	105	14	0	**19**	**33**	37	81	0	118	256
01:15 PM	0	0	0	0	0	38	44	82	**16**	0	16	32	38	54	0	92	206
01:30 PM	0	0	0	0	0	36	58	94	11	0	17	28	36	**84**	0	120	242
01:45 PM	0	0	0	0	0	**57**	60	**117**	15	0	13	28	**42**	79	0	**121**	**266**
Total Volume	0	0	0	0	0	173	225	398	56	0	65	121	153	298	0	451	970
% App. Total	0	0	0		0	43.5	56.5		46.3	0	53.7		33.9	66.1	0		
PHF	.000	.000	.000	.000	.000	.759	.893	.850	.875	.000	.855	.917	.911	.887	.000	.932	.912



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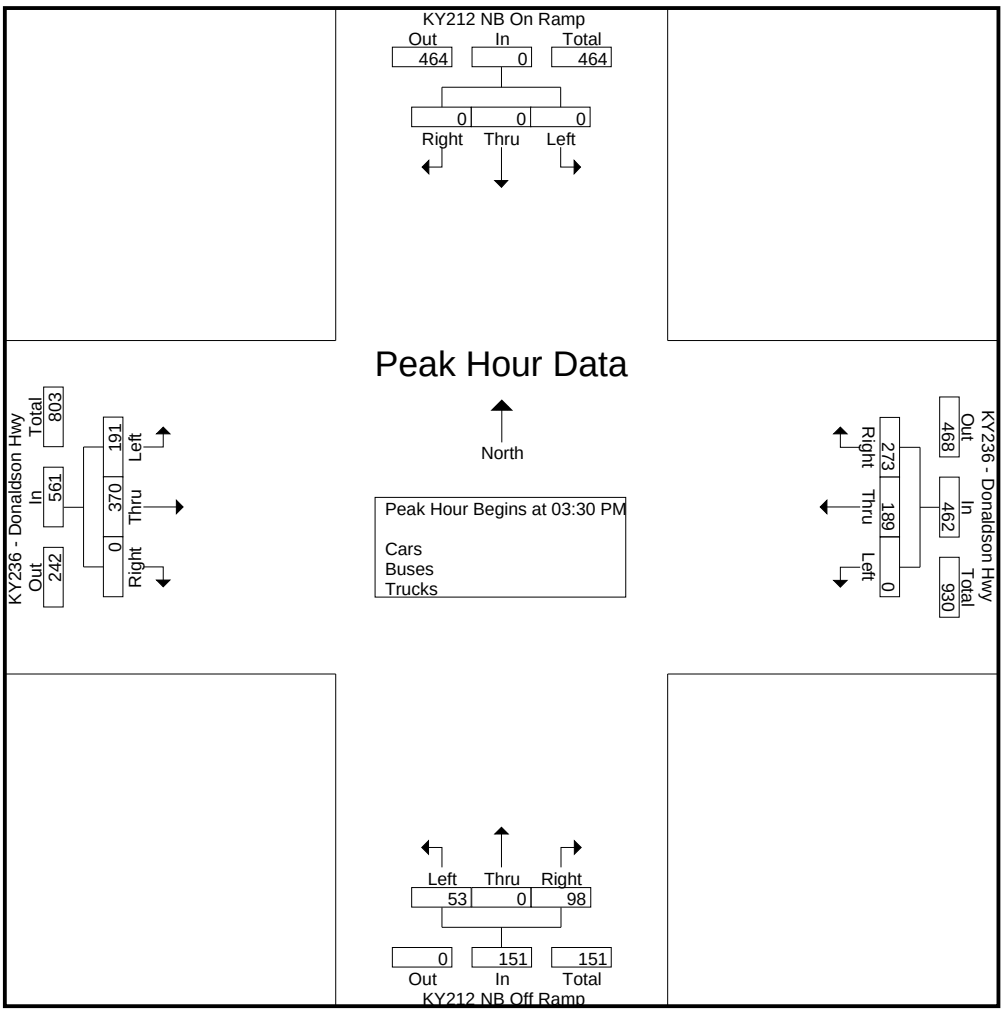
File Name : KY212_NB_Ramps_at_KY236_436496_08-03-2017
Site Code : Site 7 - Thursday
Start Date : 8/3/2017
Page No : 7

	KY212 NB On Ramp From North				KY236 - Donaldson Hwy From East				KY212 NB Off Ramp From South				KY236 - Donaldson Hwy From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 02:00 PM to 11:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 03:30 PM																	
03:30 PM	0	0	0	0	0	44	70	114	12	0	23	35	**59**	**103**	0	**162**	**311**
03:45 PM	0	0	0	0	0	50	**76**	**126**	**15**	0	24	**39**	40	90	0	130	295
04:00 PM	0	0	0	0	0	**57**	63	120	12	0	**26**	38	46	100	0	146	304
04:15 PM	0	0	0	0	0	38	64	102	14	0	25	39	46	77	0	123	264
Total Volume	0	0	0	0	0	189	273	462	53	0	98	151	191	370	0	561	1174
% App. Total	0	0	0		0	40.9	59.1		35.1	0	64.9		34	66	0		
PHF	.000	.000	.000	.000	.000	.829	.898	.917	.883	.000	.942	.968	.809	.898	.000	.866	.944



8. DONALDSON HIGHWAY (KY 236) AT TERMINAL DRIVE RAMP (WEST RAMP)

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Sunny - 83 Degrees
SCU-4GA

File Name : KY212_SB_Ramps_at_KY236_436497_08-03-2017
Site Code : Site 8 - Thursday
Start Date : 8/3/2017
Page No : 1

Groups Printed- Cars - Buses - Trucks

	KY212 SB Off Ramp From North				KY236 - Donaldson Hwy From East				KY212 SB On Ramp From South				KY236 - Donaldson Hwy From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
12:00 AM	5	0	7	12	5	13	0	18	0	0	0	0	0	55	2	57	87
12:15 AM	6	0	7	13	2	5	0	7	0	0	0	0	0	32	0	32	52
12:30 AM	3	0	4	7	0	7	0	7	0	0	0	0	0	29	0	29	43
12:45 AM	3	0	7	10	3	4	0	7	0	0	0	0	0	18	0	18	35
Total	17	0	25	42	10	29	0	39	0	0	0	0	0	134	2	136	217
01:00 AM	1	0	3	4	3	4	0	7	0	0	0	0	0	19	0	19	30
01:15 AM	7	0	3	10	3	5	0	8	0	0	0	0	0	11	0	11	29
01:30 AM	5	0	3	8	0	3	0	3	0	0	0	0	0	20	0	20	31
01:45 AM	3	0	3	6	1	3	0	4	0	0	0	0	0	3	0	3	13
Total	16	0	12	28	7	15	0	22	0	0	0	0	0	53	0	53	103
02:00 AM	3	0	3	6	1	5	0	6	0	0	0	0	0	8	1	9	21
02:15 AM	4	0	3	7	1	6	0	7	0	0	0	0	0	6	0	6	20
02:30 AM	13	1	2	16	0	7	0	7	0	0	0	0	0	4	0	4	27
02:45 AM	11	0	3	14	0	6	0	6	0	0	0	0	0	3	0	3	23
Total	31	1	11	43	2	24	0	26	0	0	0	0	0	21	1	22	91
03:00 AM	14	0	3	17	0	5	0	5	0	0	0	0	0	5	0	5	27
03:15 AM	14	0	13	27	2	5	0	7	0	0	0	0	0	5	0	5	39
03:30 AM	19	0	19	38	4	13	0	17	0	0	0	0	0	5	0	5	60
03:45 AM	19	0	14	33	5	8	0	13	0	0	0	0	0	3	1	4	50
Total	66	0	49	115	11	31	0	42	0	0	0	0	0	18	1	19	176
04:00 AM	19	0	20	39	10	12	0	22	0	0	0	0	0	5	1	6	67
04:15 AM	13	0	32	45	13	15	0	28	0	0	0	0	1	6	3	10	83
04:30 AM	18	0	33	51	11	18	0	29	0	0	0	0	0	10	5	15	95
04:45 AM	32	1	42	75	6	18	0	24	0	0	0	0	0	13	1	14	113
Total	82	1	127	210	40	63	0	103	0	0	0	0	1	34	10	45	358
05:00 AM	26	0	35	61	12	17	0	29	0	0	0	0	0	12	3	15	105
05:15 AM	21	1	41	63	6	11	0	17	0	0	0	0	0	21	3	24	104
05:30 AM	32	0	59	91	15	28	0	43	0	0	0	0	0	26	5	31	165
05:45 AM	35	0	55	90	10	26	0	36	0	0	0	0	0	34	5	39	165
Total	114	1	190	305	43	82	0	125	0	0	0	0	0	93	16	109	539
06:00 AM	44	1	49	94	11	30	0	41	0	0	0	0	0	22	4	26	161
06:15 AM	42	0	51	93	6	28	0	34	0	0	0	0	0	54	3	57	184
06:30 AM	56	0	52	108	13	29	0	42	0	0	0	0	0	62	4	66	216
06:45 AM	59	0	83	142	5	26	0	31	0	0	0	0	0	36	4	40	213
Total	201	1	235	437	35	113	0	148	0	0	0	0	0	174	15	189	774
07:00 AM	57	0	70	127	10	28	0	38	0	0	0	0	0	37	4	41	206
07:15 AM	44	0	81	125	10	25	0	35	0	0	0	0	1	36	3	40	200
07:30 AM	61	0	55	116	24	34	0	58	0	0	0	0	0	42	4	46	220
07:45 AM	65	0	34	99	14	35	0	49	0	0	0	0	0	42	2	44	192
Total	227	0	240	467	58	122	0	180	0	0	0	0	1	157	13	171	818
08:00 AM	59	0	29	88	22	30	0	52	0	0	0	0	0	47	1	48	188
08:15 AM	41	0	19	60	12	19	0	31	0	0	0	0	0	48	5	53	144
08:30 AM	39	0	38	77	9	39	0	48	0	0	0	0	0	43	3	46	171
08:45 AM	44	0	32	76	8	23	0	31	0	0	0	0	0	43	2	45	152
Total	183	0	118	301	51	111	0	162	0	0	0	0	0	181	11	192	655

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File Name : KY212_SB_Ramps_at_KY236_436497_08-03-2017
Site Code : Site 8 - Thursday
Start Date : 8/3/2017
Page No : 2

Groups Printed- Cars - Buses - Trucks

	KY212 SB Off Ramp From North				KY236 - Donaldson Hwy From East				KY212 SB On Ramp From South				KY236 - Donaldson Hwy From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
09:00 AM	32	0	35	67	10	25	0	35	0	0	0	0	0	42	2	44	146
09:15 AM	34	0	24	58	9	31	0	40	0	0	0	0	0	44	3	47	145
09:30 AM	33	0	28	61	9	27	0	36	0	0	0	0	0	38	2	40	137
09:45 AM	37	0	37	74	13	29	0	42	0	0	0	0	0	68	2	70	186
Total	136	0	124	260	41	112	0	153	0	0	0	0	0	192	9	201	614
10:00 AM	25	2	37	64	13	30	0	43	0	0	0	0	0	54	3	57	164
10:15 AM	41	1	38	80	6	27	0	33	0	0	0	0	0	47	7	54	167
10:30 AM	45	0	52	97	14	32	0	46	0	0	0	0	0	49	2	51	194
10:45 AM	40	0	54	94	15	35	0	50	0	0	0	0	0	48	3	51	195
Total	151	3	181	335	48	124	0	172	0	0	0	0	0	198	15	213	720
11:00 AM	37	0	60	97	11	37	0	48	0	0	0	0	0	54	2	56	201
11:15 AM	41	0	40	81	8	28	0	36	0	0	0	0	0	53	6	59	176
11:30 AM	47	1	46	94	15	30	0	45	0	0	0	0	0	55	2	57	196
11:45 AM	64	0	52	116	16	48	0	64	0	0	0	0	0	56	3	59	239
Total	189	1	198	388	50	143	0	193	0	0	0	0	0	218	13	231	812
12:00 PM	50	0	57	107	13	40	0	53	0	0	0	0	0	63	2	65	225
12:15 PM	49	0	48	97	6	39	0	45	0	0	0	0	0	61	3	64	206
12:30 PM	50	1	48	99	16	47	0	63	0	0	0	0	0	65	7	72	234
12:45 PM	39	0	57	96	16	40	0	56	0	0	0	0	0	69	1	70	222
Total	188	1	210	399	51	166	0	217	0	0	0	0	0	258	13	271	887
01:00 PM	56	1	54	111	16	33	0	49	0	0	0	0	0	67	5	72	232
01:15 PM	47	0	41	88	11	46	0	57	0	0	0	0	0	44	4	48	193
01:30 PM	51	0	58	109	11	36	0	47	0	0	0	0	0	65	1	66	222
01:45 PM	43	0	70	113	15	58	0	73	0	0	0	0	0	78	0	78	264
Total	197	1	223	421	53	173	0	226	0	0	0	0	0	254	10	264	911
02:00 PM	41	1	73	115	19	44	0	63	0	0	0	0	0	82	4	86	264
02:15 PM	47	0	56	103	16	47	0	63	0	0	0	0	0	90	2	92	258
02:30 PM	64	0	64	128	12	44	0	56	0	0	0	0	0	83	1	84	268
02:45 PM	47	0	59	106	16	51	0	67	0	0	0	0	0	64	3	67	240
Total	199	1	252	452	63	186	0	249	0	0	0	0	0	319	10	329	1030
03:00 PM	44	0	74	118	8	55	0	63	0	0	0	0	0	55	6	61	242
03:15 PM	59	0	71	130	21	48	0	69	0	0	0	0	0	58	1	59	258
03:30 PM	70	0	66	136	14	44	0	58	0	0	0	0	0	91	3	94	288
03:45 PM	70	0	66	136	24	37	0	61	0	0	0	0	0	56	0	56	253
Total	243	0	277	520	67	184	0	251	0	0	0	0	0	260	10	270	1041
04:00 PM	68	0	52	120	16	60	0	76	0	1	0	1	0	82	2	84	281
04:15 PM	50	0	55	105	15	40	0	55	0	0	0	0	0	68	3	71	231
04:30 PM	82	0	63	145	13	48	0	61	0	0	0	0	0	58	1	59	265
04:45 PM	53	0	64	117	17	60	0	77	0	0	0	0	0	56	3	59	253
Total	253	0	234	487	61	208	0	269	0	1	0	1	0	264	9	273	1030
05:00 PM	72	0	43	115	15	60	0	75	0	0	0	0	0	75	1	76	266
05:15 PM	49	0	44	93	13	38	0	51	0	0	0	0	0	49	1	50	194
05:30 PM	61	0	42	103	15	44	0	59	0	0	0	0	0	47	1	48	210
05:45 PM	51	0	31	82	10	38	0	48	0	0	0	0	0	62	2	64	194
Total	233	0	160	393	53	180	0	233	0	0	0	0	0	233	5	238	864
06:00 PM	52	1	43	96	12	36	0	48	0	0	0	0	0	66	3	69	213

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File Name : KY212_SB_Ramps_at_KY236_436497_08-03-2017
Site Code : Site 8 - Thursday
Start Date : 8/3/2017
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Groups Printed- Cars - Buses - Trucks

	KY212 SB Off Ramp From North				KY236 - Donaldson Hwy From East				KY212 SB On Ramp From South				KY236 - Donaldson Hwy From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
06:15 PM	37	0	29	66	9	44	0	53	0	0	0	0	0	68	4	72	191
06:30 PM	41	0	28	69	19	30	0	49	0	0	0	0	0	71	1	72	190
06:45 PM	44	1	34	79	14	33	0	47	0	0	0	0	0	55	1	56	182
Total	174	2	134	310	54	143	0	197	0	0	0	0	0	260	9	269	776
07:00 PM	30	0	35	65	11	31	0	42	0	0	0	0	0	62	3	65	172
07:15 PM	15	0	30	45	10	25	0	35	0	0	0	0	0	58	0	58	138
07:30 PM	20	0	26	46	16	18	0	34	0	0	0	0	0	45	2	47	127
07:45 PM	17	0	28	45	6	21	0	27	0	0	0	0	0	61	0	61	133
Total	82	0	119	201	43	95	0	138	0	0	0	0	0	226	5	231	570
08:00 PM	23	0	24	47	14	18	0	32	0	0	0	0	0	66	1	67	146
08:15 PM	20	0	27	47	4	16	0	20	0	0	0	0	0	47	0	47	114
08:30 PM	17	0	27	44	9	17	0	26	0	0	0	0	0	34	1	35	105
08:45 PM	19	0	15	34	8	26	0	34	0	0	0	0	0	34	0	34	102
Total	79	0	93	172	35	77	0	112	0	0	0	0	0	181	2	183	467
09:00 PM	14	0	14	28	6	28	0	34	0	0	0	0	0	51	0	51	113
09:15 PM	12	0	9	21	4	20	0	24	0	0	0	0	0	30	3	33	78
09:30 PM	14	0	14	28	7	14	0	21	0	0	0	0	0	28	1	29	78
09:45 PM	11	0	13	24	8	19	0	27	0	0	0	0	0	38	2	40	91
Total	51	0	50	101	25	81	0	106	0	0	0	0	0	147	6	153	360
10:00 PM	8	0	8	16	12	9	0	21	0	0	0	0	0	29	1	30	67
10:15 PM	21	0	15	36	6	15	0	21	0	0	0	0	0	20	1	21	78
10:30 PM	14	0	9	23	4	12	0	16	0	0	0	0	0	43	0	43	82
10:45 PM	16	0	13	29	7	14	0	21	0	0	0	0	0	61	0	61	111
Total	59	0	45	104	29	50	0	79	0	0	0	0	0	153	2	155	338
11:00 PM	17	0	9	26	7	16	0	23	0	0	0	0	0	55	1	56	105
11:15 PM	11	0	8	19	7	9	0	16	0	0	0	0	0	54	0	54	89
11:30 PM	10	0	9	19	3	12	0	15	0	0	0	0	0	37	2	39	73
11:45 PM	7	0	8	15	3	6	0	9	0	0	0	0	0	39	1	40	64
Total	45	0	34	79	20	43	0	63	0	0	0	0	0	185	4	189	331
Grand Total	3216	13	3341	6570	950	2555	0	3505	0	1	0	1	2	4213	191	4406	14482
Apprch %	48.9	0.2	50.9		27.1	72.9	0		0	100	0		0	95.6	4.3		
Total %	22.2	0.1	23.1	45.4	6.6	17.6	0	24.2	0	0	0	0	0	29.1	1.3	30.4	
Cars	2769	13	3207	5989	930	1778	0	2708	0	1	0	1	2	4000	124	4126	12824
% Cars	86.1	100	96	91.2	97.9	69.6	0	77.3	0	100	0	100	100	94.9	64.9	93.6	88.6
Buses	10	0	42	52	7	685	0	692	0	0	0	0	0	31	55	86	830
% Buses	0.3	0	1.3	0.8	0.7	26.8	0	19.7	0	0	0	0	0	0.7	28.8	2	5.7
Trucks	437	0	92	529	13	92	0	105	0	0	0	0	0	182	12	194	828
% Trucks	13.6	0	2.8	8.1	1.4	3.6	0	3	0	0	0	0	0	4.3	6.3	4.4	5.7

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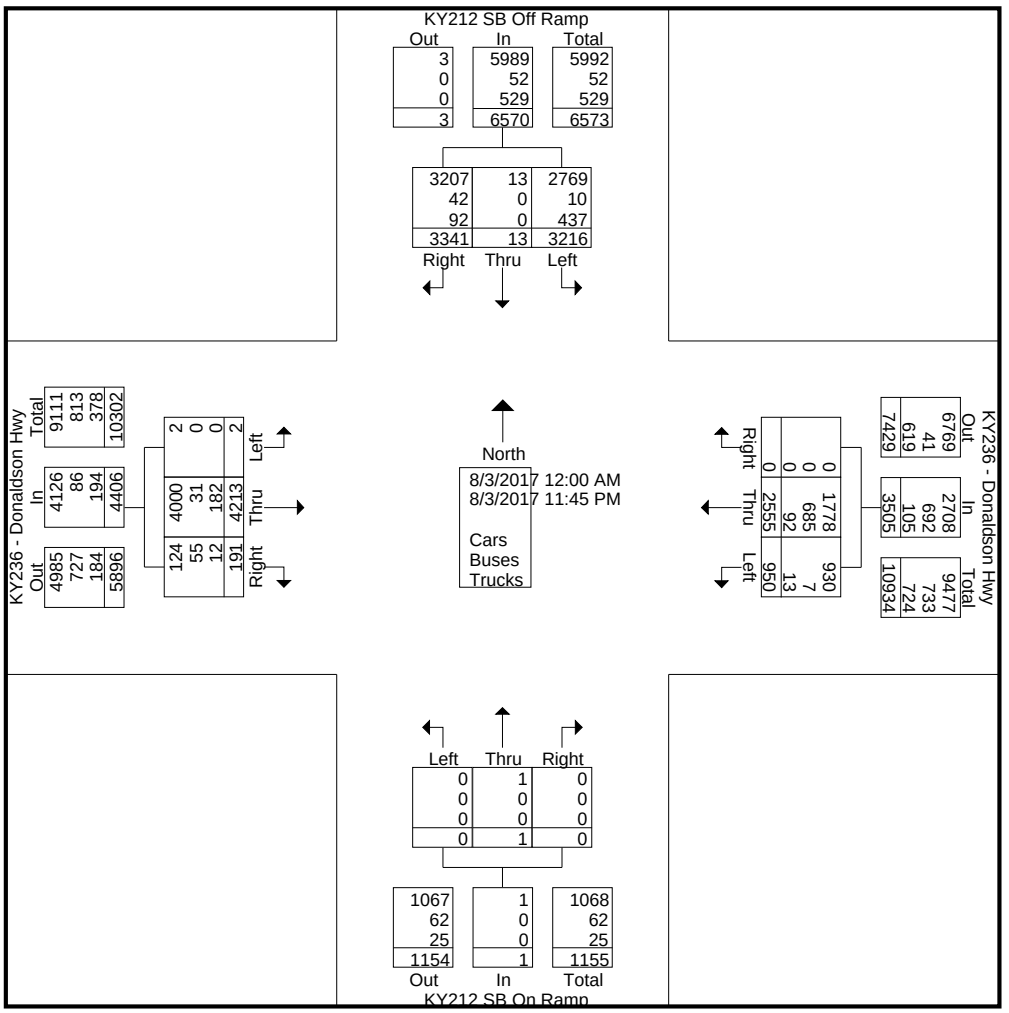
File Name : KY212_SB_Ramps_at_KY236_436497_08-03-2017
Site Code : Site 8 - Thursday
Start Date : 8/3/2017
Page No : 4



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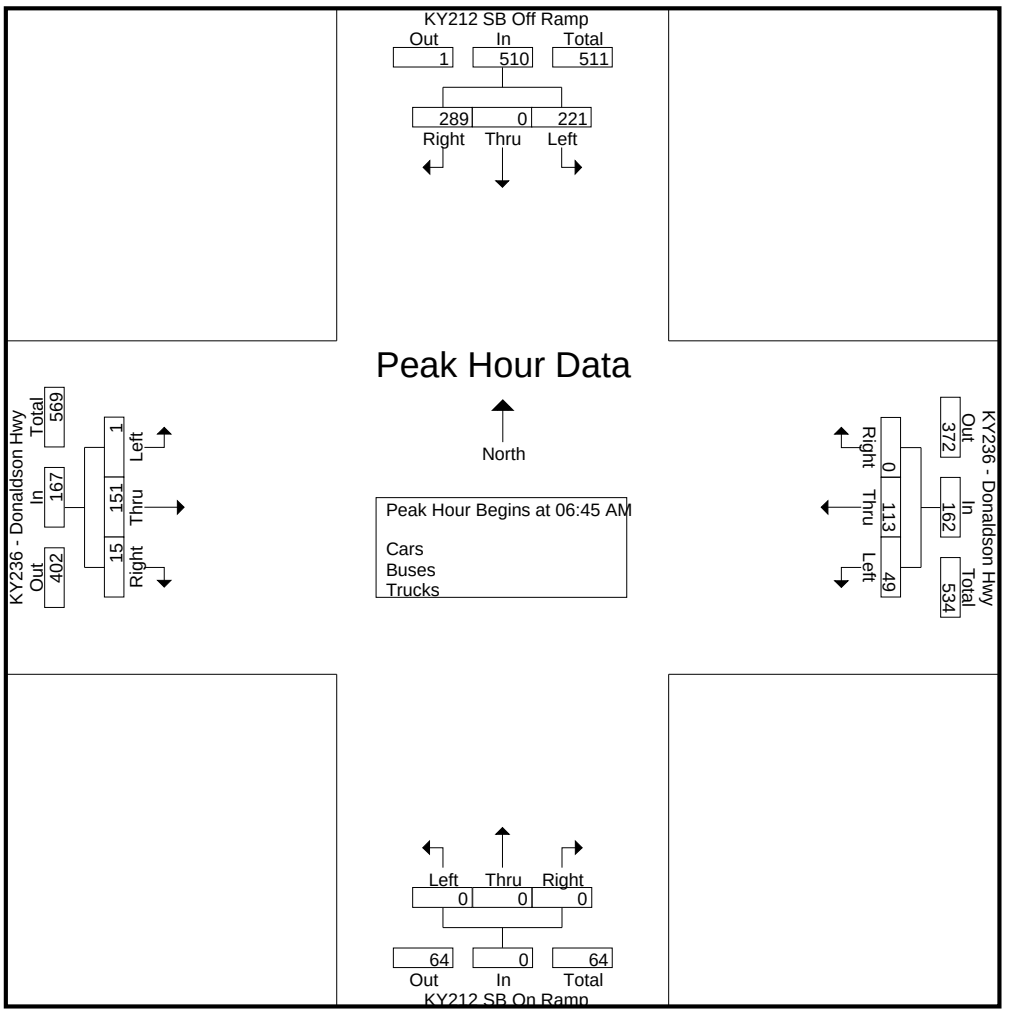
File Name : KY212_SB_Ramps_at_KY236_436497_08-03-2017
Site Code : Site 8 - Thursday
Start Date : 8/3/2017

	KY212 SB Off Ramp From North				KY236 - Donaldson Hwy From East				KY212 SB On Ramp From South				KY236 - Donaldson Hwy From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 12:00 AM to 09:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 06:45 AM																	
06:45 AM	59	0	**83**	**142**	5	26	0	31	0	0	0	0	0	36	**4**	40	213
07:00 AM	57	0	70	127	10	28	0	38	0	0	0	0	0	37	4	41	206
07:15 AM	44	0	81	125	10	25	0	35	0	0	0	0	**1**	36	3	40	200
07:30 AM	**61**	0	55	116	**24**	**34**	0	**58**	0	0	0	0	0	**42**	4	**46**	**220**
Total Volume	221	0	289	510	49	113	0	162	0	0	0	0	1	151	15	167	839
% App. Total	43.3	0	56.7		30.2	69.8	0		0	0	0		0.6	90.4	9		
PHF	.906	.000	.870	.898	.510	.831	.000	.698	.000	.000	.000	.000	.250	.899	.938	.908	.953



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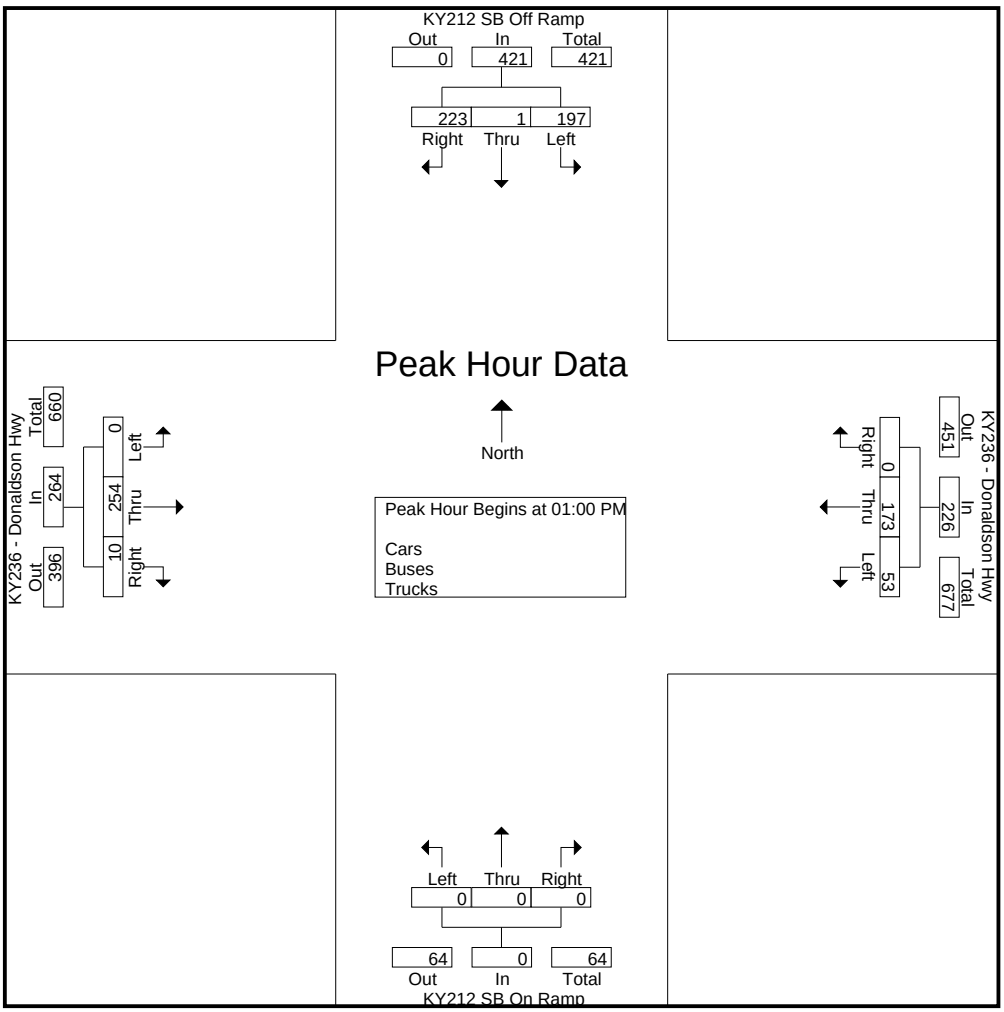
File Name : KY212_SB_Ramps_at_KY236_436497_08-03-2017
Site Code : Site 8 - Thursday
Start Date : 8/3/2017
Page No : 6

	KY212 SB Off Ramp From North				KY236 - Donaldson Hwy From East				KY212 SB On Ramp From South				KY236 - Donaldson Hwy From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 01:00 PM																	
01:00 PM	**56**	**1**	54	111	**16**	33	0	49	0	0	0	0	0	67	**5**	72	232
01:15 PM	47	0	41	88	11	46	0	57	0	0	0	0	0	44	4	48	193
01:30 PM	51	0	58	109	11	36	0	47	0	0	0	0	0	65	1	66	222
01:45 PM	43	0	**70**	**113**	15	**58**	0	**73**	0	0	0	0	0	**78**	0	**78**	**264**
Total Volume	197	1	223	421	53	173	0	226	0	0	0	0	0	254	10	264	911
% App. Total	46.8	0.2	53		23.5	76.5	0		0	0	0		0	96.2	3.8		
PHF	.879	.250	.796	.931	.828	.746	.000	.774	.000	.000	.000	.000	.000	.814	.500	.846	.863



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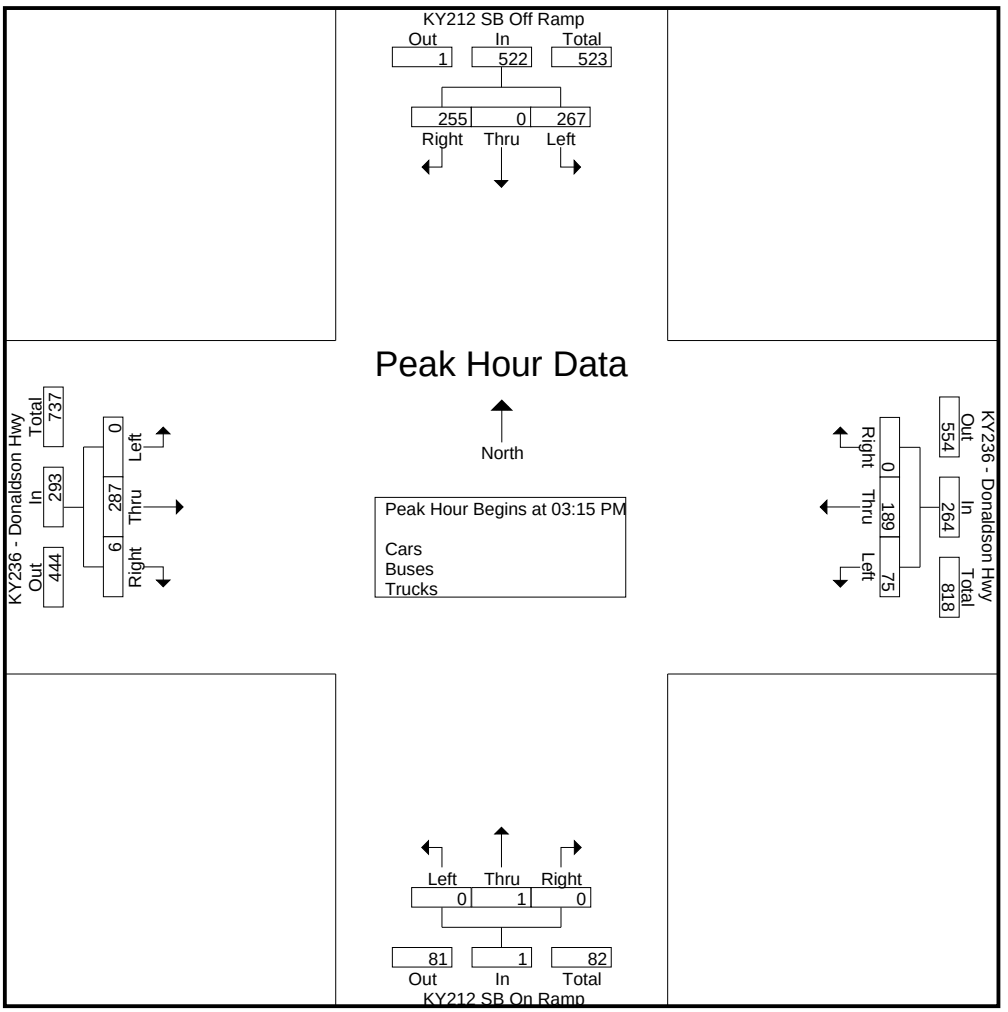
File Name : KY212_SB_Ramps_at_KY236_436497_08-03-2017
Site Code : Site 8 - Thursday
Start Date : 8/3/2017
Page No : 7

	KY212 SB Off Ramp From North				KY236 - Donaldson Hwy From East				KY212 SB On Ramp From South				KY236 - Donaldson Hwy From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 02:00 PM to 11:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 03:15 PM																	
03:15 PM	59	0	**71**	130	21	48	0	69	0	0	0	0	0	58	1	59	258
03:30 PM	**70**	0	66	**136**	14	44	0	58	0	0	0	0	0	**91**	**3**	**94**	**288**
03:45 PM	70	0	66	136	**24**	37	0	61	0	0	0	0	0	56	0	56	253
04:00 PM	68	0	52	120	16	**60**	0	**76**	0	**1**	0	**1**	0	82	2	84	281
Total Volume	267	0	255	522	75	189	0	264	0	1	0	1	0	287	6	293	1080
% App. Total	51.1	0	48.9		28.4	71.6	0		0	100	0		0	98	2		
PHF	.954	.000	.898	.960	.781	.788	.000	.868	.000	.250	.000	.250	.000	.788	.500	.779	.938



9. DONALDSON HIGHWAY AT VALUE PARK INTERSECTION

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Sunny - 83 Degrees
SCU-4HR

File Name : ValuePark_at_KY236_436498_08-03-2017
Site Code : Site 9 - Thursday
Start Date : 8/3/2017
Page No : 1

Groups Printed- Cars - Buses - Trucks

	Value Park Lot From North				KY236 - Donaldson Hwy From East				Car Rental Lot From South				KY236 - Donaldson Hwy From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
06:00 AM	7	0	0	7	7	31	39	77	1	0	0	1	0	19	2	21	106
06:15 AM	10	0	0	10	13	24	41	78	2	0	0	2	0	46	1	47	137
06:30 AM	9	0	0	9	12	35	35	82	0	0	0	0	1	57	2	60	151
06:45 AM	2	0	0	2	6	44	58	108	0	0	0	0	0	38	2	40	150
Total	28	0	0	28	38	134	173	345	3	0	0	3	1	160	7	168	544
07:00 AM	1	0	1	2	9	39	53	101	1	0	0	1	0	39	0	39	143
07:15 AM	4	0	0	4	13	34	62	109	0	0	0	0	1	37	4	42	155
07:30 AM	3	0	1	4	11	34	44	89	0	0	0	0	2	41	5	48	141
07:45 AM	1	0	0	1	10	32	27	69	0	0	0	0	1	43	8	52	122
Total	9	0	2	11	43	139	186	368	1	0	0	1	4	160	17	181	561
08:00 AM	4	0	0	4	13	26	18	57	0	0	0	0	4	43	0	47	108
08:15 AM	5	0	0	5	2	26	11	39	0	0	0	0	0	48	3	51	95
08:30 AM	5	0	0	5	14	44	19	77	0	0	0	0	0	40	3	43	125
08:45 AM	7	0	0	7	11	25	20	56	0	0	0	0	0	41	2	43	106
Total	21	0	0	21	40	121	68	229	0	0	0	0	4	172	8	184	434
09:00 AM	6	0	0	6	8	31	20	59	0	0	0	0	0	37	6	43	108
09:15 AM	10	0	1	11	8	29	19	56	0	0	0	0	0	37	6	43	110
09:30 AM	2	0	0	2	11	31	12	54	0	0	1	1	2	37	3	42	99
09:45 AM	8	0	0	8	7	30	29	66	0	0	0	0	2	62	3	67	141
Total	26	0	1	27	34	121	80	235	0	0	1	1	4	173	18	195	458
10:00 AM	10	1	0	11	15	26	26	67	0	0	0	0	1	46	6	53	131
10:15 AM	10	0	1	11	9	35	21	65	0	0	0	0	0	43	5	48	124
10:30 AM	5	0	0	5	12	38	34	84	0	0	0	0	0	46	5	51	140
10:45 AM	5	0	1	6	13	54	19	86	0	0	0	0	2	46	2	50	142
Total	30	1	2	33	49	153	100	302	0	0	0	0	3	181	18	202	537
11:00 AM	3	0	0	3	20	47	31	98	1	0	0	1	0	54	2	56	158
11:15 AM	10	0	0	10	10	31	27	68	0	0	0	0	0	48	2	50	128
11:30 AM	8	0	0	8	11	41	25	77	1	0	0	1	1	46	2	49	135
11:45 AM	10	0	0	10	12	61	27	100	0	0	0	0	1	49	3	53	163
Total	31	0	0	31	53	180	110	343	2	0	0	2	2	197	9	208	584
12:00 PM	10	0	0	10	18	57	22	97	0	0	0	0	0	55	3	58	165
12:15 PM	14	0	0	14	24	43	21	88	0	0	1	1	0	49	2	51	154
12:30 PM	14	0	0	14	23	45	26	94	0	0	0	0	3	57	2	62	170
12:45 PM	12	0	0	12	25	55	17	97	1	0	1	2	0	57	3	60	171
Total	50	0	0	50	90	200	86	376	1	0	2	3	3	218	10	231	660
01:00 PM	13	0	1	14	20	44	24	88	1	1	0	2	1	60	5	66	170
01:15 PM	15	0	1	16	9	51	24	84	0	0	0	0	0	33	5	38	138
01:30 PM	10	0	1	11	17	54	25	96	0	0	0	0	2	55	13	70	177
01:45 PM	8	0	2	10	21	80	28	129	1	0	1	2	1	69	9	79	220
Total	46	0	5	51	67	229	101	397	2	1	1	4	4	217	32	253	705
02:00 PM	24	0	0	24	26	71	21	118	0	0	0	0	1	60	3	64	206
02:15 PM	27	0	0	27	25	50	28	103	0	0	0	0	1	65	7	73	203
02:30 PM	10	0	1	11	21	61	24	106	2	0	0	2	1	72	9	82	201
02:45 PM	6	0	1	7	20	72	19	111	0	0	0	0	1	56	3	60	178
Total	67	0	2	69	92	254	92	438	2	0	0	2	4	253	22	279	788

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File Name : ValuePark_at_KY236_436498_08-03-2017
Site Code : Site 9 - Thursday
Start Date : 8/3/2017

Groups Printed- Cars - Buses - Trucks

	Value Park Lot From North				KY236 - Donaldson Hwy From East				Car Rental Lot From South				KY236 - Donaldson Hwy From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
03:00 PM	10	0	1	11	22	76	31	129	0	0	2	2	2	48	7	57	199
03:15 PM	13	0	1	14	18	77	22	117	0	0	0	0	2	50	6	58	189
03:30 PM	12	0	0	12	17	68	25	110	3	0	0	3	2	87	5	94	219
03:45 PM	14	0	2	16	23	63	26	112	1	0	0	1	0	42	5	47	176
Total	49	0	4	53	80	284	104	468	4	0	2	6	6	227	23	256	783
04:00 PM	16	0	1	17	27	65	18	110	2	0	0	2	3	67	4	74	203
04:15 PM	20	0	0	20	25	56	19	100	0	0	0	0	0	51	2	53	173
04:30 PM	10	0	1	11	24	65	23	112	0	0	0	0	2	46	4	52	175
04:45 PM	10	0	0	10	22	83	19	124	0	0	0	0	4	49	11	64	198
Total	56	0	2	58	98	269	79	446	2	0	0	2	9	213	21	243	749
05:00 PM	10	0	2	12	15	72	17	104	0	0	0	0	0	62	3	65	181
05:15 PM	6	0	0	6	22	46	15	83	1	0	0	1	2	46	3	51	141
05:30 PM	5	0	0	5	13	51	21	85	0	0	0	0	0	43	5	48	138
05:45 PM	9	0	0	9	16	40	12	68	0	0	0	0	0	53	1	54	131
Total	30	0	2	32	66	209	65	340	1	0	0	1	2	204	12	218	591
Grand Total	443	1	20	464	750	2293	1244	4287	18	1	6	25	46	2375	197	2618	7394
Apprch %	95.5	0.2	4.3		17.5	53.5	29		72	4	24		1.8	90.7	7.5		
Total %	6	0	0.3	6.3	10.1	31	16.8	58	0.2	0	0.1	0.3	0.6	32.1	2.7	35.4	
Cars	442	1	19	462	569	2146	1000	3715	18	1	5	24	41	2173	183	2397	6598
% Cars	99.8	100	95	99.6	75.9	93.6	80.4	86.7	100	100	83.3	96	89.1	91.5	92.9	91.6	89.2
Buses	1	0	0	1	172	47	243	462	0	0	0	0	2	73	11	86	549
% Buses	0.2	0	0	0.2	22.9	2	19.5	10.8	0	0	0	0	4.3	3.1	5.6	3.3	7.4
Trucks	0	0	1	1	9	100	1	110	0	0	1	1	3	129	3	135	247
% Trucks	0	0	5	0.2	1.2	4.4	0.1	2.6	0	0	16.7	4	6.5	5.4	1.5	5.2	3.3

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File Name : ValuePark_at_KY236_436498_08-03-2017
Site Code : Site 9 - Thursday
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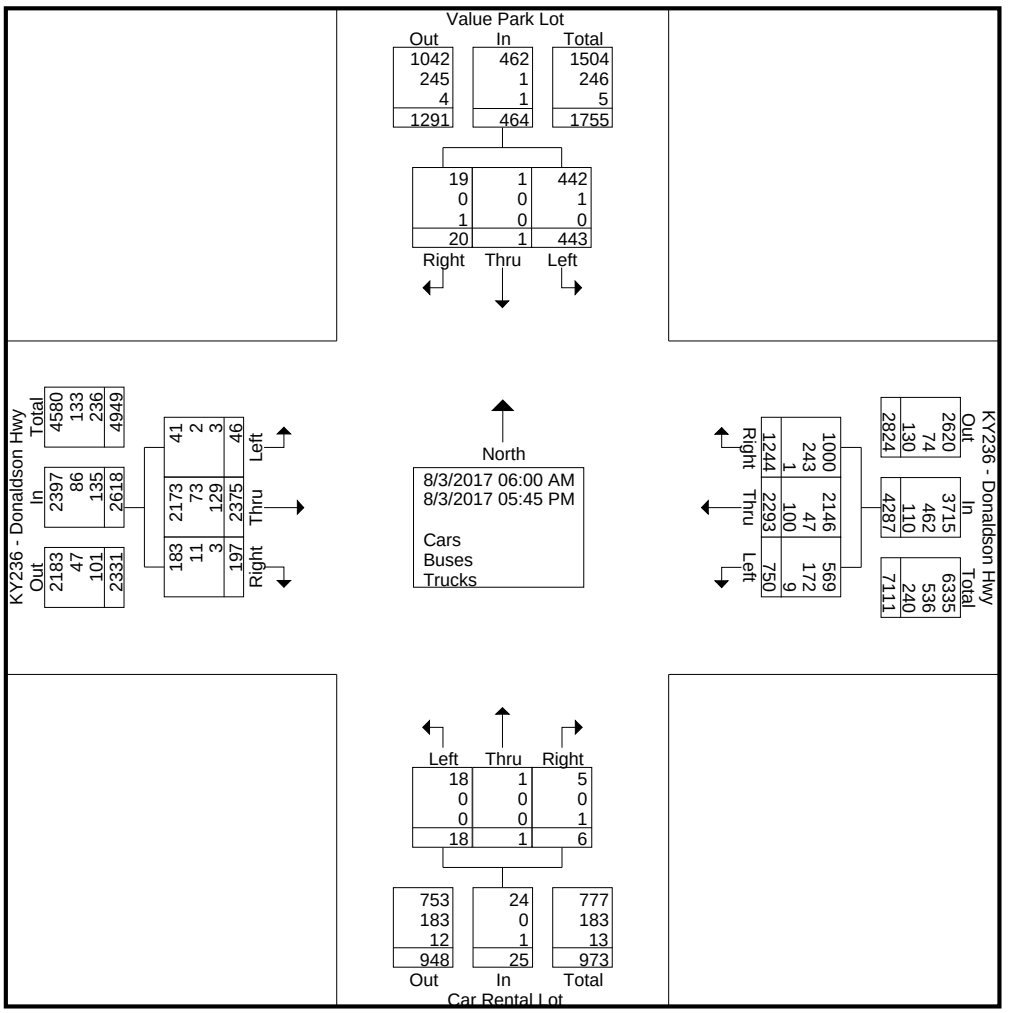

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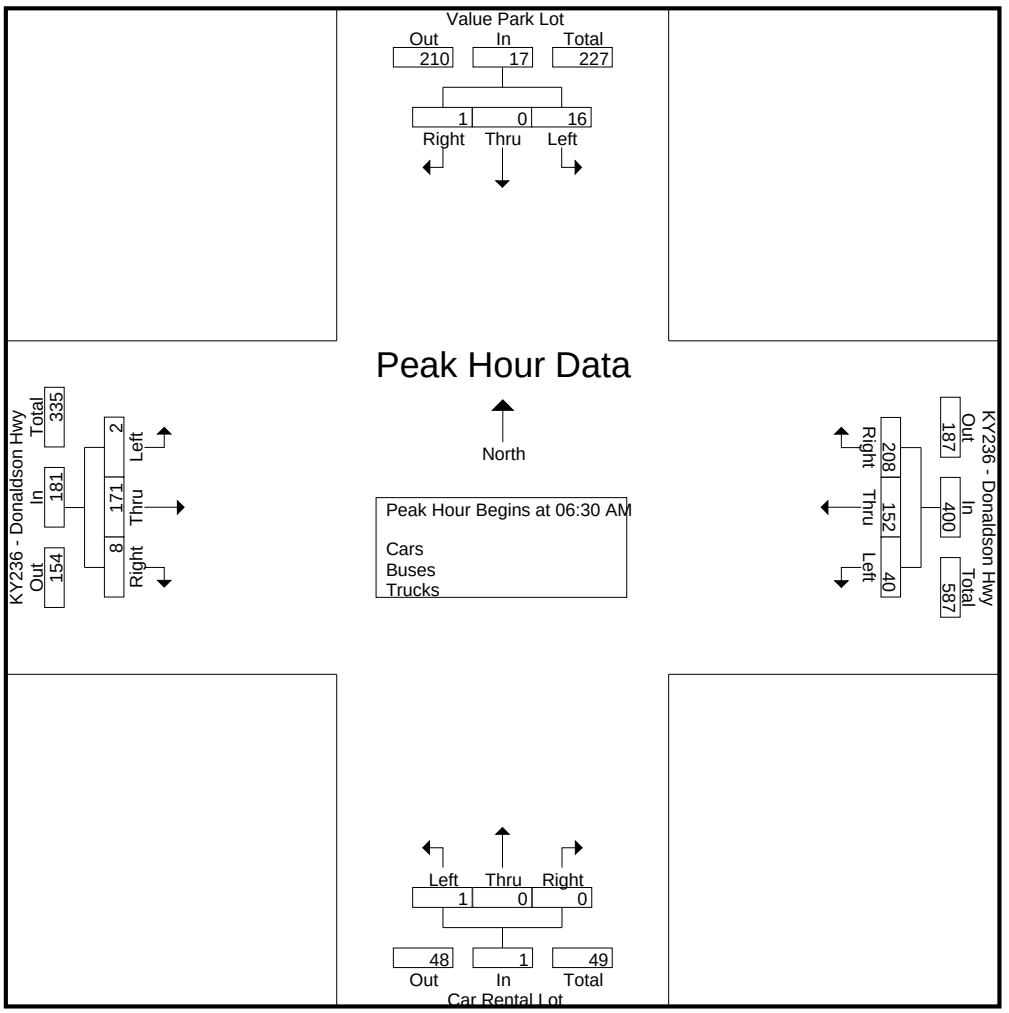
File Name : ValuePark_at_KY236_436498_08-03-2017
Site Code : Site 9 - Thursday
Start Date : 8/3/2017
Page No : 4

	Value Park Lot From North				KY236 - Donaldson Hwy From East				Car Rental Lot From South				KY236 - Donaldson Hwy From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 09:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 06:30 AM																	
06:30 AM	**9**	0	0	**9**	12	35	35	82	0	0	0	0	**1**	**57**	2	**60**	151
06:45 AM	2	0	0	2	6	**44**	58	108	0	0	0	0	0	38	2	40	150
07:00 AM	1	0	**1**	2	9	39	53	101	**1**	0	0	**1**	0	39	0	39	143
07:15 AM	4	0	0	4	**13**	34	**62**	**109**	0	0	0	0	1	37	**4**	42	**155**
Total Volume	16	0	1	17	40	152	208	400	1	0	0	1	2	171	8	181	599
% App. Total	94.1	0	5.9		10	38	52		100	0	0		1.1	94.5	4.4		
PHF	.444	.000	.250	.472	.769	.864	.839	.917	.250	.000	.000	.250	.500	.750	.500	.754	.966



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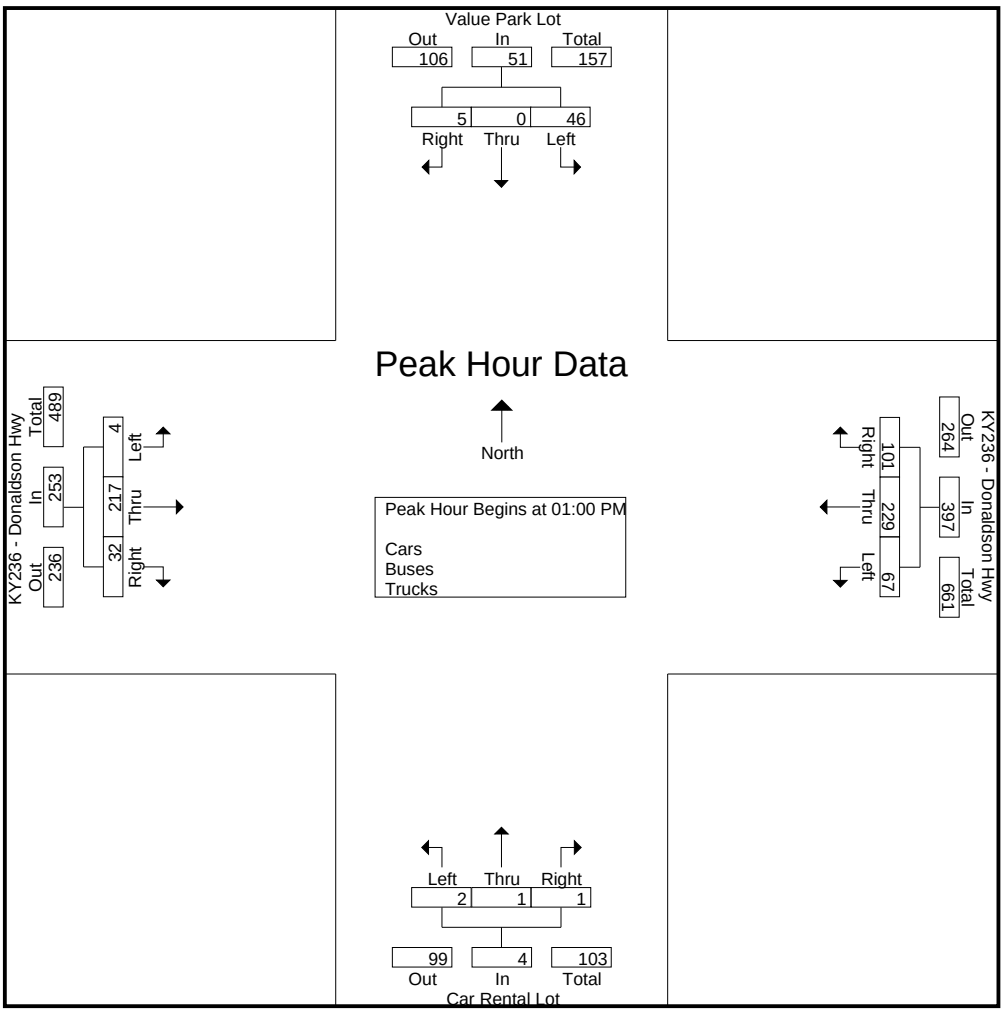
File Name : ValuePark_at_KY236_436498_08-03-2017
Site Code : Site 9 - Thursday
Start Date : 8/3/2017
Page No : 5

	Value Park Lot From North				KY236 - Donaldson Hwy From East				Car Rental Lot From South				KY236 - Donaldson Hwy From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 01:00 PM																	
01:00 PM	13	0	1	14	20	44	24	88	**1**	**1**	0	**2**	1	60	5	66	170
01:15 PM	**15**	0	1	**16**	9	51	24	84	0	0	0	0	0	33	5	38	138
01:30 PM	10	0	1	11	17	54	25	96	0	0	0	0	**2**	55	**13**	70	177
01:45 PM	8	0	**2**	10	**21**	**80**	**28**	**129**	1	0	**1**	2	1	**69**	9	**79**	**220**
Total Volume	46	0	5	51	67	229	101	397	2	1	1	4	4	217	32	253	705
% App. Total	90.2	0	9.8		16.9	57.7	25.4		50	25	25		1.6	85.8	12.6		
PHF	.767	.000	.625	.797	.798	.716	.902	.769	.500	.250	.250	.500	.500	.786	.615	.801	.801



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Site Code : Site 9 - Thursday
Start Date : 8/3/2017
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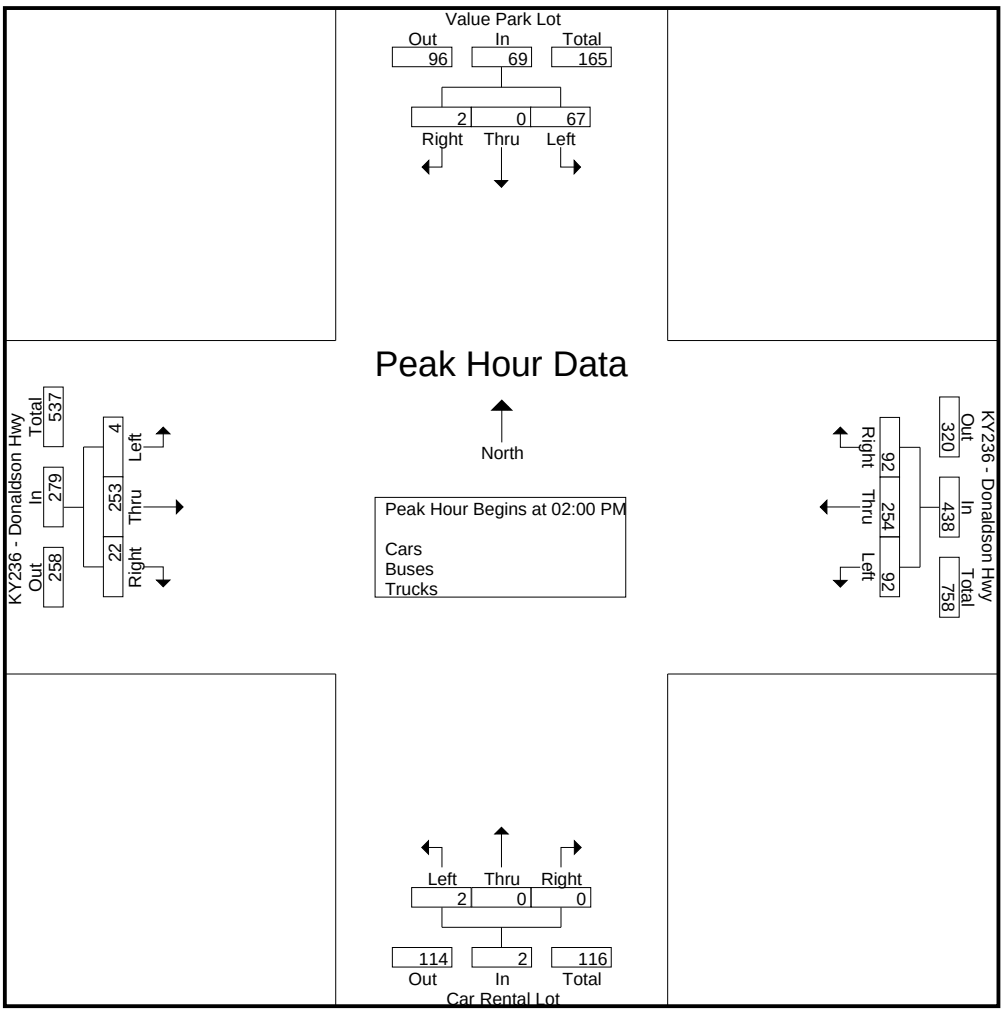
	Value Park Lot From North				KY236 - Donaldson Hwy From East				Car Rental Lot From South				KY236 - Donaldson Hwy From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 02:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 02:00 PM																	
02:00 PM	24	0	0	24	**26**	71	21	**118**	0	0	0	0	**1**	60	3	64	**206**
02:15 PM	**27**	0	0	**27**	25	50	**28**	103	0	0	0	0	1	65	7	73	203
02:30 PM	10	0	**1**	11	21	61	24	106	**2**	0	0	**2**	1	**72**	**9**	**82**	201
02:45 PM	6	0	1	7	20	**72**	19	111	0	0	0	0	1	56	3	60	178
Total Volume	67	0	2	69	92	254	92	438	2	0	0	2	4	253	22	279	788
% App. Total	97.1	0	2.9		21	58	21		100	0	0		1.4	90.7	7.9		
PHF	.620	.000	.500	.639	.885	.882	.821	.928	.250	.000	.000	.250	1.00	.878	.611	.851	.956



10. DONALDSON HIGHWAY AT LOOMIS ROAD/CLAY DRIVE

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Sunny - 83 Degrees

File Name : Donaldson_at_Loomis_436492_08-03-2017
Site Code : Site 10 - Thursday
Start Date : 8/3/2017
Page No : 1

Groups Printed- Cars - Buses - Trucks

	Loomis Road From North				KY236 - Donaldson Hwy From East				Loomis Road From South				Clay Drive From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
12:00 AM	3	6	0	9	10	1	4	15	1	3	18	22	1	1	0	2	48
12:15 AM	3	1	0	4	7	0	1	8	1	2	15	18	1	0	1	2	32
12:30 AM	2	3	1	6	6	0	1	7	0	0	21	21	0	0	0	0	34
12:45 AM	1	0	1	2	4	3	0	7	0	1	13	14	0	0	0	0	23
Total	9	10	2	21	27	4	6	37	2	6	67	75	2	1	1	4	137
01:00 AM	0	4	0	4	2	2	1	5	0	2	14	16	1	2	0	3	28
01:15 AM	2	2	0	4	3	2	0	5	0	1	4	5	0	2	0	2	16
01:30 AM	6	1	0	7	1	2	3	6	0	3	4	7	0	2	0	2	22
01:45 AM	0	1	0	1	4	0	2	6	0	1	1	2	1	1	0	2	11
Total	8	8	0	16	10	6	6	22	0	7	23	30	2	7	0	9	77
02:00 AM	2	1	0	3	3	2	4	9	0	0	8	8	0	0	0	0	20
02:15 AM	1	2	0	3	3	0	3	6	0	2	1	3	0	0	0	0	12
02:30 AM	1	2	0	3	0	1	2	3	0	0	2	2	0	1	0	1	9
02:45 AM	0	4	0	4	3	2	2	7	0	0	1	1	0	2	0	2	14
Total	4	9	0	13	9	5	11	25	0	2	12	14	0	3	0	3	55
03:00 AM	3	1	0	4	0	2	1	3	0	0	1	1	0	1	0	1	9
03:15 AM	4	5	0	9	8	1	2	11	0	0	1	1	0	1	0	1	22
03:30 AM	1	5	0	6	6	0	0	6	0	0	3	3	0	1	0	1	16
03:45 AM	0	12	1	13	7	1	1	9	0	1	3	4	0	1	0	1	27
Total	8	23	1	32	21	4	4	29	0	1	8	9	0	4	0	4	74
04:00 AM	2	6	0	8	2	2	1	5	0	1	3	4	0	0	0	0	17
04:15 AM	4	8	0	12	10	0	1	11	0	0	2	2	0	2	0	2	27
04:30 AM	4	16	0	20	8	0	1	9	0	0	11	11	1	2	0	3	43
04:45 AM	5	9	0	14	12	4	0	16	1	1	3	5	0	5	0	5	40
Total	15	39	0	54	32	6	3	41	1	2	19	22	1	9	0	10	127
05:00 AM	7	9	0	16	9	3	3	15	1	0	5	6	0	3	0	3	40
05:15 AM	6	10	0	16	6	1	3	10	0	0	3	3	0	4	0	4	33
05:30 AM	16	13	0	29	13	5	6	24	1	1	10	12	0	1	0	1	66
05:45 AM	14	14	1	29	28	6	4	38	0	2	8	10	0	3	1	4	81
Total	43	46	1	90	56	15	16	87	2	3	26	31	0	11	1	12	220
06:00 AM	13	12	1	26	18	2	14	34	0	0	10	10	1	0	1	2	72
06:15 AM	17	9	0	26	14	1	9	24	0	3	28	31	0	1	0	1	82
06:30 AM	30	8	1	39	18	3	13	34	1	5	29	35	0	0	0	0	108
06:45 AM	16	13	1	30	19	4	22	45	0	6	20	26	0	0	0	0	101
Total	76	42	3	121	69	10	58	137	1	14	87	102	1	1	1	3	363
07:00 AM	17	13	1	31	25	6	8	39	0	4	20	24	0	3	0	3	97
07:15 AM	23	12	2	37	24	4	7	35	0	8	13	21	1	3	1	5	98
07:30 AM	24	15	2	41	23	1	11	35	0	4	22	26	1	1	0	2	104
07:45 AM	33	17	1	51	15	5	8	28	0	7	18	25	0	2	0	2	106
Total	97	57	6	160	87	16	34	137	0	23	73	96	2	9	1	12	405
08:00 AM	20	16	2	38	14	1	13	28	0	7	18	25	0	6	0	6	97
08:15 AM	29	14	1	44	12	2	7	21	1	9	21	31	1	4	0	5	101
08:30 AM	18	7	0	25	25	5	12	42	0	2	22	24	0	0	0	0	91
08:45 AM	12	8	3	23	20	0	4	24	0	7	27	34	2	3	0	5	86
Total	79	45	6	130	71	8	36	115	1	25	88	114	3	13	0	16	375

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File Name : Donaldson_at_Loomis_436492_08-03-2017
Site Code : Site 10 - Thursday
Start Date : 8/3/2017

Groups Printed- Cars - Buses - Trucks

	Loomis Road From North				KY236 - Donaldson Hwy From East				Loomis Road From South				Clay Drive From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
09:00 AM	14	8	0	22	15	4	14	33	0	5	25	30	1	1	1	3	88
09:15 AM	16	8	1	25	17	2	11	30	0	7	26	33	1	2	0	3	91
09:30 AM	14	10	0	24	22	3	5	30	0	3	23	26	0	3	0	3	83
09:45 AM	18	11	2	31	16	3	9	28	1	7	41	49	2	4	1	7	115
Total	62	37	3	102	70	12	39	121	1	22	115	138	4	10	2	16	377
10:00 AM	8	12	1	21	15	2	9	26	1	6	42	49	5	5	1	11	107
10:15 AM	13	9	0	22	19	2	15	36	0	7	34	41	2	1	0	3	102
10:30 AM	17	11	1	29	26	2	6	34	0	2	28	30	1	1	1	3	96
10:45 AM	10	7	2	19	38	3	16	57	0	5	36	41	0	4	1	5	122
Total	48	39	4	91	98	9	46	153	1	20	140	161	8	11	3	22	427
11:00 AM	11	15	1	27	36	1	9	46	0	5	37	42	1	4	1	6	121
11:15 AM	11	13	2	26	22	1	8	31	0	15	35	50	1	6	0	7	114
11:30 AM	13	10	0	23	28	3	10	41	0	8	34	42	0	0	1	1	107
11:45 AM	13	18	1	32	31	2	27	60	1	8	32	41	0	5	0	5	138
Total	48	56	4	108	117	7	54	178	1	36	138	175	2	15	2	19	480
12:00 PM	22	7	3	32	28	5	24	57	0	6	32	38	4	4	0	8	135
12:15 PM	11	17	1	29	20	5	17	42	0	5	33	38	0	7	0	7	116
12:30 PM	15	12	2	29	27	5	14	46	1	7	36	44	2	5	0	7	126
12:45 PM	24	15	0	39	35	6	17	58	2	3	33	38	1	7	2	10	145
Total	72	51	6	129	110	21	72	203	3	21	134	158	7	23	2	32	522
01:00 PM	12	10	1	23	30	4	11	45	1	6	43	50	2	5	0	7	125
01:15 PM	6	8	0	14	29	2	19	50	0	12	29	41	1	3	1	5	110
01:30 PM	27	16	1	44	34	5	11	50	0	5	37	42	0	1	0	1	137
01:45 PM	16	11	2	29	44	4	28	76	0	8	52	60	3	1	2	6	171
Total	61	45	4	110	137	15	69	221	1	31	161	193	6	10	3	19	543
02:00 PM	15	13	0	28	46	6	18	70	0	13	43	56	1	6	0	7	161
02:15 PM	23	6	1	30	30	2	16	48	0	10	49	59	2	1	0	3	140
02:30 PM	23	9	2	34	45	2	20	67	0	9	55	64	0	1	0	1	166
02:45 PM	17	13	1	31	37	6	29	72	0	10	37	47	2	4	1	7	157
Total	78	41	4	123	158	16	83	257	0	42	184	226	5	12	1	18	624
03:00 PM	11	12	0	23	41	3	30	74	0	10	35	45	1	4	0	5	147
03:15 PM	18	9	3	30	49	3	27	79	0	14	39	53	2	4	2	8	170
03:30 PM	40	11	2	53	43	1	24	68	1	11	45	57	2	1	0	3	181
03:45 PM	17	10	0	27	51	0	15	66	1	9	32	42	0	0	2	2	137
Total	86	42	5	133	184	7	96	287	2	44	151	197	5	9	4	18	635
04:00 PM	22	9	1	32	36	4	25	65	0	9	47	56	3	3	0	6	159
04:15 PM	14	11	2	27	33	5	18	56	0	2	36	38	5	3	0	8	129
04:30 PM	20	14	0	34	41	1	23	65	1	9	29	39	5	1	0	6	144
04:45 PM	14	9	1	24	45	5	30	80	0	5	41	46	1	3	0	4	154
Total	70	43	4	117	155	15	96	266	1	25	153	179	14	10	0	24	586
05:00 PM	15	7	1	23	32	3	37	72	0	8	44	52	2	8	0	10	157
05:15 PM	19	9	0	28	23	3	19	45	0	6	26	32	0	3	0	3	108
05:30 PM	14	4	1	19	27	5	19	51	0	2	29	31	0	2	0	2	103
05:45 PM	17	8	3	28	22	1	19	42	0	2	33	35	1	2	0	3	108
Total	65	28	5	98	104	12	94	210	0	18	132	150	3	15	0	18	476

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File Name : Donaldson_at_Loomis_436492_08-03-2017
Site Code : Site 10 - Thursday
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Groups Printed- Cars - Buses - Trucks

	Loomis Road From North				KY236 - Donaldson Hwy From East				Loomis Road From South				Clay Drive From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
06:00 PM	16	9	2	27	23	5	20	48	0	4	37	41	1	2	0	3	119
06:15 PM	6	8	0	14	24	5	21	50	0	4	37	41	1	3	0	4	109
06:30 PM	15	8	1	24	22	2	17	41	0	5	32	37	1	2	1	4	106
06:45 PM	15	7	2	24	26	5	14	45	0	1	28	29	2	3	0	5	103
Total	52	32	5	89	95	17	72	184	0	14	134	148	5	10	1	16	437
07:00 PM	11	9	0	20	22	1	10	33	0	9	39	48	1	2	0	3	104
07:15 PM	11	7	1	19	17	1	14	32	1	4	29	34	0	0	1	1	86
07:30 PM	14	11	0	25	15	0	8	23	0	5	18	23	0	2	0	2	73
07:45 PM	4	8	0	12	25	0	3	28	1	4	39	44	0	1	0	1	85
Total	40	35	1	76	79	2	35	116	2	22	125	149	1	5	1	7	348
08:00 PM	7	3	0	10	17	3	8	28	0	3	43	46	0	0	1	1	85
08:15 PM	8	7	0	15	16	2	8	26	0	4	27	31	0	1	0	1	73
08:30 PM	8	5	0	13	20	3	14	37	0	4	20	24	0	5	0	5	79
08:45 PM	3	10	0	13	19	0	11	30	0	1	20	21	0	1	0	1	65
Total	26	25	0	51	72	8	41	121	0	12	110	122	0	7	1	8	302
09:00 PM	6	6	0	12	13	0	12	25	1	1	29	31	1	6	0	7	75
09:15 PM	9	6	0	15	11	1	8	20	0	5	13	18	0	1	0	1	54
09:30 PM	2	10	0	12	10	2	5	17	0	3	15	18	0	1	0	1	48
09:45 PM	7	2	1	10	7	2	7	16	1	4	19	24	0	4	0	4	54
Total	24	24	1	49	41	5	32	78	2	13	76	91	1	12	0	13	231
10:00 PM	6	5	0	11	4	0	2	6	0	4	16	20	1	0	0	1	38
10:15 PM	1	7	1	9	10	2	7	19	0	4	22	26	3	0	0	3	57
10:30 PM	3	7	0	10	4	0	5	9	0	2	17	19	0	0	0	0	38
10:45 PM	6	9	0	15	14	1	4	19	0	4	18	22	0	0	0	0	56
Total	16	28	1	45	32	3	18	53	0	14	73	87	4	0	0	4	189
11:00 PM	5	5	0	10	15	1	5	21	0	2	26	28	0	1	0	1	60
11:15 PM	3	6	0	9	9	2	1	12	0	0	27	27	0	2	0	2	50
11:30 PM	3	3	0	6	12	0	3	15	0	4	17	21	0	0	0	0	42
11:45 PM	3	4	0	7	6	0	1	7	1	3	12	16	0	0	0	0	30
Total	14	18	0	32	42	3	10	55	1	9	82	92	0	3	0	3	182
Grand Total	1101	823	66	1990	1876	226	1031	3133	22	426	2311	2759	76	210	24	310	8192
Apprch %	55.3	41.4	3.3		59.9	7.2	32.9		0.8	15.4	83.8		24.5	67.7	7.7		
Total %	13.4	10	0.8	24.3	22.9	2.8	12.6	38.2	0.3	5.2	28.2	33.7	0.9	2.6	0.3	3.8	
Cars	1030	349	60	1439	1754	171	986	2911	20	334	2113	2467	71	154	21	246	7063
% Cars	93.6	42.4	90.9	72.3	93.5	75.7	95.6	92.9	90.9	78.4	91.4	89.4	93.4	73.3	87.5	79.4	86.2
Buses	30	348	1	379	57	1	14	72	1	72	73	146	1	0	1	2	599
% Buses	2.7	42.3	1.5	19	3	0.4	1.4	2.3	4.5	16.9	3.2	5.3	1.3	0	4.2	0.6	7.3
Trucks	41	126	5	172	65	54	31	150	1	20	125	146	4	56	2	62	530
% Trucks	3.7	15.3	7.6	8.6	3.5	23.9	3	4.8	4.5	4.7	5.4	5.3	5.3	26.7	8.3	20	6.5

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File Name : Donaldson_at_Loomis_436492_08-03-2017
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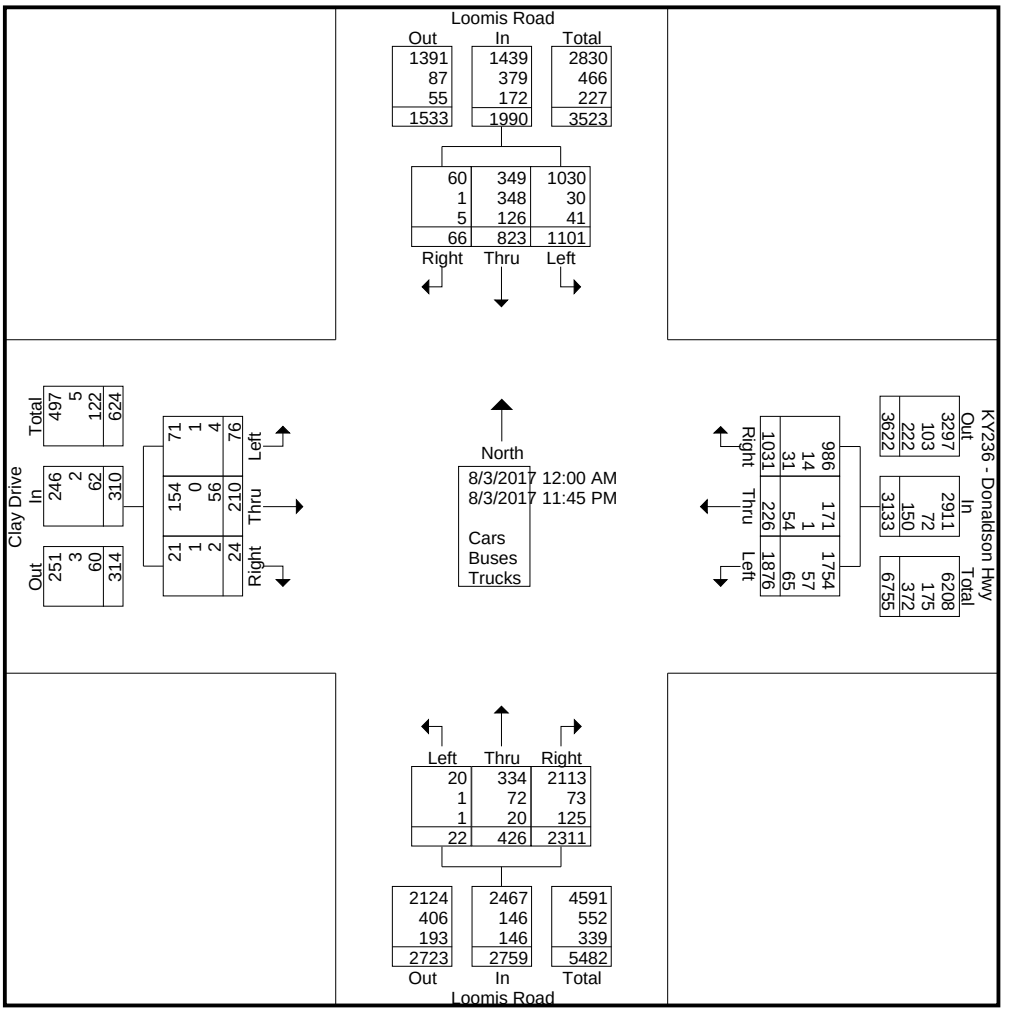

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File Name : Donaldson_at_Loomis_436492_08-03-2017
Site Code : Site 10 - Thursday
Start Date : 8/3/2017

	Loomis Road From North				KY236 - Donaldson Hwy From East				Loomis Road From South				Clay Drive From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 12:00 AM to 09:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	24	15	**2**	41	**23**	1	11	**35**	0	4	**22**	26	**1**	1	0	2	104
07:45 AM	**33**	**17**	1	**51**	15	**5**	8	28	0	7	18	25	0	2	0	2	**106**
08:00 AM	20	16	2	38	14	1	**13**	28	0	7	18	25	0	**6**	0	**6**	97
08:15 AM	29	14	1	44	12	2	7	21	**1**	**9**	21	**31**	1	4	0	5	101
Total Volume	106	62	6	174	64	9	39	112	1	27	79	107	2	13	0	15	408
% App. Total	60.9	35.6	3.4		57.1	8	34.8		0.9	25.2	73.8		13.3	86.7	0		
PHF	.803	.912	.750	.853	.696	.450	.750	.800	.250	.750	.898	.863	.500	.542	.000	.625	.962

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File Name : Donaldson_at_Loomis_436492_08-03-2017
Site Code : Site 10 - Thursday
Start Date : 8/3/2017
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	Loomis Road From North				KY236 - Donaldson Hwy From East				Loomis Road From South				Clay Drive From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 01:00 PM																	
01:00 PM	12	10	1	23	30	4	11	45	**1**	6	43	50	2	**5**	0	**7**	125
01:15 PM	6	8	0	14	29	2	19	50	0	**12**	29	41	1	3	1	5	110
01:30 PM	**27**	**16**	1	**44**	34	**5**	11	50	0	5	37	42	0	1	0	1	137
01:45 PM	16	11	**2**	29	**44**	4	**28**	**76**	0	8	**52**	**60**	**3**	1	**2**	6	**171**
Total Volume	61	45	4	110	137	15	69	221	1	31	161	193	6	10	3	19	543
% App. Total	55.5	40.9	3.6		62	6.8	31.2		0.5	16.1	83.4		31.6	52.6	15.8		
PHF	.565	.703	.500	.625	.778	.750	.616	.727	.250	.646	.774	.804	.500	.500	.375	.679	.794

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File Name : Donaldson_at_Loomis_436492_08-03-2017
Site Code : Site 10 - Thursday
Start Date : 8/3/2017
Page No : 7

	Loomis Road From North				KY236 - Donaldson Hwy From East				Loomis Road From South				Clay Drive From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 02:00 PM to 11:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 02:45 PM																	
02:45 PM	17	**13**	1	31	37	**6**	29	72	0	10	37	47	**2**	**4**	1	7	157
03:00 PM	11	12	0	23	41	3	**30**	74	0	10	35	45	1	4	0	5	147
03:15 PM	18	9	**3**	30	**49**	3	27	**79**	0	**14**	39	53	2	4	**2**	**8**	170
03:30 PM	**40**	11	2	**53**	43	1	24	68	**1**	11	**45**	**57**	2	1	0	3	**181**
Total Volume	86	45	6	137	170	13	110	293	1	45	156	202	7	13	3	23	655
% App. Total	62.8	32.8	4.4		58	4.4	37.5		0.5	22.3	77.2		30.4	56.5	13		
PHF	.538	.865	.500	.646	.867	.542	.917	.927	.250	.804	.867	.886	.875	.813	.375	.719	.905

11. LOOMIS ROAD AT BARKLEY DRIVE

Cummins Consulting Services

4661 Marlberry Place, Lexington, KY 40509
swcummins@windstream.net 859.361.2589

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Sunny - 83 Degrees

File Name : Barkley_at_Loomis_436493_08-03-2017
Site Code : Site 11 - Thursday
Start Date : 8/3/2017
Page No : 1

Groups Printed- Cars - Buses - Trucks

	Loomis Road From North				Hertz Lot Entrance From East				Loomis Road From South				Barkley Drive From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
12:00 AM	0	12	8	20	0	0	0	0	2	4	0	6	9	0	10	19	45
12:15 AM	0	9	7	16	0	0	0	0	2	3	0	5	4	0	3	7	28
12:30 AM	0	8	5	13	0	0	0	0	7	2	0	9	3	0	1	4	26
12:45 AM	0	2	4	6	0	0	0	0	2	2	0	4	4	0	7	11	21
Total	0	31	24	55	0	0	0	0	13	11	0	24	20	0	21	41	120
01:00 AM	0	6	2	8	0	0	0	0	1	2	0	3	8	0	6	14	25
01:15 AM	0	5	2	7	0	0	0	0	4	1	0	5	0	0	10	10	22
01:30 AM	0	3	1	4	0	0	0	0	2	2	0	4	3	0	1	4	12
01:45 AM	0	2	1	3	0	0	0	0	1	1	0	2	1	0	6	7	12
Total	0	16	6	22	0	0	0	0	8	6	0	14	12	0	23	35	71
02:00 AM	0	4	1	5	0	0	0	0	2	4	0	6	0	0	4	4	15
02:15 AM	0	3	2	5	0	0	0	0	0	0	0	0	0	0	2	2	7
02:30 AM	0	2	0	2	0	0	0	0	1	0	0	1	1	0	1	2	5
02:45 AM	0	3	3	6	0	0	0	0	2	0	0	2	0	0	1	1	9
Total	0	12	6	18	0	0	0	0	5	4	0	9	1	0	8	9	36
03:00 AM	0	1	0	1	0	0	0	0	1	0	0	1	1	0	0	1	3
03:15 AM	0	6	3	9	0	0	0	0	0	0	0	0	0	0	0	0	9
03:30 AM	0	5	1	6	0	0	0	0	2	0	0	2	3	0	0	3	11
03:45 AM	3	8	3	14	0	0	0	0	2	0	0	2	2	0	0	2	18
Total	3	20	7	30	0	0	0	0	5	0	0	5	6	0	0	6	41
04:00 AM	0	8	1	9	0	0	0	0	0	1	0	1	2	0	0	2	12
04:15 AM	2	10	0	12	0	0	0	0	5	2	2	9	0	0	0	0	21
04:30 AM	2	16	6	24	0	0	0	0	3	6	1	10	0	0	1	1	35
04:45 AM	2	13	5	20	0	0	0	0	6	3	0	9	3	0	1	4	33
Total	6	47	12	65	0	0	0	0	14	12	3	29	5	0	2	7	101
05:00 AM	0	11	4	15	0	0	0	0	9	3	0	12	1	0	0	1	28
05:15 AM	3	11	6	20	0	0	0	0	4	2	0	6	2	0	5	7	33
05:30 AM	4	15	7	26	0	0	0	0	6	5	0	11	5	0	6	11	48
05:45 AM	7	12	20	39	0	0	0	0	15	5	0	20	2	0	7	9	68
Total	14	49	37	100	0	0	0	0	34	15	0	49	10	0	18	28	177
06:00 AM	2	18	11	31	0	0	0	0	6	3	0	9	5	0	7	12	52
06:15 AM	6	16	3	25	0	0	0	0	10	5	0	15	21	0	6	27	67
06:30 AM	5	13	7	25	0	0	0	0	10	6	2	18	16	0	8	24	67
06:45 AM	5	16	10	31	0	0	0	0	10	4	2	16	9	0	1	10	57
Total	18	63	31	112	0	0	0	0	36	18	4	58	51	0	22	73	243
07:00 AM	5	22	10	37	0	0	0	0	6	4	0	10	5	0	4	9	56
07:15 AM	2	20	5	27	0	0	0	0	13	8	0	21	11	0	1	12	60
07:30 AM	9	26	5	40	0	0	0	0	11	7	0	18	10	0	2	12	70
07:45 AM	4	20	5	29	0	0	0	0	7	14	0	21	3	1	3	7	57
Total	20	88	25	133	0	0	0	0	37	33	0	70	29	1	10	40	243
08:00 AM	3	17	9	29	0	0	0	0	6	8	0	14	5	0	4	9	52
08:15 AM	2	17	11	30	0	0	0	0	5	6	0	11	9	0	6	15	56
08:30 AM	2	20	12	34	0	0	0	0	6	6	0	12	5	0	12	17	63
08:45 AM	4	20	6	30	0	0	0	0	5	7	0	12	8	1	9	18	60
Total	11	74	38	123	0	0	0	0	22	27	0	49	27	1	31	59	231

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File Name : Barkley_at_Loomis_436493_08-03-2017
Site Code : Site 11 - Thursday
Start Date : 8/3/2017

Groups Printed- Cars - Buses - Trucks

	Loomis Road From North				Hertz Lot Entrance From East				Loomis Road From South				Barkley Drive From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
09:00 AM	1	20	7	28	0	0	0	0	7	6	0	13	7	0	16	23	64
09:15 AM	4	18	7	29	0	0	0	0	10	5	0	15	6	0	8	14	58
09:30 AM	5	19	12	36	0	0	0	0	7	10	1	18	2	0	5	7	61
09:45 AM	8	22	7	37	0	0	0	0	13	9	0	22	9	2	10	21	80
Total	18	79	33	130	0	0	0	0	37	30	1	68	24	2	39	65	263
10:00 AM	4	20	6	30	0	0	0	0	8	9	0	17	6	0	4	10	57
10:15 AM	8	23	1	32	0	0	0	0	9	11	2	22	8	0	1	9	63
10:30 AM	7	19	8	34	0	0	0	0	7	3	0	10	5	0	11	16	60
10:45 AM	8	23	6	37	0	0	0	0	8	8	0	16	9	0	11	20	73
Total	27	85	21	133	0	0	0	0	32	31	2	65	28	0	27	55	253
11:00 AM	12	22	17	51	0	0	0	0	12	7	0	19	4	0	11	15	85
11:15 AM	7	19	10	36	0	0	0	0	6	9	2	17	6	1	9	16	69
11:30 AM	6	21	11	38	0	0	0	0	4	11	1	16	11	0	9	20	74
11:45 AM	6	25	7	38	0	0	0	0	12	12	0	24	7	0	11	18	80
Total	31	87	45	163	0	0	0	0	34	39	3	76	28	1	40	69	308
12:00 PM	8	16	3	27	0	0	0	0	7	7	0	14	5	0	16	21	62
12:15 PM	4	24	14	42	0	0	0	0	12	4	4	20	10	2	18	30	92
12:30 PM	9	25	8	42	0	0	0	0	9	12	0	21	6	1	12	19	82
12:45 PM	13	24	5	42	0	0	0	0	13	4	3	20	1	0	12	13	75
Total	34	89	30	153	0	0	0	0	41	27	7	75	22	3	58	83	311
01:00 PM	13	22	5	40	0	0	0	0	7	6	1	14	8	0	7	15	69
01:15 PM	6	21	9	36	0	0	0	0	11	10	1	22	4	0	11	15	73
01:30 PM	7	27	11	45	0	0	0	0	5	8	1	14	9	1	8	18	77
01:45 PM	11	25	10	46	0	0	0	0	6	12	0	18	9	0	19	28	92
Total	37	95	35	167	0	0	0	0	29	36	3	68	30	1	45	76	311
02:00 PM	17	25	16	58	0	0	0	0	7	11	0	18	7	0	26	33	109
02:15 PM	9	22	5	36	0	0	0	0	11	11	0	22	6	0	10	16	74
02:30 PM	9	26	11	46	0	0	0	0	7	11	1	19	8	0	2	10	75
02:45 PM	18	18	12	48	0	0	0	0	8	13	1	22	7	1	8	16	86
Total	53	91	44	188	0	0	0	0	33	46	2	81	28	1	46	75	344
03:00 PM	13	32	14	59	0	0	0	0	12	7	0	19	9	0	10	19	97
03:15 PM	12	24	8	44	0	0	0	0	10	5	0	15	12	0	10	22	81
03:30 PM	11	21	8	40	0	0	0	0	14	4	1	19	12	0	11	23	82
03:45 PM	13	29	5	47	0	0	0	0	7	9	0	16	9	0	9	18	81
Total	49	106	35	190	0	0	0	0	43	25	1	69	42	0	40	82	341
04:00 PM	7	29	10	46	0	0	0	0	11	9	2	22	10	1	12	23	91
04:15 PM	10	18	7	35	0	0	0	0	16	6	1	23	4	0	17	21	79
04:30 PM	10	17	6	33	0	0	0	0	5	7	0	12	8	0	8	16	61
04:45 PM	11	27	11	49	0	0	0	0	9	10	1	20	14	0	15	29	98
Total	38	91	34	163	0	0	0	0	41	32	4	77	36	1	52	89	329
05:00 PM	11	19	9	39	0	0	0	0	10	9	0	19	13	0	6	19	77
05:15 PM	9	18	5	32	0	0	0	0	5	6	2	13	10	0	2	12	57
05:30 PM	6	20	3	29	0	0	0	0	5	6	0	11	1	0	9	10	50
05:45 PM	6	24	5	35	0	0	0	0	8	5	0	13	4	0	19	23	71
Total	32	81	22	135	0	0	0	0	28	26	2	56	28	0	36	64	255

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swcummins@windstream.net 859.361.2589

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File Name : Barkley_at_Loomis_436493_08-03-2017
Site Code : Site 11 - Thursday
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Groups Printed- Cars - Buses - Trucks

	Loomis Road From North				Hertz Lot Entrance From East				Loomis Road From South				Barkley Drive From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
06:00 PM	3	25	6	34	0	0	0	0	8	7	0	15	2	0	19	21	70
06:15 PM	5	27	8	40	0	0	0	0	4	5	0	9	3	1	18	22	71
06:30 PM	1	19	11	31	0	0	0	0	14	12	0	26	4	0	14	18	75
06:45 PM	6	17	14	37	0	0	0	0	10	6	0	16	2	0	13	15	68
Total	15	88	39	142	0	0	0	0	36	30	0	66	11	1	64	76	284
07:00 PM	7	25	11	43	0	0	0	0	10	6	0	16	2	0	14	16	75
07:15 PM	3	20	10	33	0	0	0	0	8	4	0	12	1	2	14	17	62
07:30 PM	1	15	9	25	0	0	0	0	9	8	0	17	2	0	16	18	60
07:45 PM	1	26	19	46	0	0	0	0	6	3	0	9	4	1	22	27	82
Total	12	86	49	147	0	0	0	0	33	21	0	54	9	3	66	78	279
08:00 PM	4	18	8	30	0	0	0	0	8	5	0	13	8	0	13	21	64
08:15 PM	1	15	15	31	0	0	0	0	9	7	0	16	5	0	6	11	58
08:30 PM	3	12	11	26	0	0	0	0	10	4	1	15	2	0	8	10	51
08:45 PM	3	16	13	32	0	0	0	0	10	2	1	13	4	0	5	9	54
Total	11	61	47	119	0	0	0	0	37	18	2	57	19	0	32	51	227
09:00 PM	0	16	8	24	0	0	0	0	8	2	0	10	8	0	7	15	49
09:15 PM	1	14	6	21	0	0	0	0	4	3	0	7	5	0	14	19	47
09:30 PM	1	19	7	27	0	0	0	0	5	5	0	10	3	0	14	17	54
09:45 PM	0	11	5	16	0	0	0	0	6	6	0	12	5	0	4	9	37
Total	2	60	26	88	0	0	0	0	23	16	0	39	21	0	39	60	187
10:00 PM	3	10	4	17	0	0	0	0	2	0	0	2	3	0	12	15	34
10:15 PM	0	16	7	23	0	0	0	0	6	9	0	15	4	0	14	18	56
10:30 PM	0	13	3	16	0	0	0	0	4	4	0	8	2	0	19	21	45
10:45 PM	2	18	9	29	0	0	0	0	6	4	0	10	3	0	14	17	56
Total	5	57	23	85	0	0	0	0	18	17	0	35	12	0	59	71	191
11:00 PM	0	15	11	26	0	0	0	0	11	2	0	13	4	0	12	16	55
11:15 PM	0	7	7	14	0	0	0	0	4	2	0	6	3	0	17	20	40
11:30 PM	0	12	7	19	0	0	0	0	6	3	0	9	9	0	23	32	60
11:45 PM	0	11	6	17	0	0	0	0	4	2	0	6	3	0	15	18	41
Total	0	45	31	76	0	0	0	0	25	9	0	34	19	0	67	86	196
Grand Total	436	1601	700	2737	0	0	0	0	664	529	34	1227	518	15	845	1378	5342
Apprch %	15.9	58.5	25.6		0	0	0		54.1	43.1	2.8		37.6	1.1	61.3		
Total %	8.2	30	13.1	51.2	0	0	0	0	12.4	9.9	0.6	23	9.7	0.3	15.8	25.8	
Cars	425	461	620	1506	0	0	0	0	622	248	34	904	423	12	828	1263	3673
% Cars	97.5	28.8	88.6	55	0	0	0	0	93.7	46.9	100	73.7	81.7	80	98	91.7	68.8
Buses	10	1110	7	1127	0	0	0	0	2	262	0	264	1	3	2	6	1397
% Buses	2.3	69.3	1	41.2	0	0	0	0	0.3	49.5	0	21.5	0.2	20	0.2	0.4	26.2
Trucks	1	30	73	104	0	0	0	0	40	19	0	59	94	0	15	109	272
% Trucks	0.2	1.9	10.4	3.8	0	0	0	0	6	3.6	0	4.8	18.1	0	1.8	7.9	5.1

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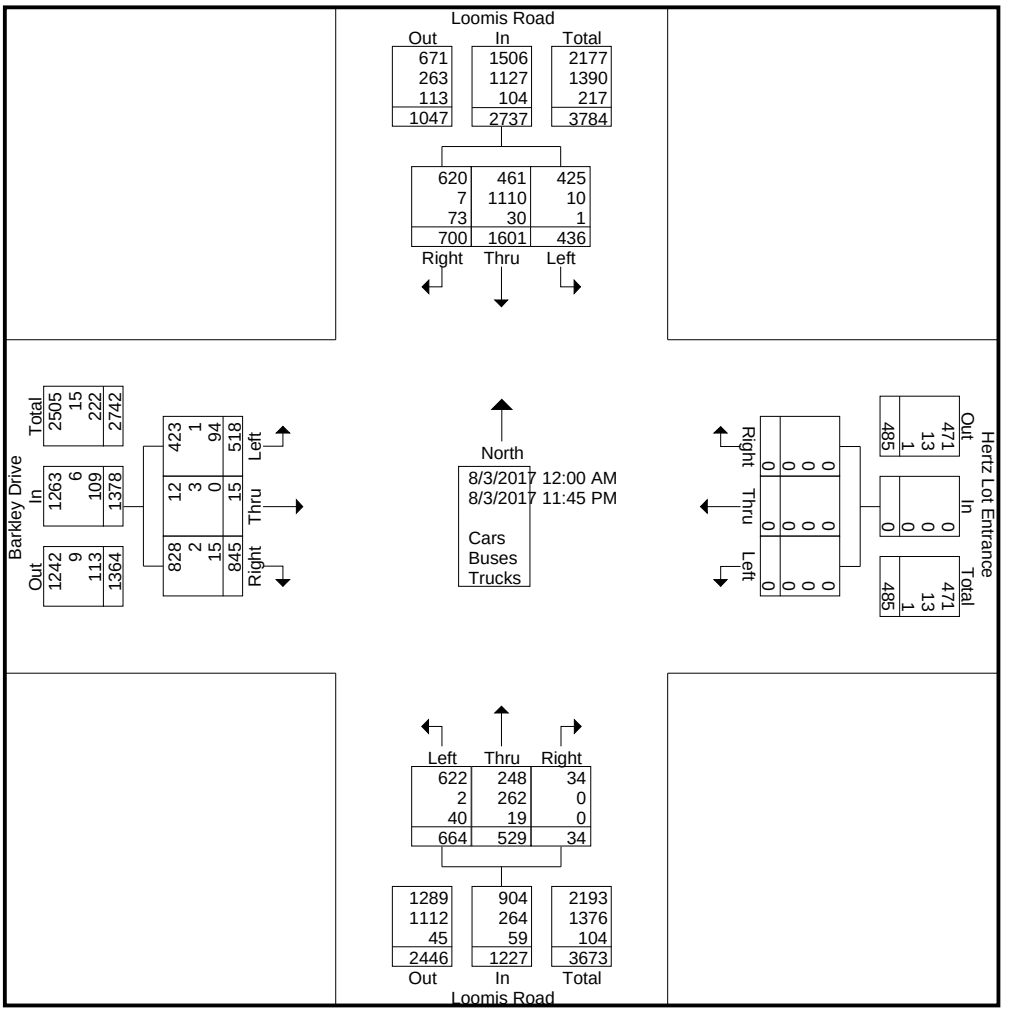

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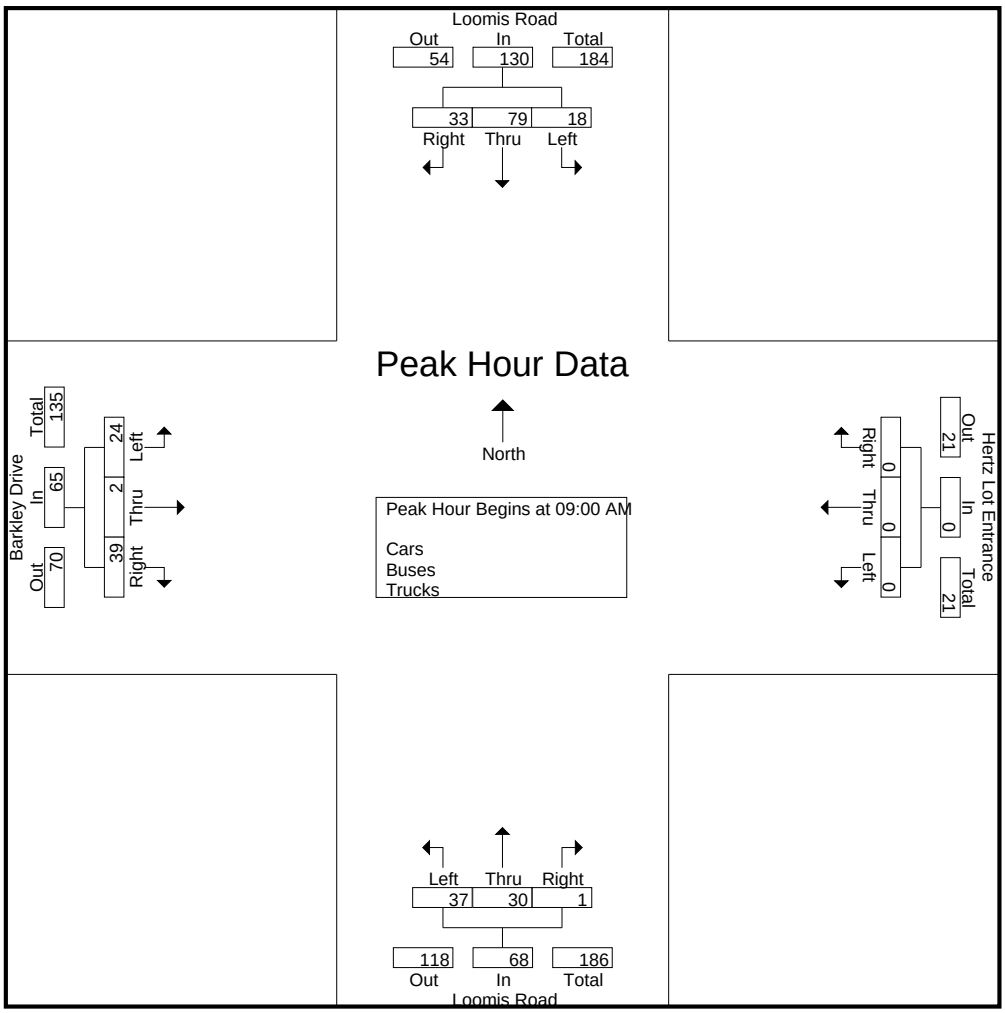
File Name : Barkley_at_Loomis_436493_08-03-2017
Site Code : Site 11 - Thursday
Start Date : 8/3/2017

	Loomis Road From North				Hertz Lot Entrance From East				Loomis Road From South				Barkley Drive From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 12:00 AM to 09:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 09:00 AM																	
09:00 AM	1	20	7	28	0	0	0	0	7	6	0	13	7	0	**16**	**23**	64
09:15 AM	4	18	7	29	0	0	0	0	10	5	0	15	6	0	8	14	58
09:30 AM	5	19	**12**	36	0	0	0	0	7	**10**	**1**	18	2	0	5	7	61
09:45 AM	**8**	**22**	7	**37**	0	0	0	0	**13**	9	0	**22**	**9**	**2**	10	21	**80**
Total Volume	18	79	33	130	0	0	0	0	37	30	1	68	24	2	39	65	263
% App. Total	13.8	60.8	25.4		0	0	0		54.4	44.1	1.5		36.9	3.1	60		
PHF	.563	.898	.688	.878	.000	.000	.000	.000	.712	.750	.250	.773	.667	.250	.609	.707	.822



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File Name : Barkley_at_Loomis_436493_08-03-2017
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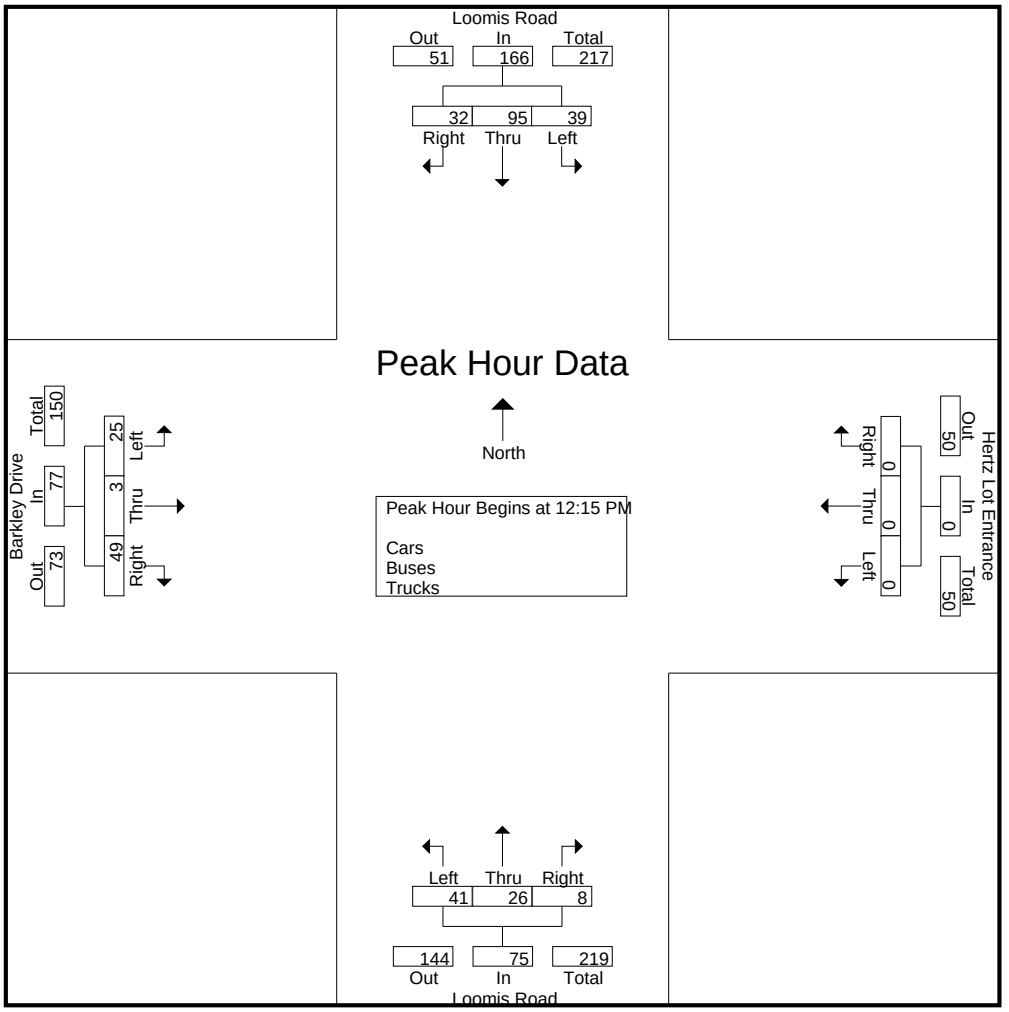
	Loomis Road From North				Hertz Lot Entrance From East				Loomis Road From South				Barkley Drive From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 12:15 PM																	
12:15 PM	4	24	**14**	**42**	0	0	0	0	12	4	**4**	20	**10**	**2**	**18**	**30**	**92**
12:30 PM	9	**25**	8	42	0	0	0	0	9	**12**	0	**21**	6	1	12	19	82
12:45 PM	**13**	24	5	42	0	0	0	0	**13**	4	3	20	1	0	12	13	75
01:00 PM	13	22	5	40	0	0	0	0	7	6	1	14	8	0	7	15	69
Total Volume	39	95	32	166	0	0	0	0	41	26	8	75	25	3	49	77	318
% App. Total	23.5	57.2	19.3		0	0	0		54.7	34.7	10.7		32.5	3.9	63.6		
PHF	.750	.950	.571	.988	.000	.000	.000	.000	.788	.542	.500	.893	.625	.375	.681	.642	.864



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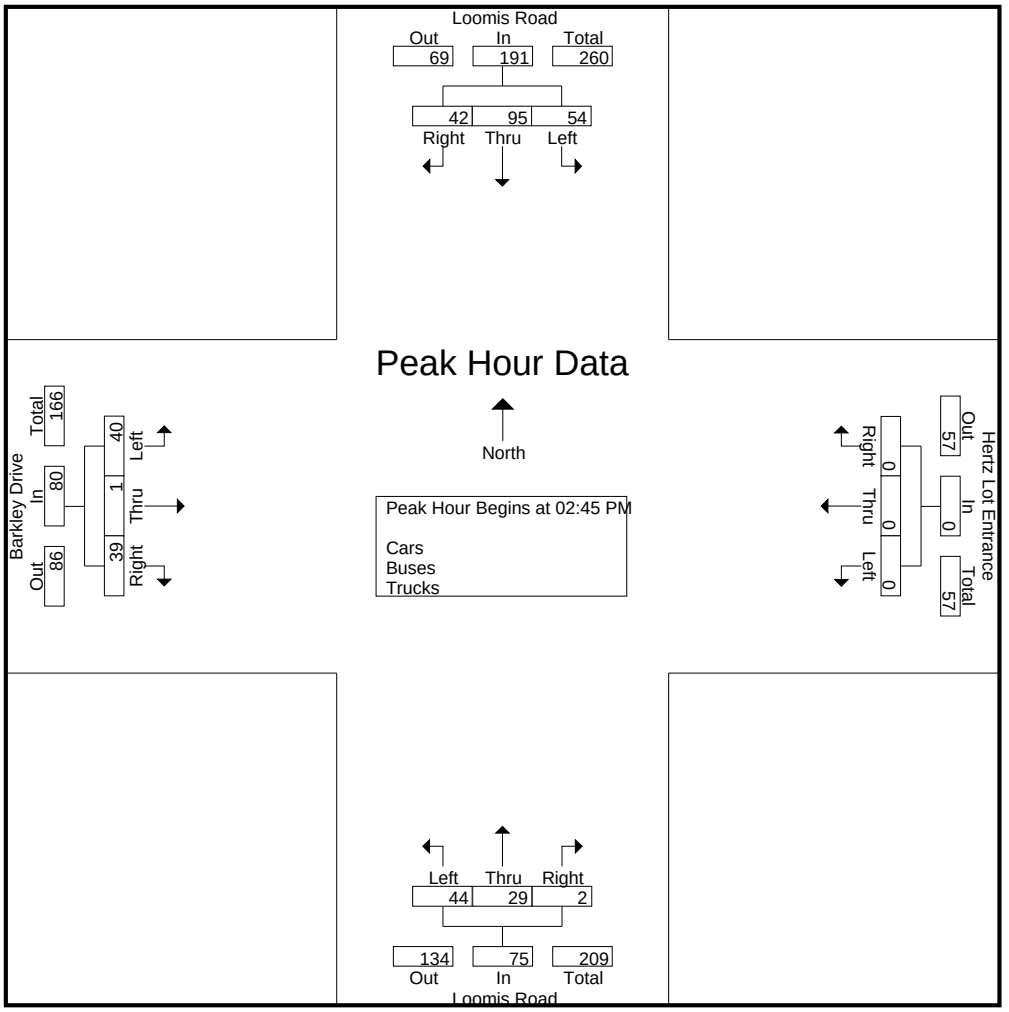
	Loomis Road From North				Hertz Lot Entrance From East				Loomis Road From South				Barkley Drive From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 02:00 PM to 11:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 02:45 PM																	
02:45 PM	**18**	18	12	48	0	0	0	0	8	**13**	**1**	**22**	7	**1**	8	16	86
03:00 PM	13	**32**	**14**	**59**	0	0	0	0	12	7	0	19	9	0	10	19	**97**
03:15 PM	12	24	8	44	0	0	0	0	10	5	0	15	**12**	0	10	22	81
03:30 PM	11	21	8	40	0	0	0	0	**14**	4	1	19	12	0	**11**	**23**	82
Total Volume	54	95	42	191	0	0	0	0	44	29	2	75	40	1	39	80	346
% App. Total	28.3	49.7	22		0	0	0		58.7	38.7	2.7		50	1.2	48.8		
PHF	.750	.742	.750	.809	.000	.000	.000	.000	.786	.558	.500	.852	.833	.250	.886	.870	.892



12. LOOMIS ROAD AT TERMINAL DRIVE

Study Name Terminal at Loomis
Start Date 08/03/2017
Start Time 6:00 AM
Site Code Site 12A - Thursday Combined

Channel Direction	SB Loomis to Terminal Direction Southbound	NB Terminal to Loomis Direction Northbound	SB Loomis to Terminal Direction Hour Peak	NB Terminal to Loomis Direction Hour Peak
6:00 AM	25	11		
6:15 AM	23	17		
6:30 AM	20	21		
6:45 AM	18	19	86	68
7:00 AM	26	13	87	70
7:15 AM	19	25	83	78
7:30 AM	27	19	90	76
7:45 AM	23	24	95	81
8:00 AM	19	14	88	82
8:15 AM	21	12	90	69
8:30 AM	30	15	93	65
8:45 AM	29	17	99	58
9:00 AM	35	16	115	60
9:15 AM	26	20	120	68
9:30 AM	23	21	113	74
9:45 AM	31	26	115	83
10:00 AM	23	19	103	86
10:15 AM	21	23	98	89
10:30 AM	29	14	104	82
10:45 AM	33	18	106	74
11:00 AM	30	25	113	80
11:15 AM	26	21	118	78
11:30 AM	30	18	119	82
11:45 AM	33	29	119	93
12:00 PM	33	16	122	84
12:15 PM	39	24	135	87
12:30 PM	32	25	137	94
12:45 PM	32	23	136	88
1:00 PM	28	19	131	91
1:15 PM	30	26	122	93
1:30 PM	37	20	127	88
1:45 PM	42	23	137	88
2:00 PM	51	20	160	89
2:15 PM	31	28	161	91
2:30 PM	27	23	151	94
2:45 PM	25	26	134	97
3:00 PM	41	24	124	101
3:15 PM	33	21	126	94
3:30 PM	32	23	131	94
3:45 PM	36	21	142	89

4:00 PM	37	27	138	92
4:15 PM	31	27	136	98
4:30 PM	27	17	131	92
4:45 PM	38	23	133	94
5:00 PM	23	22	119	89
5:15 PM	21	18	109	80
5:30 PM	28	14	110	77
5:45 PM	42	17	114	71

13. TERMINAL DIVE SPLIT TO UPPER AND LOWER ROADWAY

Study Name Terminal Upper Split at Lincoln
Start Date 10/27/2017
Start Time 5:00 AM
Site Code Site 13A - Friday

Channel / Direction	Right Lane - Arrivals Eastbound	Left Lane - Arrivals Eastbound	Right Lane - Departures Eastbound	Left Lane - Departures Eastbound	Peak Hour Arrivals	Peak Hour Departures	Total Arrivals & Departure
5:00 AM	8	3	27	53			
5:15 AM	16	2	38	64			
5:30 AM	21	2	31	64			
5:45 AM	13	1	40	57	66	374	440
6:00 AM	6	1	26	69	62	389	451
6:15 AM	7	0	35	55	51	377	428
6:30 AM	4	0	24	46	32	352	384
6:45 AM	5	0	36	66	23	357	380
7:00 AM	4	3	17	54	23	333	356
7:15 AM	1	2	27	58	19	328	347
7:30 AM	8	0	30	54	23	342	365
7:45 AM	12	1	30	49	31	319	350
8:00 AM	22	6	27	48	52	323	375
8:15 AM	37	4	16	50	90	304	394
8:30 AM	35	8	41	37	125	298	423
8:45 AM	33	6	31	33	151	283	434
9:00 AM	63	7	28	41	193	277	470
9:15 AM	41	12	35	58	205	304	509
9:30 AM	50	13	36	40	225	302	527
9:45 AM	48	7	24	42	241	304	545
10:00 AM	36	6	22	46	213	303	516
10:15 AM	64	1	29	36	225	275	500
10:30 AM	116	14	25	37	292	261	553
10:45 AM	77	6	24	40	320	259	579
11:00 AM	61	7	19	28	346	238	584
11:15 AM	71	7	18	18	359	209	568
11:30 AM	130	8	22	41	367	210	577
11:45 AM	65	16	20	40	365	206	571
12:00 PM	16	4	21	39	317	219	536
12:15 PM	17	4	31	37	260	251	511
12:30 PM	32	3	29	51	157	268	425
12:45 PM	50	8	14	61	134	283	417
1:00 PM	76	13	28	71	203	322	525
1:15 PM	62	6	30	54	250	338	588
1:30 PM	44	8	32	46	267	336	603
1:45 PM	78	11	34	59	298	354	652
2:00 PM	90	14	20	47	313	322	635
2:15 PM	85	9	25	42	339	305	644
2:30 PM	88	19	29	37	394	293	687
2:45 PM	111	15	33	37	431	270	701
3:00 PM	101	14	27	51	442	281	723
3:15 PM	114	14	26	34	476	274	750
3:30 PM	84	16	27	50	469	285	754
3:45 PM	54	5	27	41	402	283	685
4:00 PM	65	10	25	42	362	272	634
4:15 PM	62	11	20	46	307	278	585
4:30 PM	65	6	26	32	278	259	537
4:45 PM	57	12	17	29	288	237	525

Study Name Terminal Lower at Lincoln
Start Date 10/27/2017
Start Time 5:00 AM
Site Code Site 13B - Friday
Combined

Channel	Right Shoulder	Right Lane - Commercial	Middle Lane - Commercial	Left Lane - Commercial	Peak Hour	Peak Hour	Total
Direction	Eastbound	Eastbound	Eastbound	Eastbound	Baggage Claim	Airport Exit	
5:00 AM	0	0	1	4			
5:15 AM	0	0	2	2			
5:30 AM	0	0	2	4			
5:45 AM	0	0	3	5	0	23	23
6:00 AM	0	0	0	7	0	25	25
6:15 AM	0	0	3	8	0	32	32
6:30 AM	0	0	1	7	0	34	34
6:45 AM	0	0	2	9	0	37	37
7:00 AM	0	0	0	3	0	33	33
7:15 AM	0	0	2	5	0	29	29
7:30 AM	0	0	1	4	0	26	26
7:45 AM	0	1	2	4	1	21	22
8:00 AM	0	0	4	10	1	32	33
8:15 AM	0	0	2	3	1	30	31
8:30 AM	0	0	4	4	1	33	34
8:45 AM	0	0	1	9	0	37	37
9:00 AM	0	0	1	7	0	31	31
9:15 AM	0	0	2	5	0	33	33
9:30 AM	0	0	2	10	0	37	37
9:45 AM	0	0	6	14	0	47	47
10:00 AM	0	1	6	12	1	57	58
10:15 AM	1	0	2	8	2	60	62
10:30 AM	0	0	4	8	2	60	62
10:45 AM	0	0	2	9	2	51	53
11:00 AM	0	1	2	8	2	43	45
11:15 AM	0	0	4	10	1	47	48
11:30 AM	0	0	3	7	1	45	46
11:45 AM	0	0	4	21	1	59	60
12:00 PM	0	0	1	7	0	57	57
12:15 PM	0	0	3	6	0	52	52
12:30 PM	0	0	5	10	0	57	57
12:45 PM	0	0	4	4	0	40	40
1:00 PM	0	0	4	9	0	45	45
1:15 PM	0	0	6	5	0	47	47
1:30 PM	0	1	8	7	1	47	48
1:45 PM	0	1	1	9	2	49	51
2:00 PM	0	0	7	9	2	52	54
2:15 PM	0	1	5	14	3	60	63
2:30 PM	0	0	4	13	2	62	64
2:45 PM	0	1	4	10	2	66	68
3:00 PM	0	0	6	12	2	68	70
3:15 PM	0	0	3	11	1	63	64
3:30 PM	0	0	5	8	1	59	60
3:45 PM	0	0	7	11	0	63	63
4:00 PM	0	0	3	4	0	52	52
4:15 PM	0	0	5	6	0	49	49
4:30 PM	0	0	6	10	0	52	52
4:45 PM	0	0	9	10	0	53	53

14. LINCOLN ROAD AT LIMO LOT

Cummins Consulting Services

4661 Marlberry Place, Lexington, KY 40509

swcummins@windstream.net 859.361.2589

"simplifying Data Collection since 2004"

Clear and Cold - 45 Degrees
Schools in Session

File Name : Limo_Lot_at_Lincoln__464012_10-27-2017
Site Code : Site 14B - Friday
Start Date : 10/27/2017

Groups Printed- Cars - Buses - Trucks

	Limo Lot From North			Lincoln Road From East			Lincoln Road From West			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
05:00 AM	0	0	0	0	0	0	0	17	17	17
05:15 AM	0	0	0	0	0	0	0	16	16	16
05:30 AM	0	0	0	0	0	0	0	22	22	22
05:45 AM	0	0	0	0	0	0	3	18	21	21
Total	0	0	0	0	0	0	3	73	76	76
06:00 AM	0	0	0	0	0	0	1	23	24	24
06:15 AM	0	0	0	0	0	0	1	27	28	28
06:30 AM	0	0	0	0	0	0	0	29	29	29
06:45 AM	0	0	0	0	0	0	2	24	26	26
Total	0	0	0	0	0	0	4	103	107	107
07:00 AM	0	0	0	0	0	0	1	31	32	32
07:15 AM	0	0	0	0	0	0	2	18	20	20
07:30 AM	0	0	0	0	0	0	2	25	27	27
07:45 AM	0	0	0	0	0	0	4	24	28	28
Total	0	0	0	0	0	0	9	98	107	107
08:00 AM	0	0	0	0	0	0	1	37	38	38
08:15 AM	0	0	0	0	0	0	1	29	30	30
08:30 AM	0	0	0	0	0	0	0	27	27	27
08:45 AM	0	0	0	0	0	0	2	36	38	38
Total	0	0	0	0	0	0	4	129	133	133
09:00 AM	0	0	0	0	0	0	1	29	30	30
09:15 AM	0	0	0	0	0	0	2	30	32	32
09:30 AM	0	0	0	0	0	0	1	36	37	37
09:45 AM	0	0	0	0	0	0	3	39	42	42
Total	0	0	0	0	0	0	7	134	141	141
10:00 AM	0	0	0	0	0	0	3	33	36	36
10:15 AM	0	0	0	0	0	0	2	32	34	34
10:30 AM	0	0	0	0	0	0	2	44	46	46
10:45 AM	0	0	0	0	0	0	2	33	35	35
Total	0	0	0	0	0	0	9	142	151	151
11:00 AM	0	0	0	0	0	0	0	35	35	35
11:15 AM	0	0	0	0	0	0	1	41	42	42
11:30 AM	0	0	0	0	0	0	1	42	43	43
11:45 AM	0	0	0	0	0	0	2	44	46	46
Total	0	0	0	0	0	0	4	162	166	166
12:00 PM	0	0	0	0	0	0	1	33	34	34
12:15 PM	0	0	0	0	0	0	2	35	37	37
12:30 PM	0	0	0	0	0	0	7	41	48	48
12:45 PM	0	0	0	0	0	0	0	32	32	32
Total	0	0	0	0	0	0	10	141	151	151
01:00 PM	0	0	0	0	0	0	4	33	37	37
01:15 PM	0	0	0	0	0	0	1	34	35	35
01:30 PM	0	0	0	0	0	0	2	44	46	46
01:45 PM	0	0	0	0	0	0	3	34	37	37
Total	0	0	0	0	0	0	10	145	155	155

Cummins Consulting Services

4661 Marlberry Place, Lexington, KY 40509

swcummins@windstream.net 859.361.2589

"simplifying Data Collection since 2004"

File Name : Limo_Lot_at_Lincoln__464012_10-27-2017
Site Code : Site 14B - Friday
Start Date : 10/27/2017

Groups Printed- Cars - Buses - Trucks

	Limo Lot From North			Lincoln Road From East			Lincoln Road From West			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
02:00 PM	0	0	0	0	0	0	1	42	43	43
02:15 PM	0	0	0	0	0	0	3	46	49	49
02:30 PM	0	0	0	0	0	0	4	47	51	51
02:45 PM	0	0	0	0	0	0	2	46	48	48
Total	0	0	0	0	0	0	10	181	191	191
03:00 PM	0	0	0	0	0	0	0	44	44	44
03:15 PM	0	0	0	0	0	0	0	49	49	49
03:30 PM	0	0	0	0	0	0	5	40	45	45
03:45 PM	0	0	0	0	0	0	4	38	42	42
Total	0	0	0	0	0	0	9	171	180	180
04:00 PM	0	0	0	0	0	0	0	32	32	32
04:15 PM	0	0	0	0	0	0	1	42	43	43
04:30 PM	0	0	0	0	0	0	4	38	42	42
04:45 PM	0	0	0	0	0	0	4	45	49	49
Total	0	0	0	0	0	0	9	157	166	166
Grand Total	0	0	0	0	0	0	88	1636	1724	1724
Apprch %	0	0		0	0		5.1	94.9		
Total %	0	0	0	0	0	0	5.1	94.9	100	
Cars	0	0	0	0	0	0	88	587	675	675
% Cars	0	0	0	0	0	0	100	35.9	39.2	39.2
Buses	0	0	0	0	0	0	0	1021	1021	1021
% Buses	0	0	0	0	0	0	0	62.4	59.2	59.2
Trucks	0	0	0	0	0	0	0	28	28	28
% Trucks	0	0	0	0	0	0	0	1.7	1.6	1.6

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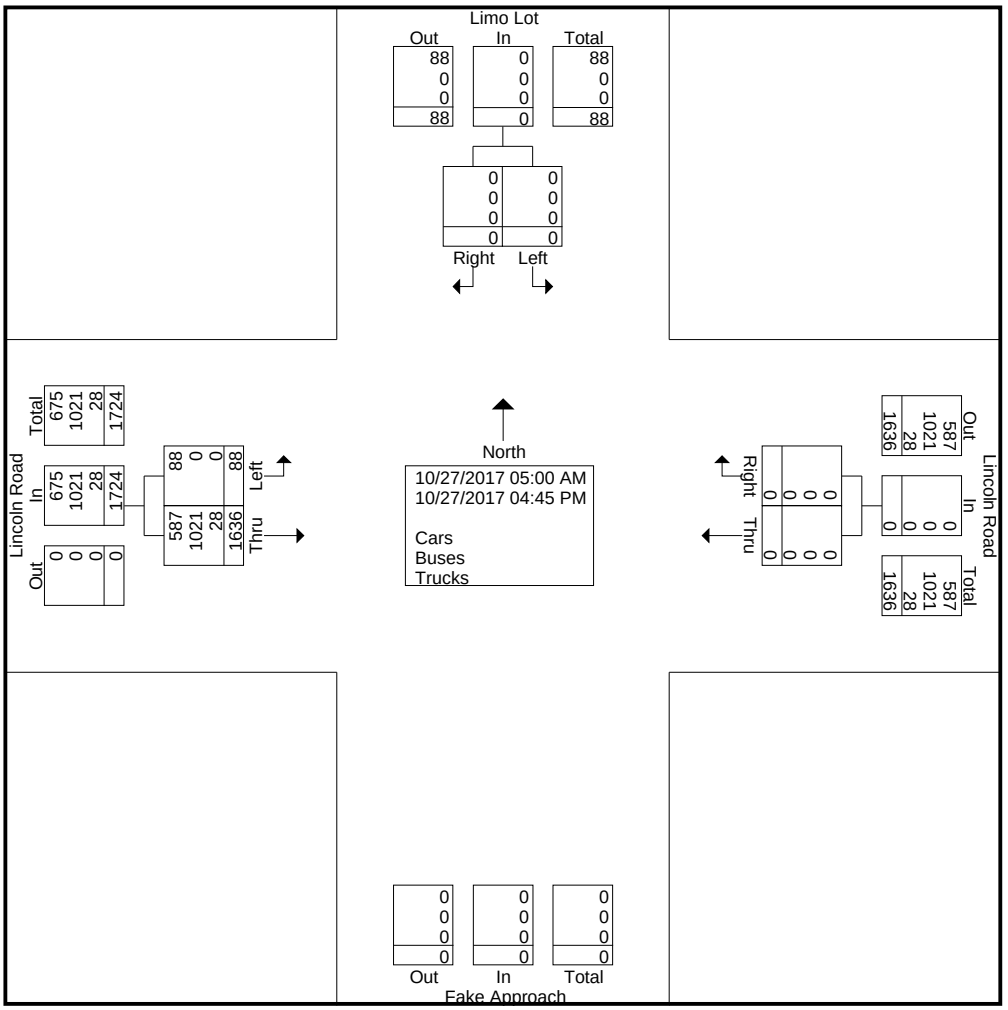
File Name : Limo_Lot_at_Lincoln__464012_10-27-2017
Site Code : Site 14B - Friday
Start Date : 10/27/2017
Page No : 3



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swcummins@windstream.net 859.361.2589
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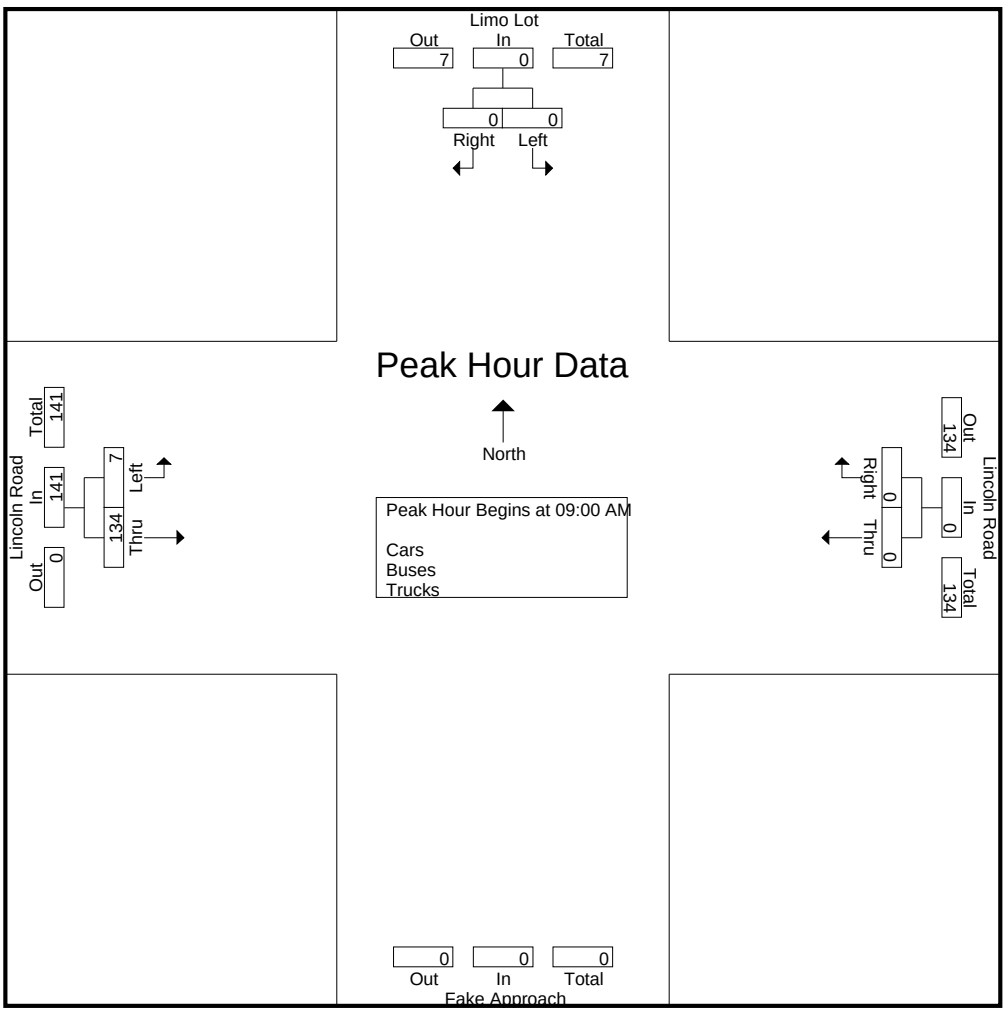
File Name : Limo_Lot_at_Lincoln__464012_10-27-2017
Site Code : Site 14B - Friday
Start Date : 10/27/2017
Page No : 4

	Limo Lot From North			Lincoln Road From East			Lincoln Road From West			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 05:00 AM to 09:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 09:00 AM										
09:00 AM	0	0	0	0	0	0	1	29	30	30
09:15 AM	0	0	0	0	0	0	2	30	32	32
09:30 AM	0	0	0	0	0	0	1	36	37	37
09:45 AM	0	0	0	0	0	0	**3**	**39**	**42**	**42**
Total Volume	0	0	0	0	0	0	7	134	141	141
% App. Total	0	0		0	0		5	95		
PHF	.000	.000	.000	.000	.000	.000	.583	.859	.839	.839



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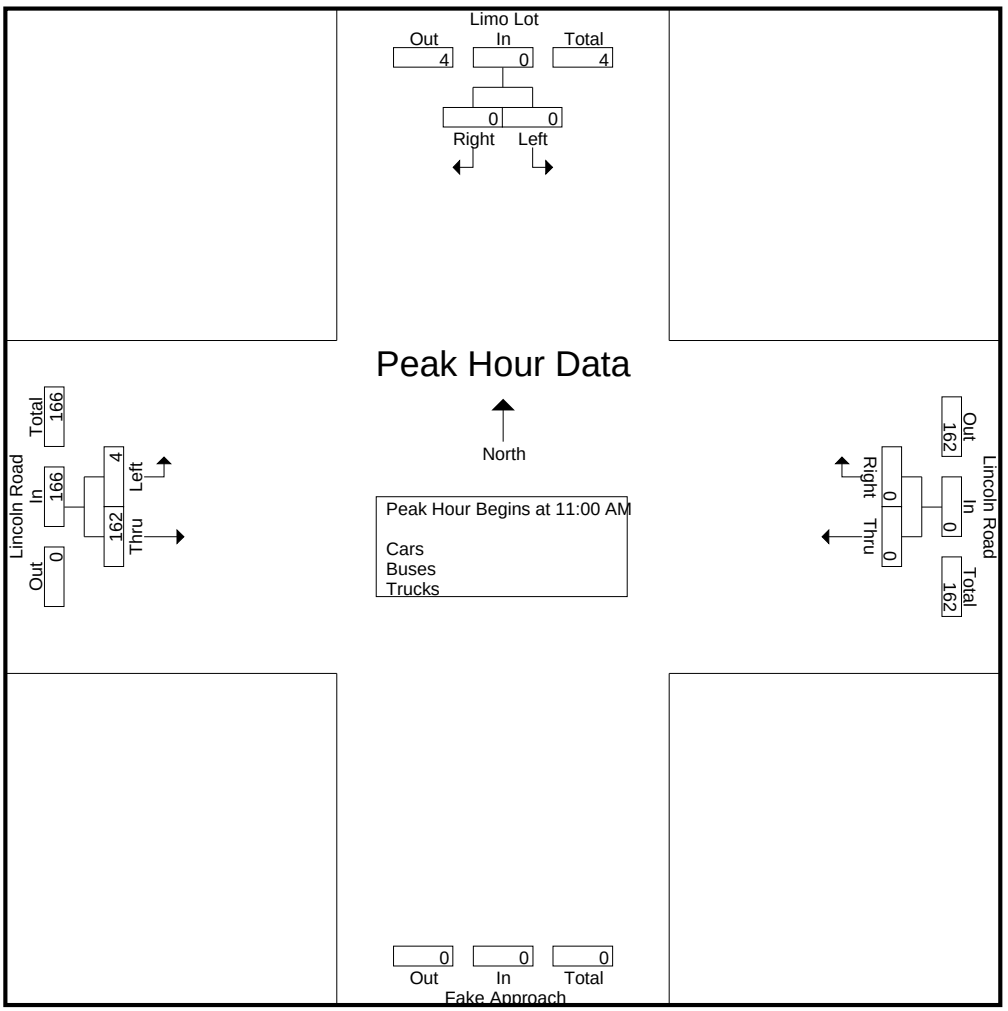
4661 Marlberry Place, Lexington, KY 40509

swcummins@windstream.net 859.361.2589

"simplifying Data Collection since 2004"

File Name : Limo_Lot_at_Lincoln__464012_10-27-2017
Site Code : Site 14B - Friday
Start Date : 10/27/2017
Page No : 5

	Limo Lot From North			Lincoln Road From East			Lincoln Road From West			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 11:00 AM										
11:00 AM	0	0	0	0	0	0	0	35	35	35
11:15 AM	0	0	0	0	0	0	1	41	42	42
11:30 AM	0	0	0	0	0	0	1	42	43	43
11:45 AM	0	0	0	0	0	0	**2**	**44**	**46**	**46**
Total Volume	0	0	0	0	0	0	4	162	166	166
% App. Total	0	0		0	0		2.4	97.6		
PHF	.000	.000	.000	.000	.000	.000	.500	.920	.902	.902

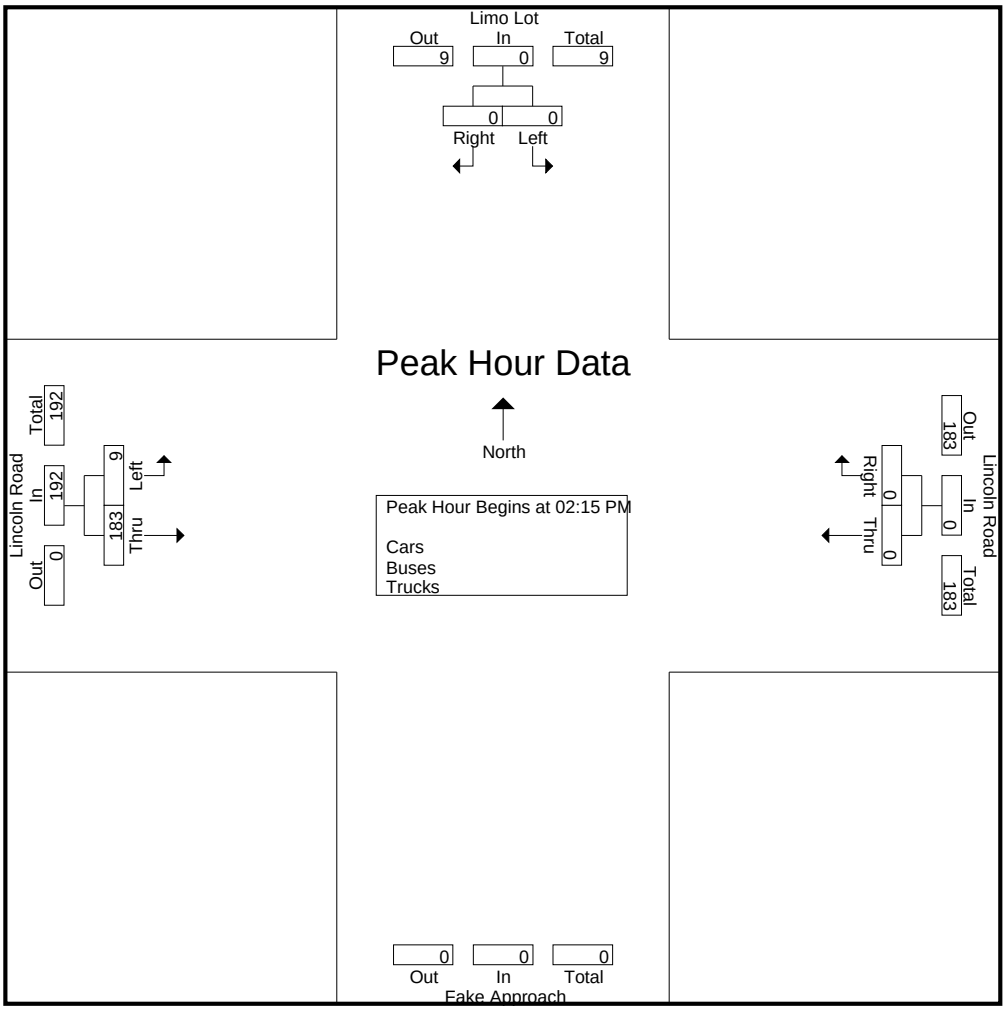


Cummins Consulting Services

4661 Marlberry Place, Lexington, KY 40509
swcummins@windstream.net 859.361.2589
"simplifying Data Collection since 2004"

File Name : Limo_Lot_at_Lincoln__464012_10-27-2017
Site Code : Site 14B - Friday
Start Date : 10/27/2017
Page No : 6

	Limo Lot From North			Lincoln Road From East			Lincoln Road From West			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 02:00 PM to 04:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 02:15 PM										
02:15 PM	0	0	0	0	0	0	3	46	49	49
02:30 PM	0	0	0	0	0	0	**4**	**47**	**51**	**51**
02:45 PM	0	0	0	0	0	0	2	46	48	48
03:00 PM	0	0	0	0	0	0	0	44	44	44
Total Volume	0	0	0	0	0	0	9	183	192	192
% App. Total	0	0		0	0		4.7	95.3		
PHF	.000	.000	.000	.000	.000	.000	.563	.973	.941	.941



15. LINCOLN ROAD AT TAXI PICKUP

Cummins Consulting Services

4661 Marlberry Place, Lexington, KY 40509

swcummins@windstream.net 859.361.2589

"simplifying Data Collection since 2004"

Clear and Cold - 45 Degrees
Schools in Session

File Name : Taxi_Pickup-Arrival_at_Lincoln_464013_10-27-2017
Site Code : Site 15 - Friday
Start Date : 10/27/2017

Groups Printed- Cars - Buses - Trucks

	Lincoln Road From North				Connector Median From East				Lincoln Road From South				Taxi-Shuttle From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
05:00 AM	0	0	0	0	0	5	1	6	6	7	2	15	6	0	0	6	27
05:15 AM	0	0	0	0	0	2	0	2	5	5	2	12	4	0	0	4	18
05:30 AM	0	0	0	0	0	2	0	2	6	9	2	17	6	0	0	6	25
05:45 AM	0	0	0	0	0	2	0	2	5	8	1	14	5	0	0	5	21
Total	0	0	0	0	0	11	1	12	22	29	7	58	21	0	0	21	91
06:00 AM	0	0	0	0	0	3	0	3	7	9	1	17	9	0	0	9	29
06:15 AM	0	0	0	0	0	5	0	5	7	13	2	22	7	1	0	8	35
06:30 AM	0	0	0	0	0	4	0	4	10	8	2	20	11	1	0	12	36
06:45 AM	0	0	0	0	0	3	0	3	7	9	2	18	7	0	0	7	28
Total	0	0	0	0	0	15	0	15	31	39	7	77	34	2	0	36	128
07:00 AM	0	0	0	0	0	3	0	3	9	13	2	24	8	0	0	8	35
07:15 AM	0	0	0	0	0	4	0	4	5	7	3	15	6	0	0	6	25
07:30 AM	0	0	0	0	0	3	0	3	8	12	2	22	7	0	0	7	32
07:45 AM	0	0	0	0	0	4	1	5	8	9	2	19	8	1	0	9	33
Total	0	0	0	0	0	14	1	15	30	41	9	80	29	1	0	30	125
08:00 AM	0	0	0	0	0	5	0	5	8	19	3	30	9	1	0	10	45
08:15 AM	0	0	0	0	0	3	0	3	6	14	2	22	7	0	0	7	32
08:30 AM	0	0	0	0	0	2	0	2	7	14	1	22	10	0	0	10	34
08:45 AM	0	0	0	0	0	4	0	4	8	20	2	30	9	1	0	10	44
Total	0	0	0	0	0	14	0	14	29	67	8	104	35	2	0	37	155
09:00 AM	0	0	0	0	0	7	1	8	7	13	1	21	12	0	0	12	41
09:15 AM	0	0	0	0	0	6	0	6	7	15	3	25	10	1	0	11	42
09:30 AM	0	0	0	0	0	3	0	3	10	14	2	26	12	0	0	12	41
09:45 AM	0	0	0	0	0	7	1	8	8	20	3	31	9	0	0	9	48
Total	0	0	0	0	0	23	2	25	32	62	9	103	43	1	0	44	172
10:00 AM	0	0	0	0	0	5	2	7	8	17	2	27	8	0	0	8	42
10:15 AM	0	0	0	0	0	6	0	6	8	17	2	27	14	0	0	14	47
10:30 AM	0	0	0	0	0	8	0	8	10	26	3	39	17	0	0	17	64
10:45 AM	0	0	0	0	0	7	0	7	7	16	2	25	11	2	0	13	45
Total	0	0	0	0	0	26	2	28	33	76	9	118	50	2	0	52	198
11:00 AM	0	0	0	0	0	8	0	8	9	18	2	29	14	0	0	14	51
11:15 AM	0	0	0	0	0	10	0	10	9	21	2	32	15	0	0	15	57
11:30 AM	0	0	0	0	0	4	0	4	10	20	2	32	15	0	0	15	51
11:45 AM	0	0	0	0	0	9	1	10	12	23	2	37	17	1	0	18	65
Total	0	0	0	0	0	31	1	32	40	82	8	130	61	1	0	62	224
12:00 PM	0	0	0	0	0	10	0	10	10	12	2	24	9	0	0	9	43
12:15 PM	0	0	0	0	0	3	1	4	10	16	3	29	14	0	0	14	47
12:30 PM	0	0	0	0	0	4	0	4	12	17	3	32	12	0	0	12	48
12:45 PM	0	0	0	0	0	4	0	4	8	16	3	27	9	0	0	9	40
Total	0	0	0	0	0	21	1	22	40	61	11	112	44	0	0	44	178
01:00 PM	0	0	0	0	0	5	1	6	7	20	4	31	10	0	0	10	47
01:15 PM	0	0	0	0	0	8	0	8	8	15	4	27	8	0	0	8	43
01:30 PM	0	0	0	0	0	6	0	6	10	22	3	35	14	0	0	14	55
01:45 PM	0	0	0	0	0	9	0	9	6	16	5	27	10	0	0	10	46
Total	0	0	0	0	0	28	1	29	31	73	16	120	42	0	0	42	191

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File Name : Taxi_Pickup-Arrival_at_Lincoln_464013_10-27-2017
Site Code : Site 15 - Friday
Start Date : 10/27/2017
Page No : 2

Groups Printed- Cars - Buses - Trucks

	Lincoln Road From North				Connector Median From East				Lincoln Road From South				Taxi-Shuttle From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
02:00 PM	0	0	0	0	0	3	0	3	9	24	3	36	14	0	0	14	53
02:15 PM	0	0	0	0	0	4	0	4	7	28	4	39	12	0	0	12	55
02:30 PM	0	0	0	0	0	12	1	13	12	22	4	38	14	0	0	14	65
02:45 PM	0	0	0	0	0	6	0	6	8	23	5	36	12	2	0	14	56
Total	0	0	0	0	0	25	1	26	36	97	16	149	52	2	0	54	229
03:00 PM	0	0	0	0	0	9	0	9	10	21	4	35	16	1	0	17	61
03:15 PM	0	0	0	0	0	9	0	9	9	22	4	35	13	0	0	13	57
03:30 PM	0	0	0	0	0	5	0	5	12	17	3	32	17	0	0	17	54
03:45 PM	0	0	0	0	0	6	0	6	9	19	2	30	9	0	0	9	45
Total	0	0	0	0	0	29	0	29	40	79	13	132	55	1	0	56	217
04:00 PM	0	0	0	0	0	8	0	8	8	14	1	23	13	1	0	14	45
04:15 PM	0	0	0	0	0	5	1	6	8	23	4	35	9	1	0	10	51
04:30 PM	0	0	0	0	0	4	0	4	9	16	4	29	8	1	0	9	42
04:45 PM	0	0	0	0	0	5	0	5	6	21	3	30	9	0	0	9	44
Total	0	0	0	0	0	22	1	23	31	74	12	117	39	3	0	42	182
Grand Total	0	0	0	0	0	259	11	270	395	780	125	1300	505	15	0	520	2090
Apprch %	0	0	0		0	95.9	4.1		30.4	60	9.6		97.1	2.9	0		
Total %	0	0	0	0	0	12.4	0.5	12.9	18.9	37.3	6	62.2	24.2	0.7	0	24.9	
Cars	0	0	0	0	0	122	10	132	8	505	15	528	120	14	0	134	794
% Cars	0	0	0	0	0	47.1	90.9	48.9	2	64.7	12	40.6	23.8	93.3	0	25.8	38
Buses	0	0	0	0	0	137	1	138	387	257	109	753	384	1	0	385	1276
% Buses	0	0	0	0	0	52.9	9.1	51.1	98	32.9	87.2	57.9	76	6.7	0	74	61.1
Trucks	0	0	0	0	0	0	0	0	0	18	1	19	1	0	0	1	20
% Trucks	0	0	0	0	0	0	0	0	0	2.3	0.8	1.5	0.2	0	0	0.2	1

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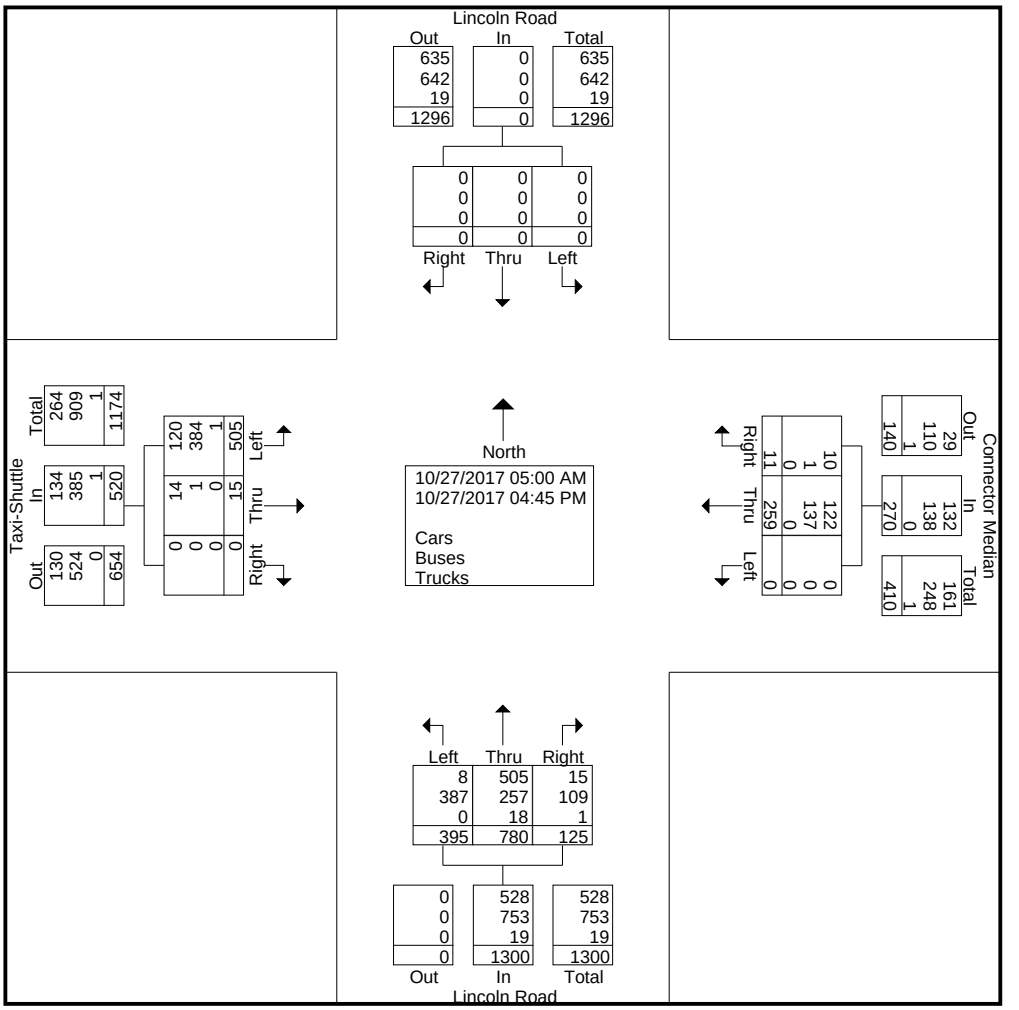
File Name : Taxi_Pickup-Arrival_at_Lincoln_464013_10-27-2017
Site Code : Site 15 - Friday
Start Date : 10/27/2017
Page No : 3



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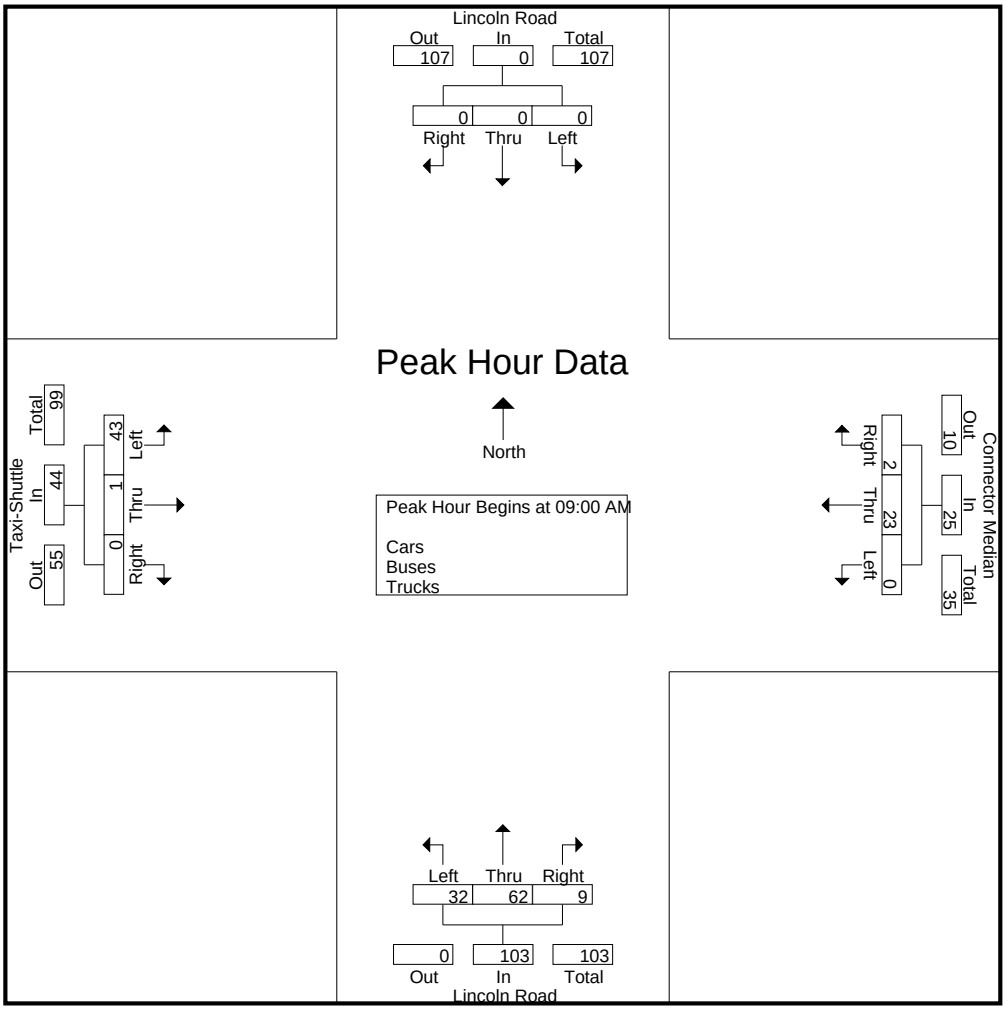
File Name : Taxi_Pickup-Arrival_at_Lincoln_464013_10-27-2017
Site Code : Site 15 - Friday
Start Date : 10/27/2017
Page No : 4

	Lincoln Road From North				Connector Median From East				Lincoln Road From South				Taxi-Shuttle From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 05:00 AM to 09:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 09:00 AM																	
09:00 AM	0	0	0	0	0	**7**	**1**	**8**	7	13	1	21	**12**	0	0	**12**	41
09:15 AM	0	0	0	0	0	6	0	6	7	15	**3**	25	10	**1**	0	11	42
09:30 AM	0	0	0	0	0	3	0	3	**10**	14	2	26	12	0	0	12	41
09:45 AM	0	0	0	0	0	7	1	8	8	**20**	3	**31**	9	0	0	9	**48**
Total Volume	0	0	0	0	0	23	2	25	32	62	9	103	43	1	0	44	172
% App. Total	0	0	0		0	92	8		31.1	60.2	8.7		97.7	2.3	0		
PHF	.000	.000	.000	.000	.000	.821	.500	.781	.800	.775	.750	.831	.896	.250	.000	.917	.896



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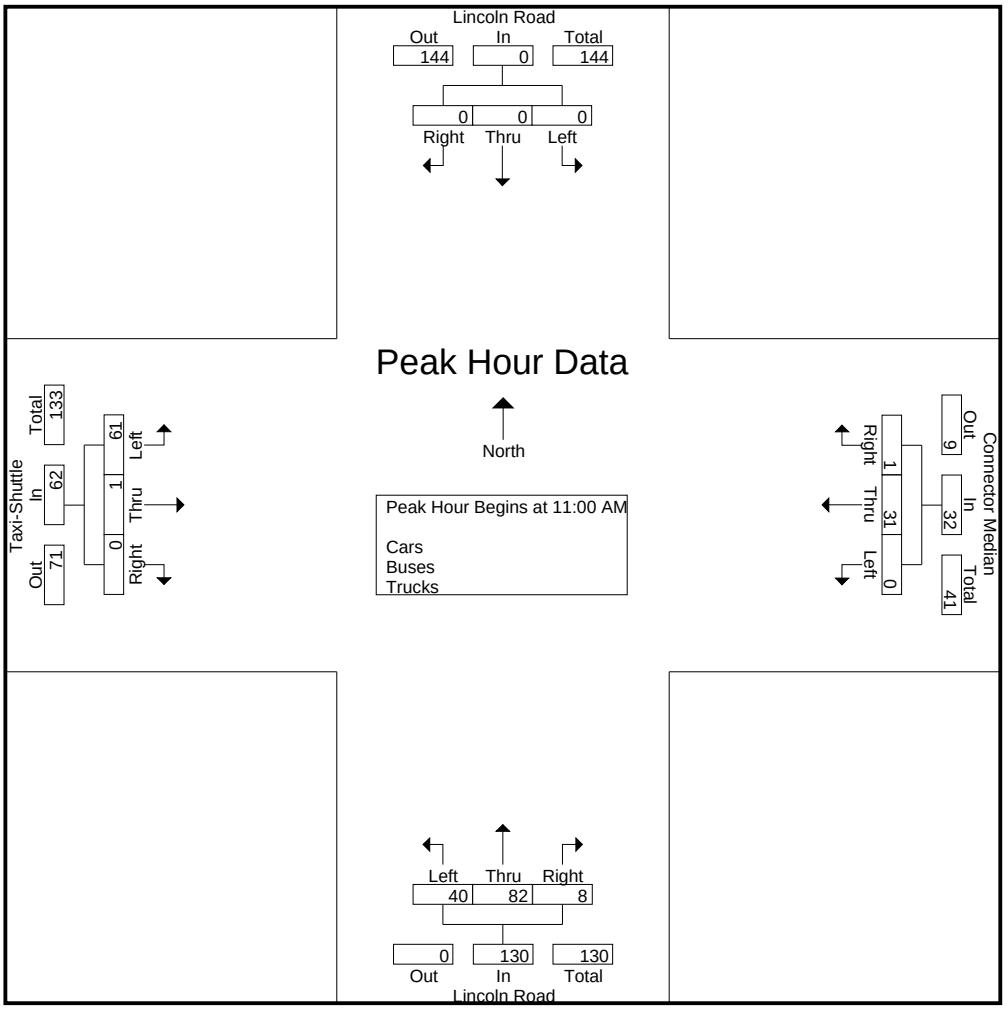
File Name : Taxi_Pickup-Arrival_at_Lincoln_464013_10-27-2017
Site Code : Site 15 - Friday
Start Date : 10/27/2017
Page No : 5

	Lincoln Road From North				Connector Median From East				Lincoln Road From South				Taxi-Shuttle From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 11:00 AM																	
11:00 AM	0	0	0	0	0	8	0	8	9	18	**2**	29	14	0	0	14	51
11:15 AM	0	0	0	0	0	**10**	0	**10**	9	21	2	32	15	0	0	15	57
11:30 AM	0	0	0	0	0	4	0	4	10	20	2	32	15	0	0	15	51
11:45 AM	0	0	0	0	0	9	**1**	10	**12**	**23**	2	**37**	**17**	**1**	0	**18**	**65**
Total Volume	0	0	0	0	0	31	1	32	40	82	8	130	61	1	0	62	224
% App. Total	0	0	0		0	96.9	3.1		30.8	63.1	6.2		98.4	1.6	0		
PHF	.000	.000	.000	.000	.000	.775	.250	.800	.833	.891	1.00	.878	.897	.250	.000	.861	.862



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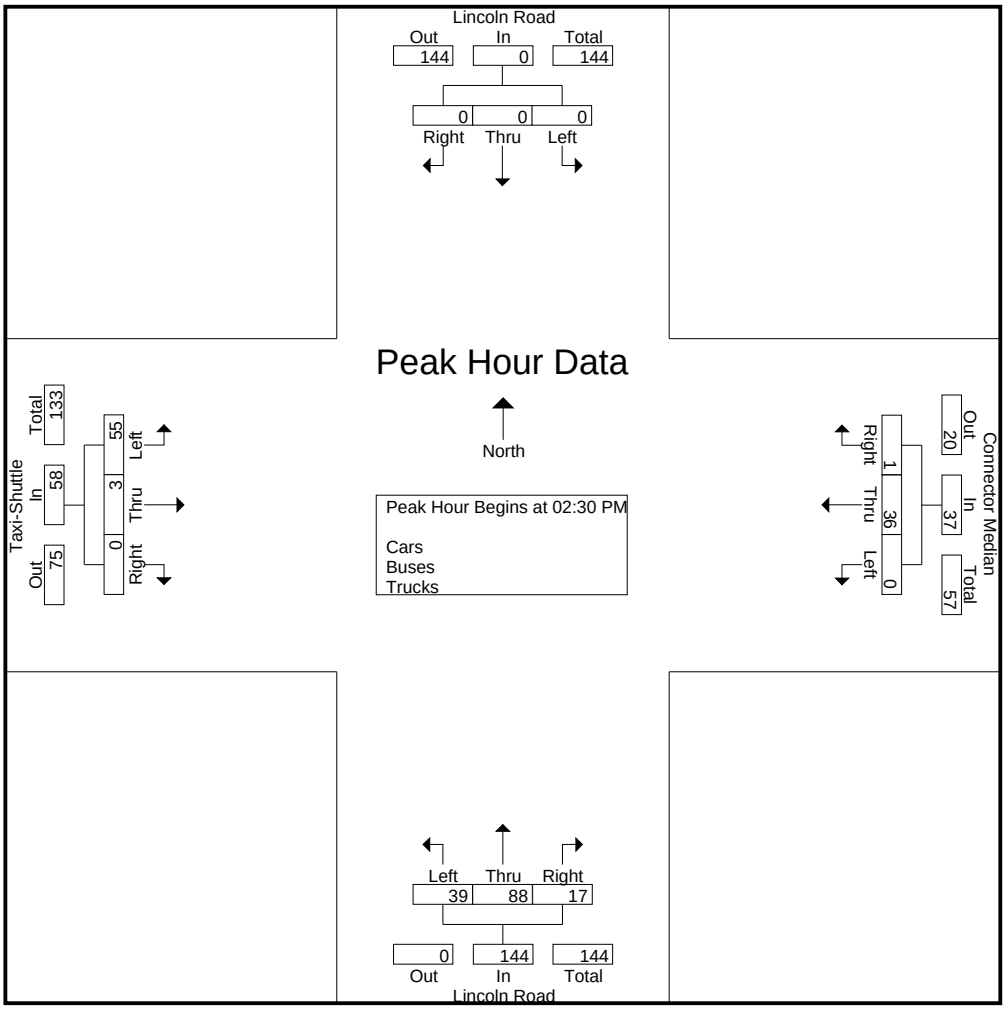
File Name : Taxi_Pickup-Arrival_at_Lincoln_464013_10-27-2017
Site Code : Site 15 - Friday
Start Date : 10/27/2017
Page No : 6

	Lincoln Road From North				Connector Median From East				Lincoln Road From South				Taxi-Shuttle From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 02:00 PM to 04:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 02:30 PM																	
02:30 PM	0	0	0	0	0	**12**	**1**	**13**	**12**	22	4	**38**	14	0	0	14	**65**
02:45 PM	0	0	0	0	0	6	0	6	8	**23**	**5**	36	12	**2**	0	14	56
03:00 PM	0	0	0	0	0	9	0	9	10	21	4	35	**16**	1	0	**17**	61
03:15 PM	0	0	0	0	0	9	0	9	9	22	4	35	13	0	0	13	57
Total Volume	0	0	0	0	0	36	1	37	39	88	17	144	55	3	0	58	239
% App. Total	0	0	0		0	97.3	2.7		27.1	61.1	11.8		94.8	5.2	0		
PHF	.000	.000	.000	.000	.000	.750	.250	.712	.813	.957	.850	.947	.859	.375	.000	.853	.919



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"simplifying Data Collection since 2004"

File Name : Lincoln_at_Commercial_Int_S_of_Limo_Lot_464011_10-27-2017

Clear and Cold - 45 Degrees Site Code : Site 14A - Friday

Schools in Session Start Date : 10/27/2017

Groups Printed- Cars - Buses - Trucks

	Commercial Access W of Limo Lot From North			Lincoln Road From East			Lincoln Road From West			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
05:00 AM	6	0	6	0	0	0	1	11	12	18
05:15 AM	5	0	5	0	0	0	0	11	11	16
05:30 AM	9	0	9	0	0	0	1	12	13	22
05:45 AM	6	0	6	0	0	0	2	16	18	24
Total	26	0	26	0	0	0	4	50	54	80
06:00 AM	8	0	8	0	0	0	1	15	16	24
06:15 AM	11	0	11	0	0	0	1	17	18	29
06:30 AM	6	0	6	0	0	0	2	17	19	25
06:45 AM	10	0	10	0	0	0	1	17	18	28
Total	35	0	35	0	0	0	5	66	71	106
07:00 AM	11	0	11	0	0	0	0	20	20	31
07:15 AM	9	0	9	0	0	0	3	11	14	23
07:30 AM	11	0	11	0	0	0	1	17	18	29
07:45 AM	9	0	9	0	0	0	1	18	19	28
Total	40	0	40	0	0	0	5	66	71	111
08:00 AM	15	0	15	0	0	0	2	23	25	40
08:15 AM	11	0	11	0	0	0	0	19	19	30
08:30 AM	13	0	13	0	0	0	5	15	20	33
08:45 AM	15	0	15	0	0	0	0	21	21	36
Total	54	0	54	0	0	0	7	78	85	139
09:00 AM	12	0	12	0	0	0	1	20	21	33
09:15 AM	13	0	13	0	0	0	1	18	19	32
09:30 AM	9	0	9	0	0	0	2	28	30	39
09:45 AM	12	0	12	0	0	0	3	31	34	46
Total	46	0	46	0	0	0	7	97	104	150
10:00 AM	10	0	10	0	0	0	1	26	27	37
10:15 AM	11	0	11	0	0	0	0	22	22	33
10:30 AM	21	0	21	0	0	0	2	25	27	48
10:45 AM	12	0	12	0	0	0	2	22	24	36
Total	54	0	54	0	0	0	5	95	100	154
11:00 AM	13	0	13	0	0	0	0	25	25	38
11:15 AM	18	0	18	0	0	0	2	23	25	43
11:30 AM	14	0	14	0	0	0	0	30	30	44
11:45 AM	13	0	13	0	0	0	2	33	35	48
Total	58	0	58	0	0	0	4	111	115	173
12:00 PM	8	0	8	0	0	0	0	25	25	33
12:15 PM	12	0	12	0	0	0	0	25	25	37
12:30 PM	16	0	16	0	0	0	0	33	33	49
12:45 PM	12	0	12	0	0	0	0	19	19	31
Total	48	0	48	0	0	0	0	102	102	150
01:00 PM	10	0	10	0	0	0	1	28	29	39
01:15 PM	15	0	15	0	0	0	1	20	21	36
01:30 PM	13	0	13	0	0	0	1	32	33	46
01:45 PM	17	0	17	0	0	0	2	21	23	40
Total	55	0	55	0	0	0	5	101	106	161

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File Name : Lincoln_at_Commercial_Int_S_of_Limo_Lot_464011_10-27-2017
Site Code : Site 14A - Friday
Start Date : 10/27/2017

Groups Printed- Cars - Buses - Trucks

	Commercial Access W of Limo Lot From North			Lincoln Road From East			Lincoln Road From West			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
02:00 PM	14	0	14	0	0	0	3	28	31	45
02:15 PM	15	0	15	0	0	0	2	34	36	51
02:30 PM	15	0	15	0	0	0	0	36	36	51
02:45 PM	17	0	17	0	0	0	3	30	33	50
Total	61	0	61	0	0	0	8	128	136	197
03:00 PM	18	0	18	0	0	0	3	25	28	46
03:15 PM	17	0	17	0	0	0	1	33	34	51
03:30 PM	15	0	15	0	0	0	0	30	30	45
03:45 PM	14	0	14	0	0	0	0	28	28	42
Total	64	0	64	0	0	0	4	116	120	184
04:00 PM	10	0	10	0	0	0	0	24	24	34
04:15 PM	18	0	18	0	0	0	1	24	25	43
04:30 PM	13	0	13	0	0	0	0	30	30	43
04:45 PM	16	0	16	0	0	0	2	32	34	50
Total	57	0	57	0	0	0	3	110	113	170
Grand Total	598	0	598	0	0	0	57	1120	1177	1775
Apprch %	100	0		0	0		4.8	95.2		
Total %	33.7	0	33.7	0	0	0	3.2	63.1	66.3	
Cars	203	0	203	0	0	0	44	502	546	749
% Cars	33.9	0	33.9	0	0	0	77.2	44.8	46.4	42.2
Buses	385	0	385	0	0	0	0	594	594	979
% Buses	64.4	0	64.4	0	0	0	0	53	50.5	55.2
Trucks	10	0	10	0	0	0	13	24	37	47
% Trucks	1.7	0	1.7	0	0	0	22.8	2.1	3.1	2.6

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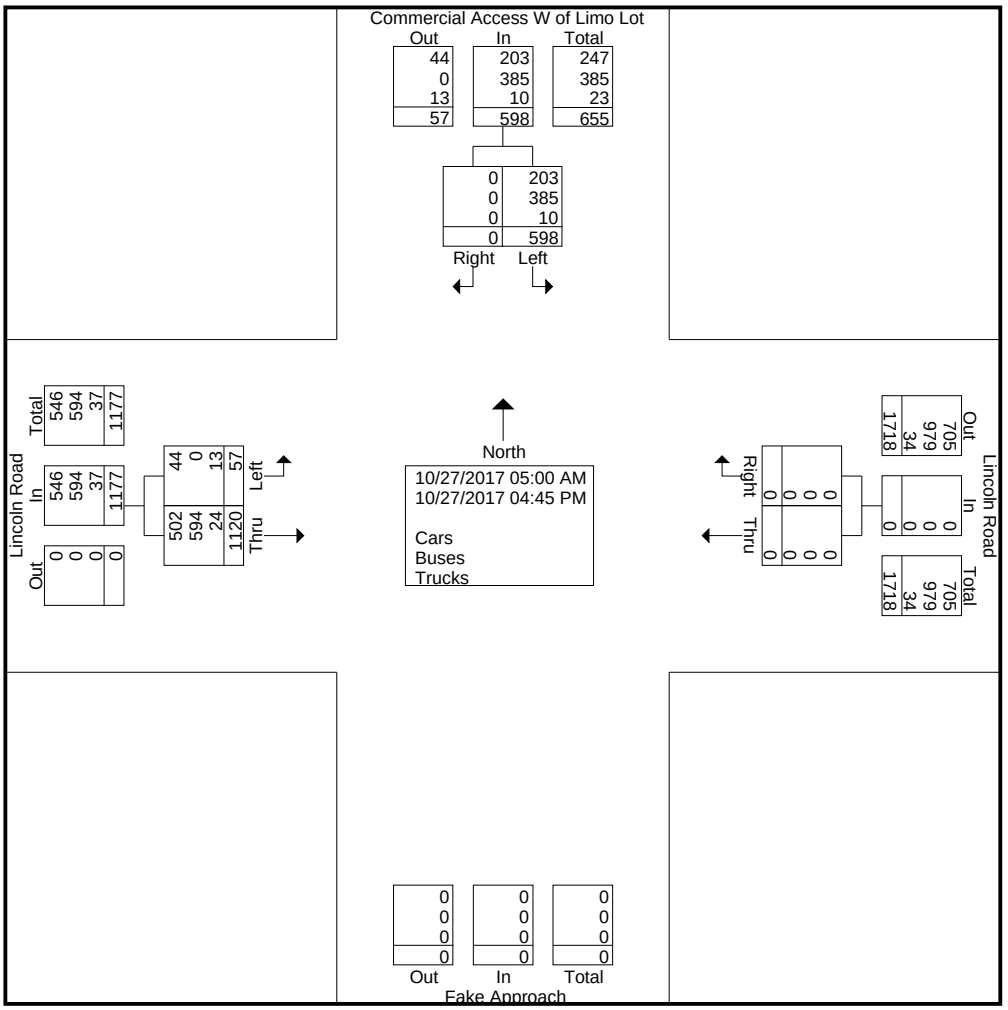
Site Code : Site 14A - Friday
Start Date : 10/27/2017
Page No : 3



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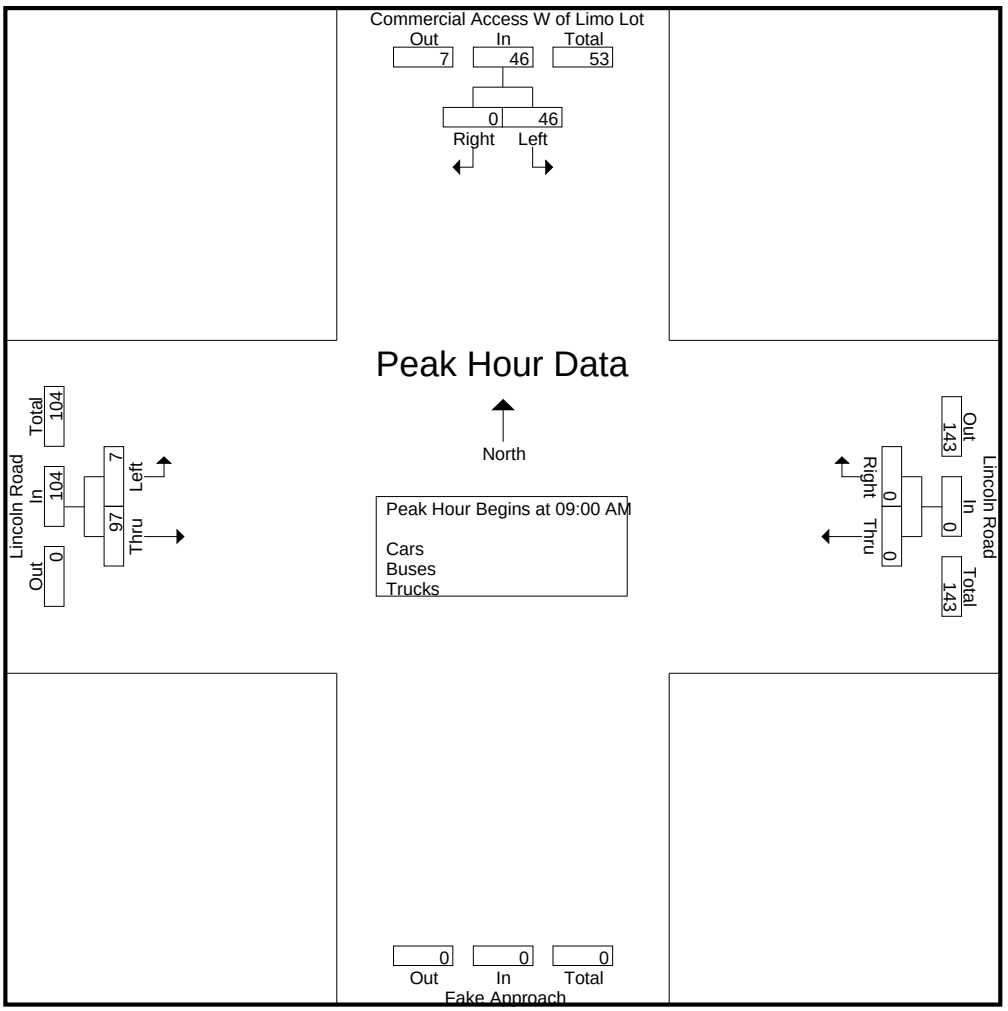
File Name : Lincoln_at_Commercial_Int_S_of_Limo_Lot_464011_10-27-2017
Site Code : Site 14A - Friday
Start Date : 10/27/2017

	Commercial Access W of Limo Lot From North			Lincoln Road From East			Lincoln Road From West			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 05:00 AM to 09:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 09:00 AM										
09:00 AM	12	0	12	0	0	0	1	20	21	33
09:15 AM	**13**	0	**13**	0	0	0	1	18	19	32
09:30 AM	9	0	9	0	0	0	2	28	30	39
09:45 AM	12	0	12	0	0	0	**3**	**31**	**34**	**46**
Total Volume	46	0	46	0	0	0	7	97	104	150
% App. Total	100	0		0	0		6.7	93.3		
PHF	.885	.000	.885	.000	.000	.000	.583	.782	.765	.815



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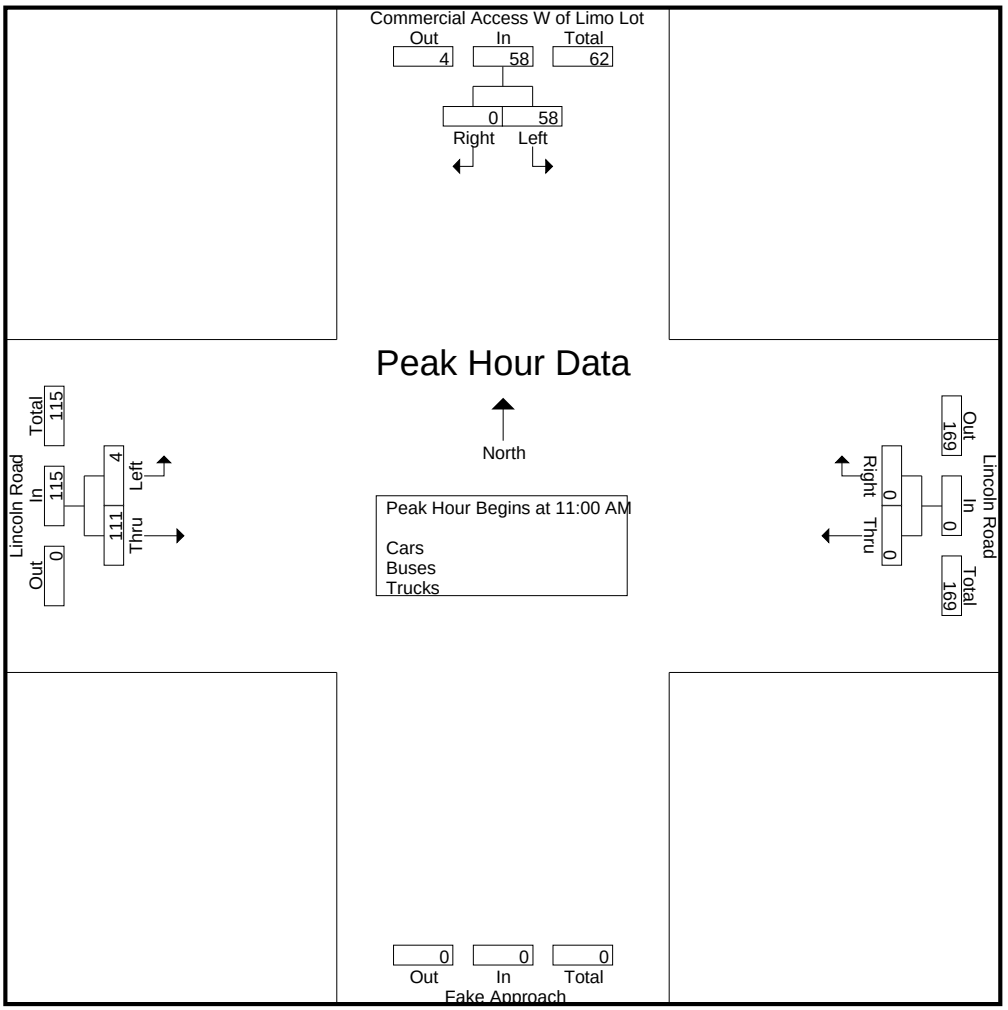
File Name : Lincoln_at_Commercial_Int_S_of_Limo_Lot_464011_10-27-2017
Site Code : Site 14A - Friday
Start Date : 10/27/2017
Page No : 5

	Commercial Access W of Limo Lot From North			Lincoln Road From East			Lincoln Road From West			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 11:00 AM										
11:00 AM	13	0	13	0	0	0	0	25	25	38
11:15 AM	**18**	0	**18**	0	0	0	**2**	23	25	43
11:30 AM	14	0	14	0	0	0	0	30	30	44
11:45 AM	13	0	13	0	0	0	2	**33**	**35**	**48**
Total Volume	58	0	58	0	0	0	4	111	115	173
% App. Total	100	0		0	0		3.5	96.5		
PHF	.806	.000	.806	.000	.000	.000	.500	.841	.821	.901



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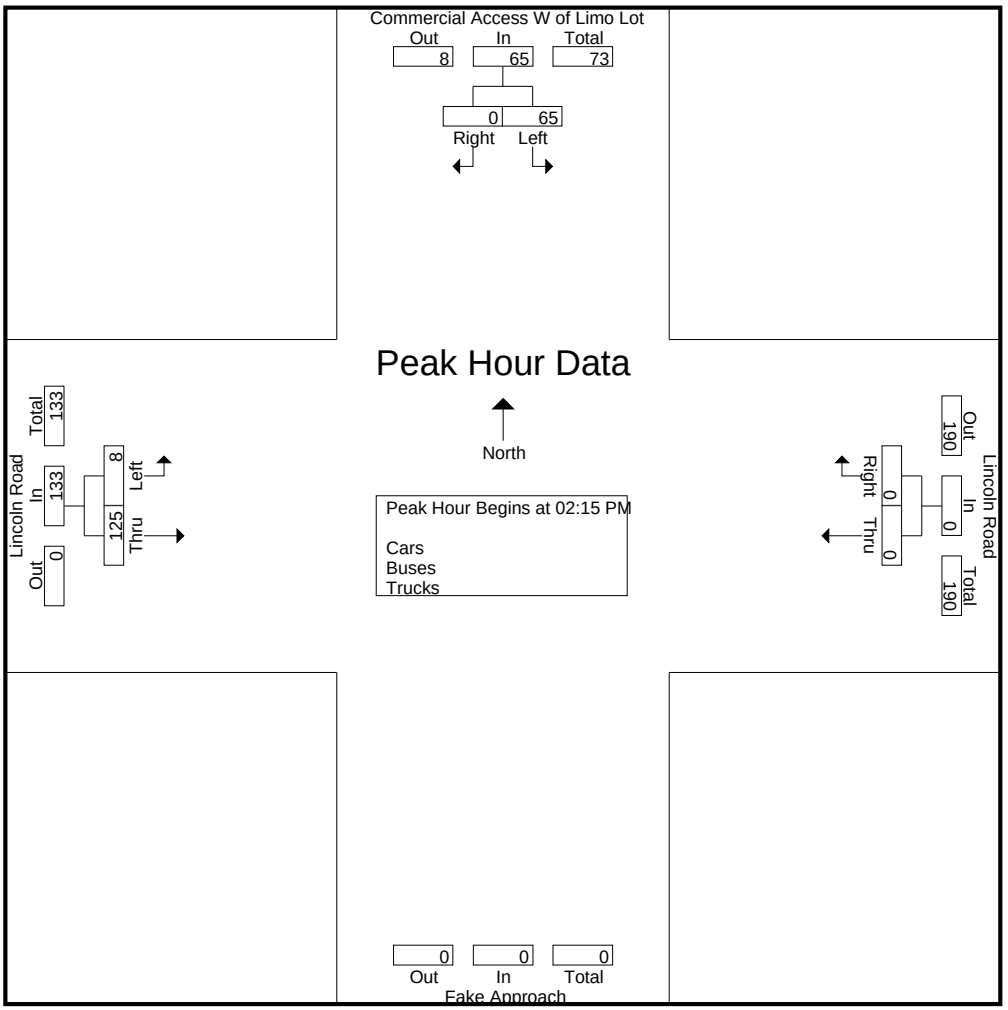
Site Code : Site 14A - Friday
Start Date : 10/27/2017
Page No : 6

	Commercial Access W of Limo Lot From North			Lincoln Road From East			Lincoln Road From West			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 02:00 PM to 04:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 02:15 PM										
02:15 PM	15	0	15	0	0	0	2	34	**36**	**51**
02:30 PM	15	0	15	0	0	0	0	**36**	36	51
02:45 PM	17	0	17	0	0	0	**3**	30	33	50
03:00 PM	**18**	0	**18**	0	0	0	3	25	28	46
Total Volume	65	0	65	0	0	0	8	125	133	198
% App. Total	100	0		0	0		6	94		
PHF	.903	.000	.903	.000	.000	.000	.667	.868	.924	.971



16. LINCOLN ROAD AT PD1

Cummins Consulting Services

4661 Marlberry Place, Lexington, KY 40509

swcummins@windstream.net 859.361.2589

"simplifying Data Collection since 2004"

Clear and Cold - 45 Degrees
Schools in Session

File Name : Lincoln_at_PD1_464014_10-27-2017
Site Code : Site 16 - Friday
Start Date : 10/27/2017
Page No : 1

Groups Printed- Cars - Buses - Trucks

	Terminal Drive From North			PD1 - Lincoln Road From East			Lincoln Road From South			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
05:00 AM	0	0	0	0	2	2	36	1	37	39
05:15 AM	0	0	0	0	1	1	37	0	37	38
05:30 AM	0	0	0	0	2	2	44	4	48	50
05:45 AM	0	0	0	0	2	2	30	3	33	35
Total	0	0	0	0	7	7	147	8	155	162
06:00 AM	0	0	0	0	2	2	32	3	35	37
06:15 AM	0	0	0	0	3	3	34	2	36	39
06:30 AM	0	0	0	0	11	11	32	2	34	45
06:45 AM	0	0	0	0	0	0	29	3	32	32
Total	0	0	0	0	16	16	127	10	137	153
07:00 AM	0	0	0	0	1	1	26	5	31	32
07:15 AM	0	0	0	0	1	1	27	2	29	30
07:30 AM	0	0	0	0	2	2	29	2	31	33
07:45 AM	0	0	0	0	2	2	34	3	37	39
Total	0	0	0	0	6	6	116	12	128	134
08:00 AM	0	0	0	0	2	2	53	6	59	61
08:15 AM	0	0	0	0	1	1	55	5	60	61
08:30 AM	0	0	0	0	1	1	76	5	81	82
08:45 AM	0	0	0	0	2	2	78	4	82	84
Total	0	0	0	0	6	6	262	20	282	288
09:00 AM	0	0	0	0	1	1	99	3	102	103
09:15 AM	0	0	0	0	2	2	79	6	85	87
09:30 AM	0	0	0	0	3	3	90	4	94	97
09:45 AM	0	0	0	0	1	1	105	2	107	108
Total	0	0	0	0	7	7	373	15	388	395
10:00 AM	0	0	0	0	2	2	74	4	78	80
10:15 AM	0	0	0	0	1	1	82	3	85	86
10:30 AM	0	0	0	0	1	1	166	7	173	174
10:45 AM	0	0	0	0	1	1	130	3	133	134
Total	0	0	0	0	5	5	452	17	469	474
11:00 AM	0	0	0	0	2	2	116	3	119	121
11:15 AM	0	0	0	0	1	1	105	3	108	109
11:30 AM	0	0	0	0	3	3	160	6	166	169
11:45 AM	0	0	0	0	2	2	159	5	164	166
Total	0	0	0	0	8	8	540	17	557	565
12:00 PM	0	0	0	0	3	3	61	1	62	65
12:15 PM	0	0	0	0	1	1	49	1	50	51
12:30 PM	0	0	0	0	5	5	73	3	76	81
12:45 PM	0	0	0	0	6	6	68	0	68	74
Total	0	0	0	0	15	15	251	5	256	271
01:00 PM	0	0	0	0	2	2	131	3	134	136
01:15 PM	0	0	0	0	3	3	106	3	109	112
01:30 PM	0	0	0	0	4	4	89	3	92	96
01:45 PM	0	0	0	0	5	5	100	4	104	109
Total	0	0	0	0	14	14	426	13	439	453

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swcummins@windstream.net 859.361.2589

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File Name : Lincoln_at_PD1_464014_10-27-2017
Site Code : Site 16 - Friday
Start Date : 10/27/2017

Groups Printed- Cars - Buses - Trucks

	Terminal Drive From North			PD1 - Lincoln Road From East			Lincoln Road From South			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
02:00 PM	0	0	0	0	8	8	161	2	163	171
02:15 PM	0	0	0	0	7	7	130	4	134	141
02:30 PM	0	0	0	0	9	9	142	4	146	155
02:45 PM	0	0	0	0	1	1	153	2	155	156
Total	0	0	0	0	25	25	586	12	598	623
03:00 PM	0	0	0	0	1	1	179	0	179	180
03:15 PM	0	0	0	0	6	6	191	3	194	200
03:30 PM	0	0	0	0	2	2	152	5	157	159
03:45 PM	0	0	0	0	2	2	89	3	92	94
Total	0	0	0	0	11	11	611	11	622	633
04:00 PM	0	0	0	0	5	5	116	1	117	122
04:15 PM	0	0	0	0	3	3	113	3	116	119
04:30 PM	0	0	0	0	3	3	97	4	101	104
04:45 PM	0	0	0	0	3	3	108	3	111	114
Total	0	0	0	0	14	14	434	11	445	459
Grand Total	0	0	0	0	134	134	4325	151	4476	4610
Apprch %	0	0		0	100		96.6	3.4		
Total %	0	0	0	0	2.9	2.9	93.8	3.3	97.1	
Cars	0	0	0	0	122	122	3334	82	3416	3538
% Cars	0	0	0	0	91	91	77.1	54.3	76.3	76.7
Buses	0	0	0	0	8	8	965	63	1028	1036
% Buses	0	0	0	0	6	6	22.3	41.7	23	22.5
Trucks	0	0	0	0	4	4	26	6	32	36
% Trucks	0	0	0	0	3	3	0.6	4	0.7	0.8

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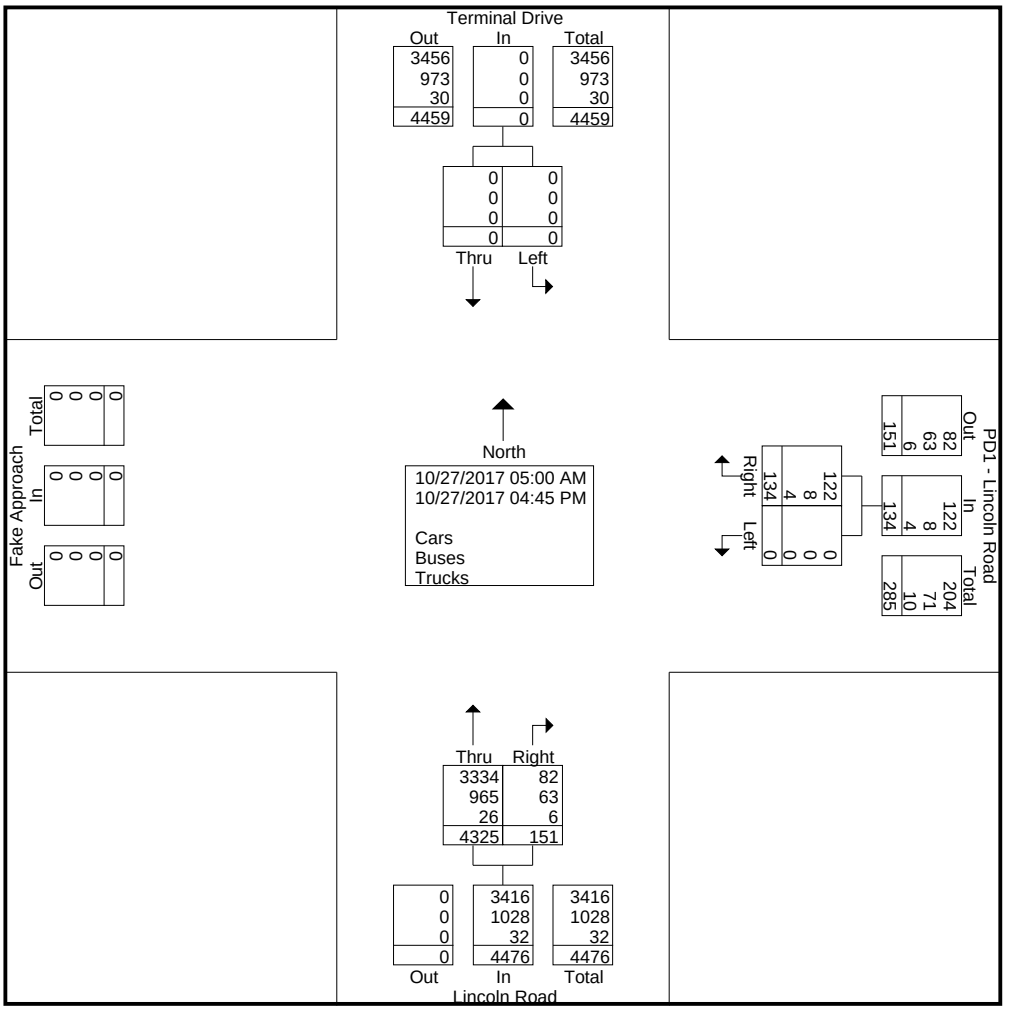
File Name : Lincoln_at_PD1_464014_10-27-2017
Site Code : Site 16 - Friday
Start Date : 10/27/2017
Page No : 3



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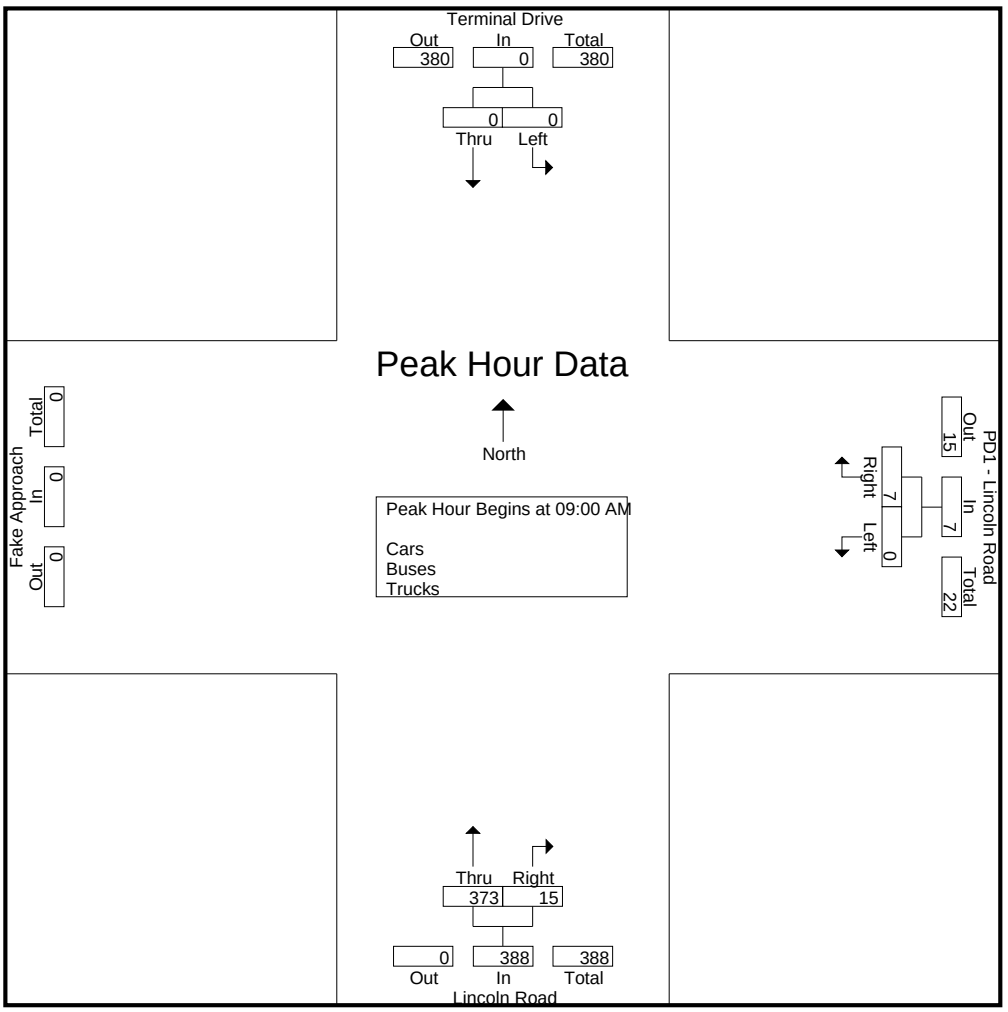
"simplifying Data Collection since 2004"

File Name : Lincoln_at_PD1_464014_10-27-2017
Site Code : Site 16 - Friday
Start Date : 10/27/2017

	Terminal Drive From North			PD1 - Lincoln Road From East			Lincoln Road From South			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 05:00 AM to 09:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 09:00 AM										
09:00 AM	0	0	0	0	1	1	99	3	102	103
09:15 AM	0	0	0	0	2	2	79	**6**	85	87
09:30 AM	0	0	0	0	**3**	**3**	90	4	94	97
09:45 AM	0	0	0	0	1	1	**105**	2	**107**	**108**
Total Volume	0	0	0	0	7	7	373	15	388	395
% App. Total	0	0		0	100		96.1	3.9		
PHF	.000	.000	.000	.000	.583	.583	.888	.625	.907	.914



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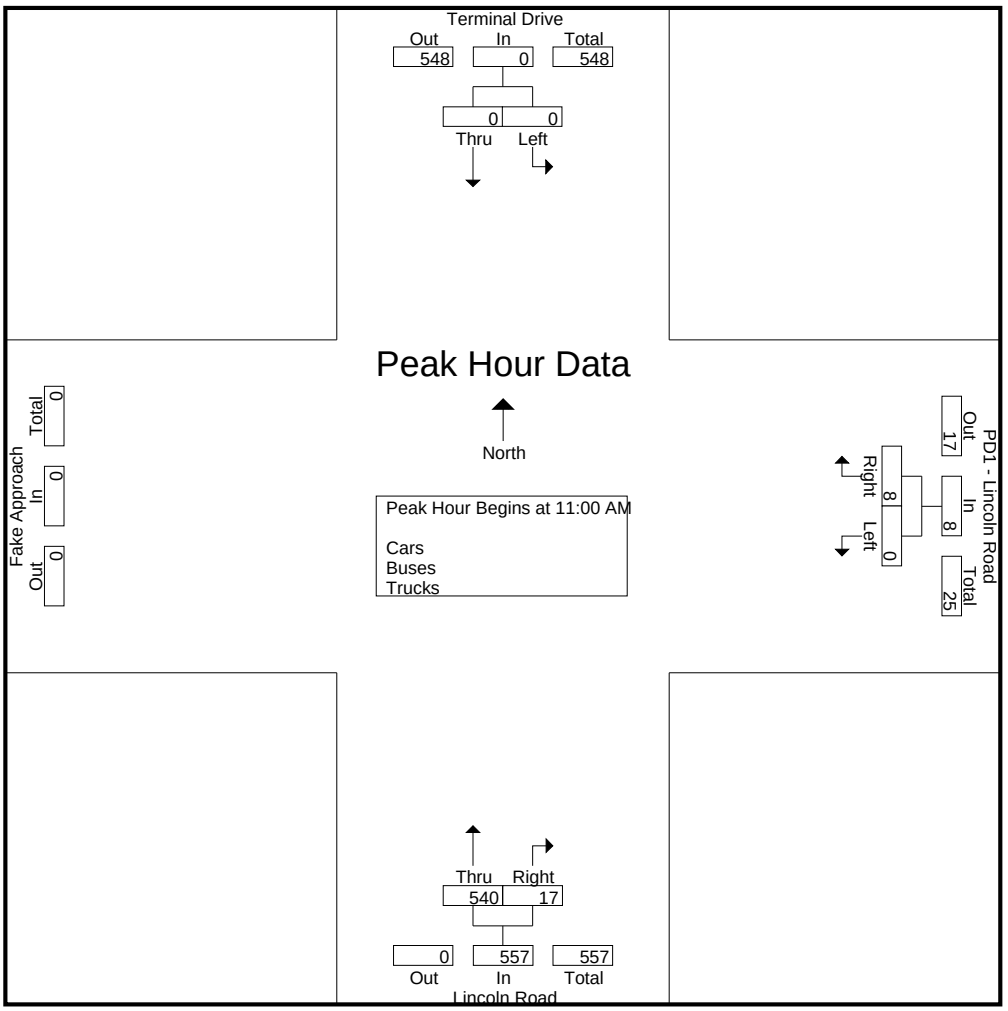
swcummins@windstream.net 859.361.2589

"simplifying Data Collection since 2004"

File Name : Lincoln_at_PD1_464014_10-27-2017
Site Code : Site 16 - Friday
Start Date : 10/27/2017
Page No : 5

	Terminal Drive From North			PD1 - Lincoln Road From East			Lincoln Road From South			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 11:00 AM										
11:00 AM	0	0	0	0	2	2	116	3	119	121
11:15 AM	0	0	0	0	1	1	105	3	108	109
11:30 AM	0	0	0	0	**3**	**3**	**160**	**6**	**166**	**169**
11:45 AM	0	0	0	0	2	2	159	5	164	166
Total Volume	0	0	0	0	8	8	540	17	557	565
% App. Total	0	0		0	100		96.9	3.1		
PHF	.000	.000	.000	.000	.667	.667	.844	.708	.839	.836



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"simplifying Data Collection since 2004"

File Name : Lincoln_at_PD1_464014_10-27-2017
Site Code : Site 16 - Friday
Start Date : 10/27/2017
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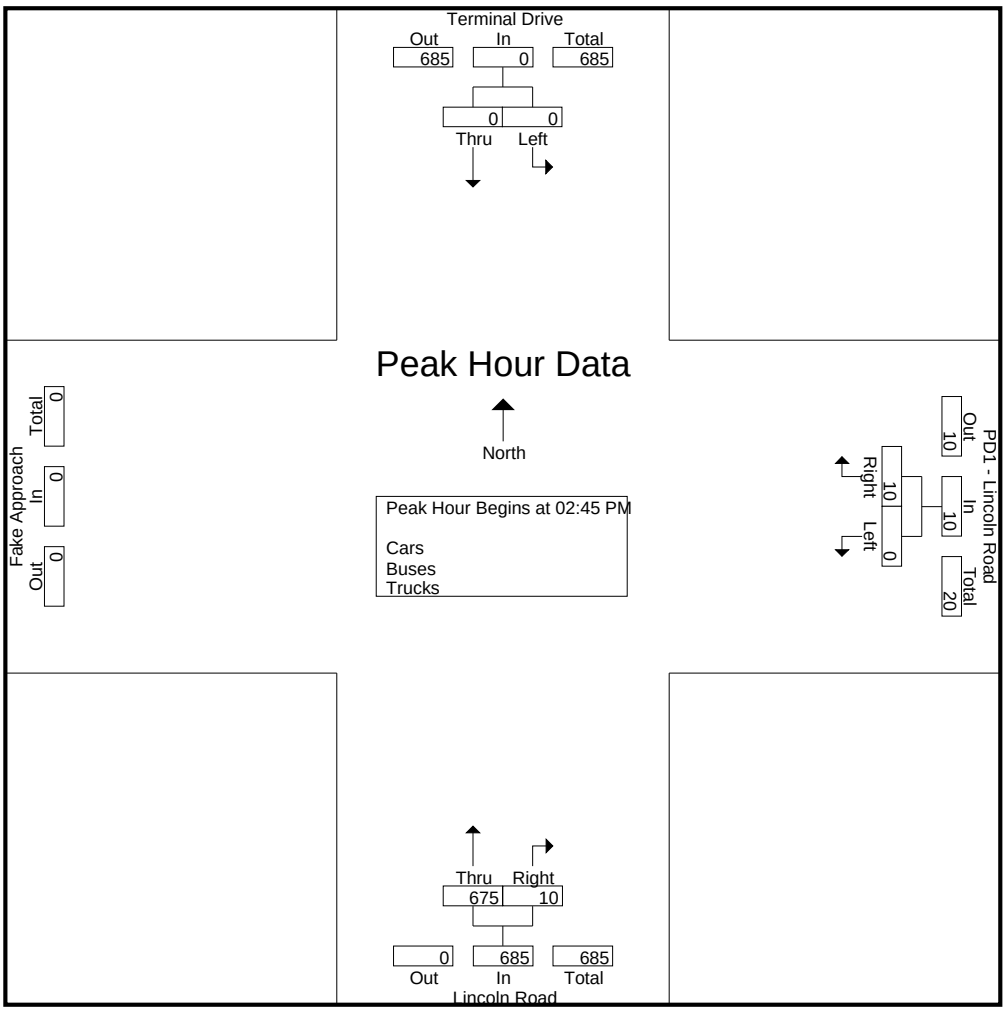
	Terminal Drive From North			PD1 - Lincoln Road From East			Lincoln Road From South			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 02:00 PM to 04:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 02:45 PM										
02:45 PM	0	0	0	0	1	1	153	2	155	156
03:00 PM	0	0	0	0	1	1	179	0	179	180
03:15 PM	0	0	0	0	**6**	**6**	**191**	3	**194**	**200**
03:30 PM	0	0	0	0	2	2	152	**5**	157	159
Total Volume	0	0	0	0	10	10	675	10	685	695
% App. Total	0	0		0	100		98.5	1.5		
PHF	.000	.000	.000	.000	.417	.417	.884	.500	.883	.869



17. LINCOLN ROAD AT PD2

Cummins Consulting Services

4661 Marlberry Place, Lexington, KY 40509

swcummins@windstream.net 859.361.2589

"simplifying Data Collection since 2004"

Clear and Cold - 45 Degrees
Schools in Session

File Name : PD2_at_Lincoln_464015_10-27-2017
Site Code : Site 17 - Friday
Start Date : 10/27/2017

Groups Printed- Cars - Buses - Trucks

	Lincoln Road From North			Lincoln Road From South			PD2 - Lincoln Connector From Southwest			
Start Time	Thru	Bear Right	App. Total	Hard Left	Thru	App. Total	Bear Left	Hard Right	App. Total	Int. Total
05:00 AM	4	2	6	0	2	2	1	0	1	9
05:15 AM	3	0	3	1	4	5	0	0	0	8
05:30 AM	3	2	5	0	2	2	4	0	4	11
05:45 AM	3	3	6	0	1	1	3	0	3	10
Total	13	7	20	1	9	10	8	0	8	38
06:00 AM	5	1	6	0	2	2	3	0	3	11
06:15 AM	5	3	8	0	4	4	2	0	2	14
06:30 AM	3	11	14	0	2	2	2	0	2	18
06:45 AM	3	0	3	0	2	2	2	0	2	7
Total	16	15	31	0	10	10	9	0	9	50
07:00 AM	2	1	3	0	2	2	5	0	5	10
07:15 AM	4	1	5	0	3	3	2	0	2	10
07:30 AM	5	3	8	0	2	2	2	0	2	12
07:45 AM	5	2	7	0	4	4	3	1	4	15
Total	16	7	23	0	11	11	12	1	13	47
08:00 AM	6	1	7	0	4	4	7	0	7	18
08:15 AM	4	1	5	0	2	2	4	0	4	11
08:30 AM	3	2	5	0	1	1	5	0	5	11
08:45 AM	5	2	7	0	3	3	4	0	4	14
Total	18	6	24	0	10	10	20	0	20	54
09:00 AM	6	2	8	0	1	1	3	0	3	12
09:15 AM	7	2	9	0	4	4	5	0	5	18
09:30 AM	3	2	5	0	3	3	4	0	4	12
09:45 AM	8	2	10	0	3	3	2	0	2	15
Total	24	8	32	0	11	11	14	0	14	57
10:00 AM	6	2	8	0	2	2	4	0	4	14
10:15 AM	6	1	7	0	2	2	4	0	4	13
10:30 AM	8	2	10	0	3	3	6	0	6	19
10:45 AM	9	1	10	0	5	5	2	2	4	19
Total	29	6	35	0	12	12	16	2	18	65
11:00 AM	9	4	13	0	4	4	4	0	4	21
11:15 AM	10	3	13	0	3	3	3	0	3	19
11:30 AM	6	1	7	1	2	3	5	1	6	16
11:45 AM	8	3	11	0	3	3	5	0	5	19
Total	33	11	44	1	12	13	17	1	18	75
12:00 PM	11	1	12	1	2	3	1	1	2	17
12:15 PM	3	3	6	0	3	3	1	0	1	10
12:30 PM	5	4	9	0	4	4	3	0	3	16
12:45 PM	6	6	12	1	5	6	1	0	1	19
Total	25	14	39	2	14	16	6	1	7	62
01:00 PM	6	2	8	0	3	3	2	0	2	13
01:15 PM	8	3	11	0	4	4	3	0	3	18
01:30 PM	5	3	8	0	4	4	3	0	3	15
01:45 PM	9	5	14	0	5	5	3	0	3	22
Total	28	13	41	0	16	16	11	0	11	68

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4661 Marlberry Place, Lexington, KY 40509

swcummins@windstream.net 859.361.2589

"simplifying Data Collection since 2004"

File Name : PD2_at_Lincoln_464015_10-27-2017
Site Code : Site 17 - Friday
Start Date : 10/27/2017
Page No : 2

Groups Printed- Cars - Buses - Trucks

	Lincoln Road From North			Lincoln Road From South			PD2 - Lincoln Connector From Southwest			
Start Time	Thru	Bear Right	App. Total	Hard Left	Thru	App. Total	Bear Left	Hard Right	App. Total	Int. Total
02:00 PM	3	8	11	0	4	4	3	0	3	18
02:15 PM	5	6	11	0	3	3	3	0	3	17
02:30 PM	13	9	22	0	6	6	4	0	4	32
02:45 PM	9	1	10	0	7	7	2	0	2	19
Total	30	24	54	0	20	20	12	0	12	86
03:00 PM	9	0	9	1	5	6	0	0	0	15
03:15 PM	10	6	16	0	6	6	2	0	2	24
03:30 PM	8	1	9	0	4	4	5	0	5	18
03:45 PM	6	2	8	0	2	2	2	0	2	12
Total	33	9	42	1	17	18	9	0	9	69
04:00 PM	7	5	12	0	3	3	2	0	2	17
04:15 PM	6	1	7	0	5	5	2	0	2	14
04:30 PM	3	1	4	3	4	7	2	0	2	13
04:45 PM	5	4	9	0	4	4	3	1	4	17
Total	21	11	32	3	16	19	9	1	10	61
Grand Total	286	131	417	8	158	166	143	6	149	732
Apprch %	68.6	31.4		4.8	95.2		96	4		
Total %	39.1	17.9	57	1.1	21.6	22.7	19.5	0.8	20.4	
Cars	153	119	272	8	41	49	77	6	83	404
% Cars	53.5	90.8	65.2	100	25.9	29.5	53.8	100	55.7	55.2
Buses	123	7	130	0	116	116	59	0	59	305
% Buses	43	5.3	31.2	0	73.4	69.9	41.3	0	39.6	41.7
Trucks	10	5	15	0	1	1	7	0	7	23
% Trucks	3.5	3.8	3.6	0	0.6	0.6	4.9	0	4.7	3.1

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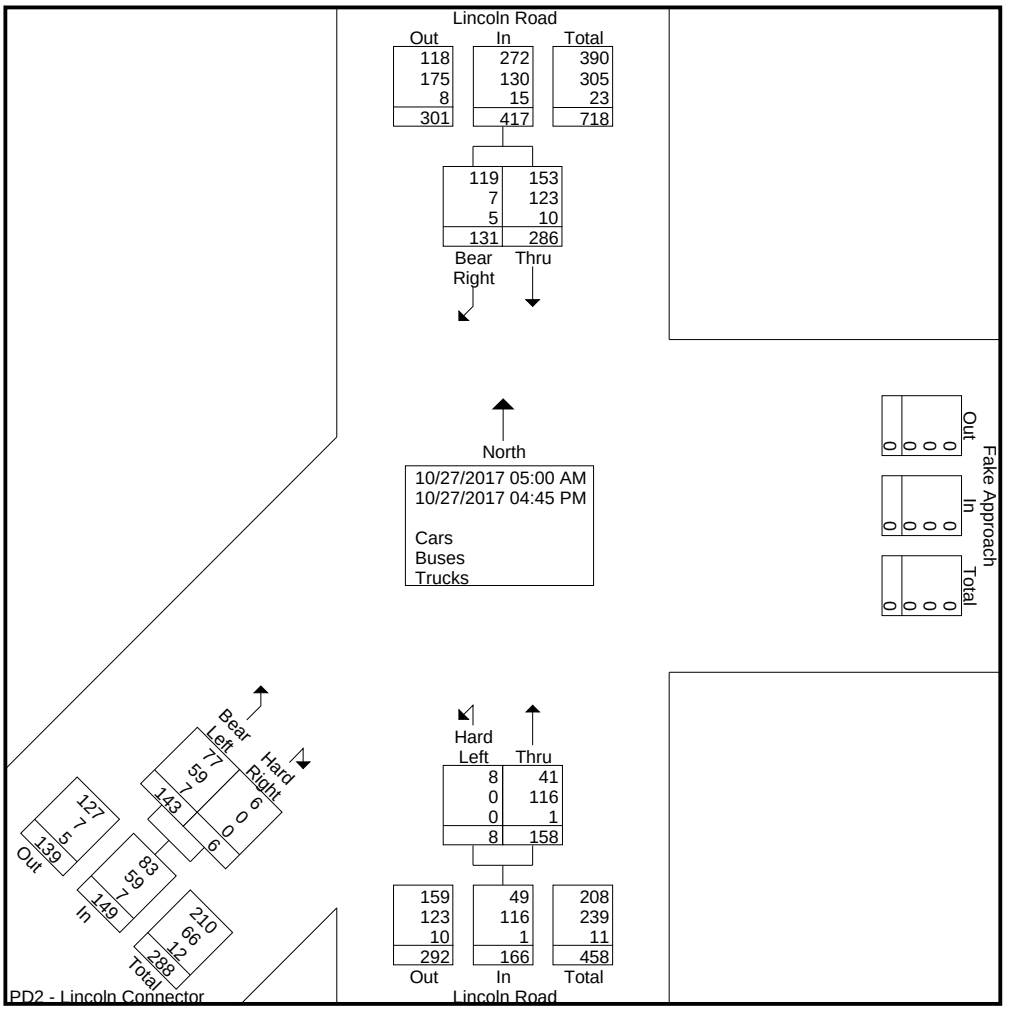
"simplifying Data Collection since 2004"

File Name : PD2_at_Lincoln_464015_10-27-2017
Site Code : Site 17 - Friday
Start Date : 10/27/2017
Page No : 3



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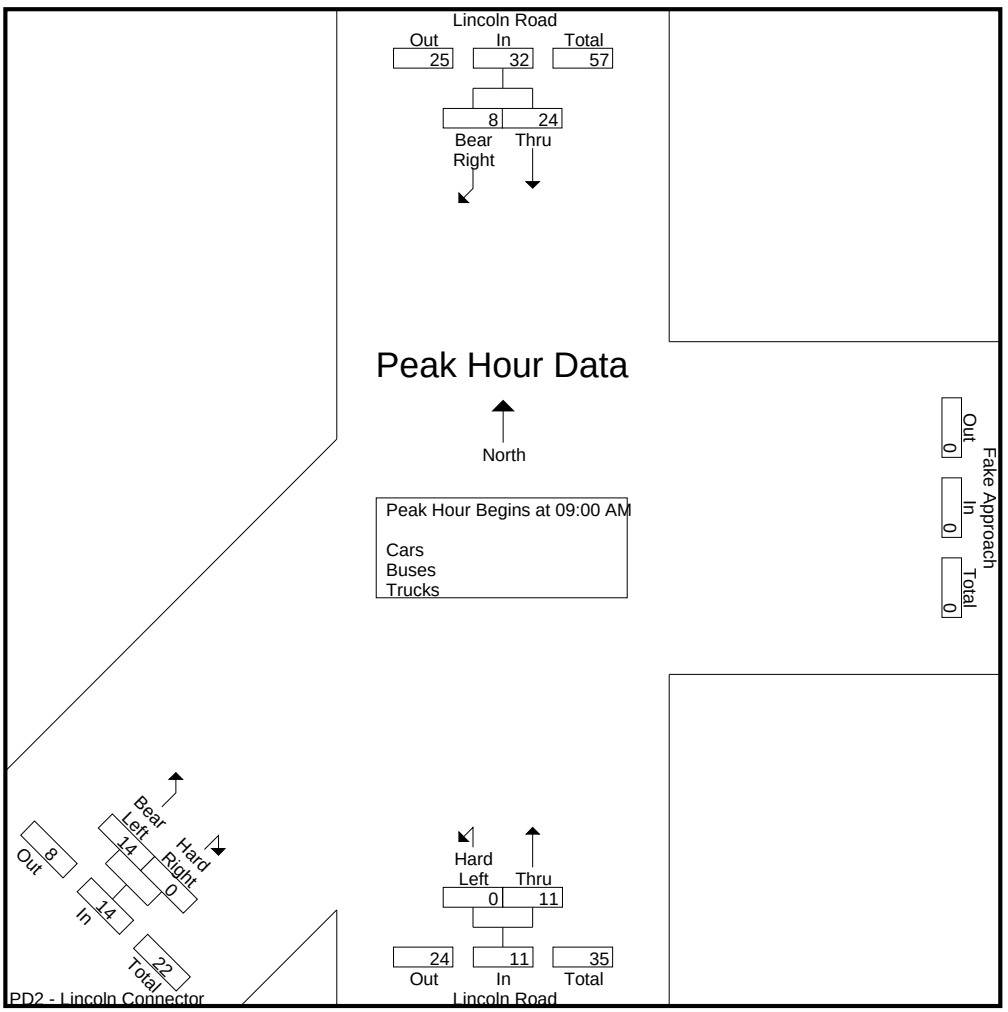
"simplifying Data Collection since 2004"

File Name : PD2_at_Lincoln_464015_10-27-2017
Site Code : Site 17 - Friday
Start Date : 10/27/2017

	Lincoln Road From North			Lincoln Road From South			PD2 - Lincoln Connector From Southwest			
Start Time	Thru	Bear Right	App. Total	Hard Left	Thru	App. Total	Bear Left	Hard Right	App. Total	Int. Total
Peak Hour Analysis From 05:00 AM to 09:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 09:00 AM										
09:00 AM	6	**2**	8	0	1	1	3	0	3	12
09:15 AM	7	2	9	0	**4**	**4**	**5**	0	**5**	**18**
09:30 AM	3	2	5	0	3	3	4	0	4	12
09:45 AM	**8**	2	**10**	0	3	3	2	0	2	15
Total Volume	24	8	32	0	11	11	14	0	14	57
% App. Total	75	25		0	100		100	0		
PHF	.750	1.00	.800	.000	.688	.688	.700	.000	.700	.792



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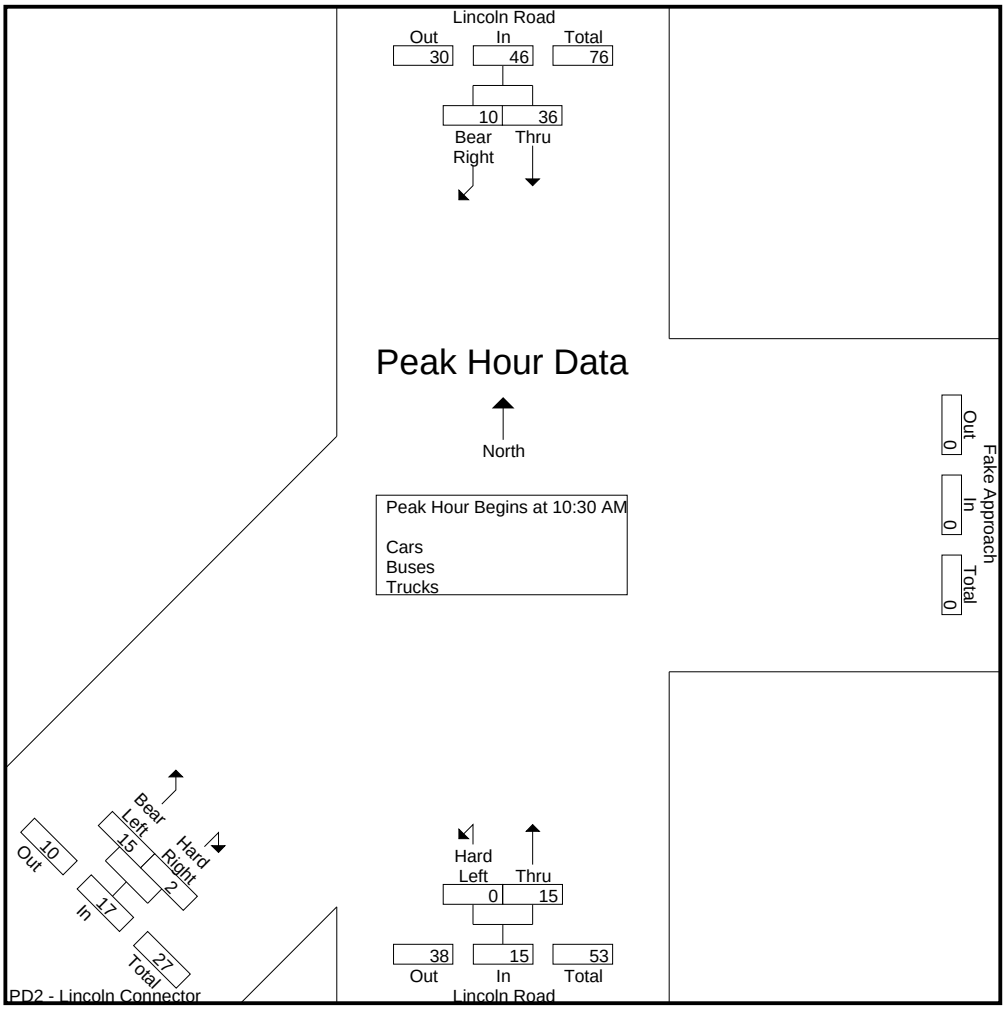
"simplifying Data Collection since 2004"

File Name : PD2_at_Lincoln_464015_10-27-2017
Site Code : Site 17 - Friday
Start Date : 10/27/2017
Page No : 5

	Lincoln Road From North			Lincoln Road From South			PD2 - Lincoln Connector From Southwest			
Start Time	Thru	Bear Right	App. Total	Hard Left	Thru	App. Total	Bear Left	Hard Right	App. Total	Int. Total
Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 10:30 AM										
10:30 AM	8	2	10	0	3	3	**6**	0	**6**	19
10:45 AM	9	1	10	0	**5**	**5**	2	**2**	4	19
11:00 AM	9	**4**	**13**	0	4	4	4	0	4	**21**
11:15 AM	**10**	3	13	0	3	3	3	0	3	19
Total Volume	36	10	46	0	15	15	15	2	17	78
% App. Total	78.3	21.7		0	100		88.2	11.8		
PHF	.900	.625	.885	.000	.750	.750	.625	.250	.708	.929



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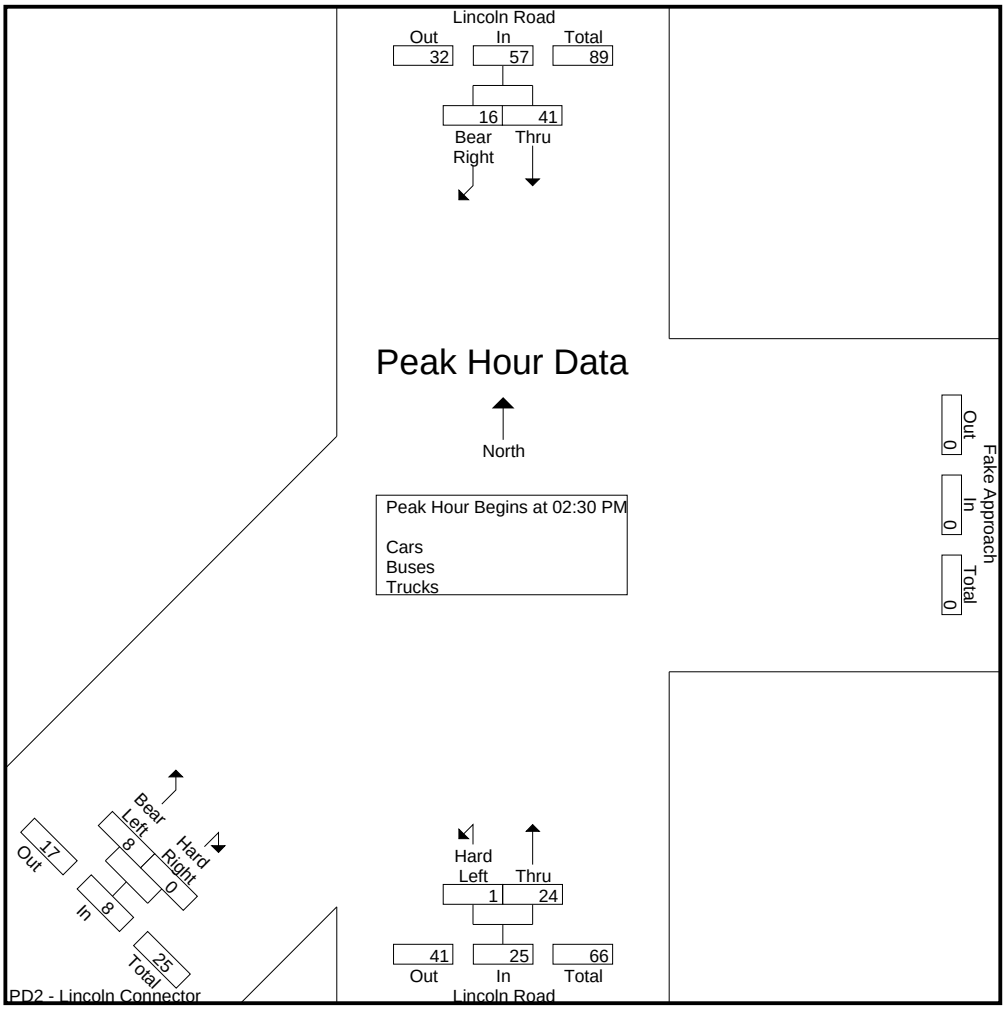
"simplifying Data Collection since 2004"

File Name : PD2_at_Lincoln_464015_10-27-2017
Site Code : Site 17 - Friday
Start Date : 10/27/2017
Page No : 6

	Lincoln Road From North			Lincoln Road From South			PD2 - Lincoln Connector From Southwest			
Start Time	Thru	Bear Right	App. Total	Hard Left	Thru	App. Total	Bear Left	Hard Right	App. Total	Int. Total
Peak Hour Analysis From 02:00 PM to 04:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 02:30 PM										
02:30 PM	**13**	**9**	**22**	0	6	6	**4**	0	**4**	**32**
02:45 PM	9	1	10	0	**7**	**7**	2	0	2	19
03:00 PM	9	0	9	**1**	5	6	0	0	0	15
03:15 PM	10	6	16	0	6	6	2	0	2	24
Total Volume	41	16	57	1	24	25	8	0	8	90
% App. Total	71.9	28.1		4	96		100	0		
PHF	.788	.444	.648	.250	.857	.893	.500	.000	.500	.703



18. LINCOLN ROAD AT KENTON ROAD

Cummins Consulting Services

4661 Marlberry Place, Lexington, KY 40509

swcummins@windstream.net 859.361.2589

"simplifying Data Collection since 2004"

Clear and Cold - 45 Degrees
Schools in Session

File Name : Kenton_at_Lincoln_464016_10-27-2017
Site Code : Site 18 - Friday
Start Date : 10/27/2017

Groups Printed- Cars - Buses - Trucks

	Lincoln Road From East			Northbound Approach From South			Lincoln Road From West			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
05:00 AM	1	5	6	0	1	1	4	0	4	11
05:15 AM	6	8	14	0	2	2	3	0	3	19
05:30 AM	2	17	19	0	6	6	4	0	4	29
05:45 AM	6	24	30	0	4	4	5	0	5	39
Total	15	54	69	0	13	13	16	0	16	98
06:00 AM	4	14	18	0	8	8	6	0	6	32
06:15 AM	3	13	16	0	3	3	5	0	5	24
06:30 AM	2	9	11	0	5	5	9	0	9	25
06:45 AM	10	11	21	0	6	6	1	0	1	28
Total	19	47	66	0	22	22	21	0	21	109
07:00 AM	8	8	16	0	7	7	6	0	6	29
07:15 AM	3	12	15	0	8	8	3	0	3	26
07:30 AM	3	17	20	0	5	5	3	0	3	28
07:45 AM	5	16	21	0	9	9	2	0	2	32
Total	19	53	72	0	29	29	14	0	14	115
08:00 AM	4	11	15	0	9	9	9	0	9	33
08:15 AM	11	14	25	0	10	10	6	0	6	41
08:30 AM	6	15	21	0	10	10	5	0	5	36
08:45 AM	6	16	22	0	9	9	8	0	8	39
Total	27	56	83	0	38	38	28	0	28	149
09:00 AM	4	7	11	0	7	7	4	0	4	22
09:15 AM	3	9	12	0	6	6	7	0	7	25
09:30 AM	8	12	20	0	9	9	6	0	6	35
09:45 AM	4	10	14	0	6	6	4	0	4	24
Total	19	38	57	0	28	28	21	0	21	106
10:00 AM	3	7	10	0	8	8	9	0	9	27
10:15 AM	3	6	9	1	6	7	4	0	4	20
10:30 AM	8	9	17	0	7	7	6	0	6	30
10:45 AM	4	17	21	0	9	9	9	0	9	39
Total	18	39	57	1	30	31	28	0	28	116
11:00 AM	3	19	22	0	8	8	8	0	8	38
11:15 AM	5	16	21	0	9	9	10	0	10	40
11:30 AM	7	17	24	0	7	7	6	0	6	37
11:45 AM	3	23	26	0	11	11	12	0	12	49
Total	18	75	93	0	35	35	36	0	36	164
12:00 PM	3	15	18	0	9	9	8	0	8	35
12:15 PM	8	11	19	0	6	6	8	0	8	33
12:30 PM	12	14	26	0	15	15	7	0	7	48
12:45 PM	16	17	33	0	10	10	3	0	3	46
Total	39	57	96	0	40	40	26	0	26	162
01:00 PM	12	15	27	0	9	9	9	0	9	45
01:15 PM	7	17	24	0	12	12	8	0	8	44
01:30 PM	4	12	16	0	11	11	12	0	12	39
01:45 PM	6	13	19	0	8	8	10	0	10	37
Total	29	57	86	0	40	40	39	0	39	165

Cummins Consulting Services

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"simplifying Data Collection since 2004"

File Name : Kenton_at_Lincoln_464016_10-27-2017
Site Code : Site 18 - Friday
Start Date : 10/27/2017

Groups Printed- Cars - Buses - Trucks

	Lincoln Road From East			Northbound Approach From South			Lincoln Road From West			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
02:00 PM	3	18	21	0	10	10	4	0	4	35
02:15 PM	8	13	21	0	14	14	7	0	7	42
02:30 PM	3	12	15	0	15	15	17	0	17	47
02:45 PM	3	11	14	0	7	7	9	0	9	30
Total	17	54	71	0	46	46	37	0	37	154
03:00 PM	2	13	15	0	11	11	4	0	4	30
03:15 PM	3	11	14	0	5	5	9	0	9	28
03:30 PM	5	11	16	0	13	13	7	1	8	37
03:45 PM	9	14	23	0	10	10	10	1	11	44
Total	19	49	68	0	39	39	30	2	32	139
04:00 PM	1	8	9	0	12	12	6	0	6	27
04:15 PM	6	15	21	1	6	7	5	0	5	33
04:30 PM	5	11	16	0	12	12	8	0	8	36
04:45 PM	1	13	14	0	8	8	3	0	3	25
Total	13	47	60	1	38	39	22	0	22	121
Grand Total	252	626	878	2	398	400	318	2	320	1598
Apprch %	28.7	71.3		0.5	99.5		99.4	0.6		
Total %	15.8	39.2	54.9	0.1	24.9	25	19.9	0.1	20	
Cars	216	433	649	1	205	206	262	2	264	1119
% Cars	85.7	69.2	73.9	50	51.5	51.5	82.4	100	82.5	70
Buses	0	168	168	1	148	149	41	0	41	358
% Buses	0	26.8	19.1	50	37.2	37.2	12.9	0	12.8	22.4
Trucks	36	25	61	0	45	45	15	0	15	121
% Trucks	14.3	4	6.9	0	11.3	11.2	4.7	0	4.7	7.6

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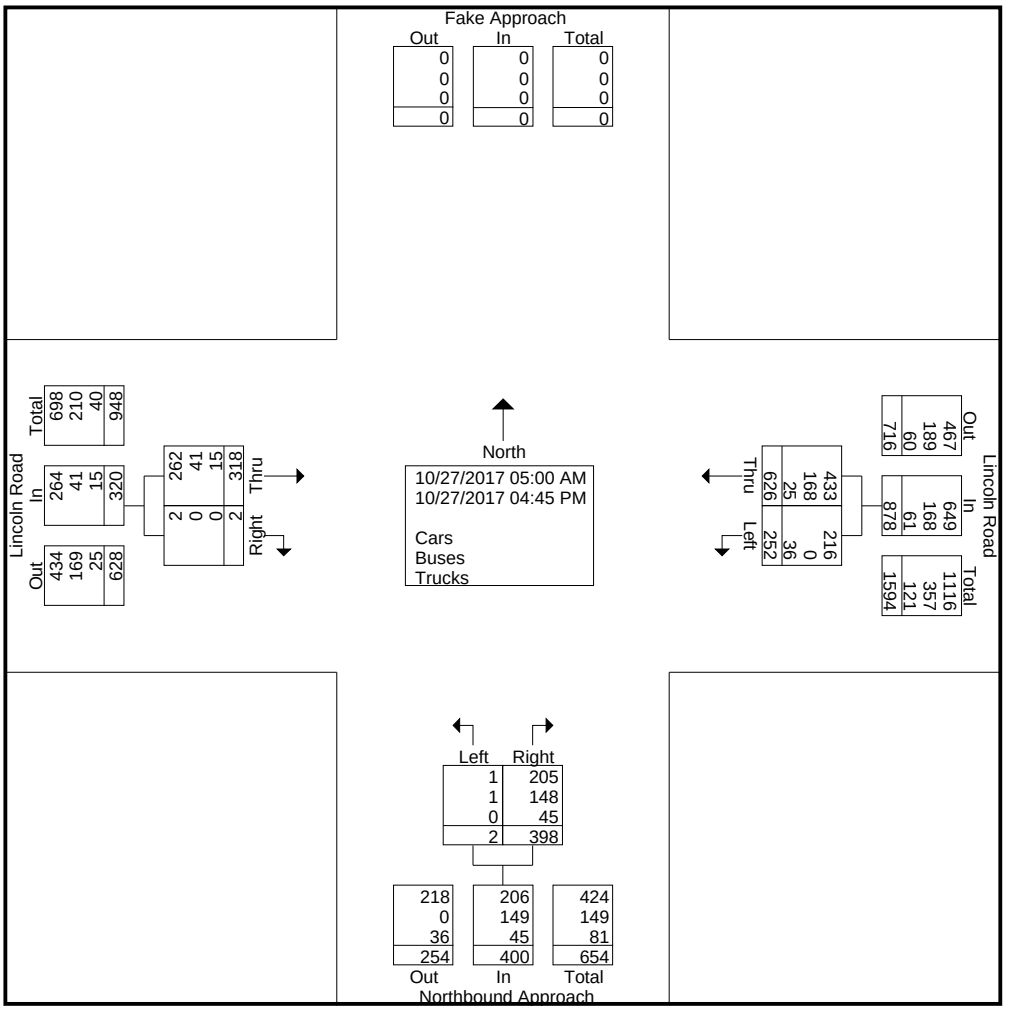
"simplifying Data Collection since 2004"

File Name : Kenton_at_Lincoln_464016_10-27-2017
Site Code : Site 18 - Friday
Start Date : 10/27/2017
Page No : 3



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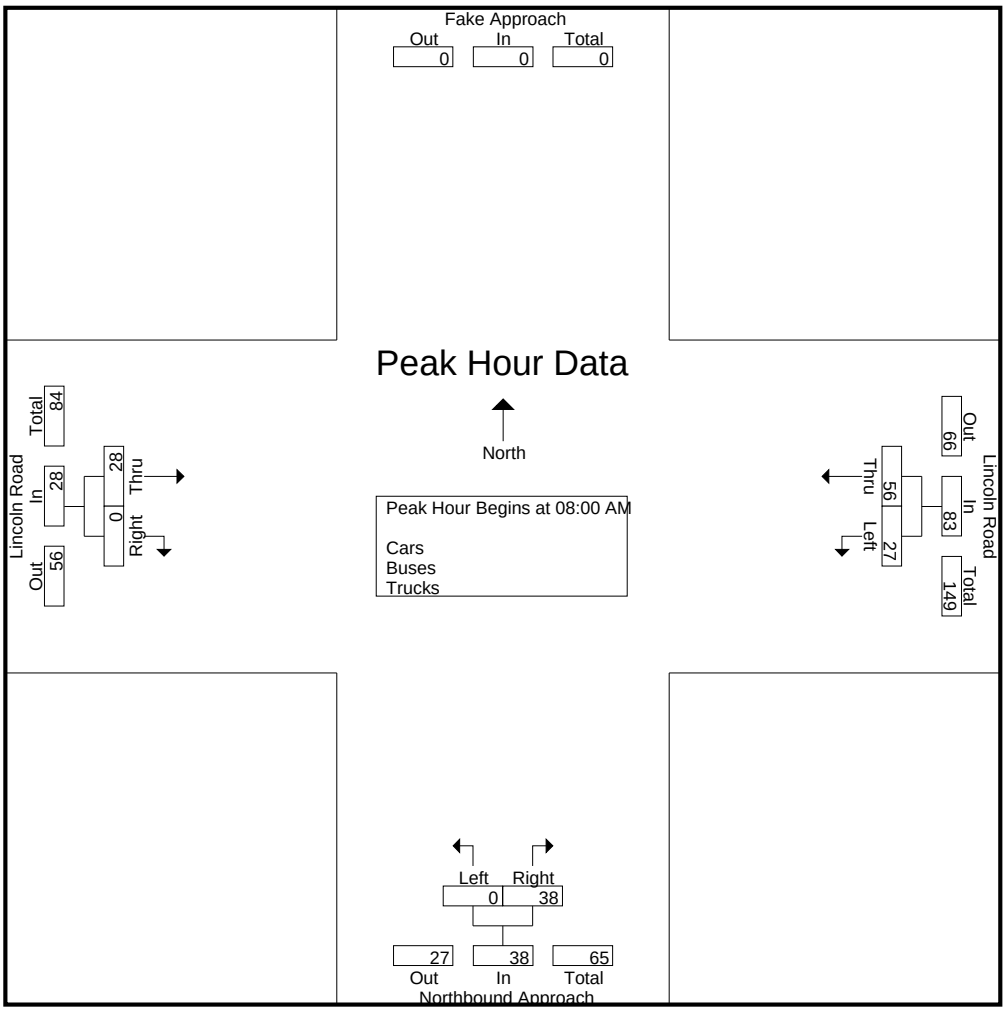
"simplifying Data Collection since 2004"

File Name : Kenton_at_Lincoln_464016_10-27-2017
Site Code : Site 18 - Friday
Start Date : 10/27/2017

	Lincoln Road From East			Northbound Approach From South			Lincoln Road From West			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 05:00 AM to 09:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 08:00 AM										
08:00 AM	4	11	15	0	9	9	**9**	0	**9**	33
08:15 AM	**11**	14	**25**	0	**10**	**10**	6	0	6	**41**
08:30 AM	6	15	21	0	10	10	5	0	5	36
08:45 AM	6	**16**	22	0	9	9	8	0	8	39
Total Volume	27	56	83	0	38	38	28	0	28	149
% App. Total	32.5	67.5		0	100		100	0		
PHF	.614	.875	.830	.000	.950	.950	.778	.000	.778	.909



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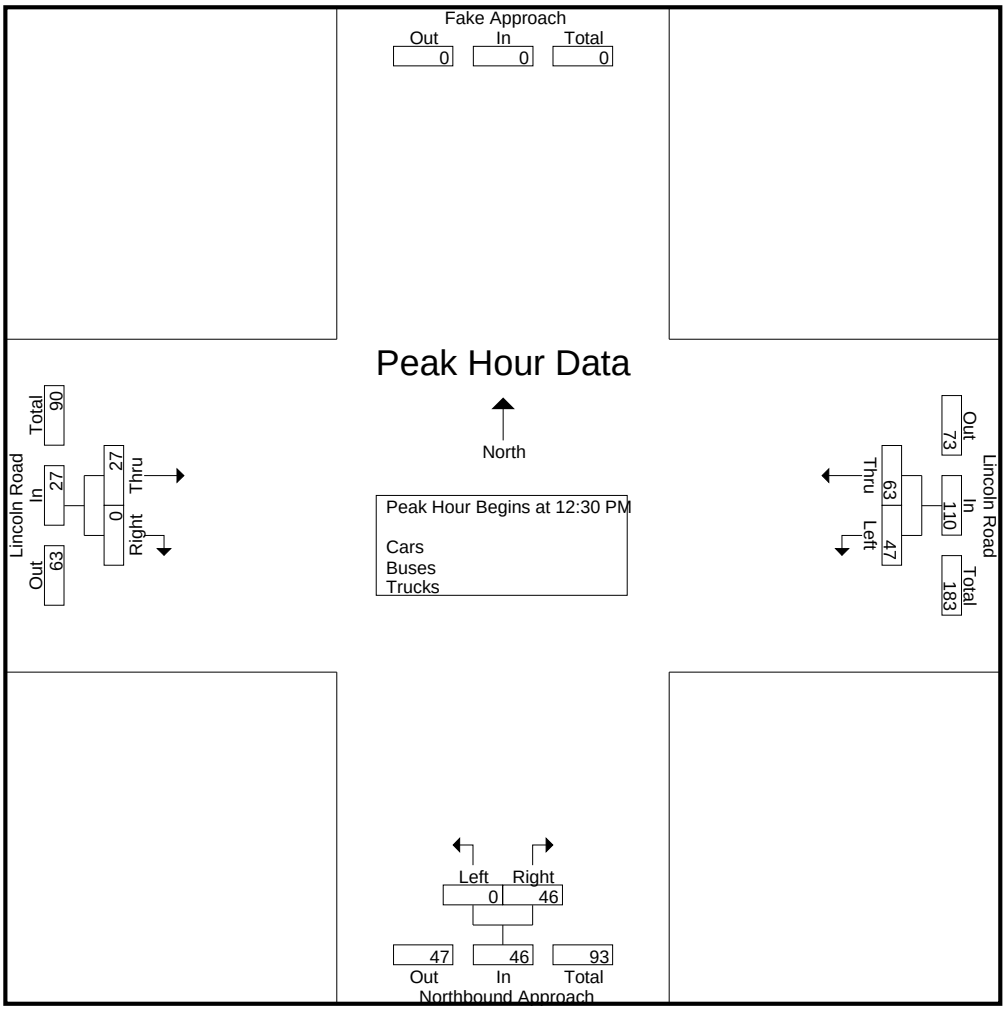
4661 Marlberry Place, Lexington, KY 40509

swcummins@windstream.net 859.361.2589

"simplifying Data Collection since 2004"

File Name : Kenton_at_Lincoln_464016_10-27-2017
Site Code : Site 18 - Friday
Start Date : 10/27/2017
Page No : 5

	Lincoln Road From East			Northbound Approach From South			Lincoln Road From West			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 12:30 PM										
12:30 PM	12	14	26	0	**15**	**15**	7	0	7	**48**
12:45 PM	**16**	**17**	**33**	0	10	10	3	0	3	46
01:00 PM	12	15	27	0	9	9	**9**	0	**9**	45
01:15 PM	7	17	24	0	12	12	8	0	8	44
Total Volume	47	63	110	0	46	46	27	0	27	183
% App. Total	42.7	57.3		0	100		100	0		
PHF	.734	.926	.833	.000	.767	.767	.750	.000	.750	.953



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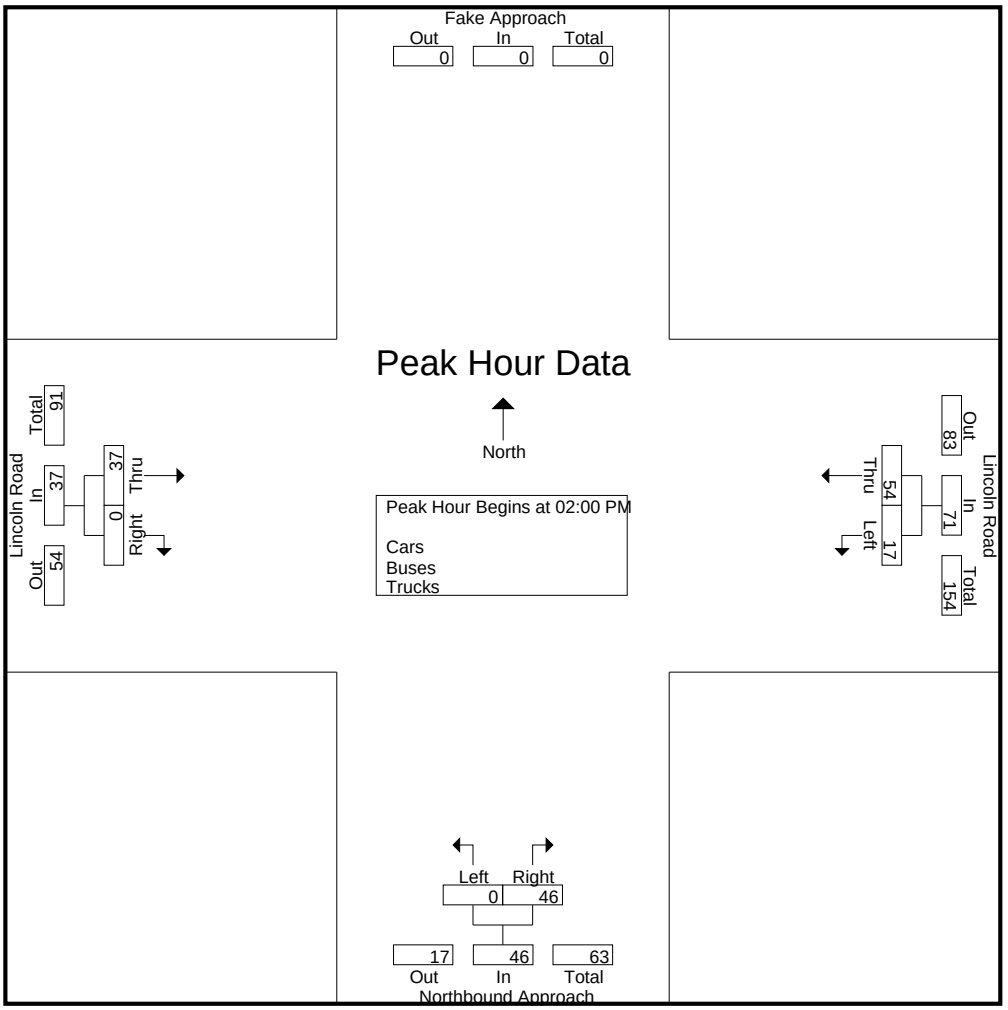
"simplifying Data Collection since 2004"

File Name : Kenton_at_Lincoln_464016_10-27-2017
Site Code : Site 18 - Friday
Start Date : 10/27/2017
Page No : 6

	Lincoln Road From East			Northbound Approach From South			Lincoln Road From West			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 02:00 PM to 04:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 02:00 PM										
02:00 PM	3	**18**	**21**	0	10	10	4	0	4	35
02:15 PM	**8**	13	21	0	14	14	7	0	7	42
02:30 PM	3	12	15	0	**15**	**15**	**17**	0	**17**	**47**
02:45 PM	3	11	14	0	7	7	9	0	9	30
Total Volume	17	54	71	0	46	46	37	0	37	154
% App. Total	23.9	76.1		0	100		100	0		
PHF	.531	.750	.845	.000	.767	.767	.544	.000	.544	.819



19. LINCOLN ROAD AT DONALDSON HIGHWAY

Cummins Consulting Services

4661 Marlberry Place, Lexington, KY 40509

swcummins@windstream.net 859.361.2589

"simplifying Data Collection since 2004"

Sunny - 83 Degrees
SCU-5QW

File Name : Lincoln_at_KY236_436503_08-03-2017
Site Code : Site 19 - Thursday
Start Date : 8/3/2017

Groups Printed- Cars - Buses - Trucks

	Airpark Drive - Gated From North				KY236 - Donaldson Hwy From East				Lincoln Drive From South				KY236 - Donaldson Hwy From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
06:00 AM	0	0	0	0	8	48	0	56	12	0	7	19	0	52	13	65	140
06:15 AM	0	0	0	0	17	48	0	65	5	0	9	14	0	62	5	67	146
06:30 AM	0	0	0	0	10	67	0	77	0	0	10	10	0	81	11	92	179
06:45 AM	0	0	0	0	14	35	0	49	5	0	10	15	0	67	13	80	144
Total	0	0	0	0	49	198	0	247	22	0	36	58	0	262	42	304	609
07:00 AM	0	0	0	0	10	34	0	44	6	0	7	13	0	76	9	85	142
07:15 AM	0	0	0	0	11	47	0	58	3	0	10	13	0	72	4	76	147
07:30 AM	0	0	0	0	13	69	0	82	8	0	9	17	0	98	8	106	205
07:45 AM	0	0	0	0	11	66	0	77	4	0	6	10	0	100	13	113	200
Total	0	0	0	0	45	216	0	261	21	0	32	53	0	346	34	380	694
08:00 AM	0	0	0	0	15	67	0	82	13	0	11	24	0	98	11	109	215
08:15 AM	0	0	0	0	12	58	0	70	1	0	8	9	0	76	4	80	159
08:30 AM	0	0	0	0	11	58	0	69	4	0	6	10	0	59	6	65	144
08:45 AM	0	0	0	0	15	41	0	56	3	0	10	13	0	69	10	79	148
Total	0	0	0	0	53	224	0	277	21	0	35	56	0	302	31	333	666
09:00 AM	0	0	0	0	8	52	0	60	6	0	14	20	0	55	8	63	143
09:15 AM	0	0	0	0	12	42	0	54	3	0	11	14	0	52	4	56	124
09:30 AM	0	0	0	0	17	52	0	69	4	0	13	17	0	48	10	58	144
09:45 AM	0	0	0	0	11	38	0	49	6	0	8	14	0	66	7	73	136
Total	0	0	0	0	48	184	0	232	19	0	46	65	0	221	29	250	547
10:00 AM	0	0	0	0	13	49	0	62	4	0	5	9	0	48	4	52	123
10:15 AM	0	0	0	0	12	43	0	55	6	0	8	14	1	56	8	65	134
10:30 AM	0	0	0	0	12	56	0	68	4	0	8	12	0	67	9	76	156
10:45 AM	0	0	0	0	11	52	0	63	5	0	10	15	0	55	13	68	146
Total	0	0	0	0	48	200	0	248	19	0	31	50	1	226	34	261	559
11:00 AM	0	0	0	0	12	68	0	80	10	0	14	24	0	65	4	69	173
11:15 AM	0	0	0	0	12	44	0	56	8	0	14	22	0	63	10	73	151
11:30 AM	0	0	0	0	15	52	0	67	6	0	15	21	0	80	4	84	172
11:45 AM	0	0	0	0	15	90	0	105	3	0	10	13	0	99	5	104	222
Total	0	0	0	0	54	254	0	308	27	0	53	80	0	307	23	330	718
12:00 PM	0	0	0	0	16	69	0	85	5	0	12	17	0	84	13	97	199
12:15 PM	0	0	0	0	9	74	0	83	10	0	11	21	0	80	8	88	192
12:30 PM	0	0	0	0	17	86	0	103	7	0	14	21	0	91	14	105	229
12:45 PM	0	0	0	0	14	91	0	105	8	0	9	17	2	69	11	82	204
Total	0	0	0	0	56	320	0	376	30	0	46	76	2	324	46	372	824
01:00 PM	0	0	0	0	18	91	0	109	11	0	12	23	0	90	14	104	236
01:15 PM	0	0	0	0	10	75	0	85	10	0	13	23	0	68	6	74	182
01:30 PM	0	0	0	0	13	83	0	96	12	0	26	38	0	90	5	95	229
01:45 PM	0	0	0	0	9	112	0	121	6	0	11	17	1	85	12	98	236
Total	0	0	0	0	50	361	0	411	39	0	62	101	1	333	37	371	883
02:00 PM	0	0	0	0	11	103	0	114	4	0	11	15	0	80	6	86	215
02:15 PM	0	0	0	0	18	95	0	113	9	0	13	22	0	79	10	89	224
02:30 PM	0	0	0	0	7	97	0	104	10	0	13	23	0	101	14	115	242
02:45 PM	0	0	0	0	11	120	0	131	3	0	23	26	0	78	7	85	242
Total	0	0	0	0	47	415	0	462	26	0	60	86	0	338	37	375	923

Cummins Consulting Services

4661 Marlberry Place, Lexington, KY 40509

swcummins@windstream.net 859.361.2589

"simplifying Data Collection since 2004"

File Name : Lincoln_at_KY236_436503_08-03-2017
Site Code : Site 19 - Thursday
Start Date : 8/3/2017
Page No : 2

Groups Printed- Cars - Buses - Trucks

	Airpark Drive - Gated From North				KY236 - Donaldson Hwy From East				Lincoln Drive From South				KY236 - Donaldson Hwy From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
03:00 PM	0	0	0	0	12	121	0	133	9	0	18	27	0	69	3	72	232
03:15 PM	0	0	0	0	10	113	0	123	2	0	10	12	1	94	5	100	235
03:30 PM	0	0	1	1	10	112	0	122	6	0	11	17	0	121	4	125	265
03:45 PM	0	0	0	0	11	112	0	123	5	0	14	19	1	107	6	114	256
Total	0	0	1	1	43	458	0	501	22	0	53	75	2	391	18	411	988
04:00 PM	0	0	0	0	16	113	0	129	6	0	16	22	1	121	8	130	281
04:15 PM	0	0	0	0	9	93	0	102	8	0	11	19	0	93	5	98	219
04:30 PM	0	0	0	0	12	111	0	123	4	0	20	24	0	112	4	116	263
04:45 PM	0	0	0	0	12	123	0	135	8	0	14	22	0	90	4	94	251
Total	0	0	0	0	49	440	0	489	26	0	61	87	1	416	21	438	1014
05:00 PM	0	0	1	1	4	118	0	122	8	0	6	14	2	114	3	119	256
05:15 PM	0	0	0	0	5	109	0	114	6	0	7	13	0	86	2	88	215
05:30 PM	0	0	0	0	9	96	0	105	4	0	10	14	1	92	5	98	217
05:45 PM	0	0	0	0	8	92	0	100	3	0	10	13	0	93	7	100	213
Total	0	0	1	1	26	415	0	441	21	0	33	54	3	385	17	405	901
Grand Total	0	0	2	2	568	3685	0	4253	293	0	548	841	10	3851	369	4230	9326
Apprch %	0	0	100		13.4	86.6	0		34.8	0	65.2		0.2	91	8.7		
Total %	0	0	0	0	6.1	39.5	0	45.6	3.1	0	5.9	9	0.1	41.3	4	45.4	
Cars	0	0	2	2	379	3347	0	3726	187	0	353	540	9	3510	281	3800	8068
% Cars	0	0	100	100	66.7	90.8	0	87.6	63.8	0	64.4	64.2	90	91.1	76.2	89.8	86.5
Buses	0	0	0	0	164	19	0	183	56	0	172	228	0	11	19	30	441
% Buses	0	0	0	0	28.9	0.5	0	4.3	19.1	0	31.4	27.1	0	0.3	5.1	0.7	4.7
Trucks	0	0	0	0	25	319	0	344	50	0	23	73	1	330	69	400	817
% Trucks	0	0	0	0	4.4	8.7	0	8.1	17.1	0	4.2	8.7	10	8.6	18.7	9.5	8.8

Cummins Consulting Services

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"simplifying Data Collection since 2004"

File Name : Lincoln_at_KY236_436503_08-03-2017
Site Code : Site 19 - Thursday
Start Date : 8/3/2017
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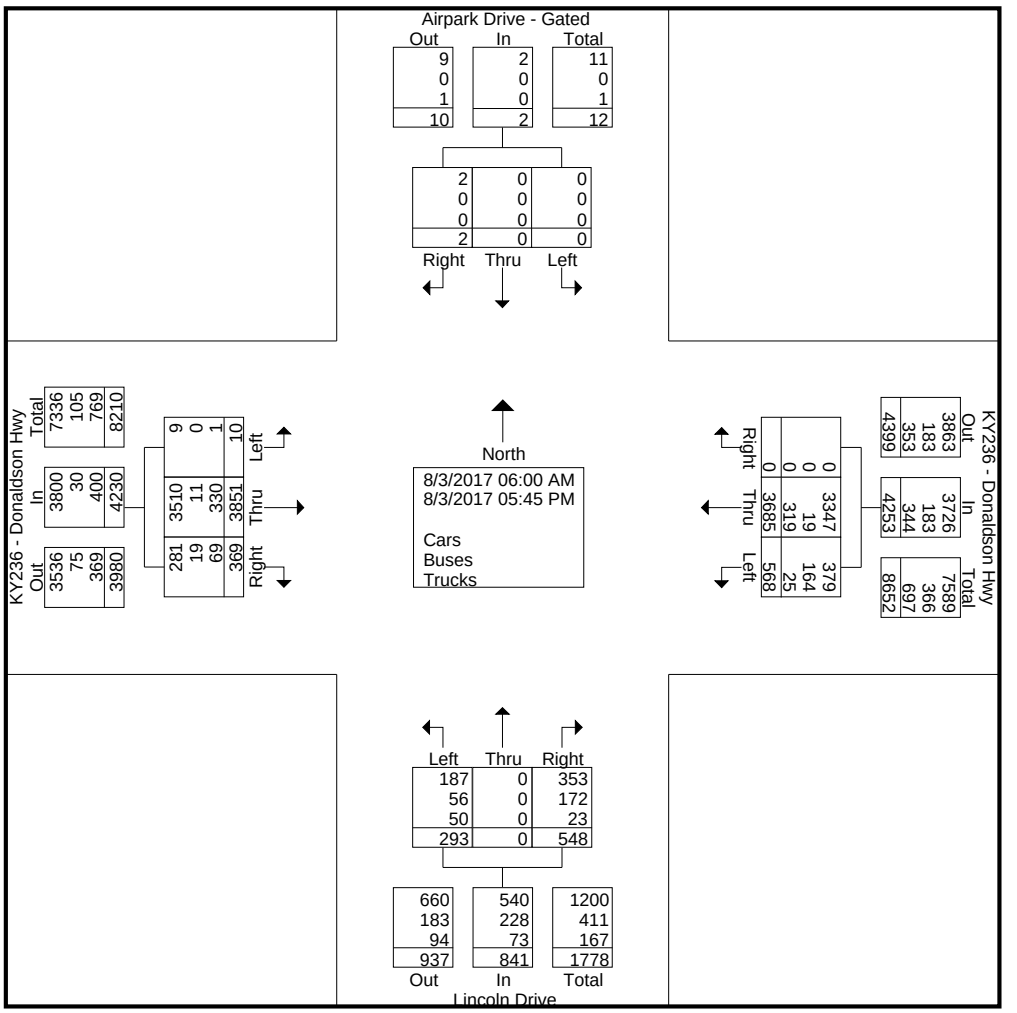

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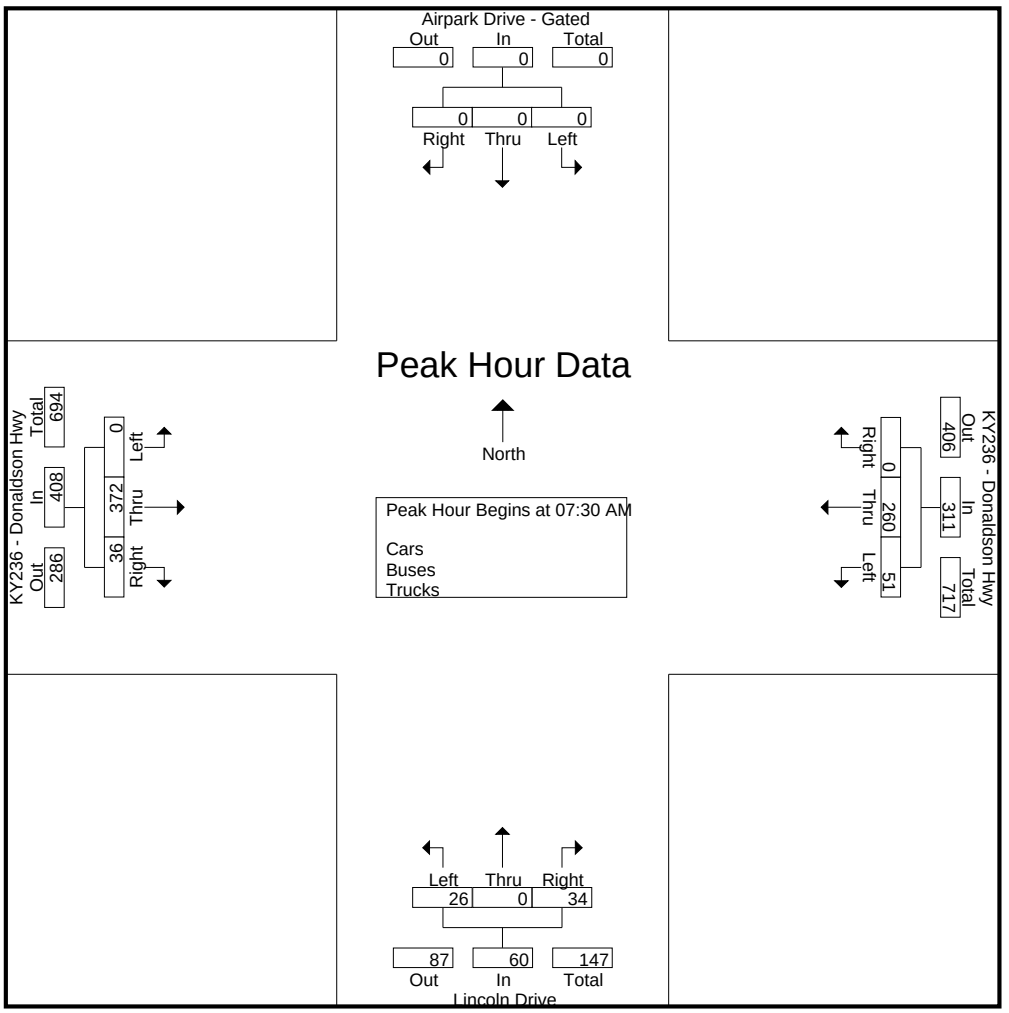
"simplifying Data Collection since 2004"

File Name : Lincoln_at_KY236_436503_08-03-2017
Site Code : Site 19 - Thursday
Start Date : 8/3/2017

	Airpark Drive - Gated From North				KY236 - Donaldson Hwy From East				Lincoln Drive From South				KY236 - Donaldson Hwy From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 09:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	0	0	0	0	13	**69**	0	**82**	8	0	9	17	0	98	8	106	205
07:45 AM	0	0	0	0	11	66	0	77	4	0	6	10	0	**100**	**13**	**113**	200
08:00 AM	0	0	0	0	**15**	67	0	82	**13**	0	**11**	**24**	0	98	11	109	**215**
08:15 AM	0	0	0	0	12	58	0	70	1	0	8	9	0	76	4	80	159
Total Volume	0	0	0	0	51	260	0	311	26	0	34	60	0	372	36	408	779
% App. Total	0	0	0		16.4	83.6	0		43.3	0	56.7		0	91.2	8.8		
PHF	.000	.000	.000	.000	.850	.942	.000	.948	.500	.000	.773	.625	.000	.930	.692	.903	.906



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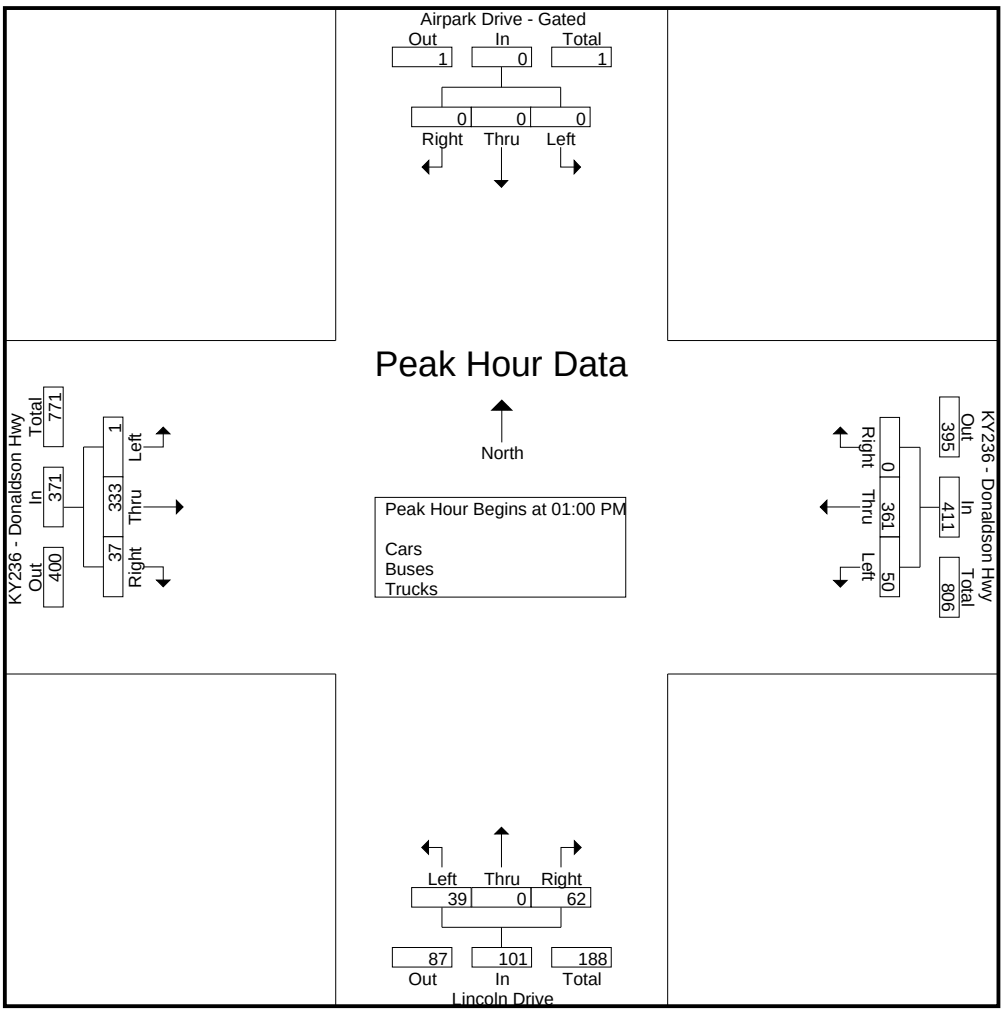
File Name : Lincoln_at_KY236_436503_08-03-2017
Site Code : Site 19 - Thursday
Start Date : 8/3/2017
Page No : 5

	Airpark Drive - Gated From North				KY236 - Donaldson Hwy From East				Lincoln Drive From South				KY236 - Donaldson Hwy From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 01:00 PM																	
01:00 PM	0	0	0	0	**18**	91	0	109	11	0	12	23	0	**90**	**14**	**104**	**236**
01:15 PM	0	0	0	0	10	75	0	85	10	0	13	23	0	68	6	74	182
01:30 PM	0	0	0	0	13	83	0	96	**12**	0	**26**	**38**	0	90	5	95	229
01:45 PM	0	0	0	0	9	**112**	0	**121**	6	0	11	17	**1**	85	12	98	236
Total Volume	0	0	0	0	50	361	0	411	39	0	62	101	1	333	37	371	883
% App. Total	0	0	0		12.2	87.8	0		38.6	0	61.4		0.3	89.8	10		
PHF	.000	.000	.000	.000	.694	.806	.000	.849	.813	.000	.596	.664	.250	.925	.661	.892	.935



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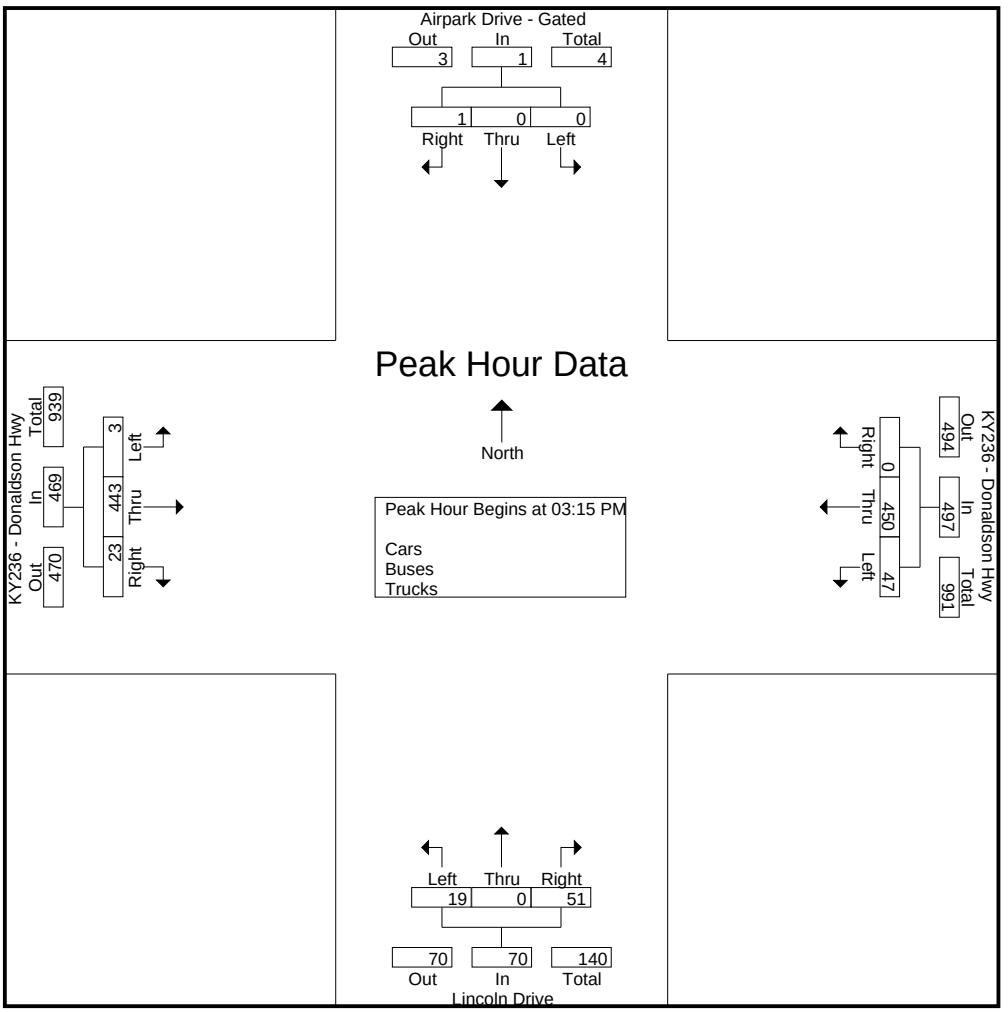
File Name : Lincoln_at_KY236_436503_08-03-2017
Site Code : Site 19 - Thursday
Start Date : 8/3/2017
Page No : 6

	Airpark Drive - Gated From North				KY236 - Donaldson Hwy From East				Lincoln Drive From South				KY236 - Donaldson Hwy From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 02:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 03:15 PM																	
03:15 PM	0	0	0	0	10	**113**	0	123	2	0	10	12	**1**	94	5	100	235
03:30 PM	0	0	**1**	**1**	10	112	0	122	**6**	0	11	17	0	**121**	4	125	265
03:45 PM	0	0	0	0	11	112	0	123	5	0	14	19	1	107	6	114	256
04:00 PM	0	0	0	0	**16**	113	0	**129**	6	0	**16**	**22**	1	121	**8**	**130**	**281**
Total Volume	0	0	1	1	47	450	0	497	19	0	51	70	3	443	23	469	1037
% App. Total	0	0	100		9.5	90.5	0		27.1	0	72.9		0.6	94.5	4.9		
PHF	.000	.000	.250	.250	.734	.996	.000	.963	.792	.000	.797	.795	.750	.915	.719	.902	.923



20. DONALDSON ROAD AT EMPLOYEE LOT

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Sunny - 83 Degrees
SCU-3DC

File Name : CVG_Employee_Lot_at_KY236_436494_08-03-2017
Site Code : Site 20 - Thursday
Start Date : 8/3/2017
Page No : 1

Groups Printed- Cars - Buses - Trucks

	CVG Employee Lot From North			KY236 - Donaldson Hwy From East			KY236 - Donaldson Hwy From West			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
06:00 AM	4	11	15	45	9	54	15	42	57	126
06:15 AM	4	10	14	55	8	63	15	57	72	149
06:30 AM	2	5	7	66	5	71	14	77	91	169
06:45 AM	1	3	4	40	6	46	5	73	78	128
Total	11	29	40	206	28	234	49	249	298	572
07:00 AM	2	5	7	40	8	48	15	69	84	139
07:15 AM	0	7	7	52	10	62	14	68	82	151
07:30 AM	1	5	6	80	7	87	15	92	107	200
07:45 AM	0	5	5	68	3	71	12	98	110	186
Total	3	22	25	240	28	268	56	327	383	676
08:00 AM	1	9	10	70	3	73	14	90	104	187
08:15 AM	2	8	10	65	1	66	8	78	86	162
08:30 AM	3	7	10	61	5	66	3	60	63	139
08:45 AM	6	8	14	48	4	52	8	72	80	146
Total	12	32	44	244	13	257	33	300	333	634
09:00 AM	1	7	8	52	4	56	8	59	67	131
09:15 AM	1	7	8	43	8	51	9	55	64	123
09:30 AM	8	9	17	56	6	62	11	52	63	142
09:45 AM	1	5	6	49	6	55	9	70	79	140
Total	11	28	39	200	24	224	37	236	273	536
10:00 AM	6	11	17	50	6	56	6	46	52	125
10:15 AM	2	6	8	52	8	60	8	59	67	135
10:30 AM	2	7	9	57	6	63	14	60	74	146
10:45 AM	5	5	10	61	7	68	9	54	63	141
Total	15	29	44	220	27	247	37	219	256	547
11:00 AM	7	10	17	72	9	81	12	69	81	179
11:15 AM	4	4	8	45	16	61	9	72	81	150
11:30 AM	4	7	11	66	6	72	15	80	95	178
11:45 AM	2	14	16	92	15	107	23	85	108	231
Total	17	35	52	275	46	321	59	306	365	738
12:00 PM	2	8	10	74	23	97	12	88	100	207
12:15 PM	5	7	12	81	13	94	8	83	91	197
12:30 PM	5	8	13	93	9	102	7	96	103	218
12:45 PM	4	20	24	87	4	91	10	68	78	193
Total	16	43	59	335	49	384	37	335	372	815
01:00 PM	17	23	40	88	12	100	12	91	103	243
01:15 PM	11	11	22	71	16	87	7	72	79	188
01:30 PM	12	23	35	75	11	86	17	103	120	241
01:45 PM	5	15	20	97	7	104	11	83	94	218
Total	45	72	117	331	46	377	47	349	396	890
02:00 PM	14	23	37	98	6	104	11	79	90	231
02:15 PM	20	16	36	90	5	95	9	88	97	228
02:30 PM	8	13	21	100	3	103	6	105	111	235
02:45 PM	6	22	28	99	2	101	11	85	96	225
Total	48	74	122	387	16	403	37	357	394	919

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File Name : CVG_Employee_Lot_at_KY236_436494_08-03-2017
Site Code : Site 20 - Thursday
Start Date : 8/3/2017
Page No : 2

Groups Printed- Cars - Buses - Trucks

	CVG Employee Lot From North			KY236 - Donaldson Hwy From East			KY236 - Donaldson Hwy From West			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
03:00 PM	6	18	24	115	5	120	15	75	90	234
03:15 PM	5	9	14	114	6	120	8	94	102	236
03:30 PM	9	12	21	107	7	114	11	119	130	265
03:45 PM	2	13	15	114	4	118	9	111	120	253
Total	22	52	74	450	22	472	43	399	442	988
04:00 PM	5	15	20	119	1	120	12	127	139	279
04:15 PM	6	7	13	97	4	101	8	97	105	219
04:30 PM	13	13	26	101	8	109	7	130	137	272
04:45 PM	9	14	23	103	2	105	7	91	98	226
Total	33	49	82	420	15	435	34	445	479	996
05:00 PM	5	10	15	121	3	124	6	117	123	262
05:15 PM	6	7	13	100	4	104	8	86	94	211
05:30 PM	9	9	18	100	3	103	9	93	102	223
05:45 PM	10	14	24	83	2	85	3	103	106	215
Total	30	40	70	404	12	416	26	399	425	911
Grand Total	263	505	768	3712	326	4038	495	3921	4416	9222
Apprch %	34.2	65.8		91.9	8.1		11.2	88.8		
Total %	2.9	5.5	8.3	40.3	3.5	43.8	5.4	42.5	47.9	
Cars	261	352	613	3340	323	3663	340	3555	3895	8171
% Cars	99.2	69.7	79.8	90	99.1	90.7	68.7	90.7	88.2	88.6
Buses	0	149	149	33	1	34	153	23	176	359
% Buses	0	29.5	19.4	0.9	0.3	0.8	30.9	0.6	4	3.9
Trucks	2	4	6	339	2	341	2	343	345	692
% Trucks	0.8	0.8	0.8	9.1	0.6	8.4	0.4	8.7	7.8	7.5

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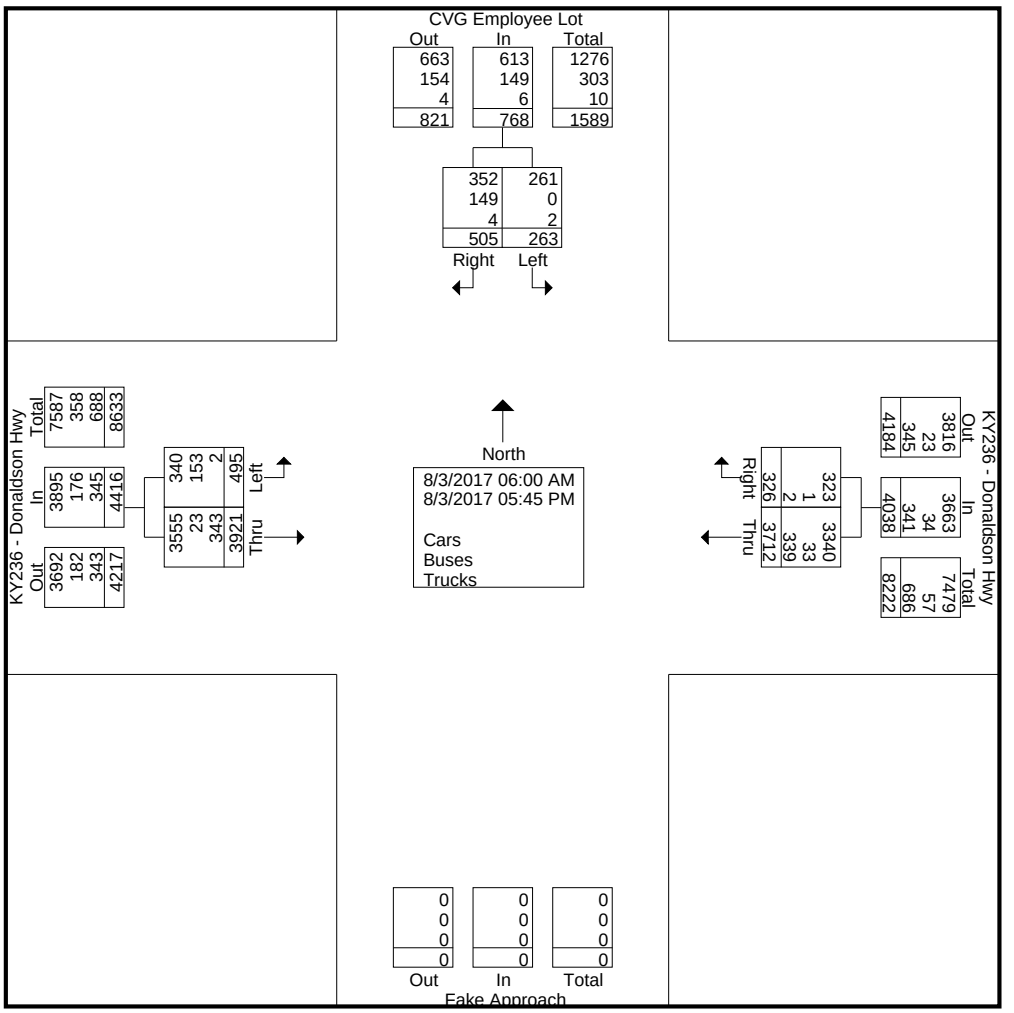
Site Code : Site 20 - Thursday
Start Date : 8/3/2017



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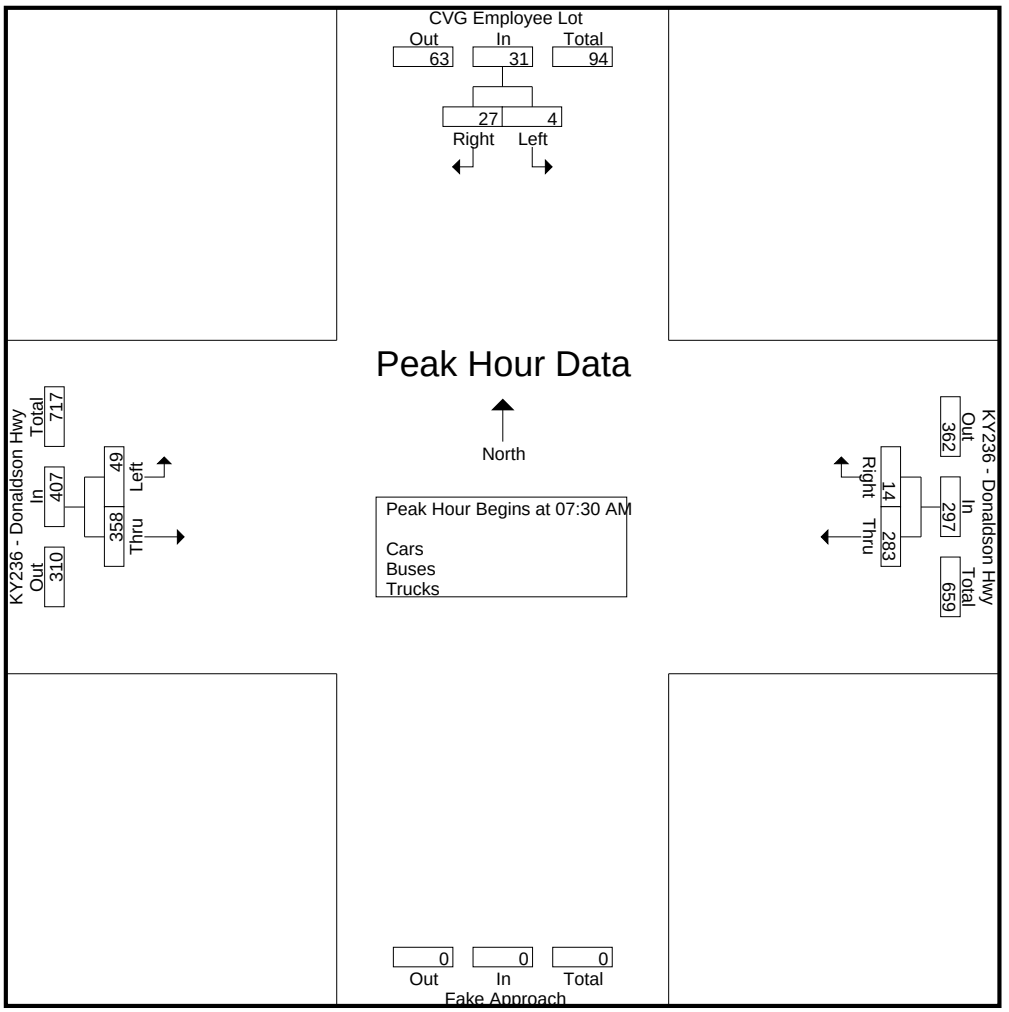
File Name : CVG_Employee_Lot_at_KY236_436494_08-03-2017
Site Code : Site 20 - Thursday
Start Date : 8/3/2017

	CVG Employee Lot From North			KY236 - Donaldson Hwy From East			KY236 - Donaldson Hwy From West			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 09:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:30 AM										
07:30 AM	1	5	6	**80**	**7**	**87**	**15**	92	107	**200**
07:45 AM	0	5	5	68	3	71	12	**98**	**110**	186
08:00 AM	1	**9**	**10**	70	3	73	14	90	104	187
08:15 AM	**2**	8	10	65	1	66	8	78	86	162
Total Volume	4	27	31	283	14	297	49	358	407	735
% App. Total	12.9	87.1		95.3	4.7		12	88		
PHF	.500	.750	.775	.884	.500	.853	.817	.913	.925	.919



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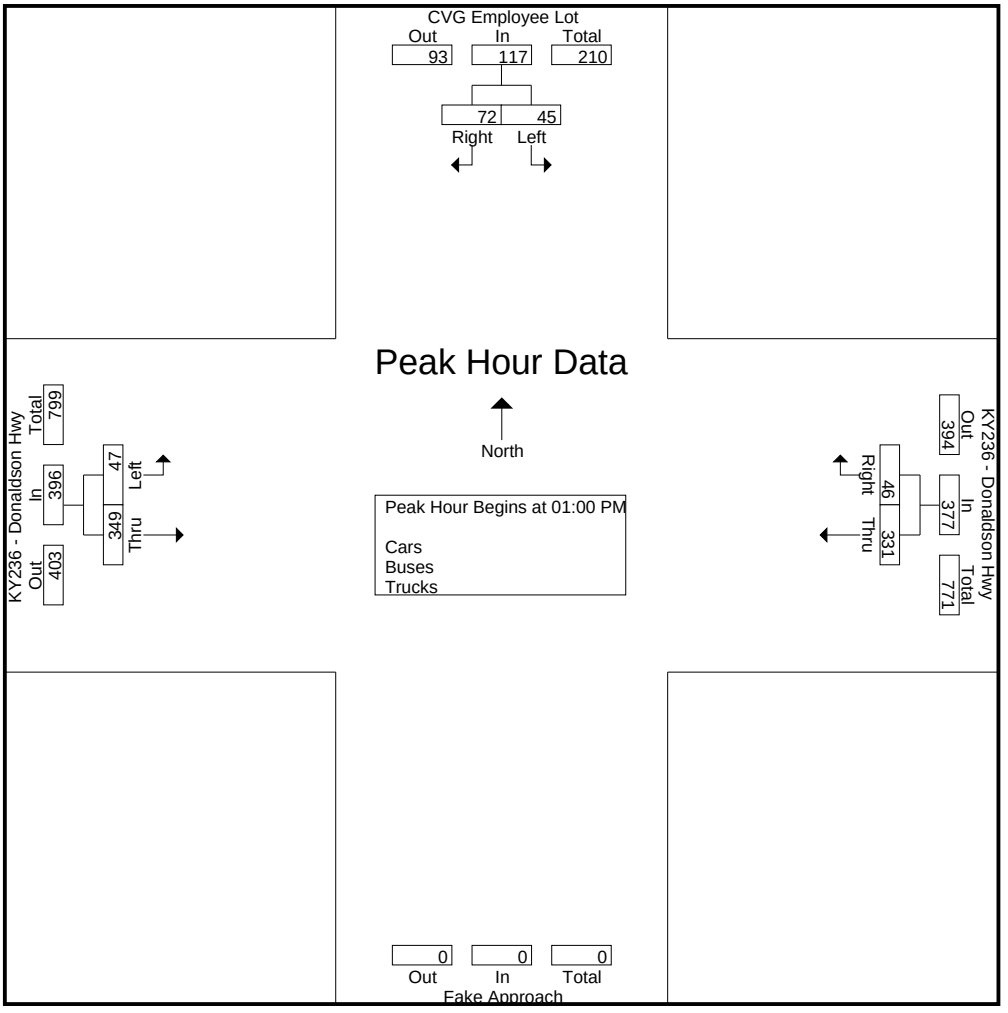
"simplifying Data Collection since 2004"

File Name : CVG_Employee_Lot_at_KY236_436494_08-03-2017
Site Code : Site 20 - Thursday
Start Date : 8/3/2017

	CVG Employee Lot From North			KY236 - Donaldson Hwy From East			KY236 - Donaldson Hwy From West			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 01:00 PM										
01:00 PM	**17**	**23**	**40**	88	12	100	12	91	103	**243**
01:15 PM	11	11	22	71	**16**	87	7	72	79	188
01:30 PM	12	23	35	75	11	86	**17**	**103**	**120**	241
01:45 PM	5	15	20	**97**	7	**104**	11	83	94	218
Total Volume	45	72	117	331	46	377	47	349	396	890
% App. Total	38.5	61.5		87.8	12.2		11.9	88.1		
PHF	.662	.783	.731	.853	.719	.906	.691	.847	.825	.916



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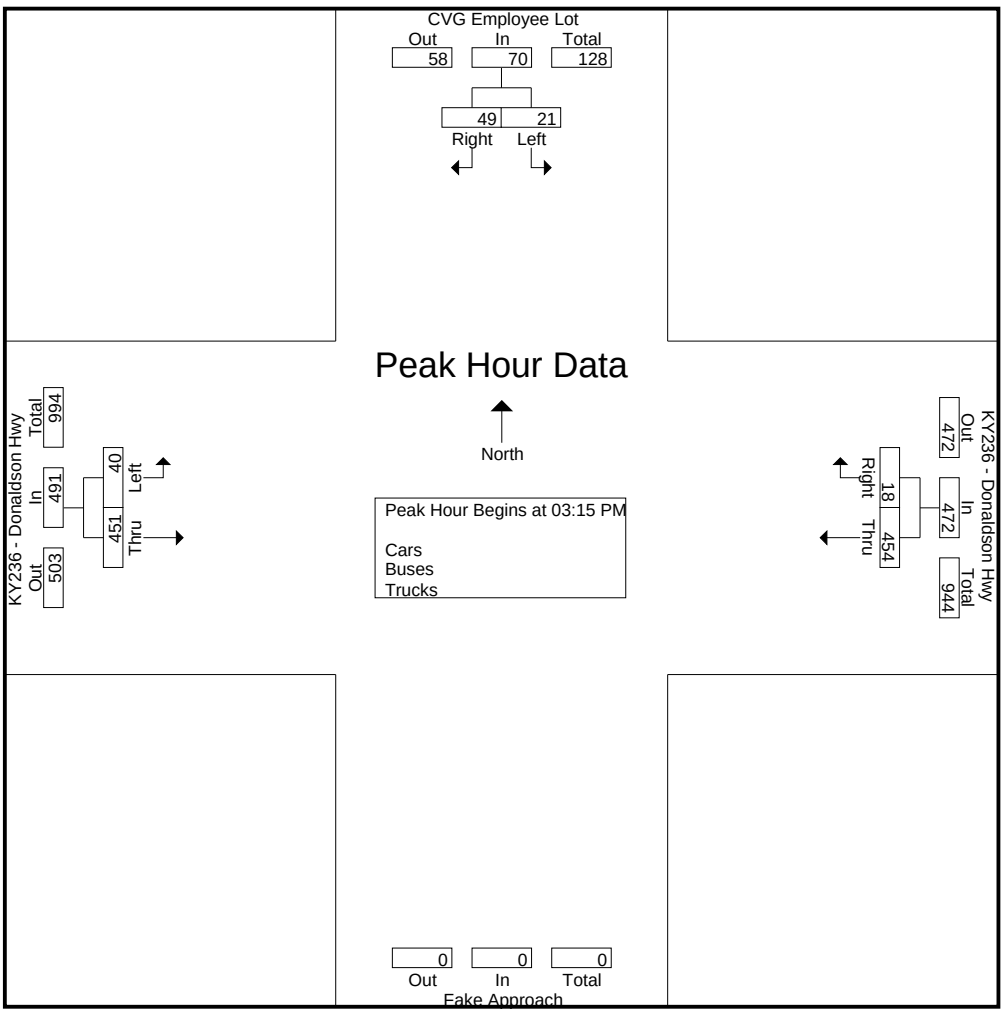
"simplifying Data Collection since 2004"

File Name : CVG_Employee_Lot_at_KY236_436494_08-03-2017
Site Code : Site 20 - Thursday
Start Date : 8/3/2017

	CVG Employee Lot From North			KY236 - Donaldson Hwy From East			KY236 - Donaldson Hwy From West			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 02:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 03:15 PM										
03:15 PM	5	9	14	114	6	**120**	8	94	102	236
03:30 PM	**9**	12	**21**	107	**7**	114	11	119	130	265
03:45 PM	2	13	15	114	4	118	9	111	120	253
04:00 PM	5	**15**	20	**119**	1	120	**12**	**127**	**139**	**279**
Total Volume	21	49	70	454	18	472	40	451	491	1033
% App. Total	30	70		96.2	3.8		8.1	91.9		
PHF	.583	.817	.833	.954	.643	.983	.833	.888	.883	.926



21. TERMINAL DRIVE TURNAROUND

Study Name Terminal Drive Turnaround
Start Date 08/03/2017
Start Time 12:00 AM
Site Code Site 21 - Thursday

	Right Turn Lane	Right Turn Lane Middle	Right Turn Lane	Left Turn Lane	WB Terminal Right Turn	WB Terminal Left Turn
Channel	Lane 1	Lane 2	Lane 3	Lane 4	Direction	Direction
Direction	Northbound	Northbound	Northbound	Northbound	Hour Peak	Hour Peak
12:00 AM	14	50	28	20		
12:15 AM	15	33	29	24		
12:30 AM	15	30	20	13		
12:45 AM	12	31	17	9	294	66
1:00 AM	7	23	10	9	242	55
1:15 AM	19	32	7	7	223	38
1:30 AM	9	8	2	7	177	32
1:45 AM	3	13	3	4	136	27
2:00 AM	8	25	8	6	137	24
2:15 AM	5	7	0	2	91	19
2:30 AM	3	3	0	0	78	12
2:45 AM	4	2	0	1	65	9
3:00 AM	0	6	0	1	30	4
3:15 AM	8	4	0	3	30	5
3:30 AM	9	2	0	0	35	5
3:45 AM	6	4	4	2	43	6
4:00 AM	13	19	4	11	73	16
4:15 AM	22	26	5	18	114	31
4:30 AM	28	43	7	14	181	45
4:45 AM	20	37	5	23	229	66
5:00 AM	27	46	16	37	282	92
5:15 AM	30	59	18	23	336	97
5:30 AM	35	78	30	41	401	124
5:45 AM	47	84	15	41	485	142
6:00 AM	36	89	27	38	548	143
6:15 AM	51	81	25	35	598	155
6:30 AM	34	74	18	35	581	149
6:45 AM	31	78	17	30	561	138
7:00 AM	39	87	16	27	551	127
7:15 AM	33	89	12	31	528	123
7:30 AM	42	85	21	38	550	126
7:45 AM	44	69	16	32	553	128
8:00 AM	33	64	28	26	536	127
8:15 AM	37	60	17	31	516	127
8:30 AM	34	48	30	35	480	124
8:45 AM	40	71	33	48	495	140
9:00 AM	39	86	27	34	522	148
9:15 AM	34	67	19	39	528	156
9:30 AM	29	55	15	33	515	154
9:45 AM	30	67	13	33	481	139
10:00 AM	45	62	19	36	455	141
10:15 AM	27	68	20	34	450	136
10:30 AM	37	66	15	27	469	130
10:45 AM	44	78	17	52	498	149
11:00 AM	50	73	23	47	518	160
11:15 AM	50	83	22	68	558	194
11:30 AM	52	95	31	53	618	220
11:45 AM	49	90	34	67	652	235
12:00 PM	57	82	39	52	684	240
12:15 PM	61	108	37	54	735	226
12:30 PM	61	109	39	61	766	234
12:45 PM	51	93	38	56	775	223
1:00 PM	53	82	39	49	771	220
1:15 PM	49	77	44	68	735	234

1:30 PM	53	70	29	51	678	224
1:45 PM	59	100	43	68	698	236
2:00 PM	73	125	66	70	788	257
2:15 PM	66	114	58	56	856	245
2:30 PM	58	84	25	44	871	238
2:45 PM	33	95	29	53	826	223
3:00 PM	54	75	32	65	723	218
3:15 PM	48	94	47	44	674	206
3:30 PM	61	95	49	48	712	210
3:45 PM	54	96	46	52	751	209
4:00 PM	54	105	72	54	821	198
4:15 PM	42	116	74	44	864	198
4:30 PM	41	83	34	42	817	192
4:45 PM	58	87	30	41	796	181
5:00 PM	47	66	25	45	703	172
5:15 PM	29	55	20	36	575	164
5:30 PM	43	50	19	38	529	160
5:45 PM	50	105	54	53	563	172
6:00 PM	49	105	43	56	622	183
6:15 PM	74	120	50	52	762	199
6:30 PM	52	70	30	56	802	217
6:45 PM	37	72	33	57	735	221
7:00 PM	55	86	40	57	719	222
7:15 PM	39	59	35	43	608	213
7:30 PM	36	61	37	60	590	217
7:45 PM	62	117	77	43	704	203
8:00 PM	24	64	42	28	653	174
8:15 PM	20	54	29	29	623	160
8:30 PM	30	30	13	15	562	115
8:45 PM	24	59	24	34	413	106
9:00 PM	18	70	44	30	415	108
9:15 PM	26	65	33	20	436	99
9:30 PM	26	73	39	24	501	108
9:45 PM	21	36	21	23	472	97
10:00 PM	22	34	11	22	407	89
10:15 PM	46	60	32	33	421	102
10:30 PM	47	101	61	21	492	99
10:45 PM	39	71	37	33	561	109
11:00 PM	45	75	57	28	671	115
11:15 PM	29	61	29	23	652	105
11:30 PM	42	96	59	27	640	111
11:45 PM	48	96	54	15	691	93

MASTER PLAN 2050

Appendix 4-A | Airfield Analysis

CVG
CINCINNATI/NORTHERN KENTUCKY
INTERNATIONAL AIRPORT

LEB
TEAM

CVG

CINCINNATI / NORTHERN KENTUCKY
INTERNATIONAL AIRPORT

ANALYSIS OF PAVEMENT GEOMETRICS, MARKING AND SIGNAGE

CINCINNATI / NORTHERN KENTUCKY INTERNATIONAL AIRPORT

August 2018

Prepared For:
Landrum & Brown

11279 Cornell Park Drive
Cincinnati, OH 45242

Prepared By:
Butler Fairman & Seufert

8450 Westfield Blvd., Suite 300
Indianapolis, IN 46240
(317) 713-4615

EXECUTIVE SUMMARY

Landrum & Brown (L&B) retained Butler, Fairman & Seufert (BF&S) to provide airfield design evaluations at the Cincinnati/Northern Kentucky International Airport (CVG) for an Airport Master Plan Study Update, titled "CVG Master Plan 2050." The scope of the airfield design evaluations includes identification of the pavement geometrics as well as pavement marking and signage that do not meet current Federal Aviation Administration (FAA) design parameters, are part of recent or proposed airfield configuration changes, or are considered existing complex geometries.

Observed non-standard geometrics and pavement markings have initiated comments from the Cincinnati FAA FAR Part 139 inspector, the Kenton County Airport Board (KCAB), and third party consultants. This report provides evaluation of pavement geometries for every intersection on the airfield, the associated impacts to airfield lighting, signage and markings, and the estimated costs to correct all identified issues. In addition to the geometric analysis, this report also delivers an analysis of existing airfield pavement markings and signage that are not in conformance with the applicable FAA Advisory Circulars (AC) at the current pavement geometry. Therefore some airfield intersections may exhibit two proposed corrections. One correction for airfield markings and signage at the current pavement geometry and one correction for geometrics with associated marking and signage.

FAA Advisory Circulars are considered the design criteria for the airfield at CVG and were consulted during the evaluation of the airfield pavement. The majority of the airfield is designed for Taxiway Design Group (TDG) 5 aircraft. A few locations were evaluated for a different critical aircraft group as depicted on the Aircraft Operating Restrictions exhibit provided by KCAB. These locations are mainly the taxilanes surrounding the terminal and taxi routes to and from the DHL cargo apron. For the cargo taxi routes there exist several approved Modifications to Standards (MOS) for the Boeing 747-8 aircraft, the sole TDG 6 aircraft regularly operating at CVG. For the scope of this report, TDG 5 is the critical design aircraft, with the exception of specific taxiways as depicted on the Aircraft Operating Restrictions exhibit provided by KCAB.

Exhibits were prepared for the entire airfield showing our analysis and recommended correction for each taxiway and intersection and are shown in Appendix B. Recommended corrections are based off the current TDG operating on a particular pavement. Summary tables are included with each exhibit indicating the location on the airfield, the controlling TDG, quantity of full depth pavement required, and cost broken out by component. The locations and associated costs of additional shoulder pavement are separated on each exhibit. Our analysis also considered lighting and signage impacts as well as pavement marking impacts due to the addition of full strength pavement.

Executive Summary

A preliminary opinion of probable construction cost is included in each exhibit for the intersection represented by that exhibit. The estimated costs focus on addition of full-depth and shoulder pavement, pavement remarking, and impacts to edge lighting. No project total is provided as it is assumed that not all recommended improvements will occur at the same time, nor would the FAA fund such a project. The total cost provided on each exhibit is a summation of the material costs and labor for those items only.

For the consideration of existing non-standard airfield markings and signage with current pavement geometry additional exhibits were created. These exhibits display the present conditions and the proposed improvements to bring the marking and signage to standard without any pavement geometry corrections.

Findings from the complete analysis reveal that additional full strength pavement is required to meet geometric fillet standards in a significant number of locations across the airfield. Furthermore, it was determined during the analysis that several angled taxiway connectors from runways are not within standard for true high-speed angled taxiway exits. It is recommended that these angled connectors be corrected to standard. In addition, the analysis confirms that five locations across the airfield where non-standard pavement markings and signage have been noted require corrective action regardless of whether or not the pavement geometrics are brought up to standard at this time.

Refer to Appendices B and C for the full analysis of pavement geometrics and pavement marking and signage.

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Analysis of Pavement Geometrics, Marking, and Signage

PROJECT DESCRIPTION

In June of 2017 Landrum & Brown (L&B) entered into agreement with the Kenton County Airport Board (KCAB) to provide various consulting services for an Airport Master Plan Study Update, titled "CVG Master Plan 2050," at the Cincinnati/Northern Kentucky International Airport (CVG). L&B retained Butler, Fairman & Seufert (BF&S) to provide airfield design evaluations at CVG. The scope of the airfield design evaluations includes identification of the pavement geometrics as well as pavement marking and signage that do not meet current Federal Aviation Administration (FAA) design parameters, are part of recent or proposed airfield configuration changes, or are considered existing complex geometries.

Observed non-standard geometrics and pavement markings have initiated comments from the Cincinnati FAA FAR Part 139 inspector, the KCAB, and third party consultants. In 2016 BF&S performed airfield design evaluation services on seven specific areas of the airfield, focusing on pavement markings associated with various hold aprons. This design evaluation, considered Phase 1, rectified the concerns of the Part 139 inspector with no deficiencies noted in the seven specific areas of the airfield during the most recent Part 139 inspection. L&B also performed airfield design evaluations in 2017 for runway ILS marking and signage and various vehicles service roads around the airport movement area. KCAB is now in need of an evaluation of the remaining portions of the airfield, not specifically studied under Phase 1, including an additional list of five specific areas where pavement markings or signage appear to be non-standard.

This report provides evaluation of pavement geometries for every intersection on the airfield, the associated impacts to airfield lighting, signage and markings, and the estimated costs to correct all identified issues. In addition to the geometric analysis, this report also delivers an analysis of existing airfield pavement markings and signage that are not in conformance with the applicable FAA Advisory Circulars (AC) at the current pavement geometry. Therefore some airfield intersections may exhibit two proposed corrections, one to correct just airfield markings and signage to standard at the current geometry and one to correct geometry to standard with associated marking and signage changes.

DESIGN PARAMETERS

FAA Advisory Circulars (AC) are considered the design criteria for the airfield at CVG and were consulted during the evaluation of the airfield pavement.

- Pavement Geometrics – The existing pavement geometries were evaluated for conformity to FAA AC 150/5300-13A – Airfield Design
- Pavement Markings – The existing taxiway markings were evaluated for conformity to FAA AC 150/5340-1L – Standards for Airfield Markings
- Airfield Lighting – The existing airfield lighting was evaluated for conformity to FAA AC 150/5340-30J – Design and Installation Details for Airport Visual Aids
- Airfield Signs – The existing airfield signage was evaluated for conformity to FAA AC 150/5340-18F – Standards for Airport Sign Systems
- Design Aircraft – The majority of the airfield is designed for Taxiway Design Group (TDG) 5 aircraft. A few locations were evaluated for a different critical aircraft group as depicted on the Aircraft Operating Restrictions exhibit provided by KCAB. These locations are mainly the taxilanes surrounding the passenger terminals and taxi routes to and from the DHL cargo apron. For the cargo taxi routes there exist several approved Modifications to Standards (MOS) for the Boeing 747-8 aircraft, the sole TDG 6 aircraft regularly operating at CVG. For the scope of this report, TDG 5 is the critical design aircraft, with the exception of specific taxiways as depicted on the Aircraft Operating Restrictions exhibit provided by KCAB. The current operating restrictions for each TDG are summarized in table and exhibit form in Appendix A.

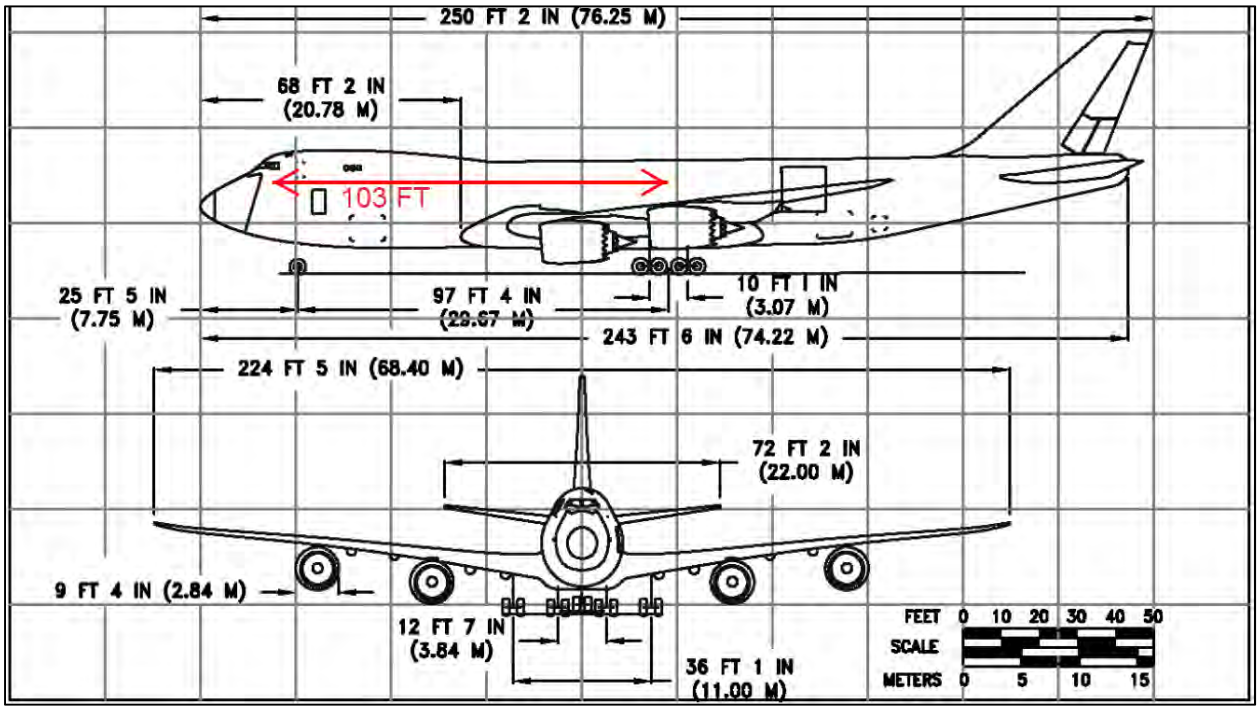


Figure 1: Dimensions of Boeing 747-8F for TDG Classification

Representative aircraft for the TDG restrictions at CVG are listed below:

- TDG 3 – Large regional jet, Medium passenger jet
  - Airbus A319/A320/A321
  - Boeing 737-700/800/900
  - Bombardier Regional Jet CRJ-700/900
- TDG 4 – Large passenger jet
  - Boeing 757
  - McDonnell Douglas MD-80/90
- TDG 5 – Heavy passenger/cargo jet
  - Airbus A300/A330
  - Boeing 747-400/767/777/787
- TDG 6 – Heavy passenger/cargo jet
  - Airbus A340
  - Boeing 747-8
  - McDonnell Douglas MD-11
- TDG 7 – Heavy passenger jet
  - Airbus A380

GEOMETRIC PARAMETERS

This issuance of FAA AC 150/5300-13A Change 1 – Airfield Design in 2014 included significant changes to the design approach for taxiway intersection fillets. Previously, taxiways were designed based on the Aircraft Design Group (ADG) airplane classification system which focuses more on aircraft operations and less on pavement geometrics. In the most recent revision, the FAA created a Taxiway Design Group (TDG) to address aircraft geometrics. Under the previous design criteria, there existed several aircraft that did not have sufficient pavement for a safe taxiing operation even though the taxiways were designed to the proper ADG. For example, the McDonnell Douglas MD-11 is an ADG IV aircraft, but the wide main gear spacing and long nose gear to main gear spacing categorize this aircraft as a TDG 6. The scope of this report covers the appropriate TDG identified for each particular taxiway as depicted on the Aircraft Operating Restrictions exhibit provided by KCAB. Therefore, Taxiway C was evaluated for TDG 6 geometrics, Taxiway M for TDG 5, and Ramp 2 North Taxilane for TDG 4 as examples.

In addition to the changes in aircraft classification, and, thus, taxiway design criteria, the revision to the AC also changed the way connector fillets are designed. The objective of the alteration was to add pavement where it was needed and eliminate pavement where it was not. In other words, pavement was added in turning movement areas and reduced in long linear taxiway sections. Our analysis includes the evaluation of taxiway shoulder pavement for the appropriate TDG as well. The required shoulder width for each TDG is provided in AC 150/5300-13A and shown below.

Table 1: TDG Design Standards from AC 150/5300-13A

ITEM	DIM (See Figure 4-6)	TDG							
		1A	1B	2	3	4	5	6	7
Taxiway Width	W	25 ft (7.5 m)	25 ft (7.5 m)	35 ft (10.5 m)	50 ft (15 m)	50 ft (15 m)	75 ft (23 m)	75 ft (23 m)	82 ft (25 m)
Taxiway Edge Safety Margin	TESM	5 ft (1.5 m)	5 ft (1.5 m)	7.5 ft (2 m)	10 ft (3 m)	10 ft (3 m)	15 ft (4.6m)	15 ft (4.6m)	15 ft (4.6m)
Taxiway Shoulder Width		10 ft (3 m)	10 ft (3 m)	15 ft (3 m)	20 ft (6 m)	20 ft (6 m)	30 ft (9 m)	30 ft (9 m)	40 ft (12 m)

Exhibits were prepared for the entire airfield showing our analysis and recommended correction for each taxiway and intersection and are shown in Appendix B. Recommended corrections are based off the current TDG operating on a particular pavement. Summary tables are included with each exhibit indicating the location on the airfield, the controlling TDG, quantity of full depth pavement required, and cost broken out by component. The locations

and associated costs of additional shoulder pavement are separated on each exhibit. Our analysis also considered lighting and signage impacts as well as pavement marking impacts due to the addition of full strength pavement.

LIGHTING AND SIGNAGE IMPACTS FOR GEOMETRIC CORRECTIONS

The taxiway edge lights will be affected considerably by the addition of full strength pavement. To provide the correct taxiway edge markings, taxiway edge lights will require relocation. This report provides a cursory evaluation of the electrical impact of improvements and provides budget costs for relocation in the pavement geometric exhibits. Due to light layout and spacing requirements of AC 150/5340-30J, light impacts in a location of geometry improvements can have a "snowball effect" on lights further down the taxiway where pavement improvements may not necessarily be needed. Our analysis provides a cost assuming the fewest amount of taxiway edge light relocation.

While taxiway edge lights are affected more frequently across the airfield, CVG has numerous taxiways with centerline lights that are part of the Surface Movement Guidance and Control System Plan (SMGCS) in effect at the airport. Geometric corrections and pavement marking standards will impact these centerline lines and significantly increase the cost for lighting improvements at various taxiway intersections.

Existing sign locations were evaluated with no impacts assessed due to full strength pavement geometry improvements. However, there are signs that are currently located in turf that would be located in the shoulder pavement if shoulders were added. Runway hold position signs are required to be located within 35 and 60 feet from the edge of the taxiway pavement per AC 150/5340-18F, Table 1. The proposed changes to the taxiway pavement edge do not result in hold position signs falling outside of the allowable range.

PAVEMENT MARKING IMPACTS FOR GEOMETRIC CORRECTIONS

The purpose of this study is to determine the locations where pavement geometrics are not in standard with AC 150/5300-13A. Associated centerline pavement markings follow the AC's guidance indicating whether or not the taxiway should be marked for cockpit-over-centerline steering or judgmental oversteer. If the pavement meets the old criteria for fillet design, then cockpit-over-centerline marking is the preferred choice. This allows the cockpit to remain over the marked taxiway centerline during turning movements and allow for a consistent taxi method throughout the airport. Judgmental oversteer requires the pilot to intentionally steer the aircraft off centerline to complete turning movements. See Figure 2 from AC 150/5300-13A

below. The majority of existing taxiway pavement at CVG does not require judgmental oversteer and is already marked for the preferred cockpit-over-center design.

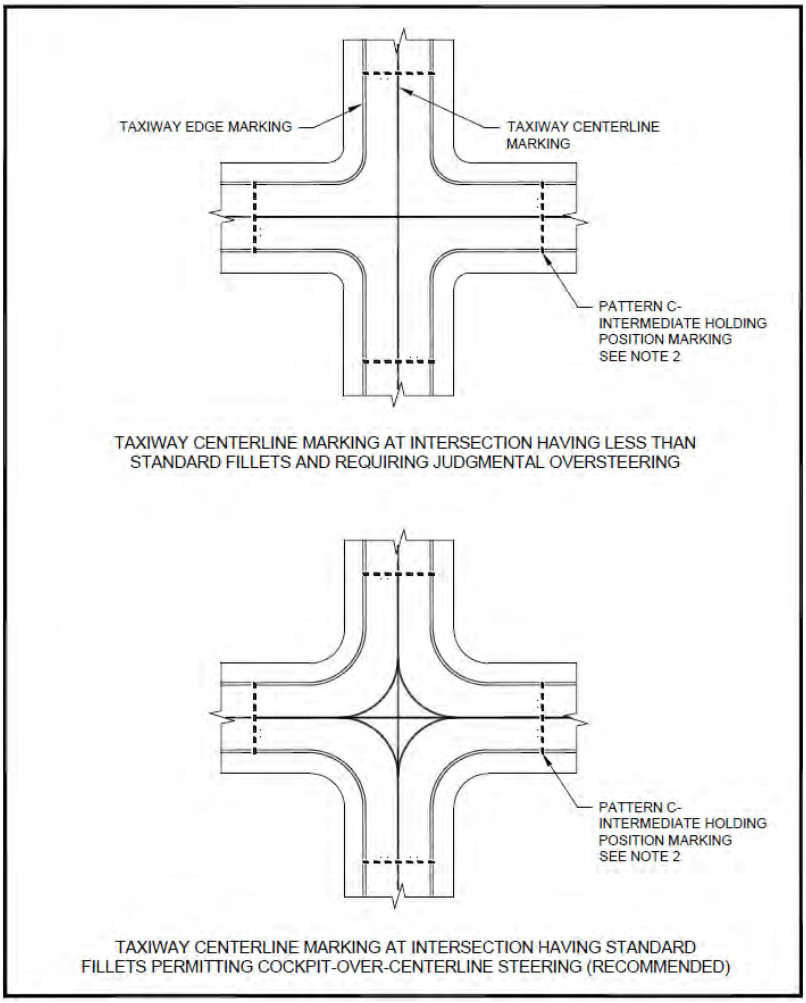


Figure 2: Difference between judgmental oversteer and cockpit-over-centerline steering

Existing cockpit-over-centerline markings have taxiway centerline radii of 150 feet for most 90 degree turns. AC 150/5300-13A requires only a 95 foot radius for a 90 degree turn on a TDG 5 taxiway and a 115 foot radius on a TDG 6 taxiway. Proposed fillet design improvements necessitate that the existing 150 foot radius markings be replaced with the current standard of markings to avoid taxiing issues. It is unlikely that there is sufficient pavement to support the 150 foot radius turns if the fillets are corrected to standard.

OPINION OF PROBABLE CONSTRUCTION COSTS

A preliminary opinion of probable construction cost is included in each geometric correction exhibit for the intersection represented by that exhibit. The estimated costs focus on addition of full-depth and shoulder pavement, pavement remarking, and impacts to edge lighting and centerline lights. The costs are based on recent bid history, but the total cost provided on each exhibit is a summation of the material costs and labor for these items only. No project total is provided as it is assumed that not all recommended improvements will occur at the same time, nor would the FAA fund such a project.

IDENTIFIED MARKING AND SIGNAGE INITIATIVES

For the consideration of existing non-standard airfield markings and signage with current pavement geometry, five specific locations on the airfield at CVG have been identified for evaluation:

- The taxiway edge lines do not match on either side of the approach hold bar to Runway 27 on Taxiway Sierra north of the intersection with Taxiway Juliet.
- The taxiway centerline on the southeast radius from Taxiway Tango to Taxiway Sierra does not continue south of the approach hold bar to Runway 27 on Taxiway Sierra north of the intersection with Taxiway Juliet.
- At Taxiway Kilo Three there are two enhanced taxiway centerlines that merge at the runway hold bar, but only one taxiway centerline continues on the other side of hold bar.
- The eastern side of the Taxiway Mike intersection with Runway 18-36C has only one mandatory hold position sign.
- Pilots are missing the turn off onto Taxiway Mike when landing on Runway 18C.

Additional exhibits were created for each location. These exhibits display the present conditions and the proposed corrections to bring the marking and signage in standard without any pavement geometry modification.

TAXIWAY SIERRA AT TAXIWAY JULIET

Two pavement marking inconsistencies were identified along the north edge of the intersection between Taxiway Sierra and Taxiway Juliet. The first, located on the northeast side of the intersection, is a non-uniform taxiway edge line at the approach holding position marking to Runway 27; refer to Exhibit 1 of Appendix C. The taxiway edge line starts and stops at different locations on either side of the holding position marking, preventing a continuous pavement marking. Holding position markings are intended to interrupt an otherwise continuous

pavement edge marking as described in AC 150/5340-1L paragraph 3.3d (3) and demonstrated in Figure D-4 from the same AC, shown below in Figure 3.

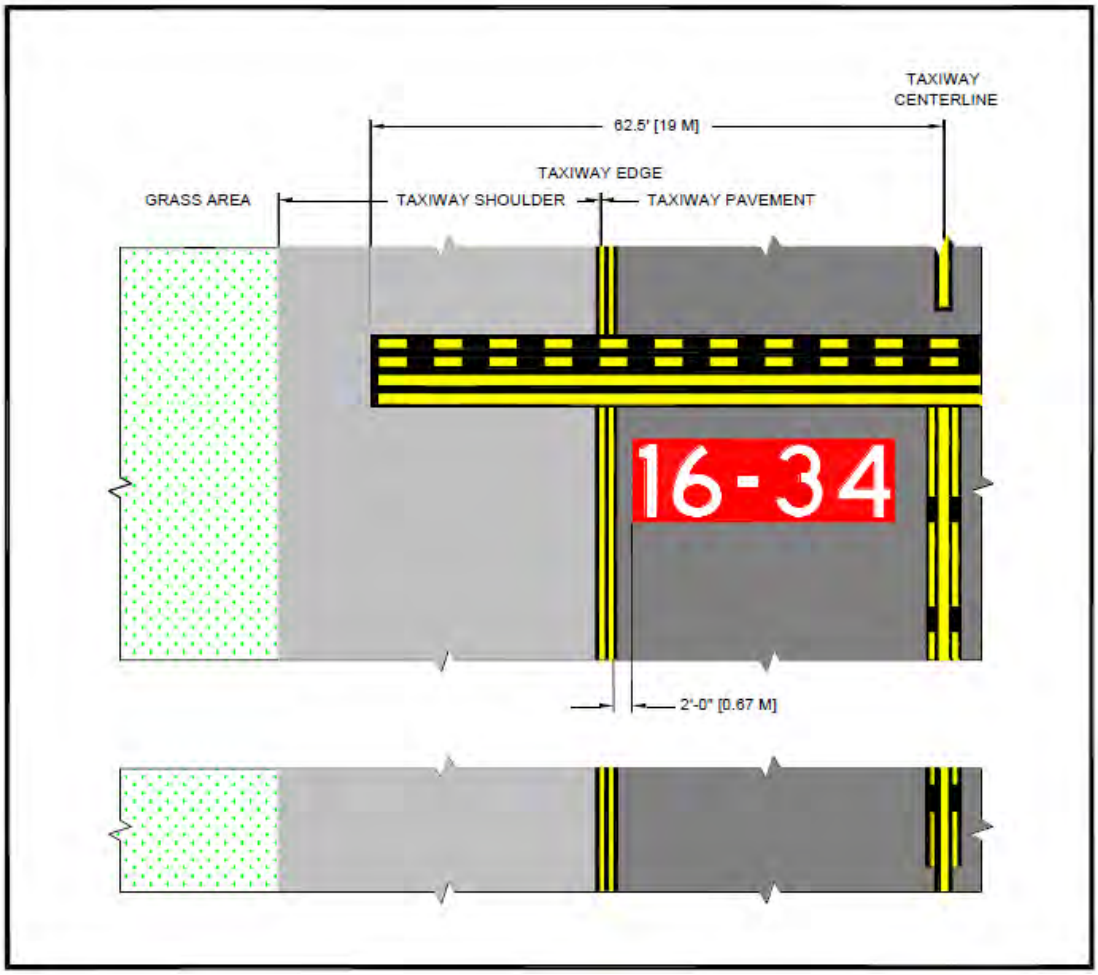


Figure 3: AC 150/5340-1L Fig. D-4

To correct this pavement marking inconsistency, the taxiway edge line south of the holding marking should be removed and remarked to create a continuous edge marking only interrupted by the holding marking. Refer to Exhibit 1 of Appendix C to view the proposed correction. It is important to note that this location on the airfield is used by TDG 5 aircraft and therefore per AC 150/5340-1L paragraph 3.3d (3), the holding position marking should extend 25 feet onto the paved shoulder of Taxiway Sierra. The northern taxiway edge line is marked correctly at the edge of the taxiway so that the holding marking extends 25 feet onto the paved shoulder; therefore, the edge marking south of the holding marking should be removed and remarked to create a continuous edge marking only interrupted by the holding marking.

The second pavement marking inconsistency is located along the same runway approach holding marking and is similar to the non-standard marking identified above. It can also be seen in Exhibit 1 of Appendix C. There are two taxiway centerlines from the north on Taxiway Sierra, one for Sierra and one for a radius from the Ramp 3 Taxilane, that end at the holding marking. However, only the Sierra centerline continues on the other side of the holding marking. Per AC 150/5340-1L paragraph 3.3d (2), the taxiway centerline marking should be continuous except for the interruption of the runway holding position marking. To correct this inconsistency the radius taxiway centerline marking should be marked on the south side of the holding marking to correctly show the intersection between the two taxiway centerline markings. For clarification, this location does not require enhanced taxiway centerline markings because the approach holding position bar is protecting the departure surface for Runway 9 only and is not protecting a physical taxiway connection to the Runway. There are no lighting or signage impacts with these pavement marking corrections as the holding position bar is in the correct location and will not be altered.

Table 2: Opinion of Probable Cost

Description	Quantity	Unit Cost	Total
Maintenance of Traffic	1 LS	$1,000.00	$1,000.00
Mobilization	1 LS	$1,000.00	$1,000.00
Security – 2 Personnel	8 HRS	$100.00	$800.00
Marking Removal	20 SFT	$100.00	$2000.00
Taxiway Marking – Yellow	18 SFT	$2.00	$36.00
Taxiway Marking - Black	22 SFT	$2.00	$44.00
Reflective Media, Type I	2 LBS	$10.00	$20.00
Labor – Crew of 4	16 HRS	$50.00	$800.00
		Project Total	$5,700.00

TAXIWAY KILO THREE

At Taxiway Kilo Three there exists the same pavement marking inconsistency in the taxiway centerline as identified at the intersection of Taxiway Sierra and Taxiway Juliet above. There are two taxiway centerlines leading onto Taxiway Kilo Three from Taxiway Kilo that intersect the runway holding position marking, however only one taxiway centerline is shown on the runway side of the holding position marking. Per AC 150/5340-1L paragraph 3.3d (2), the taxiway centerline marking should be continuous except for the interruption of the runway holding position marking. To correct this inconsistency, the second taxiway centerline marking should be marked on the runway side of the holding position marking until both taxiway centerlines intersect.

Appendix C contains Exhibit 2 showing the existing conditions and proposed corrections to the pavement marking inconsistency identified at this taxiway intersection. There are no lighting or signage impacts with the pavement marking correction as the runway holding position bar is in the correct location and will not be altered.

Table 3: Opinion of Probable Cost

Description	Quantity	Unit Cost	Total
Maintenance of Traffic	1 LS	$1,000.00	$1,000.00
Mobilization	1 LS	$1,000.00	$1,000.00
Security – 2 Personnel	8 HRS	$100.00	$800.00
Taxiway Marking – Yellow	6 SFT	$2.00	$12.00
Taxiway Marking - Black	6 SFT	$2.00	$12.00
Reflective Media, Type I	1 LBS	$10.00	$10.00
Labor – Crew of 4	4 HRS	$50.00	$800.00
		Project Total	$3,634.00

TAXIWAY MIKE AT RUNWAY 18C-36C

The intersection of Taxiway Mike and Runway 18C-36C has two identified airfield signage inconsistencies: one standards issue and one pilot confusion issue. Highlighting the significance of these signage inconsistencies is the fact that there are sixteen taxiway intersections in close proximity of each other between Taxiways Juliet, Kilo, Mike, and Runway 9-27 and Taxiways Charlie, Delta, Echo, and Runway 18C-36C. This area of the airfield is a FAA identified hot spot and the only hot spot at CVG. Figure 5 below and Exhibit 3 in Appendix C show the existing conditions in the FAA hot spot. An FAA hot spot is defined as a location on an airport movement area with a history of potential risk of collision or runway incursion, and where heightened attention by pilots and drivers is necessary. While the signage inconsistencies observed will not alleviate the hot spot in its entirety, it is critical to ensure proper signage and markings in a location with a greater potential safety risk.

The recognized standards issue is located on the east side of the intersection and relates to the runway holding position signage on Taxiway Mike protecting Runway 18C-36C. Currently there is a runway holding position sign located on the left hand side of Taxiway Mike at Runway 18C-36C only (Sign M-28). The backside panel of this sign is non-standard, the location panel for Taxiway M should be on the outboard portion of the sign. Per AC 150-5340-18F Chapter 1.12c:

> "Taxiway location signs installed in conjunction with holding position signs for taxiway/runway intersection are installed outboard of the holding position sign."

Furthermore, AC 150-5340-18F Chapter 1.5a describes several instances in which the geometric configuration of runways and taxiways necessitates holding position signs on both sides of the taxiway. The most applicable scenario in this case is as follows:

"(1) Taxiways that are 150 feet or greater in width"

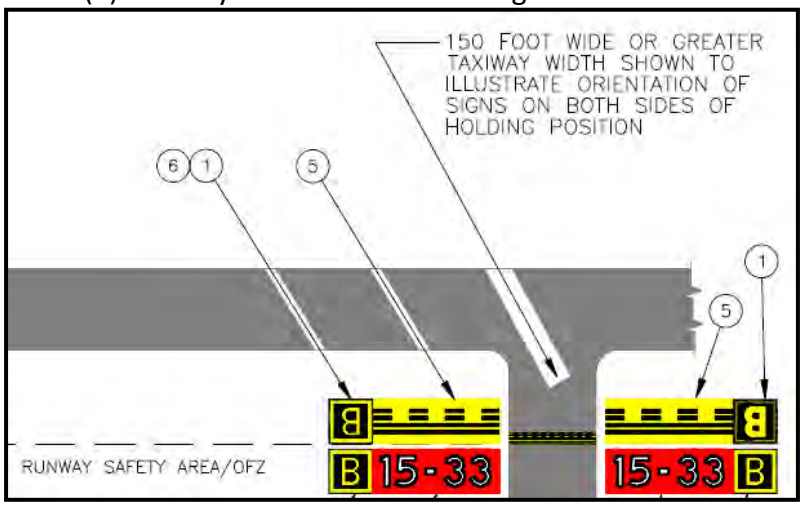


Figure 4: An excerpt from Fig. 3 of AC 150/5340-18F

Taxiway Mike at this location is 155 feet wide, therefore a second runway holding position sign should be installed on the right hand side of the taxiway to be in conformance with the Advisory Circular. There is an existing guidance sign, M-30, located on the right hand side of Taxiway Mike in the correct orientation; however, the sign is not in line with the runway holding position pavement marking, nor is it the correct number of modules for a runway holding position sign. Therefore, an entirely new sign will need to be installed on a new foundation; see Appendix C Exhibit 3 for proposed conditions. The guidance information on the existing sign will be removed as the backside panels of the proposed runway holding position sign will display the runway hold position pavement marking. See excerpt below from AC 150/5340-18F Chapter 1.7a regarding backside panels of runway hold position signs:

> "RSA/OFZ and Runway Approach Boundary Sign… The sign is typically used only at controlled airports at the request of the airport traffic control tower and is located on taxiways where the controller commonly asks the pilot to report 'clear of the runway' or where an aircraft is regularly required to stop upon exiting the runway."

Existing runway hold position signs at CVG in other locations include this backside RSA boundary sign. A four module size three sign can be installed in this location within standard offsets from both Taxiway Mike and Taxiway Delta.

As directed by KCAB in the scoping agreement for the marking evaluation, BF&S was tasked to evaluate the reported pilot confusion issue of aircraft landing on 18C and missing the turnoff on to Taxiway Mike. Consequently, when an aircraft misses the Taxiway Mike exit, runway exits Delta Four or Delta Three must be used to return to Taxiway Mike and the terminal area. To reduce pilot confusion, it is recommended that a taxiway directional sign be installed on the existing blank backside panels of sign 339 as shown in Figure 5 below and Exhibit 3 of Appendix C. Existing sign 339 is a mandatory instruction sign for aircraft on Runway 36C that they are approaching Runway 9-27. As can be seen on sign 234, directional signs exist on the backside of these mandatory instruction signs at runway/runway intersections.

There is no directional sign for Taxiway Mike on existing sign 230, and it is not recommended to install one as Taxiway Mike is less than 4,000 linear feet from the Runway 36C threshold. The backside panel of sign 339 only should be replaced with directional signs for Taxiway Mike. Moreover, to further reduce pilot confusion and in compliment with the Taxiway Mike directional sign, a lead on line in accordance with AC 150/5340-1L Chapter 4.2 c (2) (ii) should be marked from Runway 18C-36C to the east connector of Taxiway Mike. There is no operational need at this time to install Taxiway Mike directional signs or taxiway lead on lines to the west of Runway 18C-36C.

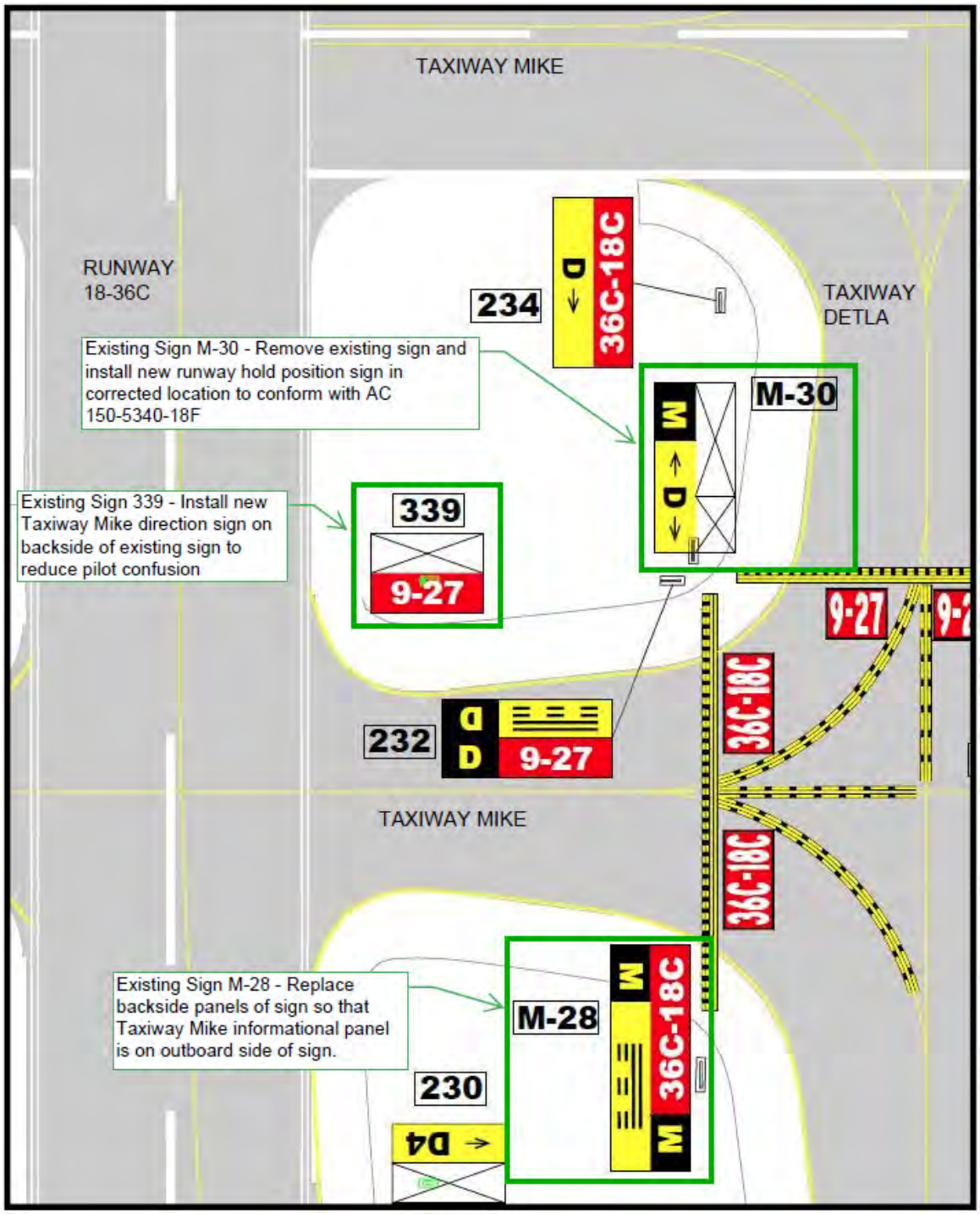


Figure 5: Overview of Existing Signage at Taxiway Mike and Runway 18C-36C Intersection

Table 4: Opinion of Probable Cost

Description	Quantity	Unit Cost	Total
Maintenance of Traffic	1 LS	$5,000.00	$5,000.00
Mobilization	1 LS	$5,000.00	$5,000.00
Security	40 HR	$100.00	$4,000.00
Construction Engineering	1 LS	$1,000.00	$1,000.00
Replace Sign Panels	2 EA	$1,000.00	$2,000.00
Remove 3 Module Sign and Foundation	1 EA	$1,500.00	$1,500.00
L-858, Install new 4 Module Sign and Foundation	1 EA	$10,000.00	$10,000.00
Taxiway Marking – Yellow	950 SFT	$2.00	$1,900.00
Taxiway Marking - Black	950 SFT	$2.00	$1,900.00
Reflective Media, Type I	60 LBS	$5.00	$300.00
		Project Total	$32,600.00

DRAFT AC 150/5340-18J ANTICIPATED CHANGES

In 2017 a draft version of AC 150/5340-18G was circulated to industry experts and leaders to review and provide comment before being officially issued to replace the current Advisory Circular 150/5340-18F. As of August 2018 this AC is still in draft form with an unknown date of publication. The principal changes in the draft AC should not be considered final and are subject to change; however, it is prudent to review the proposed principal changes in relation to the current configuration of the signage system at CVG to anticipate future modifications that might be required.

One of the most significant changes proposed in AC 18G is the inclusion of holding position signage and marking for departure surfaces in addition to approach surfaces. Previous versions of the AC address departure surfaces, however no guidance was given regarding sign convention for these departure surfaces. If the proposed changes are published as-is, CVG can expect the holding position signage and marking around Runway 27 to require modification to highlight the departure surface as well. This would include existing signage and marking on Taxiways Juliet, Sierra, Tango, and Mike. The holding position signage on Taxiway Kilo for the Runway 18R departure surface would likely require modification as well. See Figure 6 below for an excerpt from a figure in the draft AC showing the new departure surface hold signs and protection requirements.

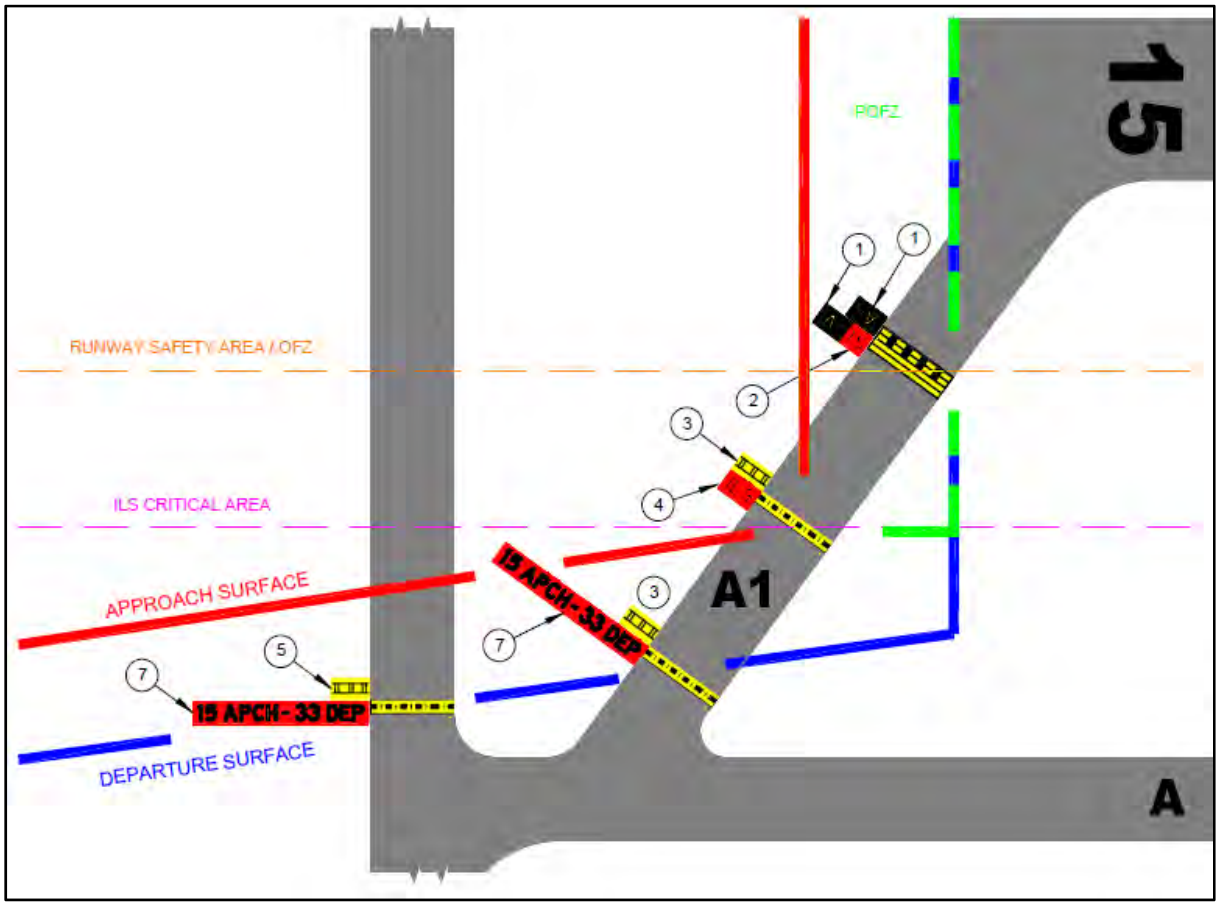


Figure 6: Excerpt from draft AC 150/5340-18G

RESULTS OF COMBINED ANALYSIS

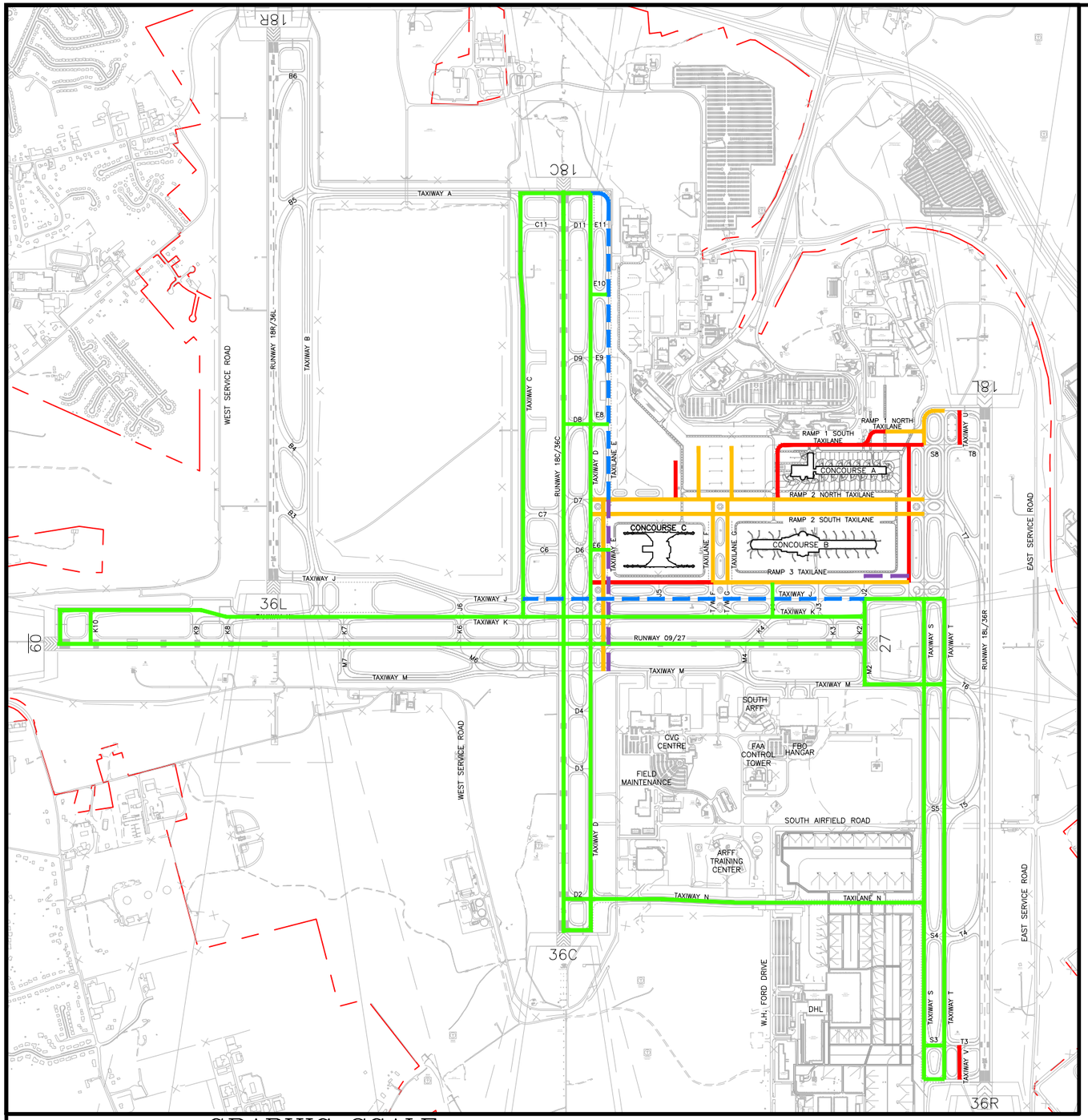
Findings from the complete analysis reveal that additional full strength pavement is required to meet geometric fillet standards in a significant number of locations across the airfield. Furthermore, it was determined during the analysis that several angled taxiway connectors from runways were designed and constructed under spiral-curve design standards. Spiral curves are no longer acceptable AC design criteria for high-speed angled exits off of runways. It is recommended that these angled connectors be corrected to current standards. The new locations of the high-speed exits in the geometric improvements exhibits are to highlight standards correction and are for cost estimating purposes only. These runway exit taxiways have not been sighted based on the operational needs of CVG. Further study is required to construct the high speeds exits in the optimal location based on the runway fleet mix.

Taxiway Delta has several runway exit taxiways with broad radii from the exiting direction of the runway. These exits are D3, D4, D6, D7, and D8. The assumption was made in this analysis that given additional offset of the Taxiway D centerline from the Runway 18C-36C centerline, some or all of these runway exit taxiways would likely be existing high speed exits. However, with a taxiway centerline offset of only 400', there is not sufficient space to construct a high speed exit to standard. Therefore these taxiway connectors were shown to be corrected to standard as perpendicular runway exit taxiways only.

Findings from the marking and signage initiative confirm that standards corrections are required for four of the five identified locations on the airfield. In addition, the analysis of the fifth location reviewed at the request from KCAB indicates that immediate action can be taken to reduce pilot confusion in a known FAA hot spot area. While pilot confusion is an operational issue and not a design issue, the recommended remediation can be implemented quickly. A more detailed analysis would need to be conducted to determine the appropriate location for future runway exit taxiways, and this recommendation should not be viewed as a long term correction to an operational issue.

The five locations where non-standard pavement markings and signage have been noted require corrective action regardless of whether or not the pavement geometrics are brought up to standard at this time. The total opinion of probable cost for all implementation is approximately $42,000.

APPENDIX A



Note:

When landing B747-8 aircraft on Runway 18C/36C during visibility below 1/2 mile, CAT I I / I I I operations, no activity is permitted on Taxiway D.

In normal operating conditions, the airfield is designed for Group V aircraft on all pavements except those noted with color restrictions.

When ILS Category I I / I I I operations are in effect to Runway 36C, FAA Design Group V and VI aircraft shall not utilize any portion of Taxiway "D", when aircraft executing the approach are at, or inside the Final Approach Fix.

LEGEND

Normal Operating Restrictions

- GROUP I I I or smaller only
- GROUP IV or smaller only

B747-8 Operating Restrictions

- B747-8 Permitted
- GROUP I I I or smaller only
- GROUP IV or smaller only

DEFINITIONS

Aircraft Design Group I: Wingspan up to but not including 49 feet (15m).

Aircraft Design Group II: Wingspan 49 feet (15m) up to but not including 79 feet (24 m).
Representative aircraft:
- Jetstream 31 - 52.0 feet (15.8 m)
- Cessna Citation II / III - 51.7 feet / 53.5 feet (15.8 m/16.3 m)
- Canadair RJ - 69.6 feet (21.2 m)

Aircraft Design Group III: Wingspan 79 feet (24 m) up to but not including 118 feet (36 m).
Representative aircraft:
- Airbus 320 - 111.3 feet (33.9 m)
- Boeing 727-(all versions) - 108.0 feet (32.9 m)
- Boeing 737-100 / 200 - 93.0 feet (28.3 m)
- Boeing 737-300 / 400 / 500 - 94.8 feet (28.9 m)
- DC 9-20 / 30 / 40 / 50 - 93.3 feet (28.4 m)
- MD 80 / 82 - 107.8 feet (32.9 m)
- Avro RJ - All versions - 86.4 feet (26.3 m)

Aircraft Design Group IV: Wingspan 118 feet (36 m) up to but not including 171 feet (52 m).
Representative aircraft:
- Airbus 300 - 147.1 feet (44.8 m)
- Airbus 310 - 1144.1 feet (43.9 m)
- Boeing 707-420 - 142.4 feet (43.4 m)
- Boeing 757 - 124.8 feet (38.0 m)
- Boeing 767-200 / 300 - 156.1 feet (47.6 m)
- L1011 100 / 200 - 155.3 feet (47.3)
- DC 10-30 / 40 - 165.4 feet (50.4 m)
- DC 8-62 - 148.4 feet (45.2 m)

Aircraft Design Group V: Wingspan 171 feet (52 m) up to but not including 214 feet (65 m).
Representative aircraft:
- Boeing 747-100 / 200 / 300 - 195.7 feet (59.6 m)
- Boeing 747-400 - 213.0 feet (64.9 m)
- Boeing 777-200 - 199.9 feet (60.9 m)
- Airbus 340-200 - 198.0 feet (60.3 m)

Aircraft Design Group VI: Wingspan 214 feet (65.2 m) and above.
Representative aircraft:
- Boeing 747-800 - 224.4 feet (68.4 m)
- Airbus A380 - 261.6 feet (79.8 m)

NORTH

GRAPHIC SCALE

1,800' 0 900' 1,800' 3,600'

(In Feet)
1 inch = 1,800ft.

DATE	REVISION	BY	AUTH.
09/26/18	REVISED TAXIWAY 'S' RESTRICTIONS	D.F.T.	J.T.M.
11/06/17	REVISED TAXIWAY 'S' RESTRICTIONS (T/W 'J' & T/W 'M')	D.F.T.	J.T.M.

KENTON COUNTY AIRPORT BOARD
CVG
CINCINNATI/NORTHERN KENTUCKY
INTERNATIONAL AIRPORT

AIRPORT CERTIFICATION MANUAL

AIRCRAFT OPERATING RESTRICTIONS

PROJ.NO: n/a	CHK.BY: J.T.M.
DATE: 04-20-17	APPR.BY: B.C.B.
DWG.BY: D.F.T.	SCALE: 1"=1800'
CAD NO: Aircraft Restrictions.dwg	

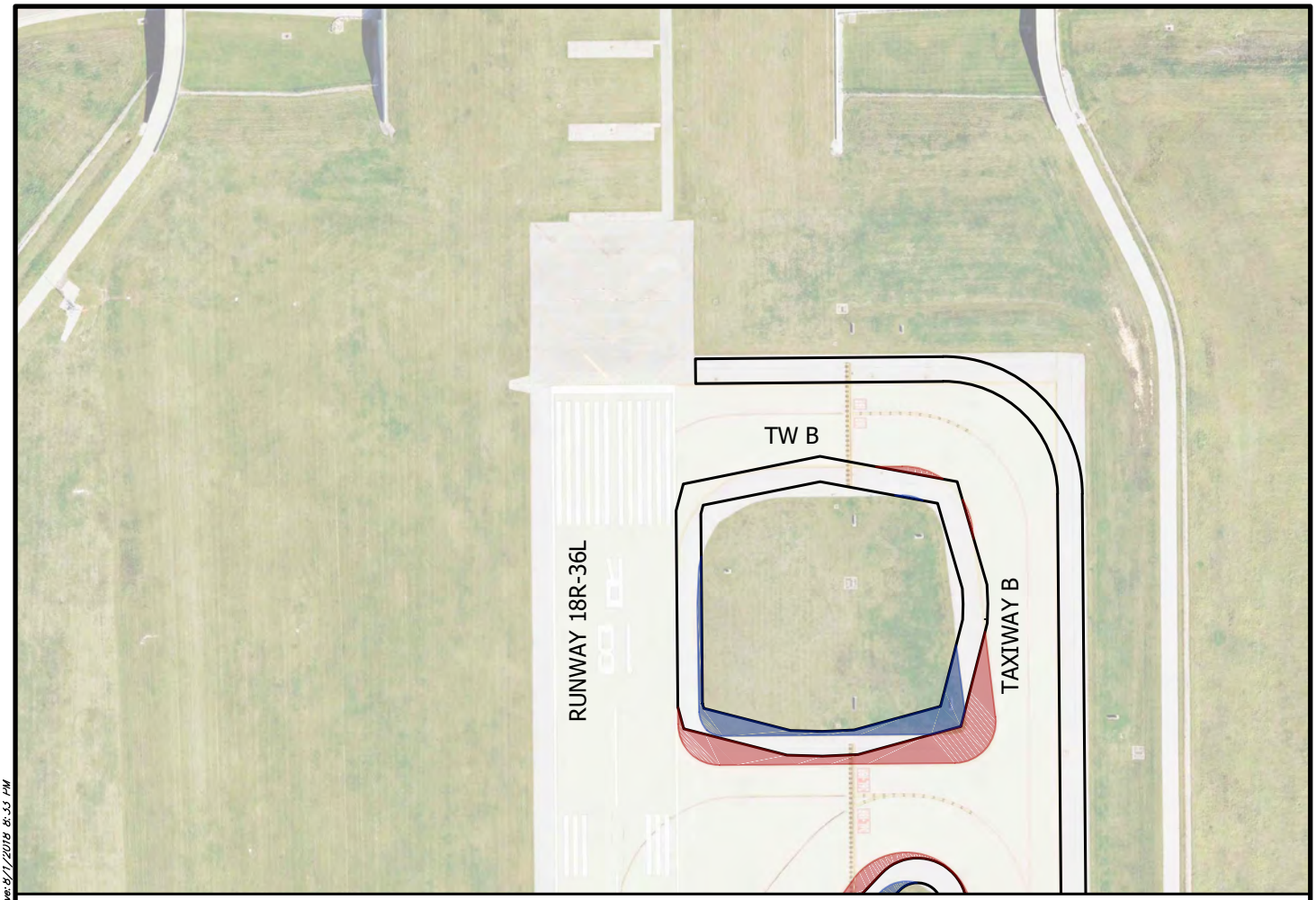
SHEET NO: 01

U:\KCAB - ACM EXHIBITS\AIRCRAFT RESTRICTIONS.DWG 11/6/2017 8:04 AM DTUCKER

Taxiway	Location & Normal Operating Restrictions (Largest TDG)	
A	Taxiway B to Taxiway C	5
	Taxiway C to Runway 18C	6
B	Full Length	5
B3	Full Length	5
B4	Full Length	5
B5	Full Length	5
B6	Full Length	5
C	Taxiway M to Taxiway K	5
	Taxiway K to Taxiway A	6
C6	Full Length	5
C7	Full Length	5
C11	Full Length	5
D	Full Length	6
D2	Full Length	6
D3	Full Length	5
D4	Full Length	5
D6	Full Length	5
D7	Full Length	5
D8	Full Length	6
D9	Full Length	5
D11	Full Length	5
E	Taxiway M to Taxiway E7	4
	Taxiway E7 to Taxiway A	5
E5	Full Length	3
E6	Full Length	6
E7	Full Length	4
E8	Full Length	6
E9	Full Length	5
E10	Full Length	6
E11	Full Length	5
F	Taxiway K to Ramp 3 Taxilane	5
	Ramp 3 to Ramp 2 North Taxilane	4
G	Taxiway K to Ramp 3 Taxilane	5
	Ramp 3 to Ramp 2 North Taxilane	4
H	Ramp 2 North Taxilane to Ramp 1 South Taxilane	3
J	Taxiway T to Taxiway J2	6
	Taxiway J2 to RW 36L	5

Taxiway	Location & Normal Operating Restrictions (Largest TDG)	
K	Full Length	6
K2	Full Length	6
K3	Full Length	5
K4	Full Length	5
K6	Full Length	5
K7	Full Length	5
K8	Full Length	5
K9	Full Length	5
K10	Full Length	6
M	Taxiway T to Taxiway M2	6
	Taxiway M2 to M7	5
M2	Full Length	6
M4	Full Length	5
M6	Full Length	5
M7	Full Length	5
N	Full Length	6
R	Full Length	3
S	RW 36R to Taxiway T	5
	Taxiway T to Taxiway J	6
	Taxiway J to RW 18L	5
S3	Full Length	6
S4	Full Length	5
S5	Full Length	5
S8	Full Length	5
T	Taxiway S3 to Taxiway J	6
	Taxiway J to Taxiway S8	6
T3	Full Length	5
T4	Full Length	5
T5	Full Length	5
T6	Full Length	5
T7	Full Length	5
T8	Full Length	5
U	Full Length	3
V	Full Length	3

APPENDIX B



Taxiway Intersection Information		
RW 18R & TW B END CONNECTOR	TDG	5
Additional Pavement (SYD) 0	$Cost_{Pvmt}$	0
Additional Shoulder (SYD) 0	$Cost_{Shoulder}$	0
Additional Marking	$Cost_{Marking}$	6,125
Lighting	$Cost_{Lighting}$	12,000
	$Cost_{Total}$	18,125

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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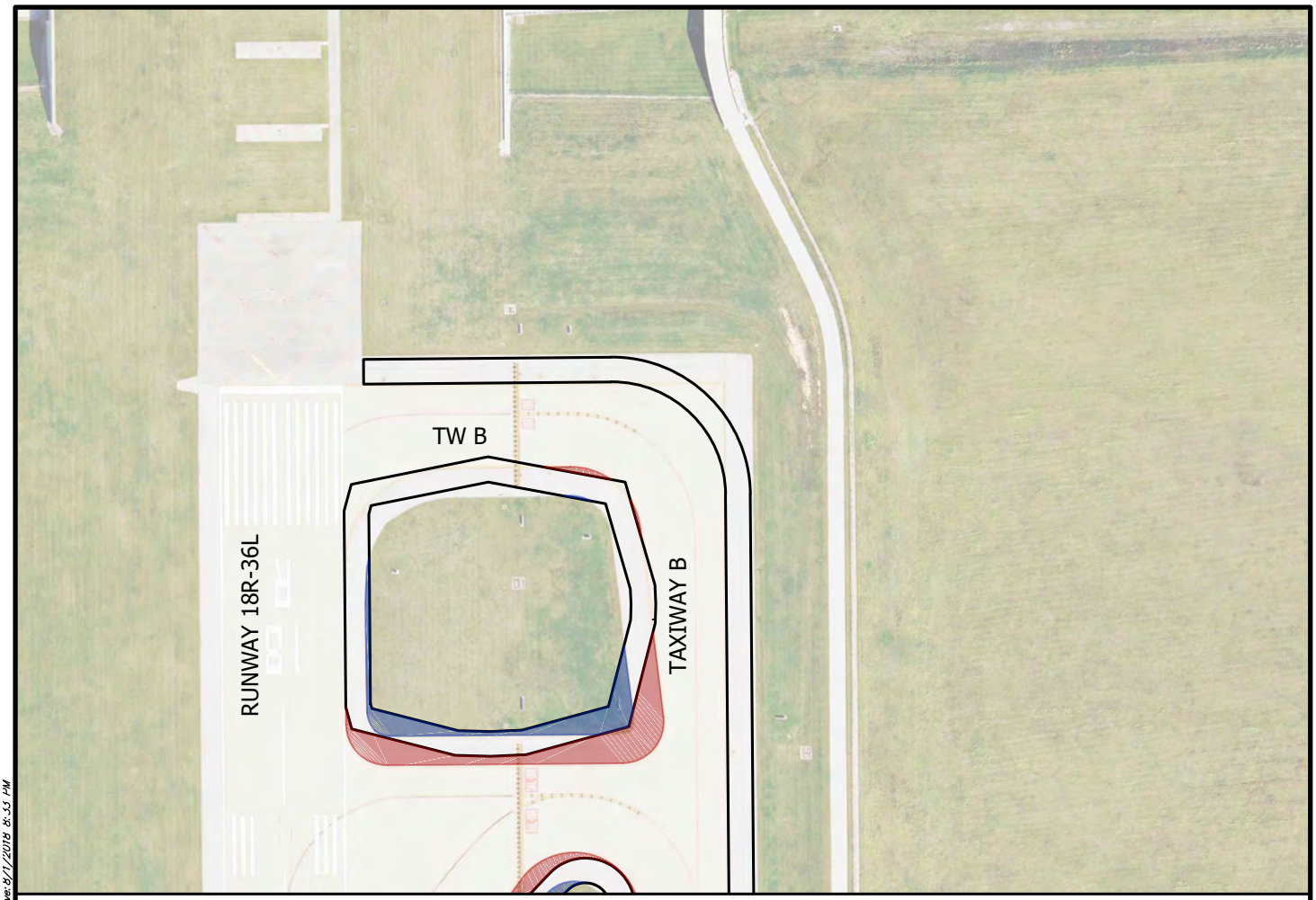
CVG CINCINNATI/NORTHERN KENTUCKY INTERNATIONAL AIRPORT



Taxiway Intersection Information		
TW B & TW B END CONNECTOR	TDG	5
Additional Pavement (SYD) 55	$Cost_{Pvmt}$	16,417
Additional Shoulder (SYD) 7	$Cost_{Shoulder}$	280
Additional Marking	$Cost_{Marking}$	7,875
Lighting	$Cost_{Lighting}$	20,000
	$Cost_{Total}$	44,572

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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Taxiway Intersection Information		
RW 18R & TW B6	TDG	5
Additional Pavement (SYD) 1618	$Cost_{Pvmt}$	485,533
Additional Shoulder (SYD) 1353	$Cost_{Shoulder}$	56,835
Additional Marking	$Cost_{Marking}$	21,375
Lighting	$Cost_{Lighting}$	34,000
	$Cost_{Total}$	597,744

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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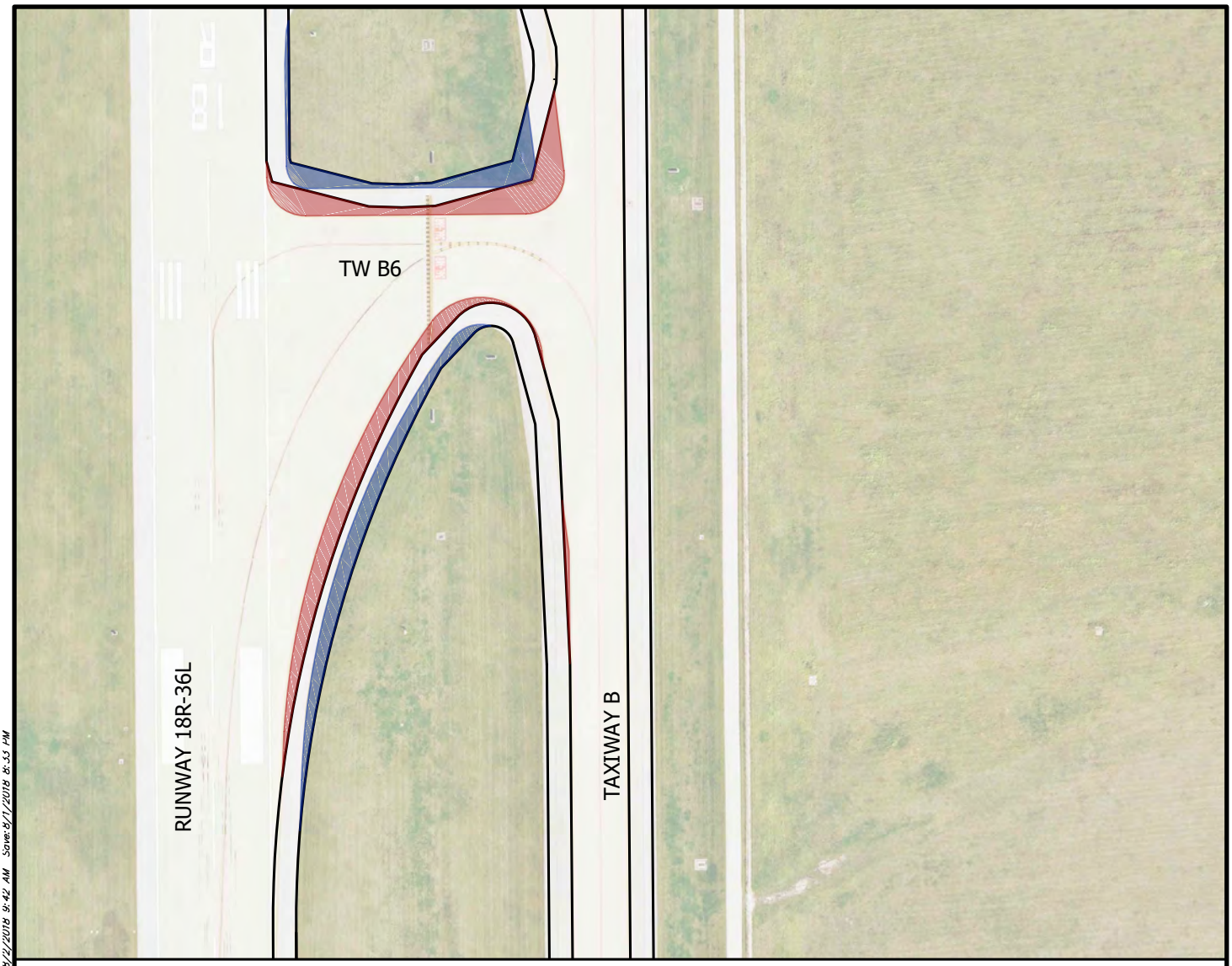

Taxiway Intersection Information		
TW B & TW B6	TDG	5
Additional Pavement (SYD) 1026	$Cost_{Pvmt}$	307,733
Additional Shoulder (SYD) 559	$Cost_{Shoulder}$	23,459
Additional Marking	$Cost_{Marking}$	16,625
Lighting	$Cost_{Lighting}$	28,000
	$Cost_{Total}$	375,818

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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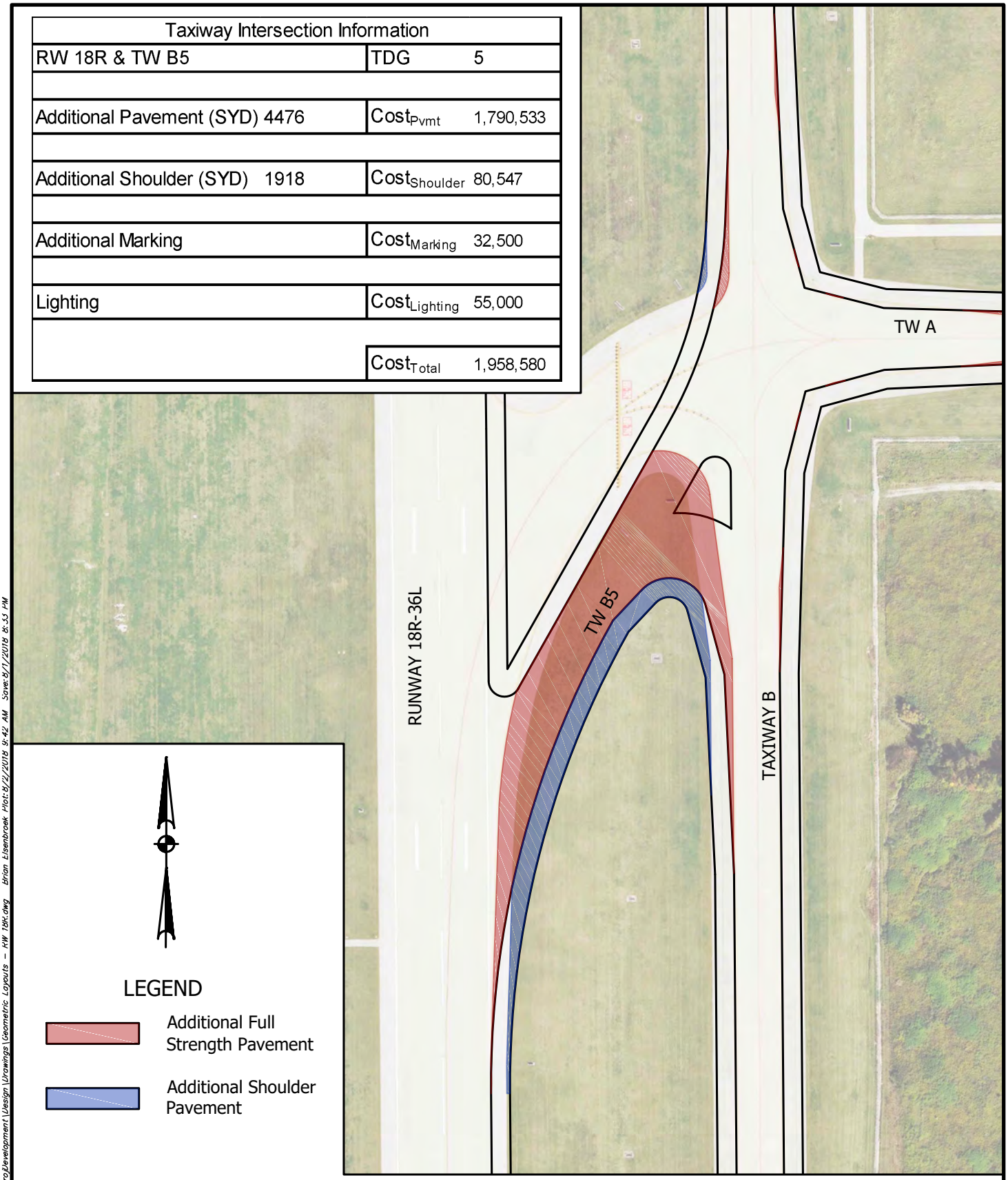
Taxiway Intersection Information		
RW 18R & TW B5	TDG	5
Additional Pavement (SYD) 4476	$Cost_{Pvmt}$	1,790,533
Additional Shoulder (SYD) 1918	$Cost_{Shoulder}$	80,547
Additional Marking	$Cost_{Marking}$	32,500
Lighting	$Cost_{Lighting}$	55,000
	$Cost_{Total}$	1,958,580



LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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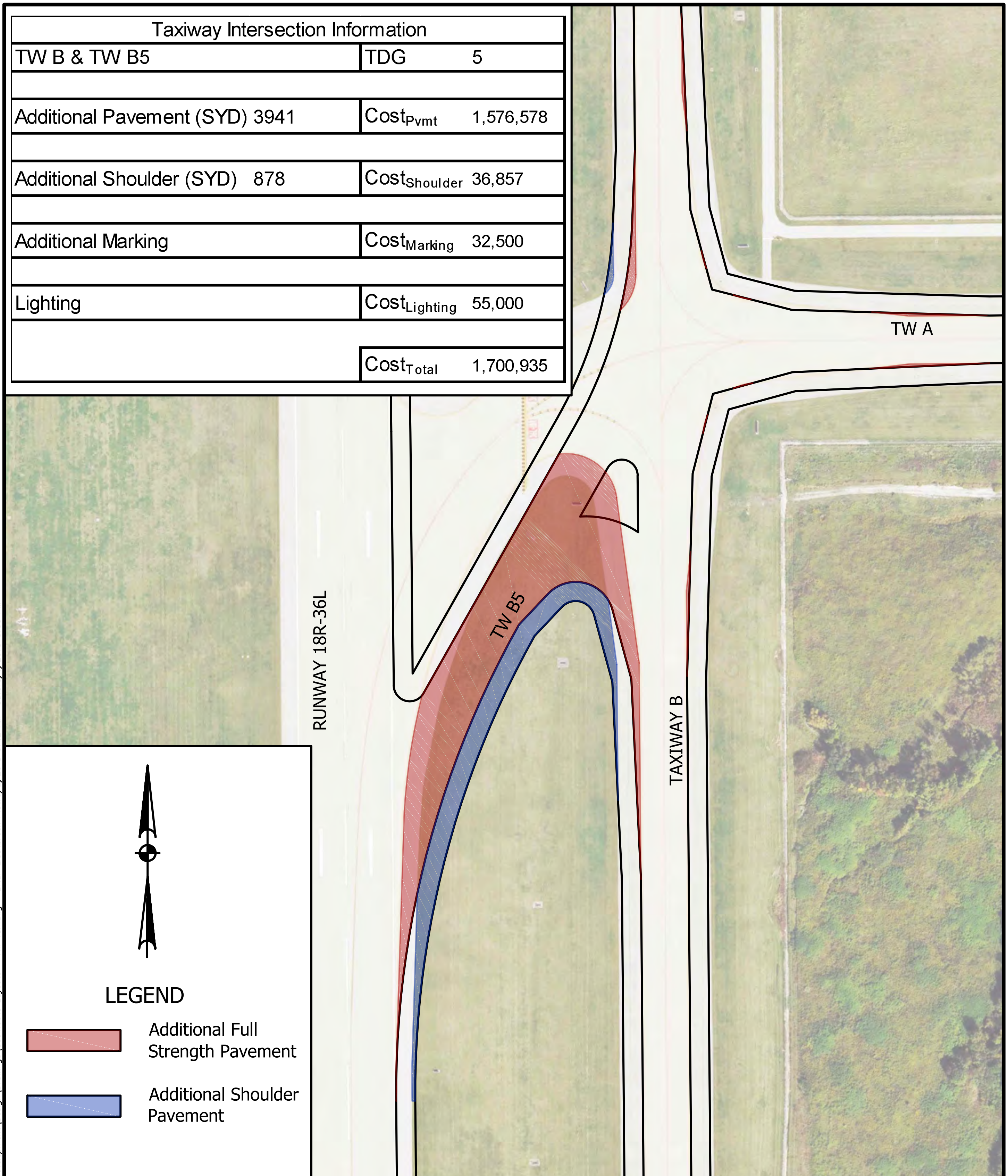
Taxiway Intersection Information	
TW B & TW B5	TDG 5
Additional Pavement (SYD) 3941	$Cost_{Pvmt}$ 1,576,578
Additional Shoulder (SYD) 878	$Cost_{Shoulder}$ 36,857
Additional Marking	$Cost_{Marking}$ 32,500
Lighting	$Cost_{Lighting}$ 55,000
	$Cost_{Total}$ 1,700,935



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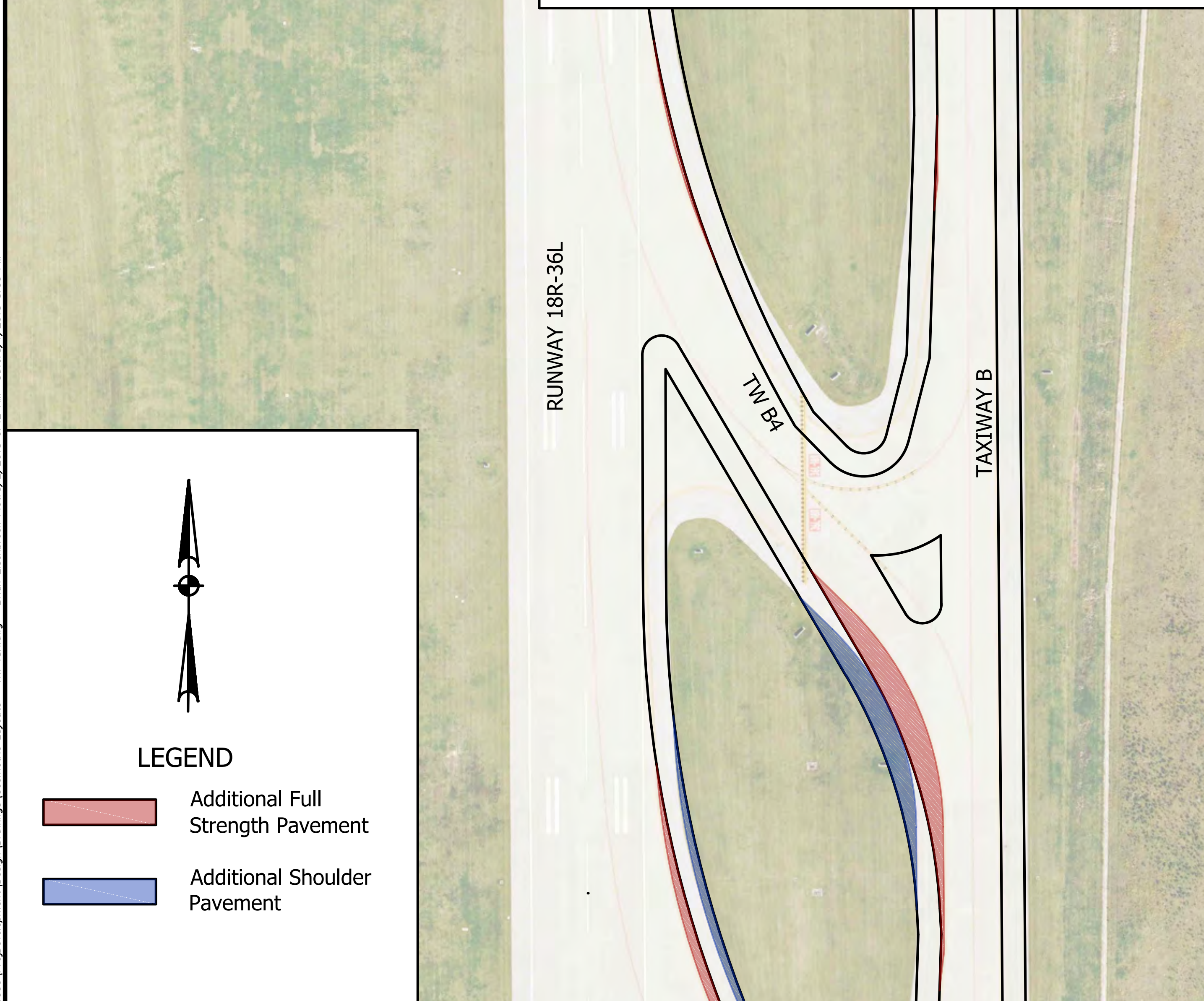
Taxiway Intersection Information			
RW 18R & TW B4		TDG	5
Additional Pavement (SYD)	84	$Cost_{Pvmt}$	25,333
Additional Shoulder (SYD)	0	$Cost_{Shoulder}$	0
Additional Marking		$Cost_{Marking}$	31,500
Lighting		$Cost_{Lighting}$	74,000
		$Cost_{Total}$	130,833



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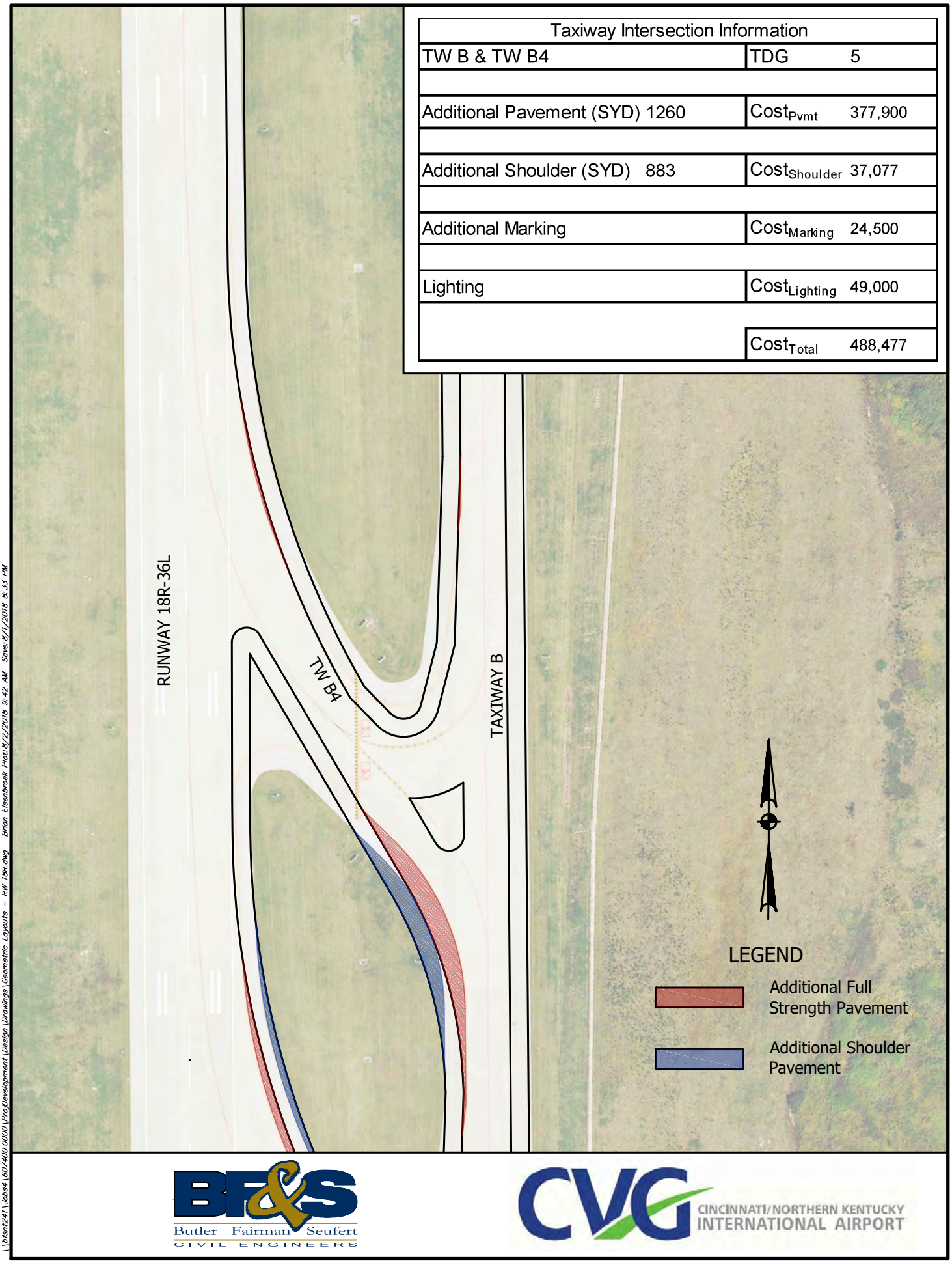

Taxiway Intersection Information		
TW B & TW B4	TDG	5
Additional Pavement (SYD) 1260	$Cost_{Pvmt}$	377,900
Additional Shoulder (SYD) 883	$Cost_{Shoulder}$	37,077
Additional Marking	$Cost_{Marking}$	24,500
Lighting	$Cost_{Lighting}$	49,000
	$Cost_{Total}$	488,477

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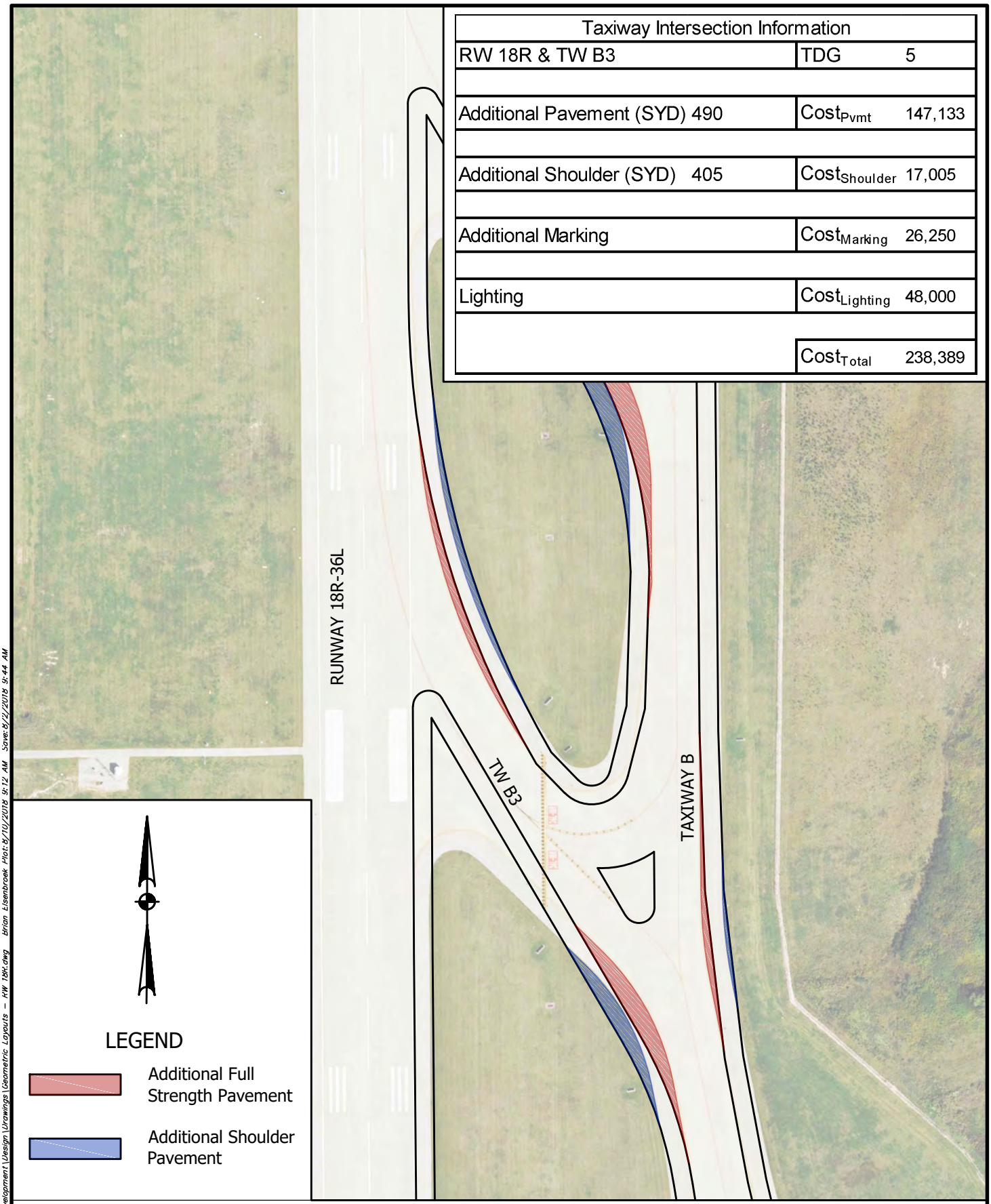

Taxiway Intersection Information		
RW 18R & TW B3	TDG	5
Additional Pavement (SYD) 490	$Cost_{Pvmt}$	147,133
Additional Shoulder (SYD) 405	$Cost_{Shoulder}$	17,005
Additional Marking	$Cost_{Marking}$	26,250
Lighting	$Cost_{Lighting}$	48,000
	$Cost_{Total}$	238,389

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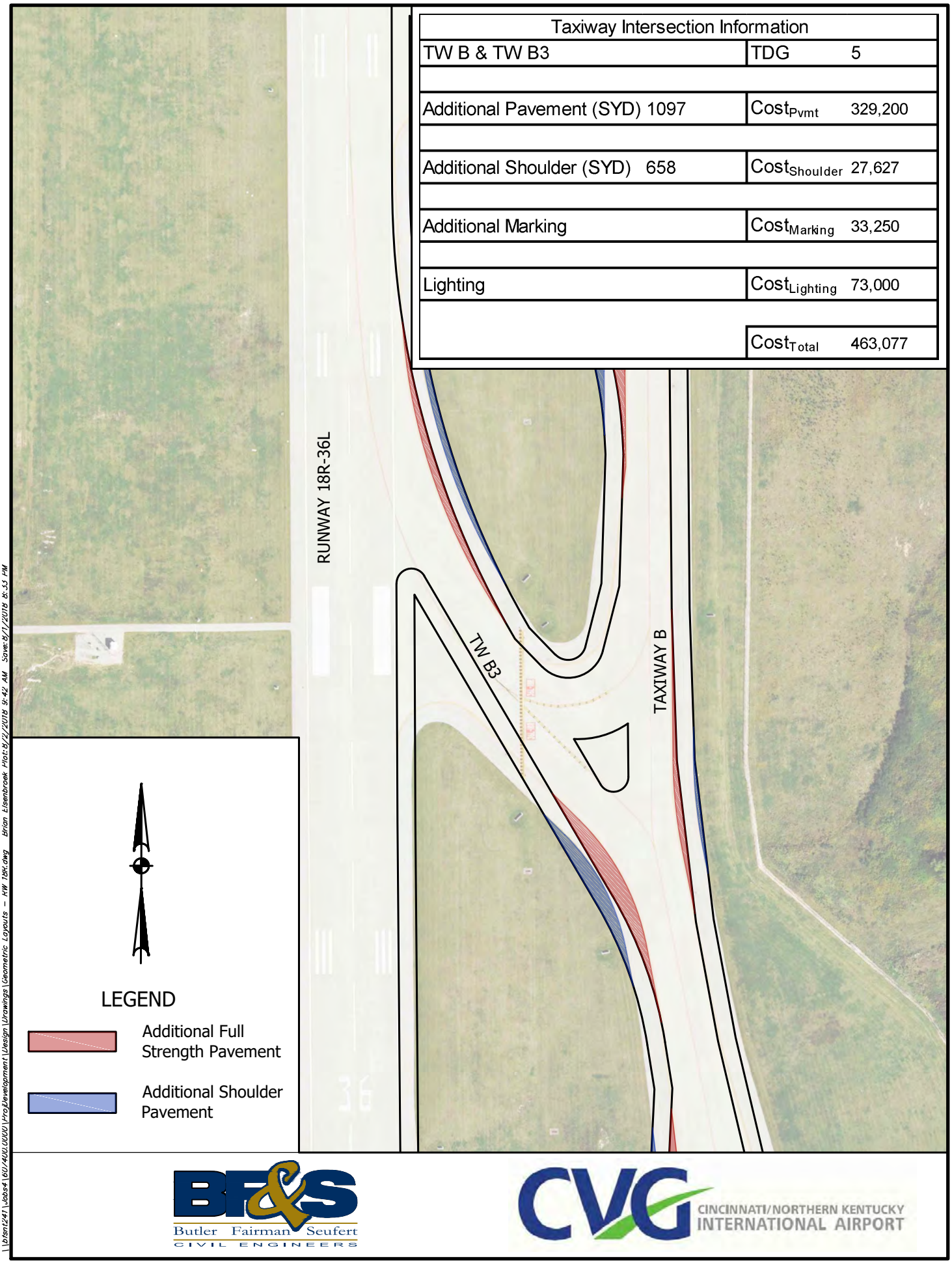

Taxiway Intersection Information		
TW B & TW B3	TDG	5
Additional Pavement (SYD) 1097	$Cost_{Pvmt}$	329,200
Additional Shoulder (SYD) 658	$Cost_{Shoulder}$	27,627
Additional Marking	$Cost_{Marking}$	33,250
Lighting	$Cost_{Lighting}$	73,000
	$Cost_{Total}$	463,077

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Taxiway Intersection Information		
RW 18R & TW J	TDG	5
Additional Pavement (SYD) 71	$Cost_{Pvmt}$	21,300
Additional Shoulder (SYD) 1	$Cost_{Shoulder}$	47
Additional Marking	$Cost_{Marking}$	8,750
Lighting	$Cost_{Lighting}$	27,000
	$Cost_{Total}$	57,097

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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Taxiway Intersection Information		
TW B & TW J	TDG	5
Additional Pavement (SYD) 700	$Cost_{Pvmt}$	210,067
Additional Shoulder (SYD) 148	$Cost_{Shoulder}$	6,216
Additional Marking	$Cost_{Marking}$	28,000
Lighting	$Cost_{Lighting}$	72,000
	$Cost_{Total}$	316,283

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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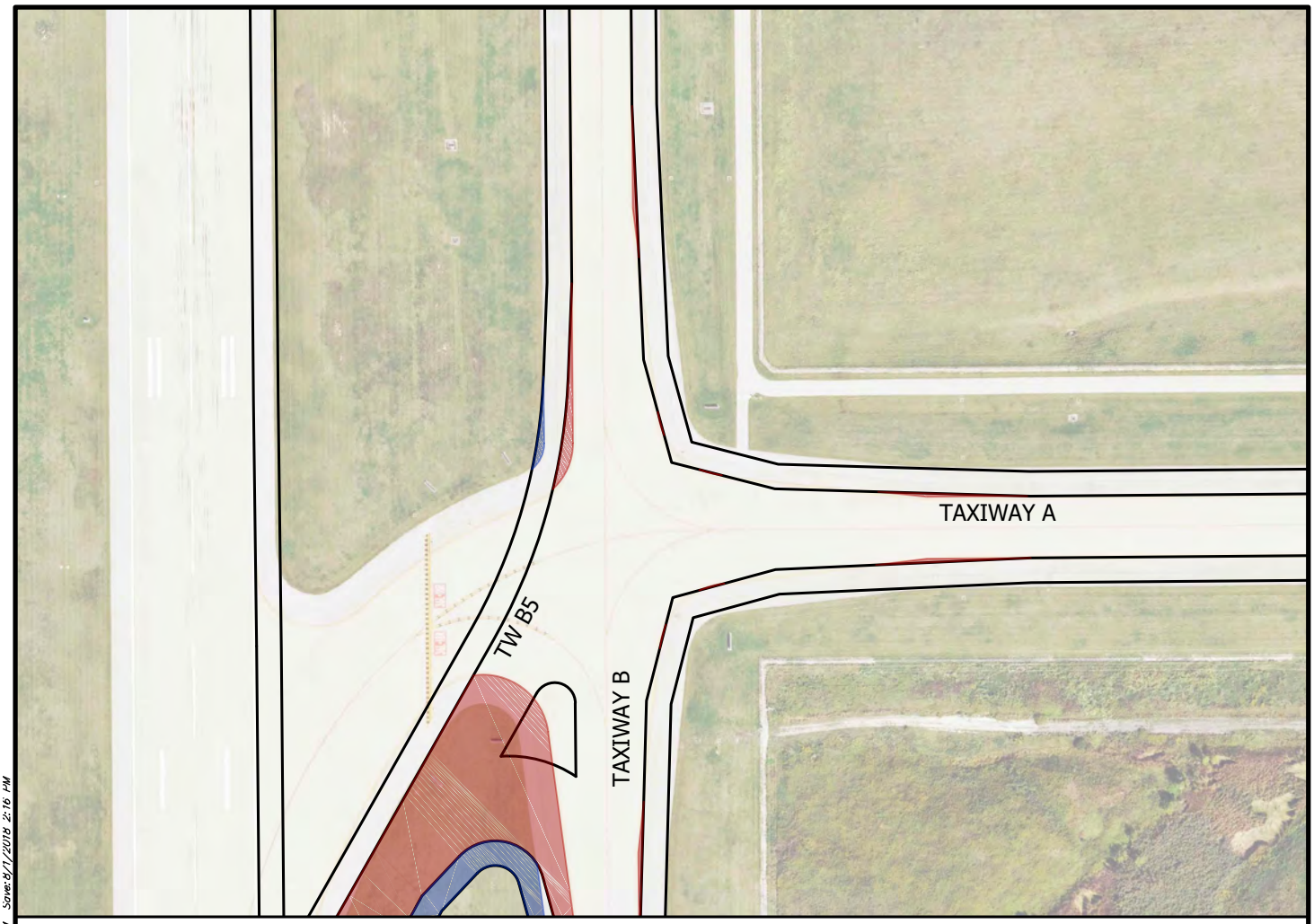

Taxiway Intersection Information		
TW A & TW B	TDG	5
Additional Pavement (SYD) 207	$Cost_{Pvmt}$	62,167
Additional Shoulder (SYD) 0	$Cost_{Shoulder}$	0
Additional Marking	$Cost_{Marking}$	31,500
Lighting	$Cost_{Lighting}$	48,000
	$Cost_{Total}$	141,667

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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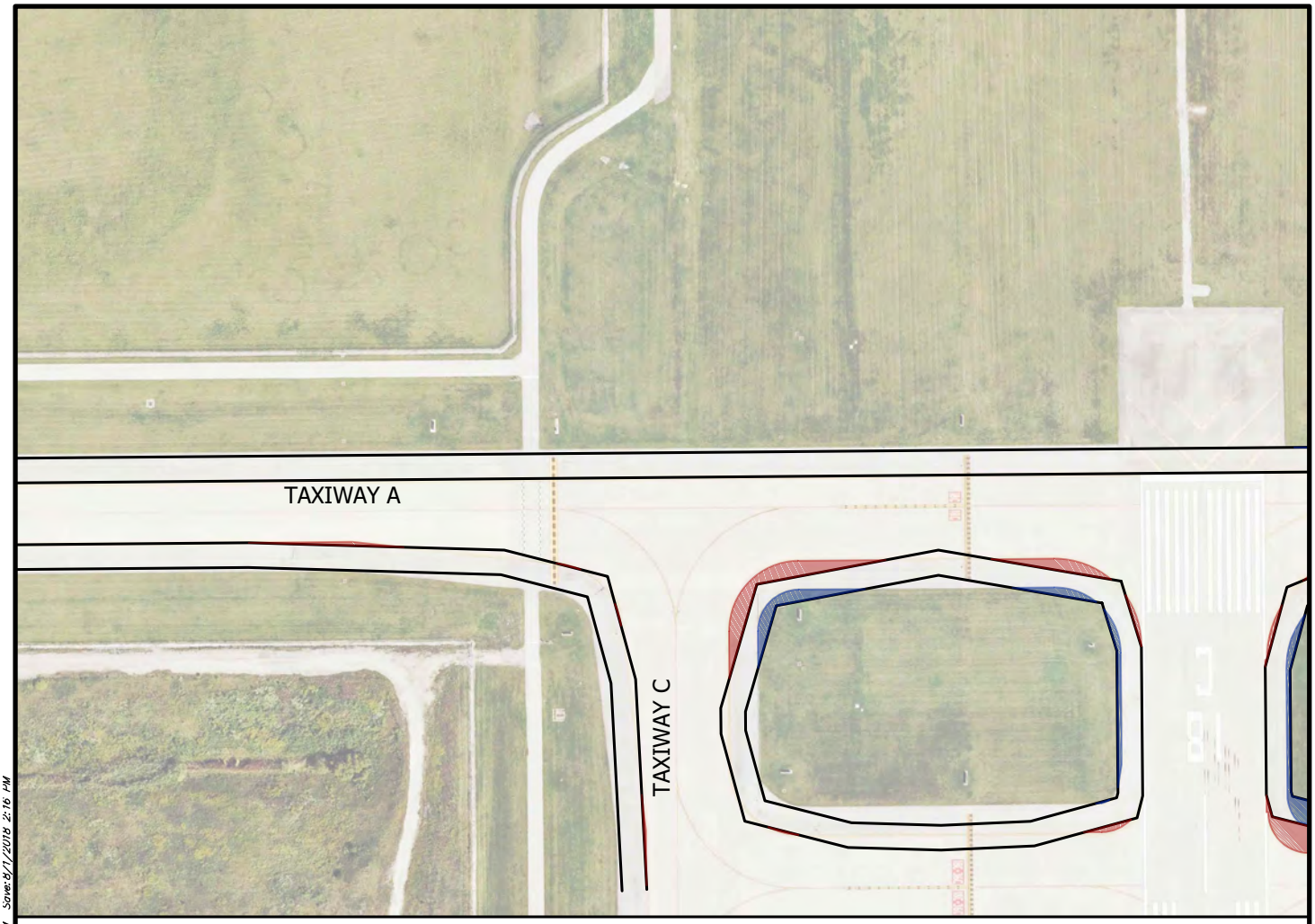

Taxiway Intersection Information		
TW A & TW C	TDG	6
Additional Pavement (SYD) 470	$Cost_{Pvmt}$	141,000
Additional Shoulder (SYD) 201	$Cost_{Shoulder}$	8,423
Additional Marking	$Cost_{Marking}$	21,875
Lighting	$Cost_{Lighting}$	36,000
	$Cost_{Total}$	207,298

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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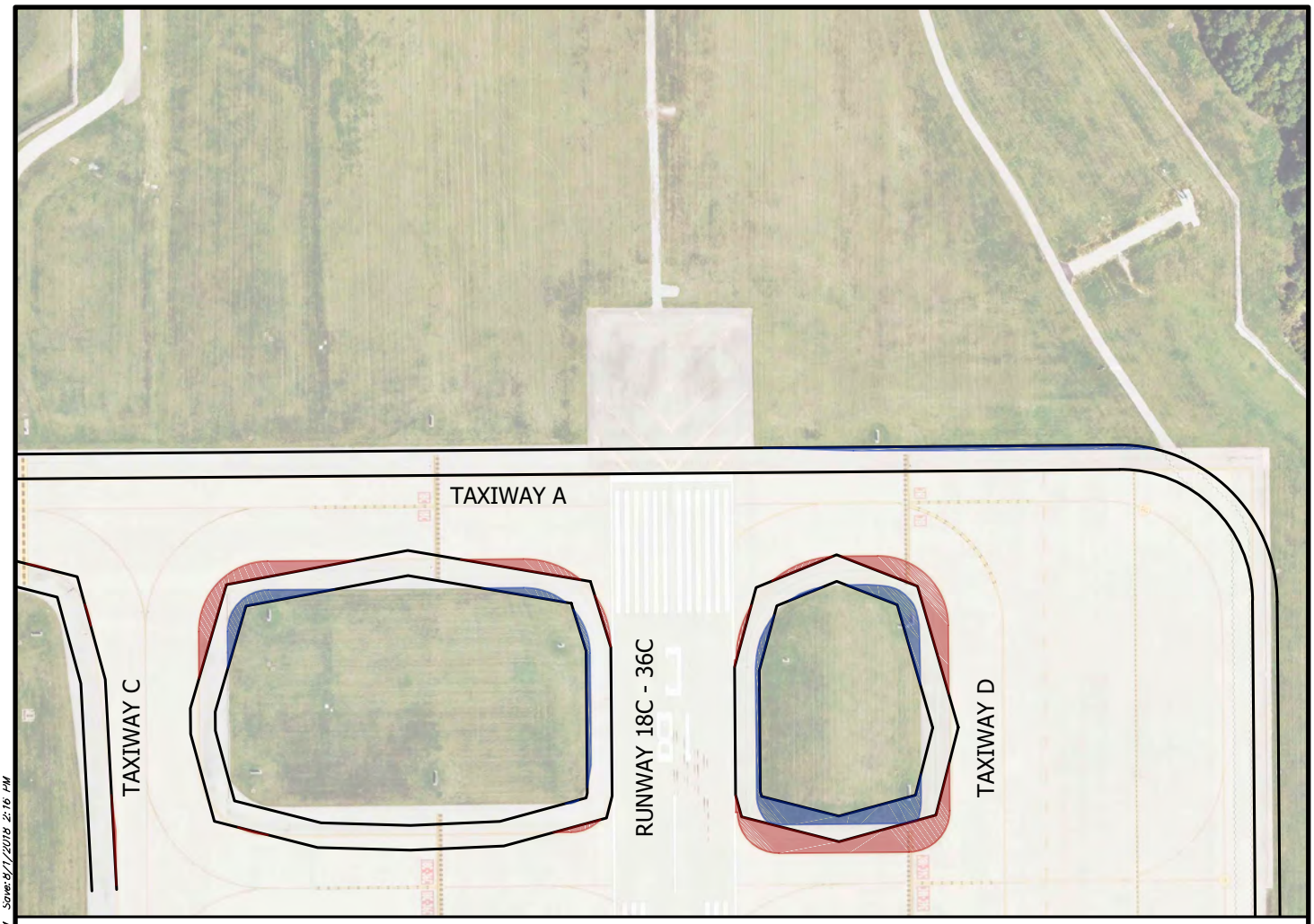

Taxiway Intersection Information		
TW A & RW 18C	TDG	6
Additional Pavement (SYD) 172	$Cost_{Pvmt}$	51,667
Additional Shoulder (SYD) 184	$Cost_{Shoulder}$	7,747
Additional Marking	$Cost_{Marking}$	5,250
Lighting	$Cost_{Lighting}$	20,000
	$Cost_{Total}$	84,663

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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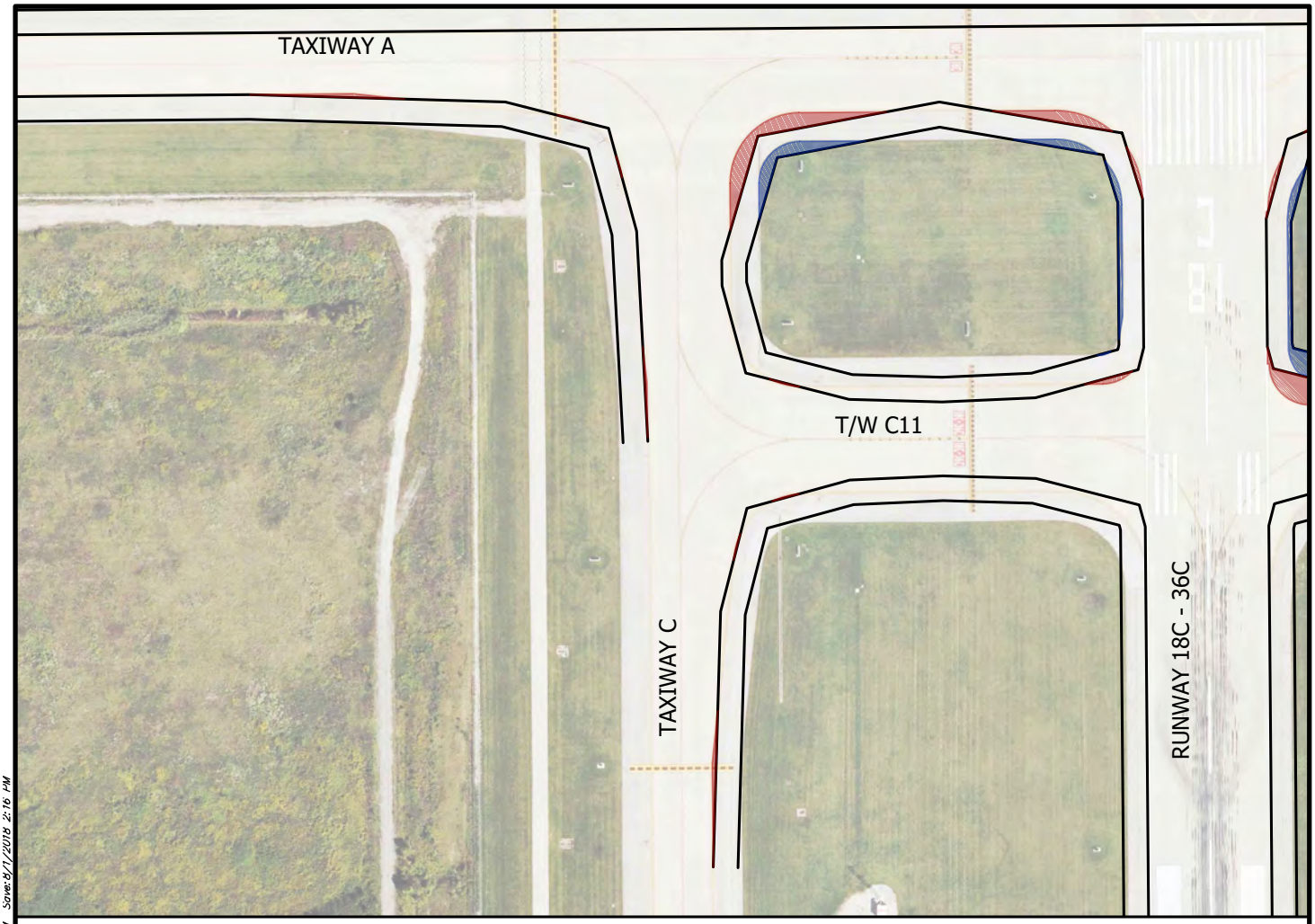

Taxiway Intersection Information		
TW C & TW C11	TDG	5
Additional Pavement (SYD) 65	$Cost_{Pvmt}$	19,533
Additional Shoulder (SYD) 0	$Cost_{Shoulder}$	0
Additional Marking	$Cost_{Marking}$	18,375
Lighting	$Cost_{Lighting}$	32,000
	$Cost_{Total}$	69,908

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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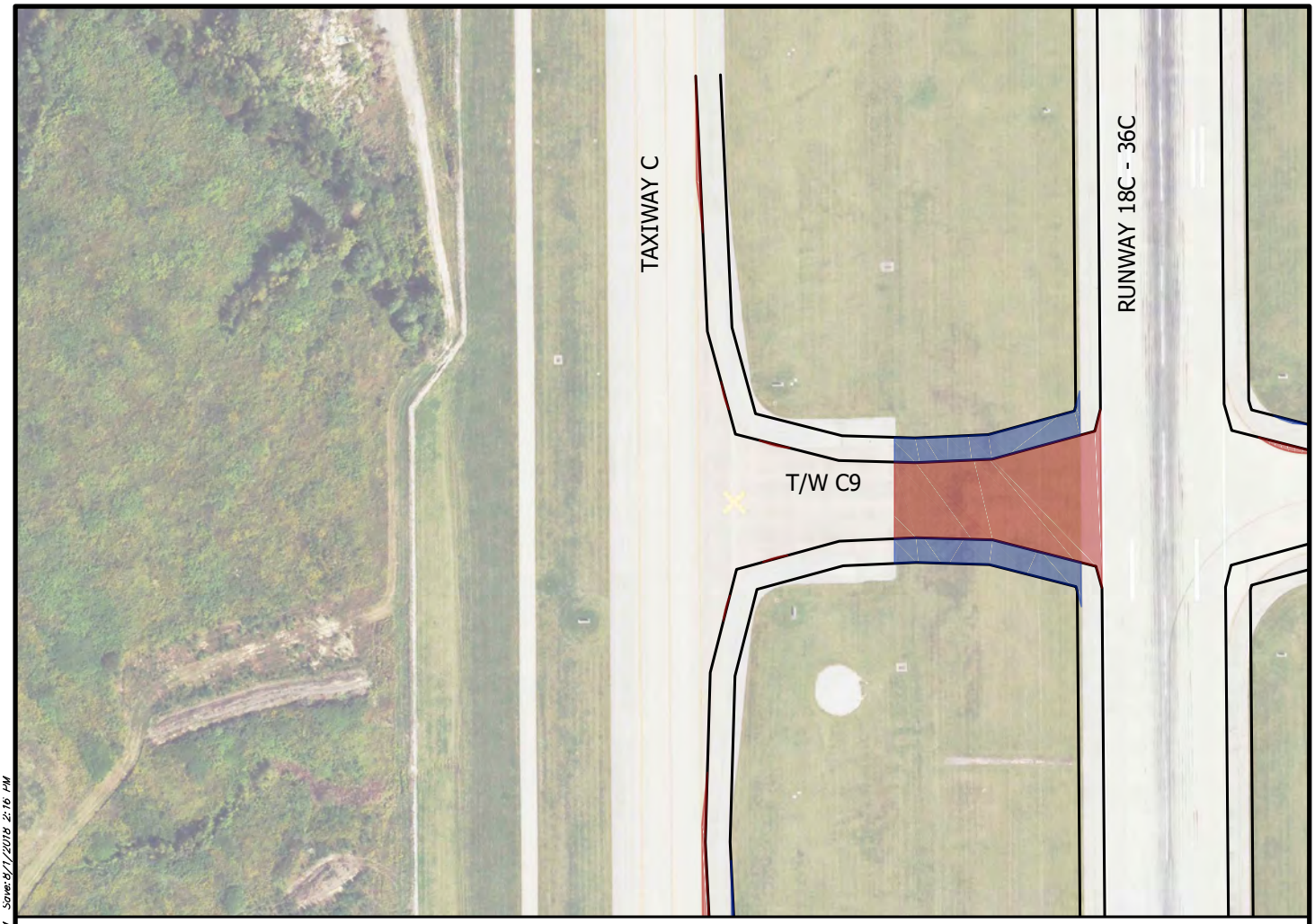

Taxiway Intersection Information		
TW C & TW C9	TDG	5
Additional Pavement (SYD) 69	$Cost_{Pvmt}$	20,733
Additional Shoulder (SYD) 0	$Cost_{Shoulder}$	0
Additional Marking	$Cost_{Marking}$	21,000
Lighting	$Cost_{Lighting}$	28,000
	$Cost_{Total}$	69,733

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

Butler Fairman Seufert CIVIL ENGINEERS

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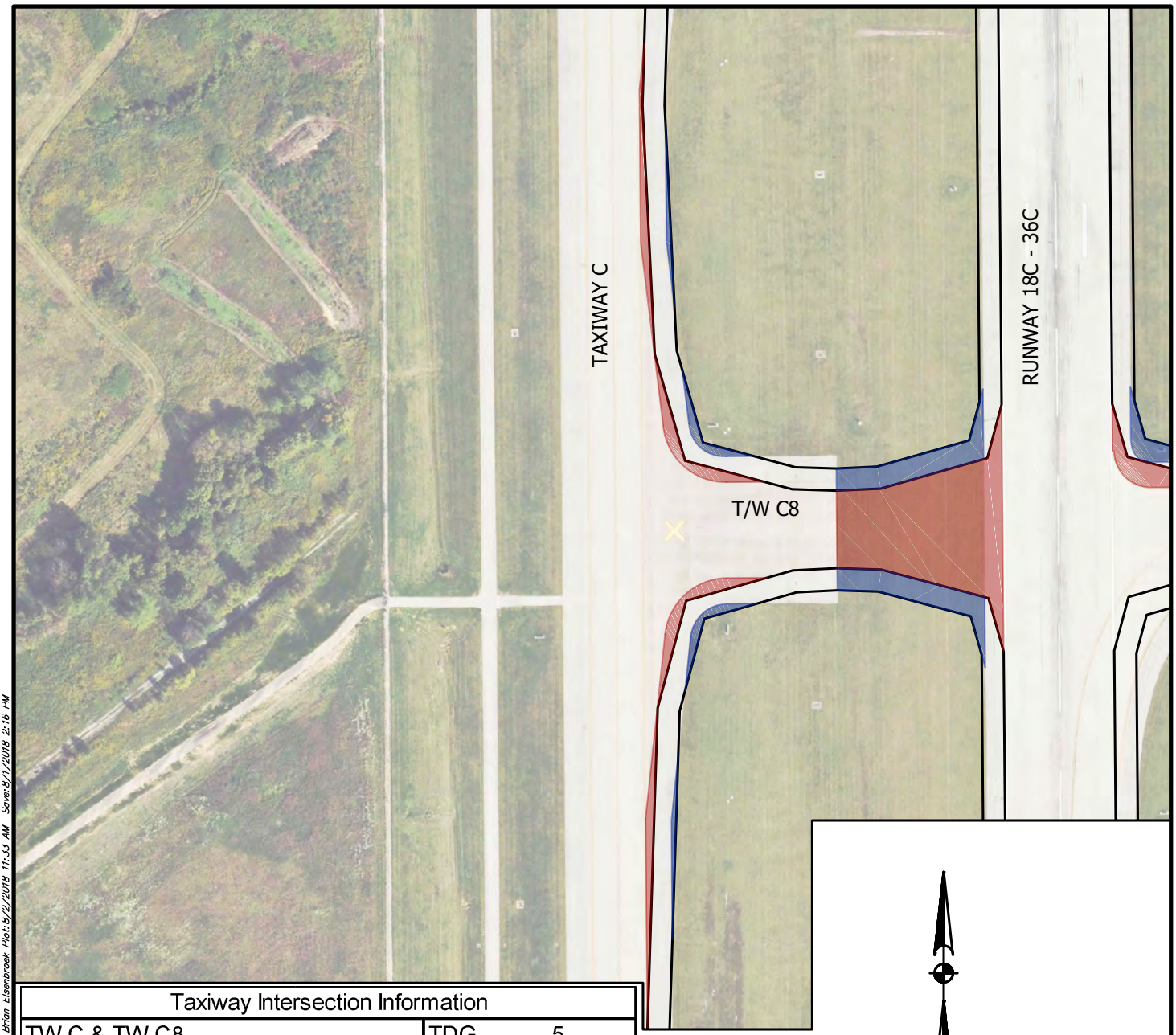

Taxiway Intersection Information		
TW C & TW C8	TDG	5
Additional Pavement (SYD) 762	$Cost_{Pvmt}$	228,733
Additional Shoulder (SYD) 486	$Cost_{Shoulder}$	20,431
Additional Marking	$Cost_{Marking}$	26,250
Lighting	$Cost_{Lighting}$	28,000
	$Cost_{Total}$	303,414

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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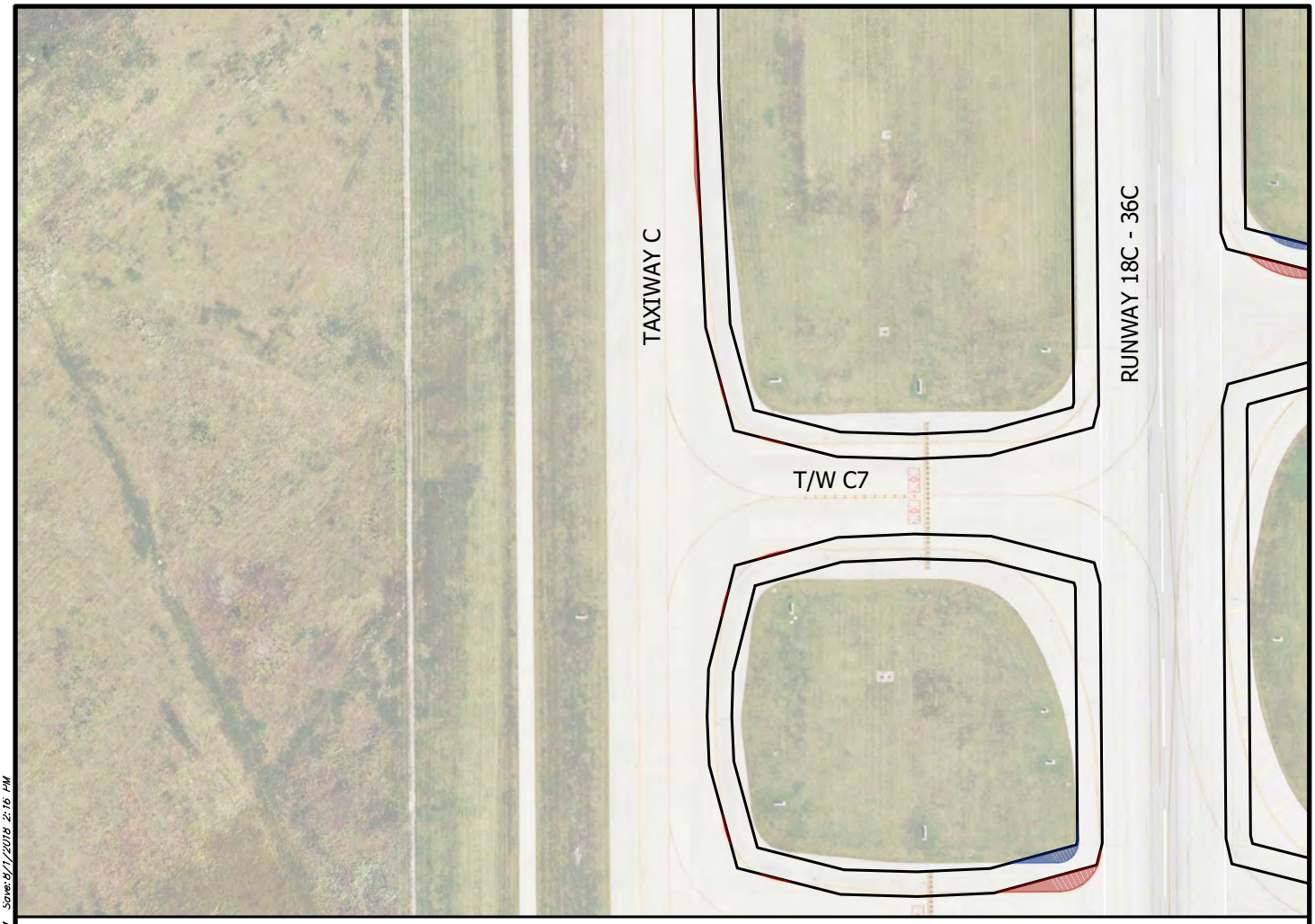

Taxiway Intersection Information		
TW C & TW C7	TDG	5
Additional Pavement (SYD) 62	$Cost_{Pvmt}$	18,600
Additional Shoulder (SYD) 0	$Cost_{Shoulder}$	0
Additional Marking	$Cost_{Marking}$	19,250
Lighting	$Cost_{Lighting}$	36,000
	$Cost_{Total}$	73,850

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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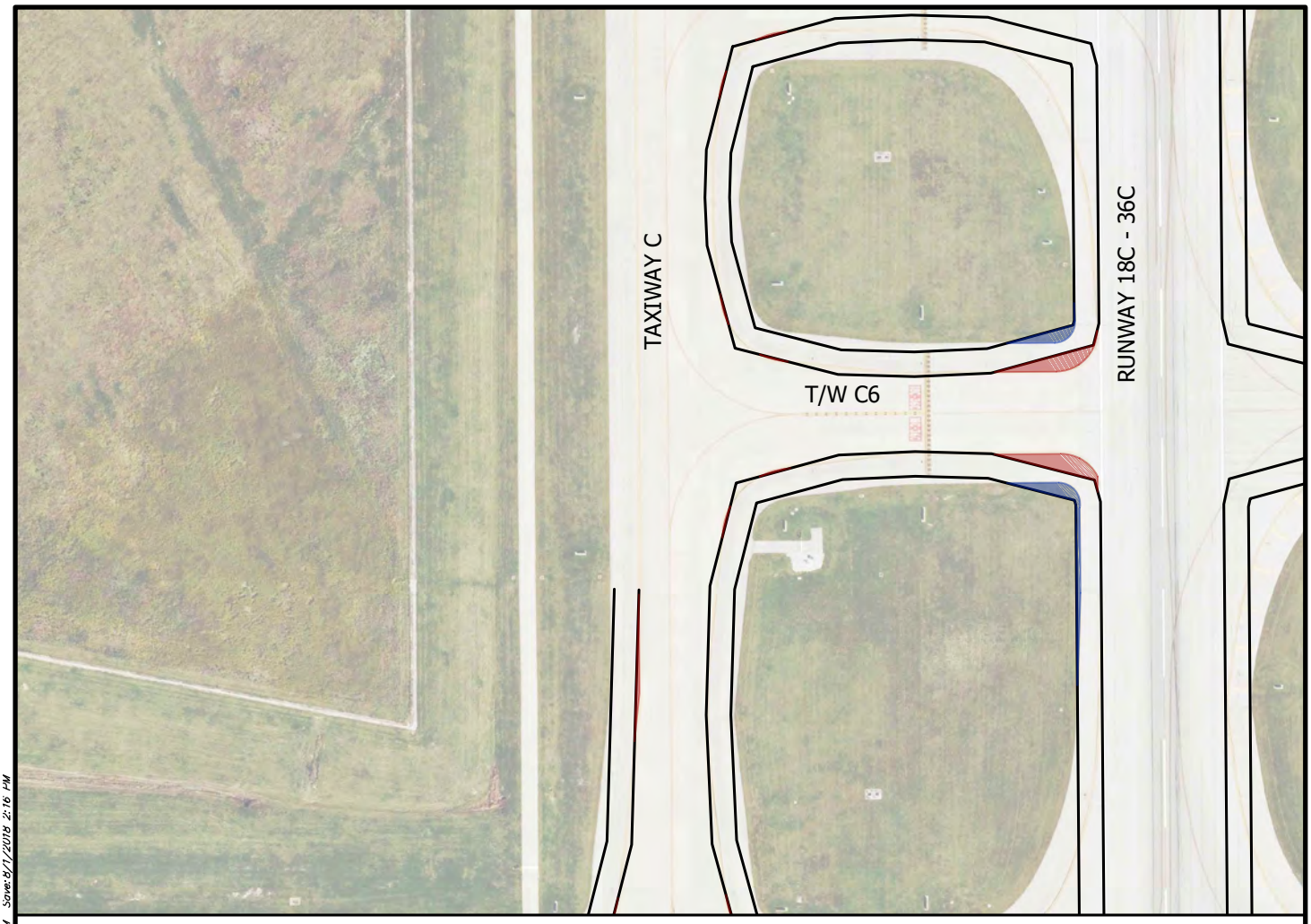

Taxiway Intersection Information		
TW C & TW C6	TDG	5
Additional Pavement (SYD) 22	$Cost_{Pvmt}$	6,700
Additional Shoulder (SYD) 0	$Cost_{Shoulder}$	0
Additional Marking	$Cost_{Marking}$	16,625
Lighting	$Cost_{Lighting}$	34,000
	$Cost_{Total}$	57,325

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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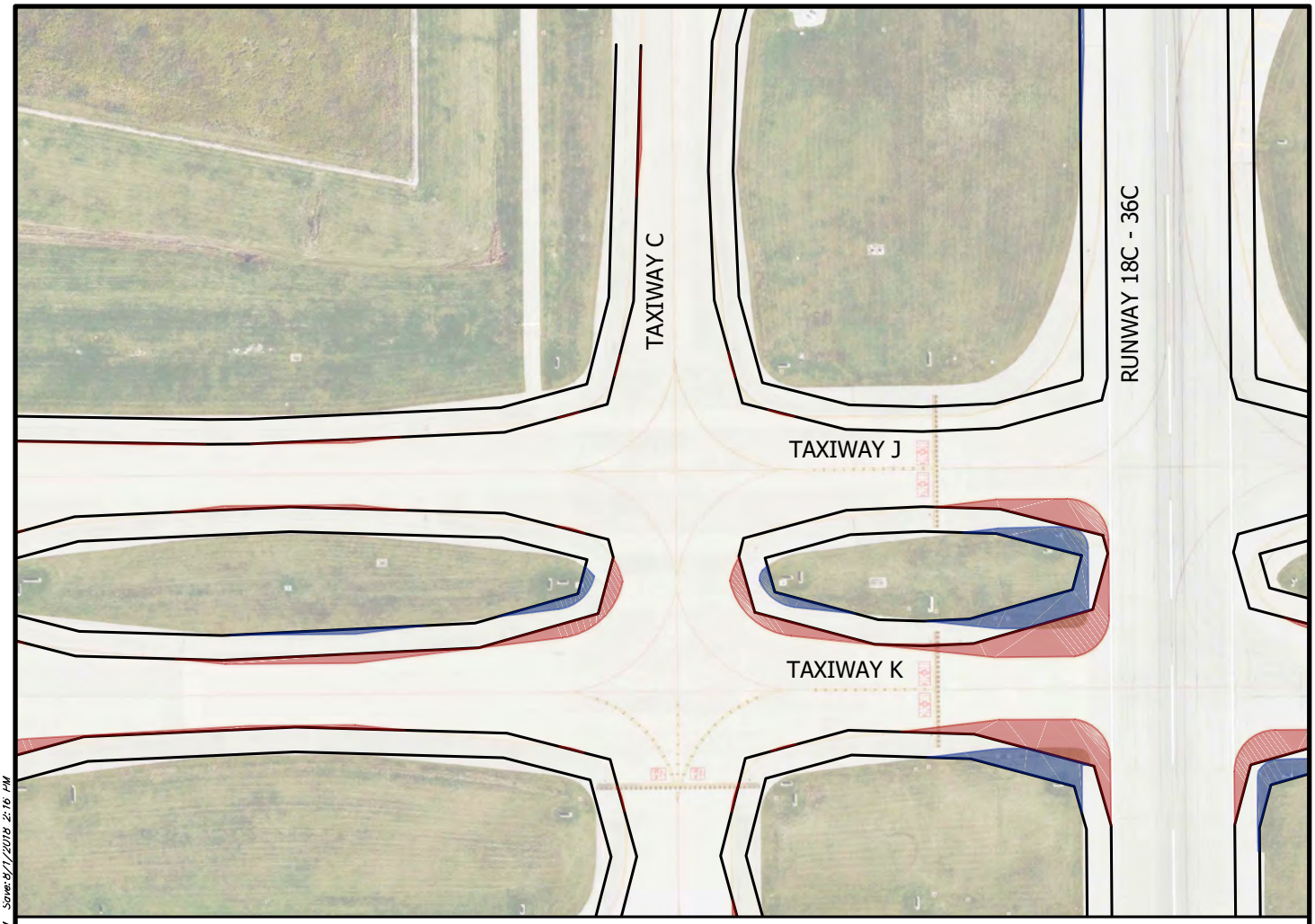

Taxiway Intersection Information		
TW C & TW J	TDG	5
Additional Pavement (SYD) 201	$Cost_{Pvmt}$	60,400
Additional Shoulder (SYD) 0	$Cost_{Shoulder}$	0
Additional Marking	$Cost_{Marking}$	36,750
Lighting	$Cost_{Lighting}$	68,000
	$Cost_{Total}$	165,150

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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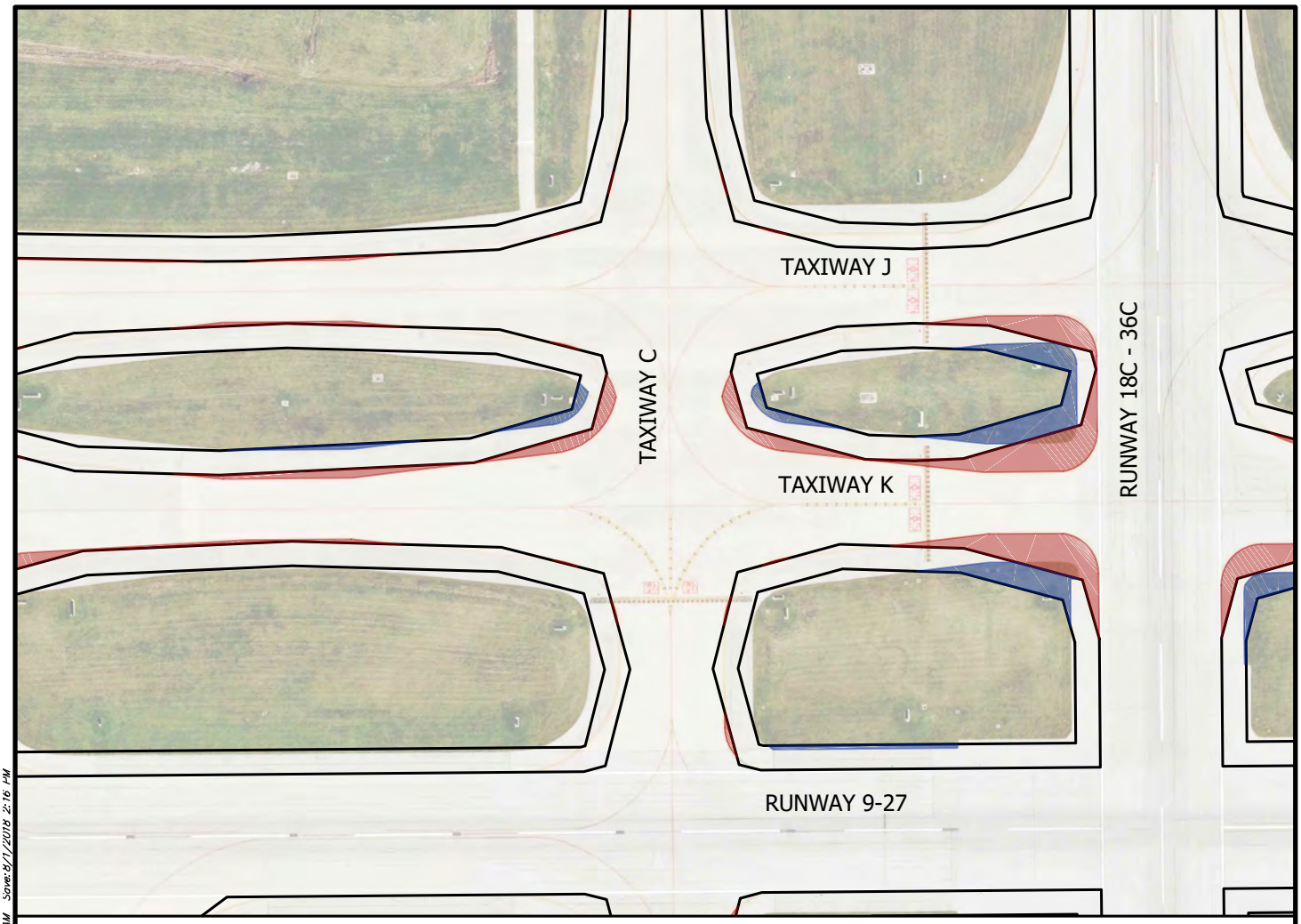


Taxiway Intersection Information		
TW C & TW K	TDG	6
Additional Pavement (SYD) 859	$Cost_{Pvmt}$	257,800
Additional Shoulder (SYD) 330	$Cost_{Shoulder}$	13,841
Additional Marking	$Cost_{Marking}$	27,125
Lighting	$Cost_{Lighting}$	48,000
	$Cost_{Total}$	346,766

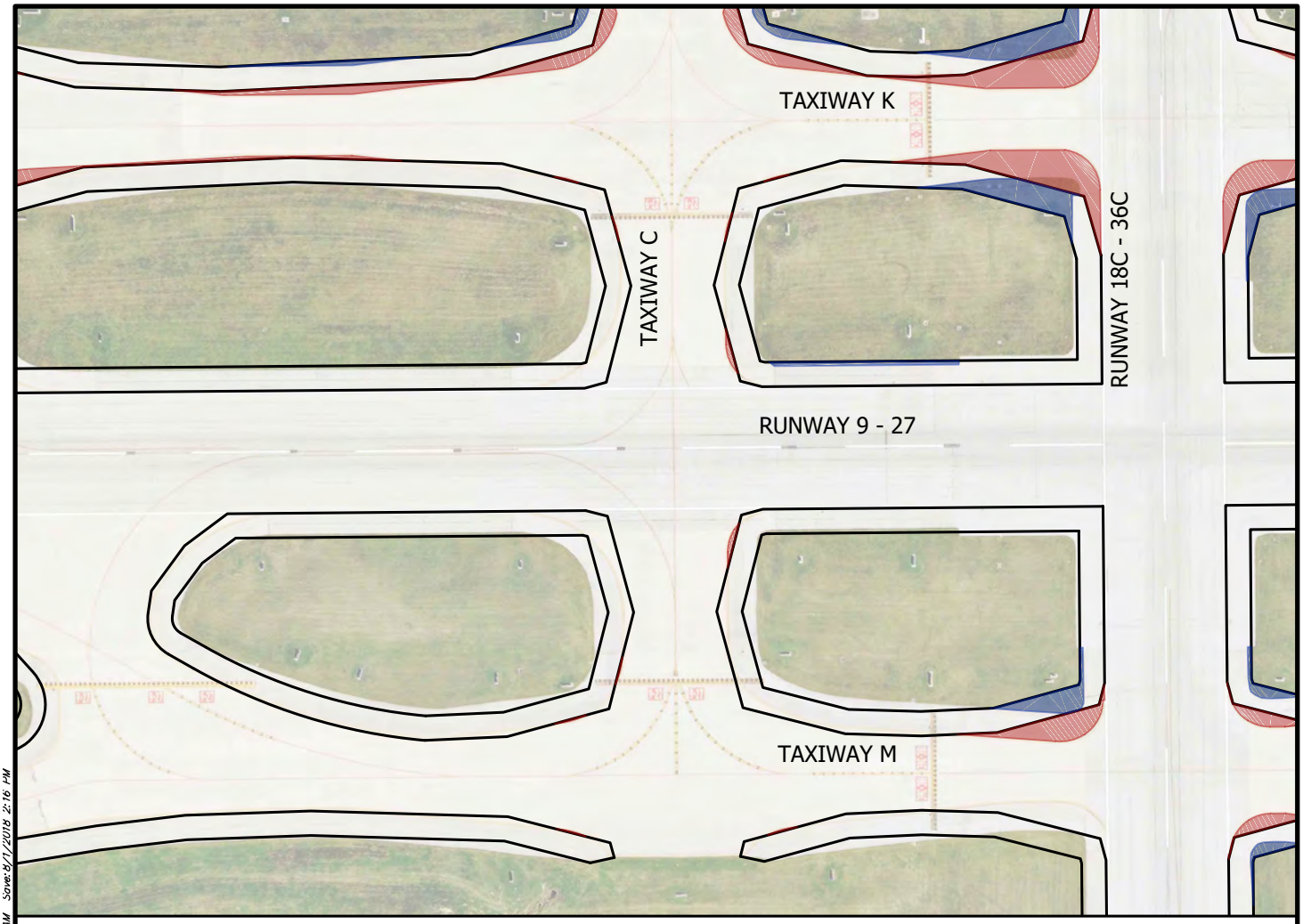
LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

BF&S Butler Fairman Seufert CIVIL ENGINEERS

CVG CINCINNATI/NORTHERN KENTUCKY INTERNATIONAL AIRPORT



Taxiway Intersection Information		
TW C & RW 9	TDG	5
Additional Pavement (SYD) 54	$Cost_{Pvmt}$	16,333
Additional Shoulder (SYD) 0	$Cost_{Shoulder}$	0
Additional Marking	$Cost_{Marking}$	20,125
Lighting	$Cost_{Lighting}$	52,000
	$Cost_{Total}$	88,458

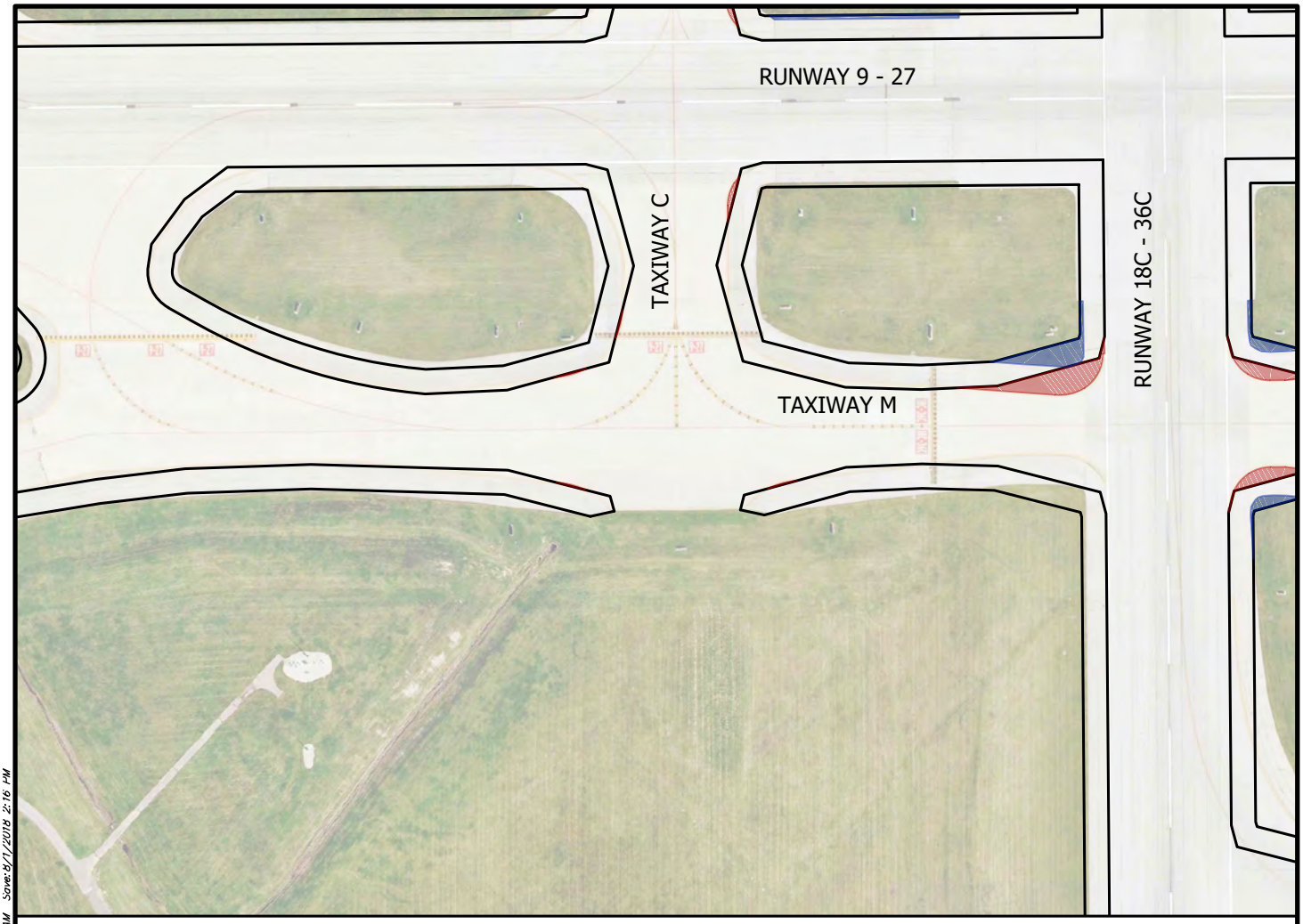
LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

BF&S Butler Fairman Seufert CIVIL ENGINEERS

CVG CINCINNATI/NORTHERN KENTUCKY INTERNATIONAL AIRPORT



Taxiway Intersection Information		
TW C & TW M	TDG	5
Additional Pavement (SYD) 21	$Cost_{Pvmt}$	6,333
Additional Shoulder (SYD) 0	$Cost_{Shoulder}$	0
Additional Marking	$Cost_{Marking}$	21,000
Lighting	$Cost_{Lighting}$	40,000
	$Cost_{Total}$	67,333

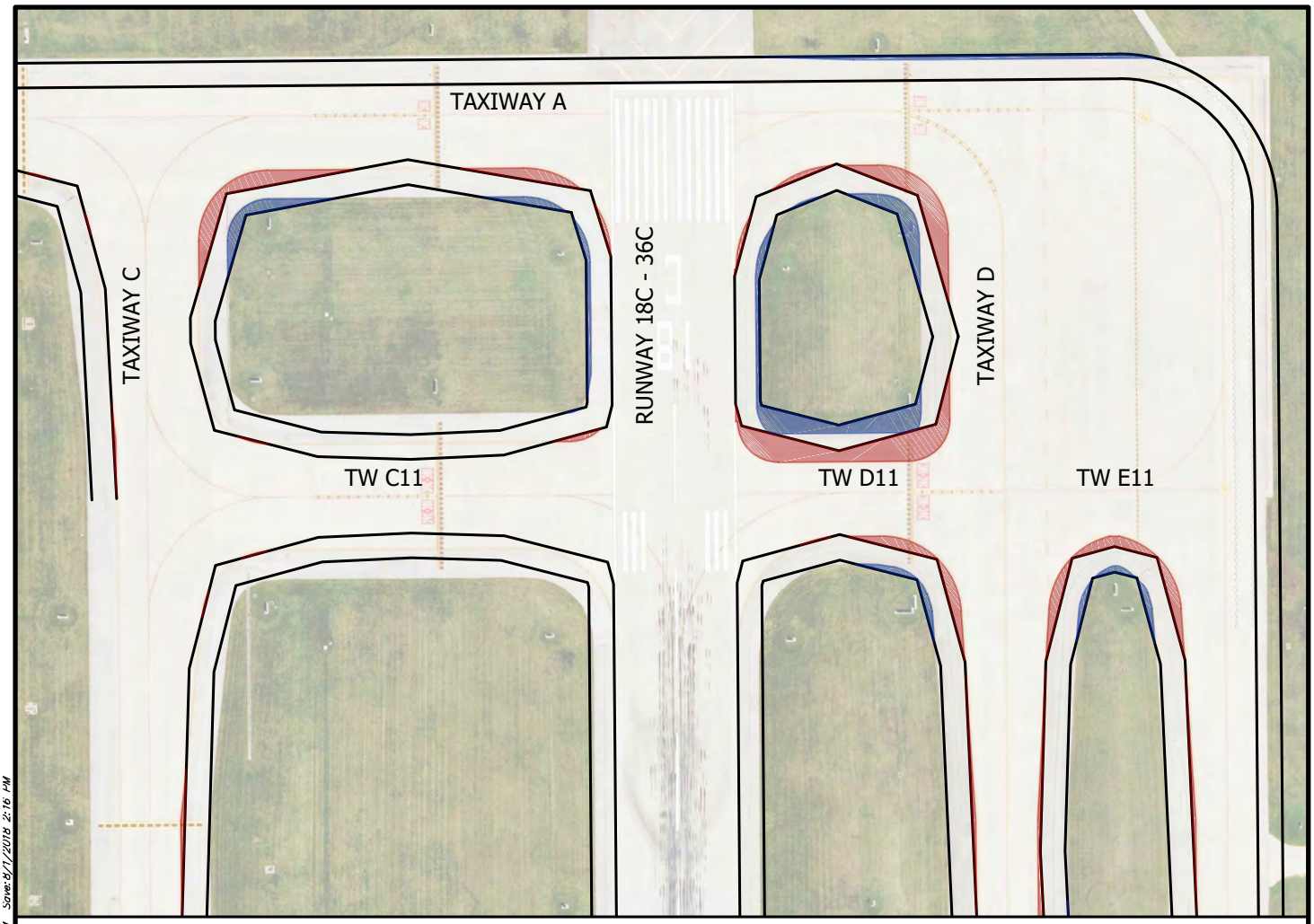
LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

Butler Fairman Seufert CIVIL ENGINEERS

CVG CINCINNATI/NORTHERN KENTUCKY INTERNATIONAL AIRPORT



Taxiway Intersection Information		
RW 18C & TW C11	TDG	5
Additional Pavement (SYD) 30	$Cost_{Pvmt}$	9,067
Additional Shoulder (SYD) 2	$Cost_{Shoulder}$	103
Additional Marking	$Cost_{Marking}$	10,500
Lighting	$Cost_{Lighting}$	29,000
	$Cost_{Total}$	48,669

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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Taxiway Intersection Information		
RW 18C & TW C9	TDG	5
Additional Pavement (SYD) 3208	$Cost_{Pvmt}$	962,367
Additional Shoulder (SYD) 1545	$Cost_{Shoulder}$	64,904
Additional Marking	$Cost_{Marking}$	24,000
Lighting	$Cost_{Lighting}$	84,000
	$Cost_{Total}$	1,135,271

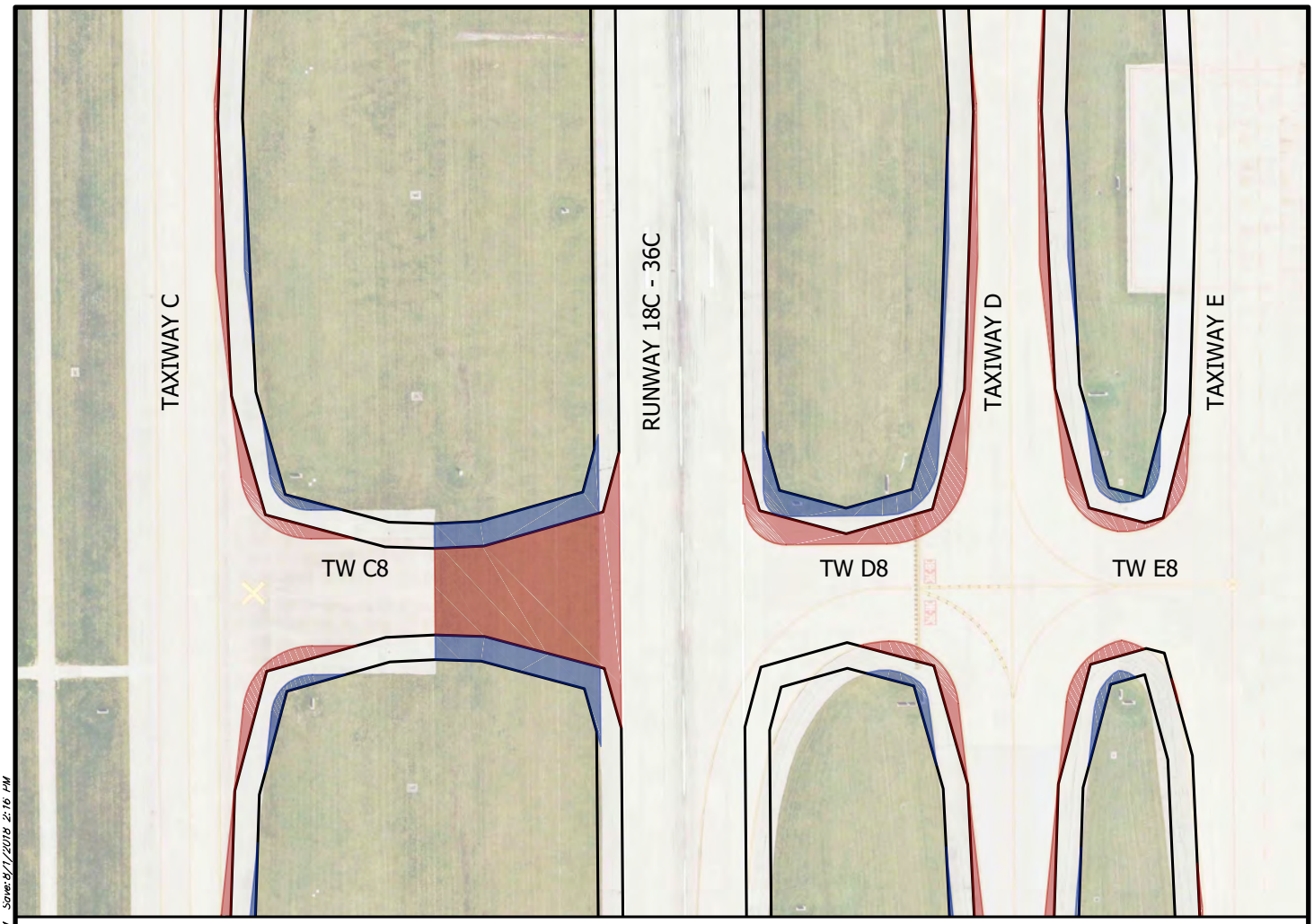
LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

Butler Fairman Seufert CIVIL ENGINEERS

CVG CINCINNATI/NORTHERN KENTUCKY INTERNATIONAL AIRPORT



Taxiway Intersection Information		
RW 18C & TW C8	TDG	5
Additional Pavement (SYD) 3717	$Cost_{Pvmt}$	1,115,067
Additional Shoulder (SYD) 1506	$Cost_{Shoulder}$	63,257
Additional Marking	$Cost_{Marking}$	24,000
Lighting	$Cost_{Lighting}$	84,000
	$Cost_{Total}$	1,286,323

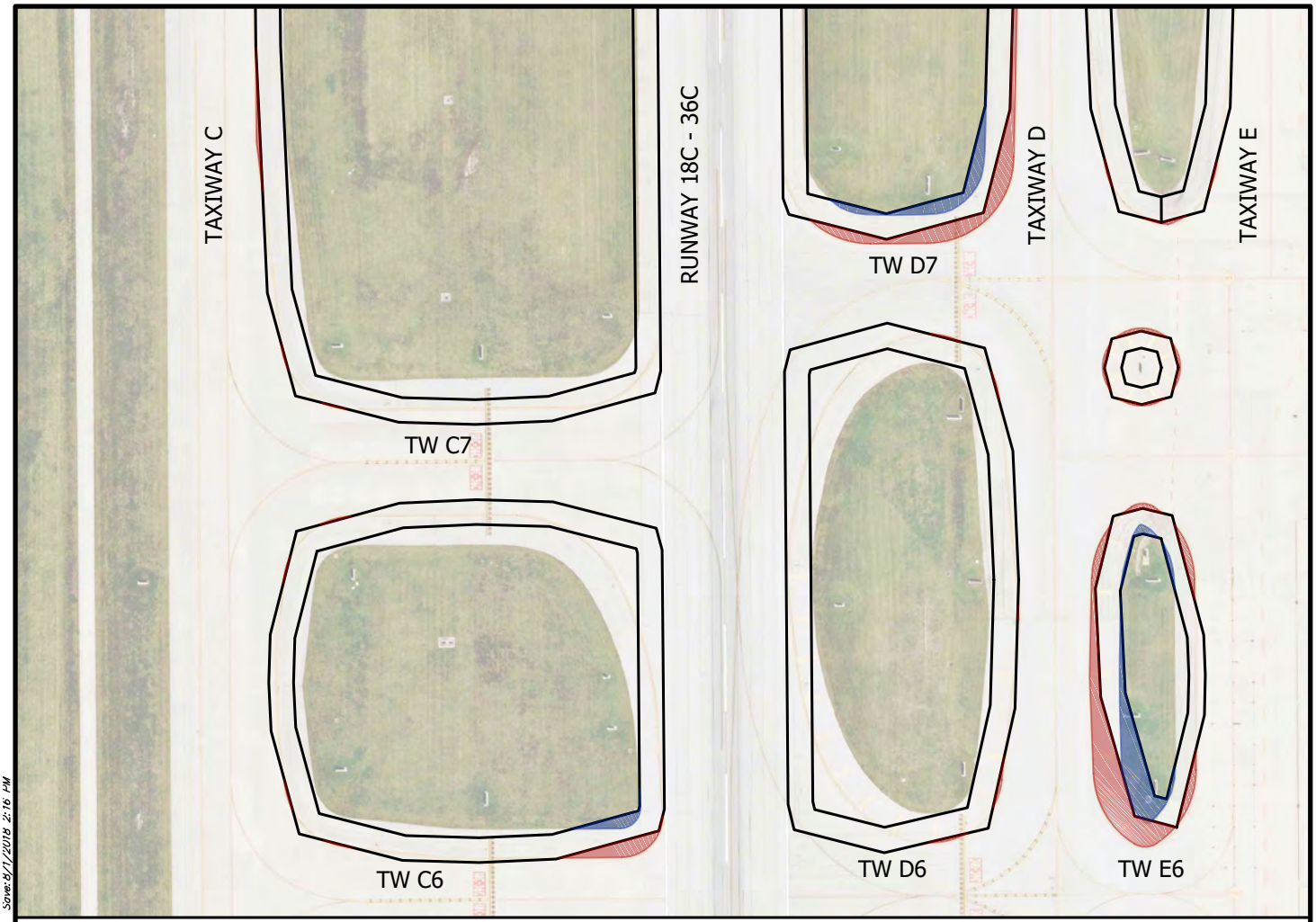
LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

Butler Fairman Seufert CIVIL ENGINEERS

CVG CINCINNATI/NORTHERN KENTUCKY INTERNATIONAL AIRPORT



Taxiway Intersection Information		
RW 18C & TW C7	TDG	5
Additional Pavement (SYD) 0	$Cost_{Pvmt}$	0
Additional Shoulder (SYD) 0	$Cost_{Shoulder}$	0
Additional Marking	$Cost_{Marking}$	12,250
Lighting	$Cost_{Lighting}$	30,000
	$Cost_{Total}$	42,250

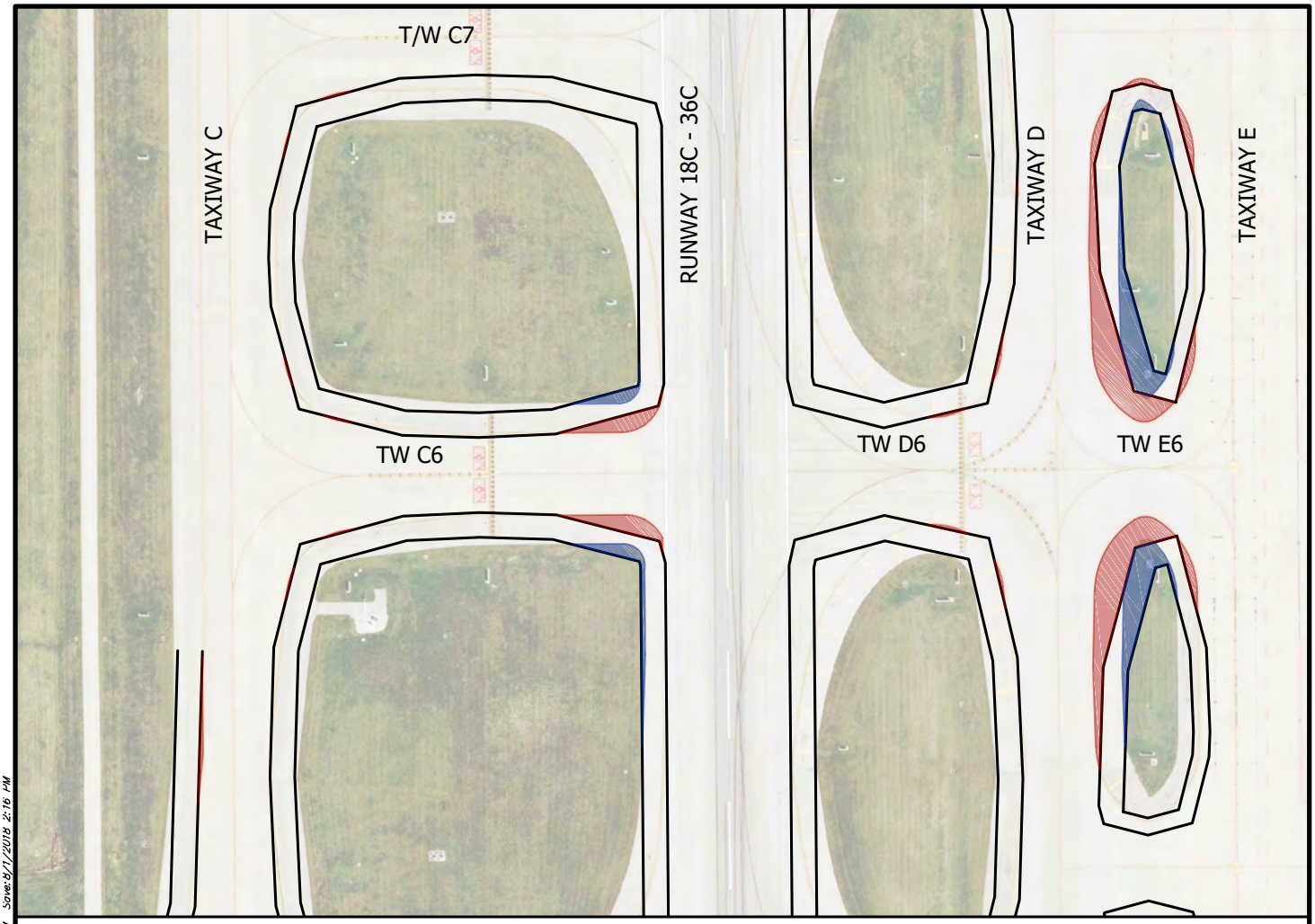
LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

Butler Fairman Seufert CIVIL ENGINEERS

CVG CINCINNATI/NORTHERN KENTUCKY INTERNATIONAL AIRPORT



Taxiway Intersection Information		
RW 18C & TW C6	TDG	5
Additional Pavement (SYD) 370	$Cost_{Pvmt}$	110,867
Additional Shoulder (SYD) 280	$Cost_{Shoulder}$	11,746
Additional Marking	$Cost_{Marking}$	11,375
Lighting	$Cost_{Lighting}$	24,000
	$Cost_{Total}$	157,988

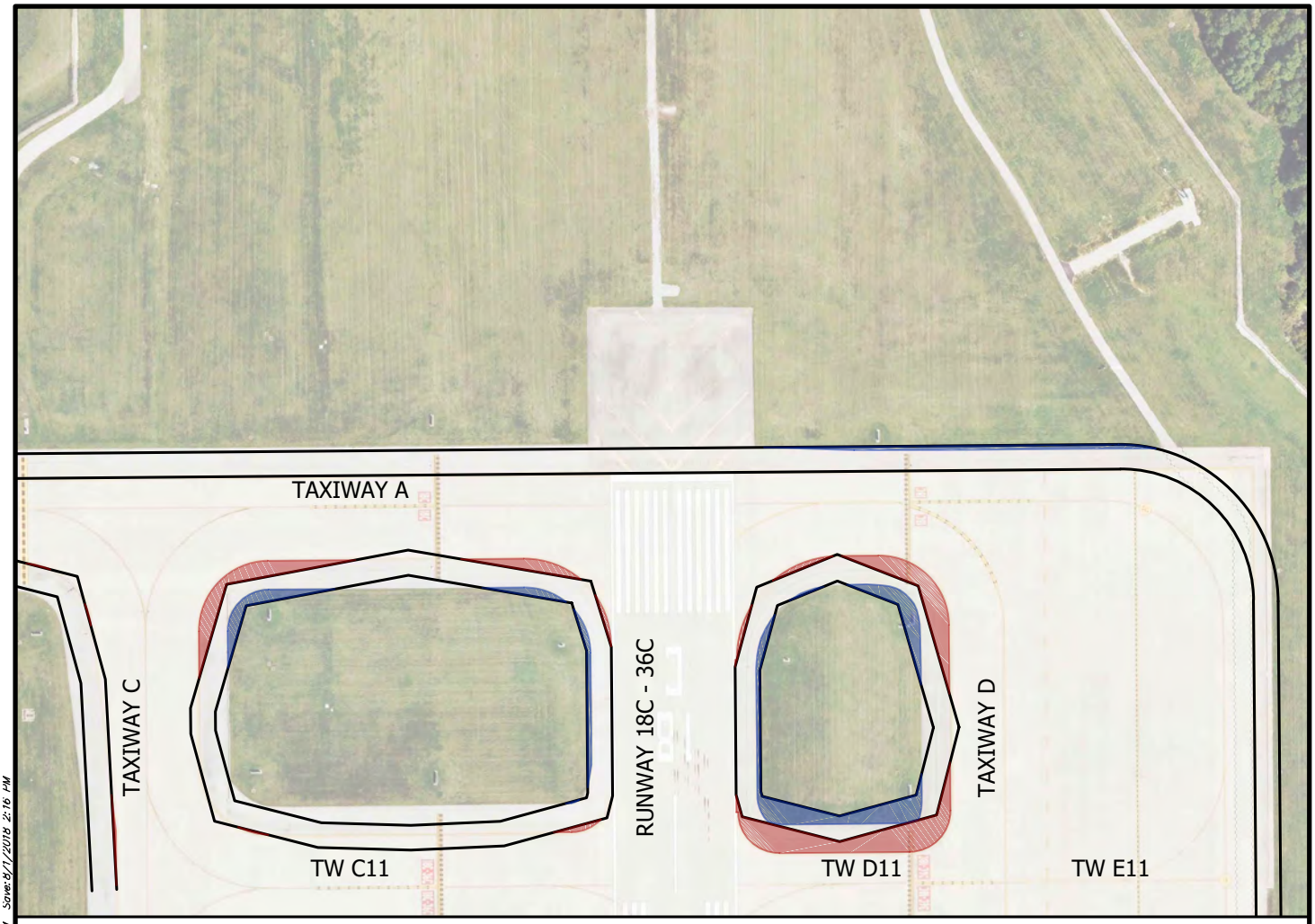
LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

Butler Fairman Seufert CIVIL ENGINEERS

CVG CINCINNATI/NORTHERN KENTUCKY INTERNATIONAL AIRPORT



Taxiway Intersection Information		
RW 18C & TW D END CONN	TDG	6
Additional Pavement (SYD) 215	$Cost_{Pvmt}$	64,600
Additional Shoulder (SYD) 239	$Cost_{Shoulder}$	10,043
Additional Marking	$Cost_{Marking}$	5,250
Lighting	$Cost_{Lighting}$	21,000
	$Cost_{Total}$	100,893

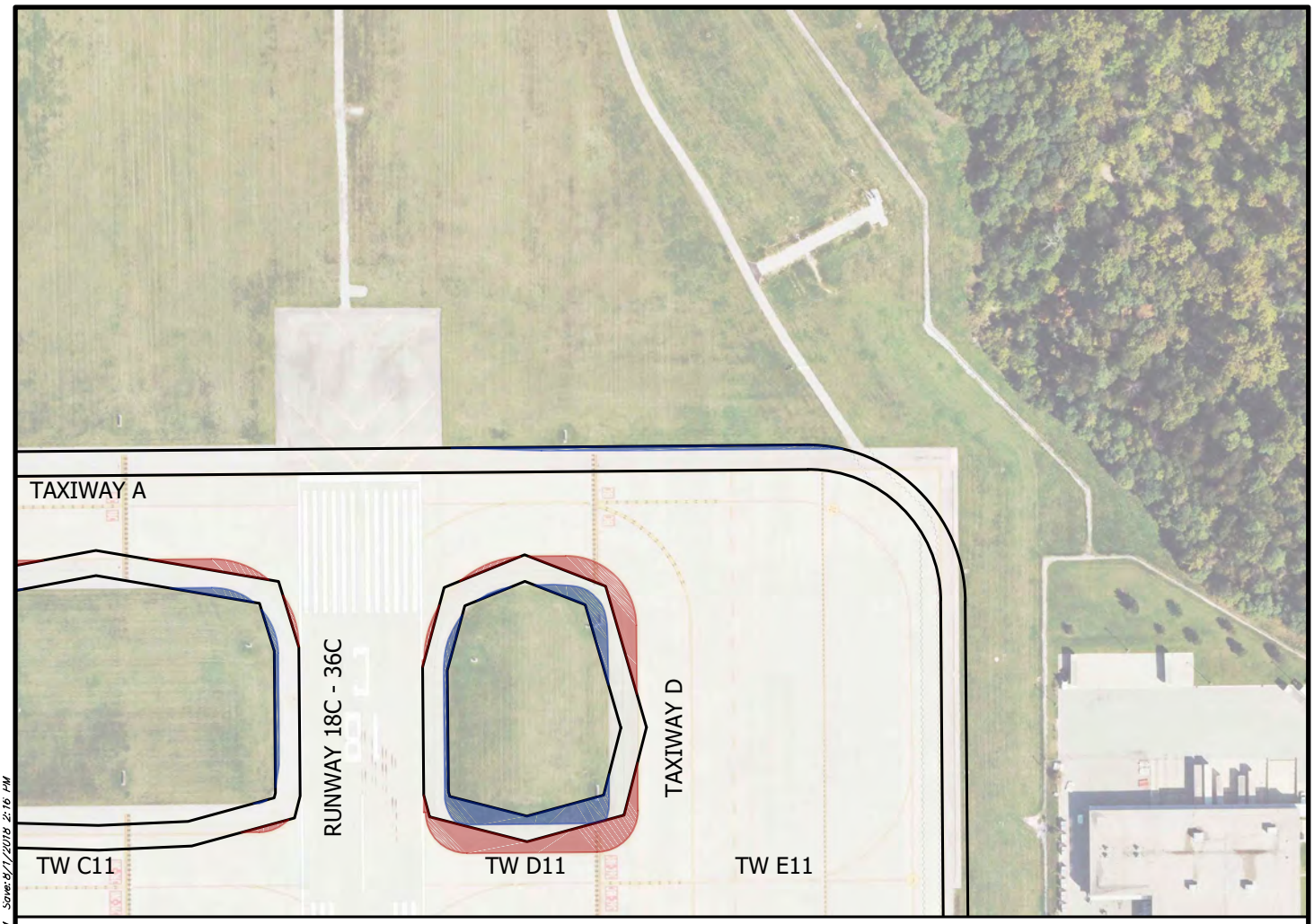
LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

Butler Fairman Seufert CIVIL ENGINEERS

CVG CINCINNATI/NORTHERN KENTUCKY INTERNATIONAL AIRPORT



Taxiway Intersection Information		
TW D & TW D END CONN	TDG	6
Additional Pavement (SYD) 299	$Cost_{Pvmt}$	89,733
Additional Shoulder (SYD) 206	$Cost_{Shoulder}$	8,652
Additional Marking	$Cost_{Marking}$	3,500
Lighting	$Cost_{Lighting}$	13,000
	$Cost_{Total}$	114,885

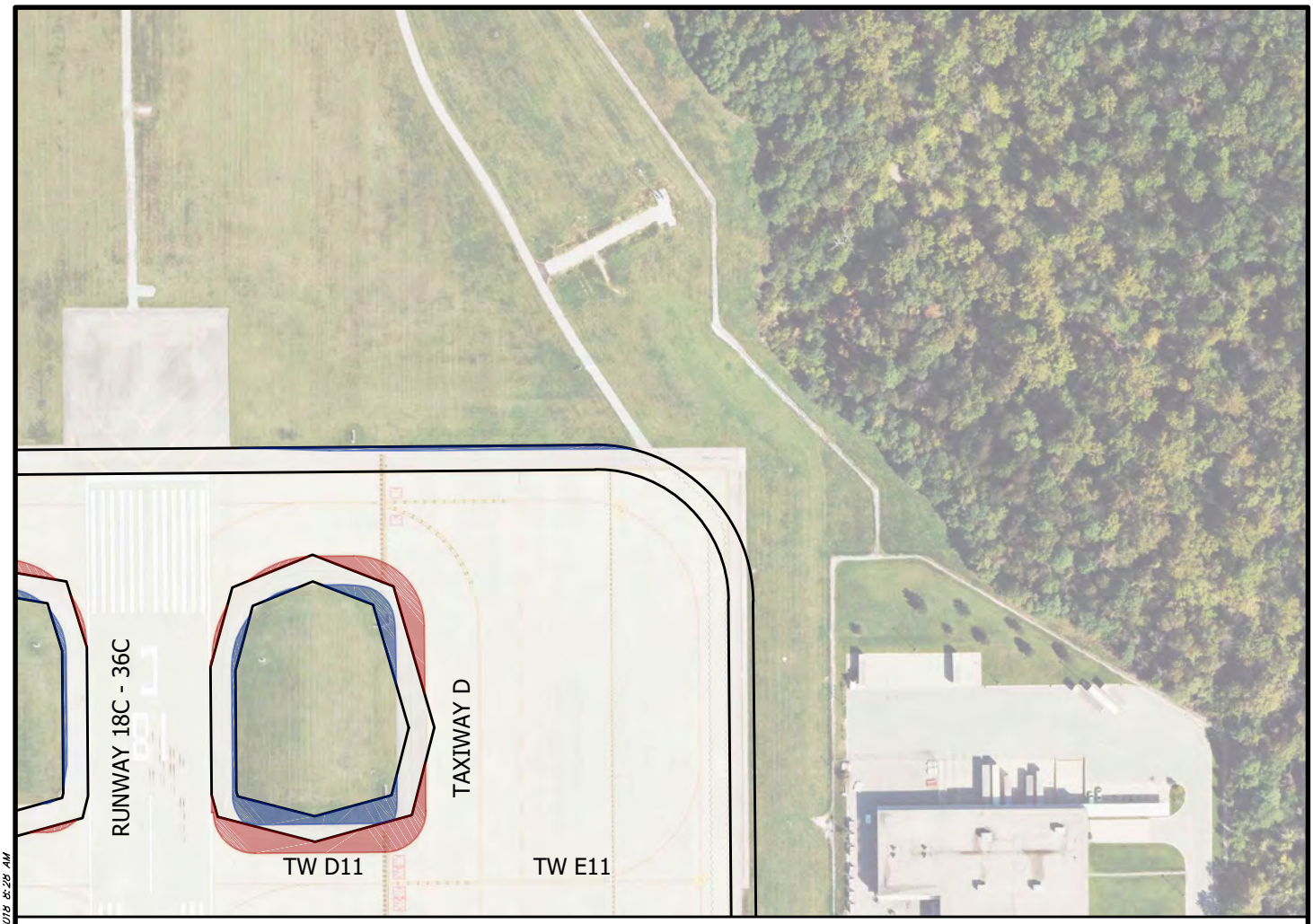
LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

Butler Fairman Seufert CIVIL ENGINEERS

CVG CINCINNATI/NORTHERN KENTUCKY INTERNATIONAL AIRPORT



Taxiway Intersection Information		
TW D END CONN & TW E END CONN	TDG	4
Additional Pavement (SYD) 0	$Cost_{Pvmt}$	0
Additional Shoulder (SYD) 22	$Cost_{Shoulder}$	938
Additional Marking	$Cost_{Marking}$	10,500
Lighting	$Cost_{Lighting}$	14,000
	$Cost_{Total}$	25,438

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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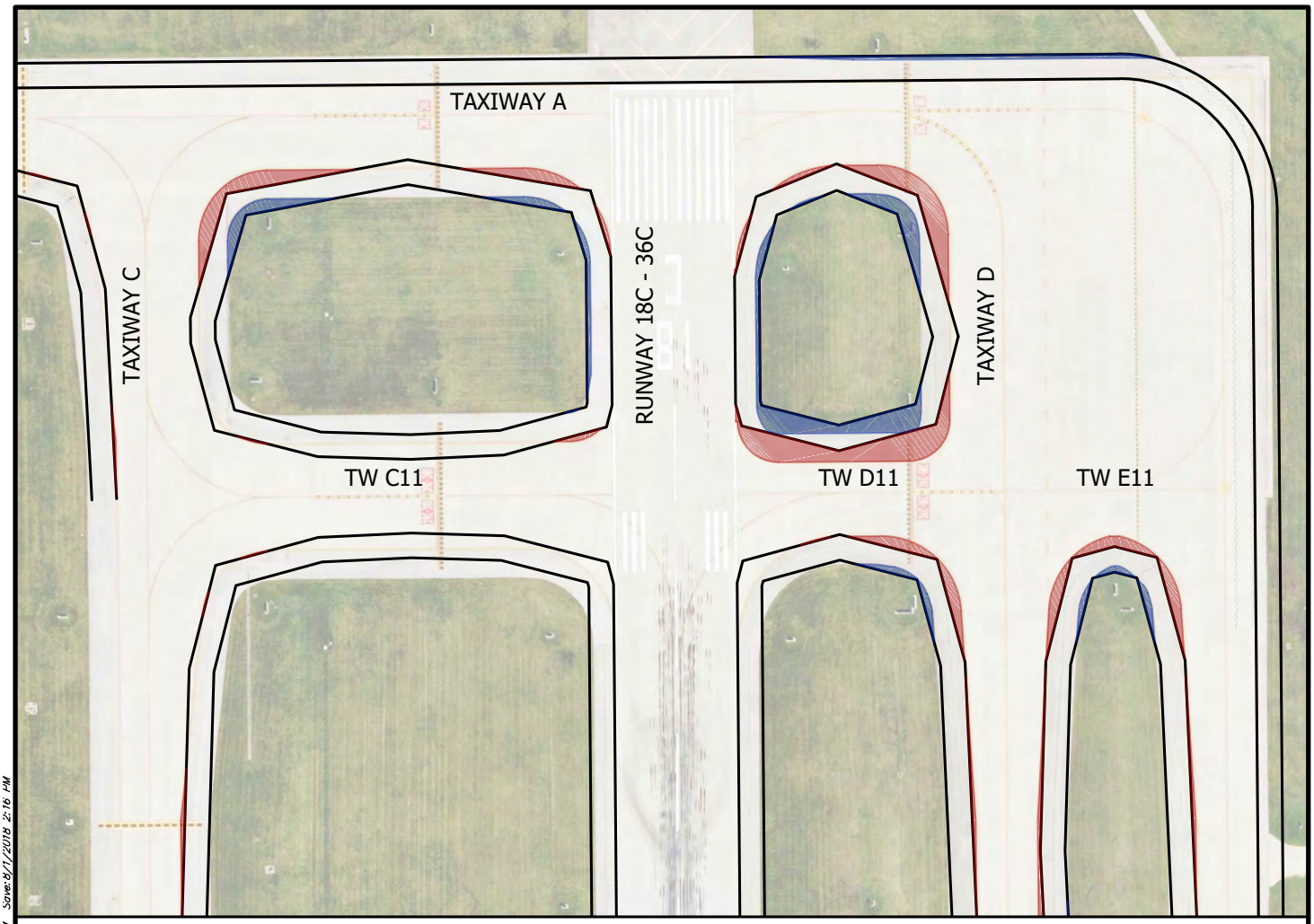
CVG CINCINNATI/NORTHERN KENTUCKY INTERNATIONAL AIRPORT



Taxiway Intersection Information		
RW 18C & TW D11	TDG	5
Additional Pavement (SYD) 706	$Cost_{Pvmt}$	211,800
Additional Shoulder (SYD) 623	$Cost_{Shoulder}$	26,175
Additional Marking	$Cost_{Marking}$	10,500
Lighting	$Cost_{Lighting}$	30,000
	$Cost_{Total}$	278,475

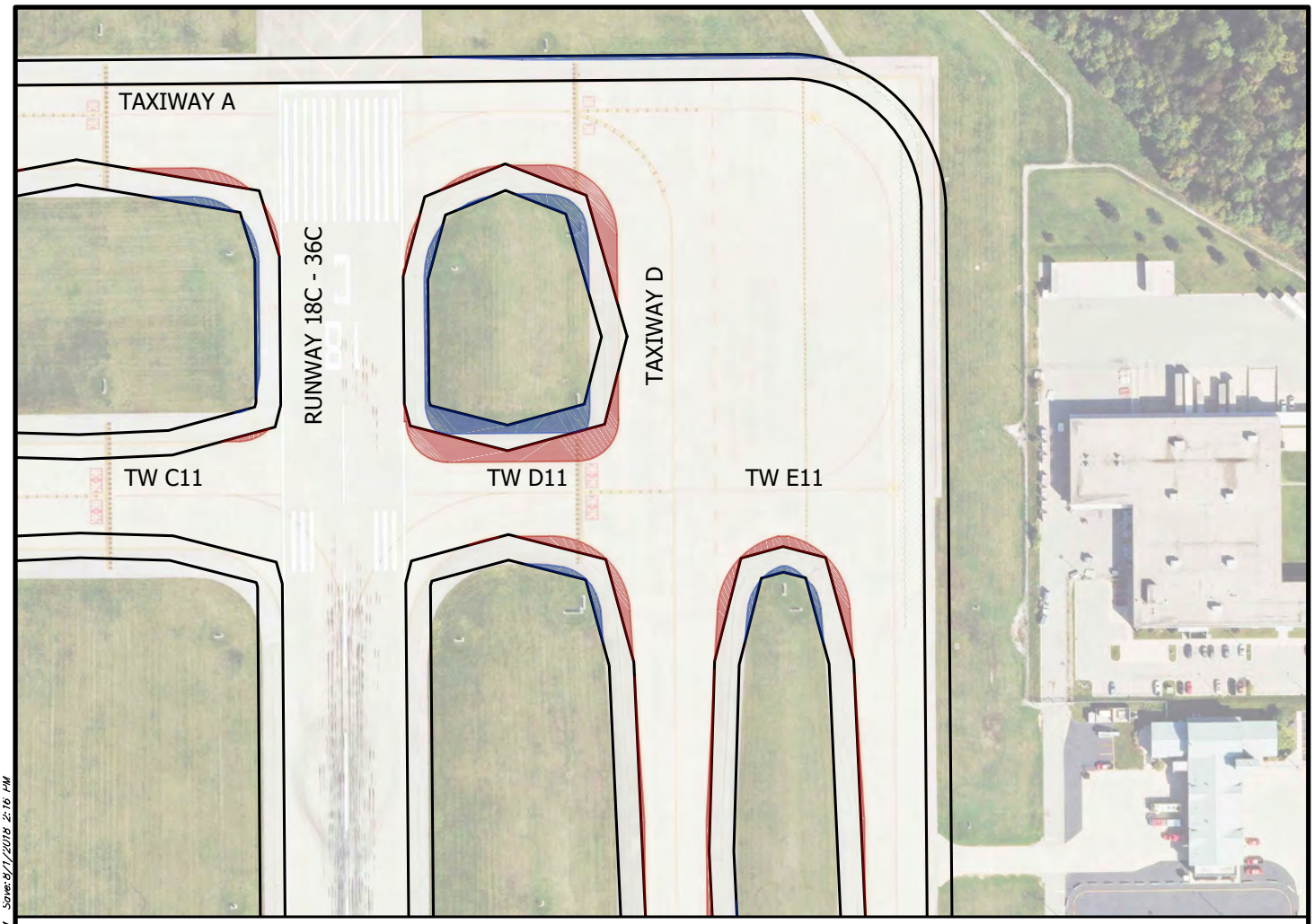
LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

Butler Fairman Seufert CIVIL ENGINEERS

CVG CINCINNATI/NORTHERN KENTUCKY INTERNATIONAL AIRPORT



Taxiway Intersection Information		
TW D & TW D11	TDG	5
Additional Pavement (SYD) 419	$Cost_{Pvmt}$	125,700
Additional Shoulder (SYD) 84	$Cost_{Shoulder}$	3,509
Additional Marking	$Cost_{Marking}$	11,375
Lighting	$Cost_{Lighting}$	18,000
	$Cost_{Total}$	158,584

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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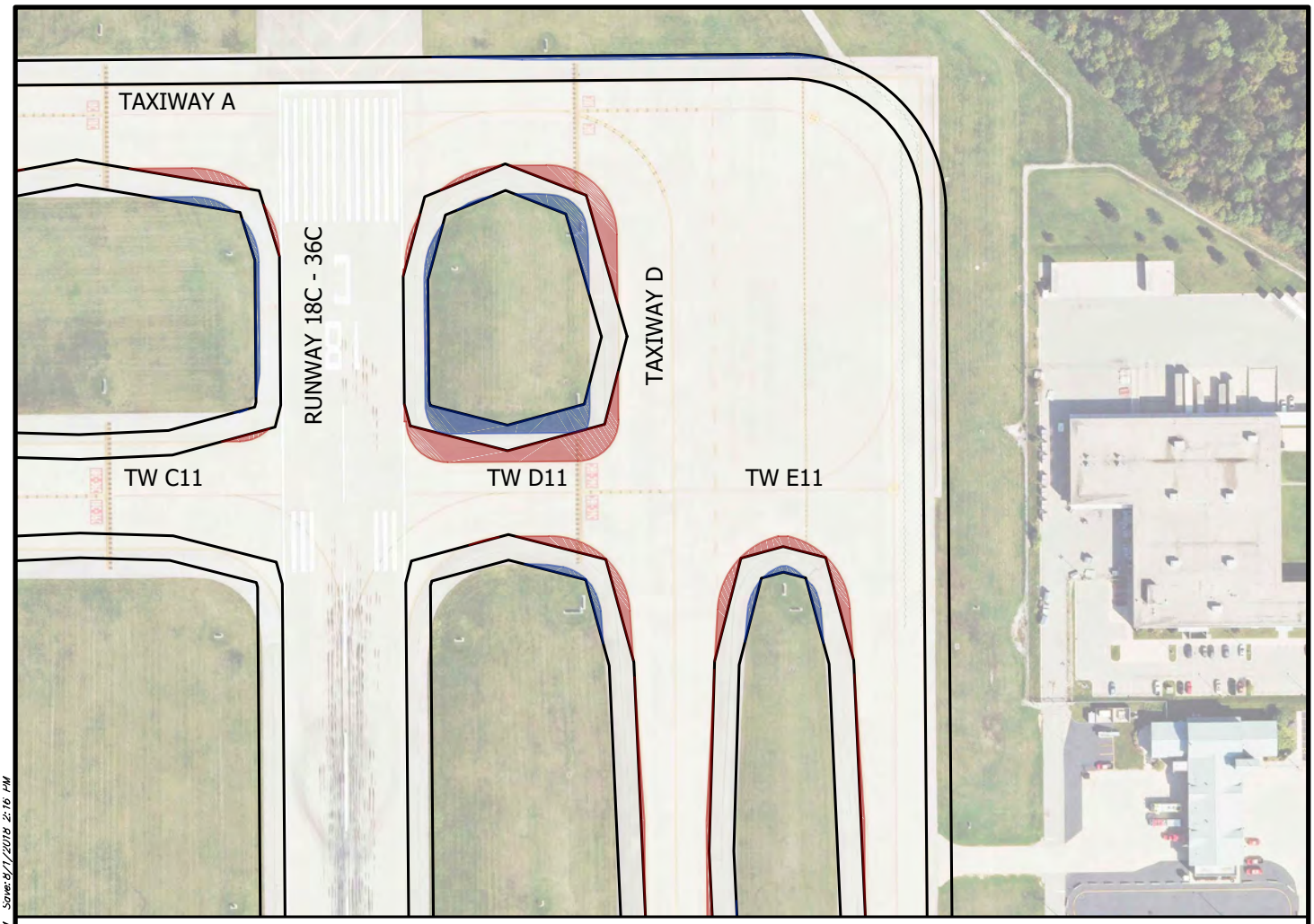
CVG CINCINNATI/NORTHERN KENTUCKY INTERNATIONAL AIRPORT



Taxiway Intersection Information		
TW D & TW E11	TDG	5
Additional Pavement (SYD) 268	$Cost_{Pvmt}$	80,433
Additional Shoulder (SYD) 53	$Cost_{Shoulder}$	2,245
Additional Marking	$Cost_{Marking}$	7,875
Lighting	$Cost_{Lighting}$	14,000
	$Cost_{Total}$	104,553

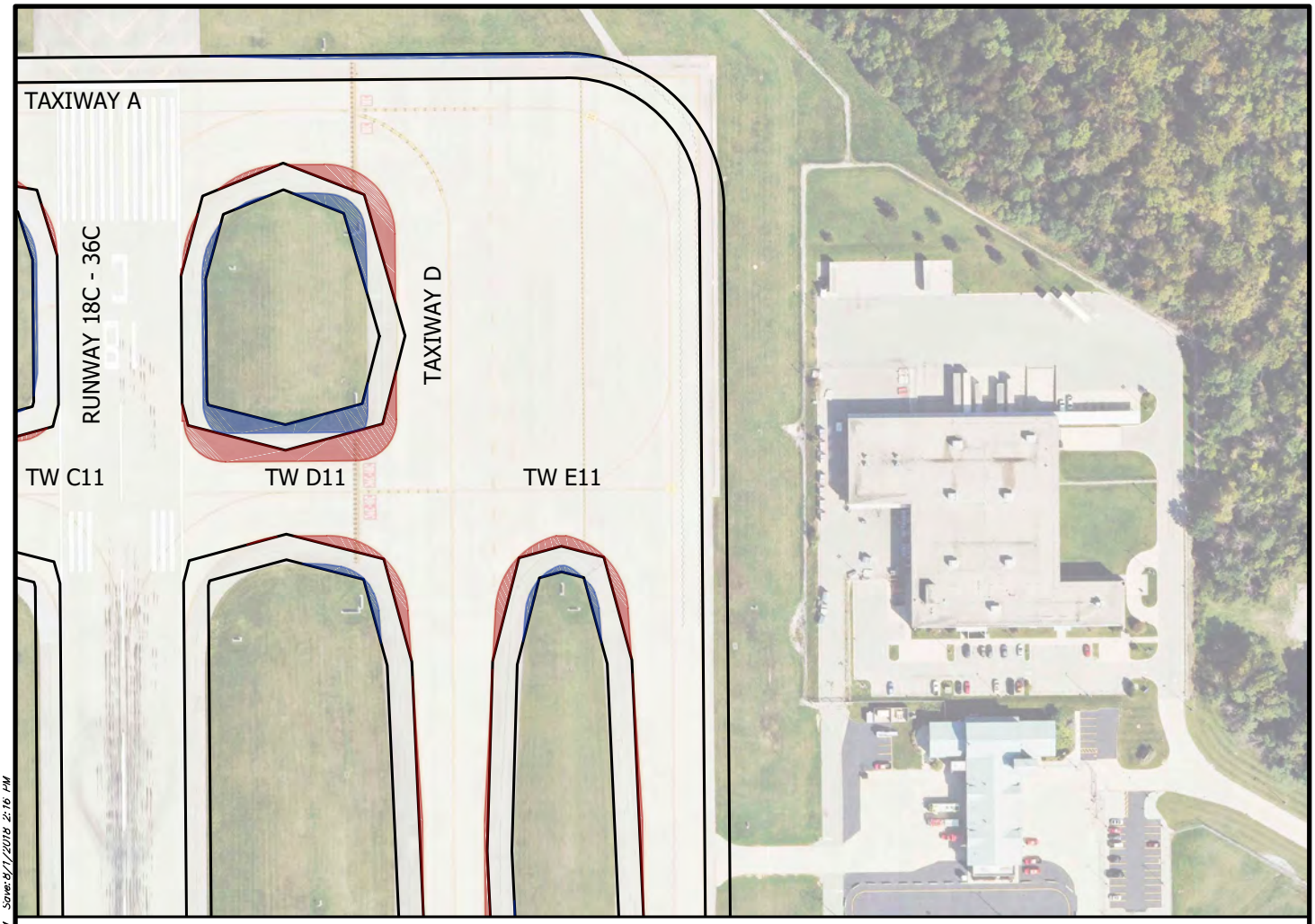
LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

Butler Fairman Seufert CIVIL ENGINEERS

CVG CINCINNATI/NORTHERN KENTUCKY INTERNATIONAL AIRPORT



Taxiway Intersection Information		
TW E & TW E11	TDG	5
Additional Pavement (SYD) 249	$Cost_{Pvmt}$	74,600
Additional Shoulder (SYD) 63	$Cost_{Shoulder}$	2,627
Additional Marking	$Cost_{Marking}$	8,750
Lighting	$Cost_{Lighting}$	16,000
	$Cost_{Total}$	101,977

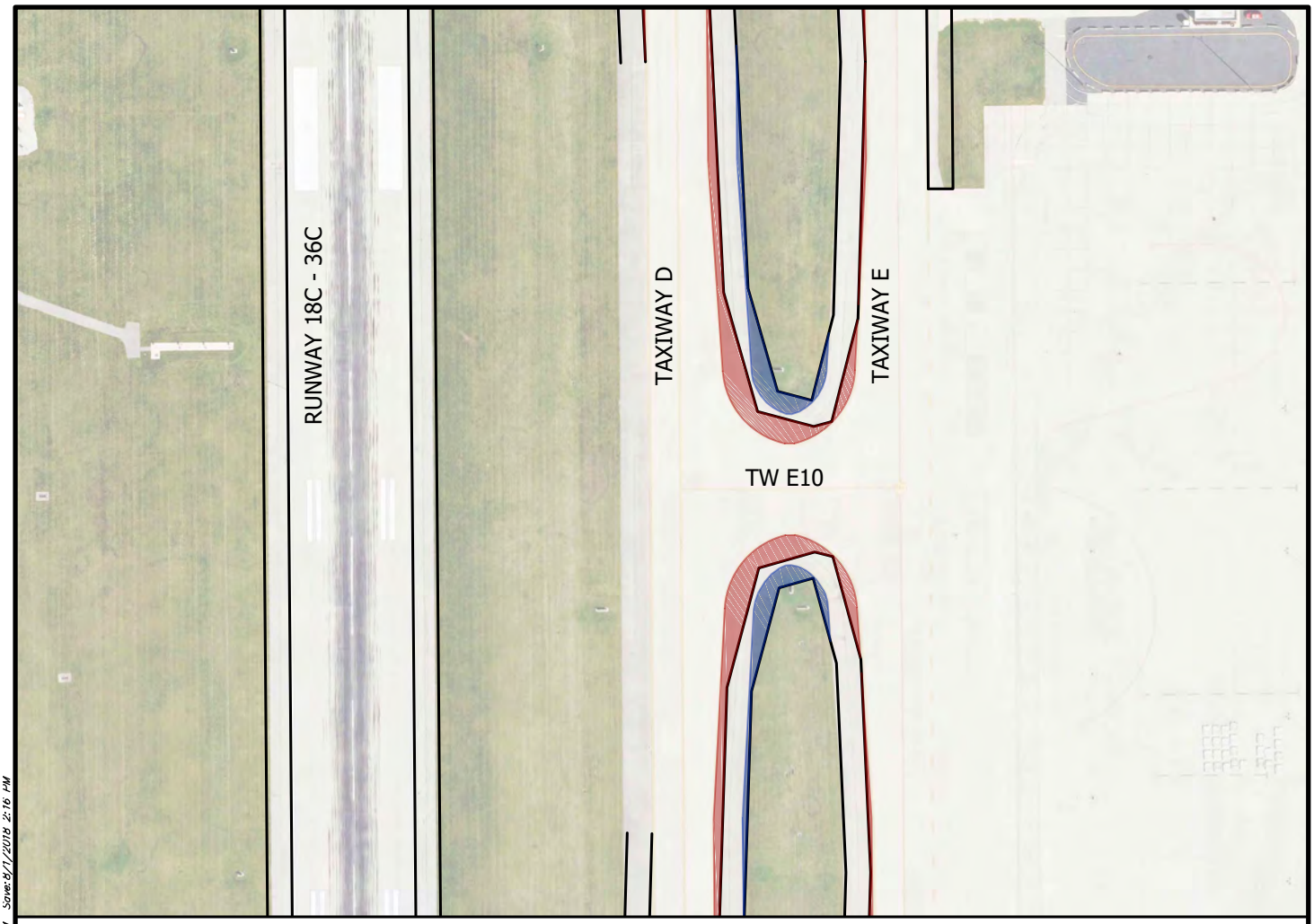
LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

Butler Fairman Seufert CIVIL ENGINEERS

CVG CINCINNATI/NORTHERN KENTUCKY INTERNATIONAL AIRPORT



Taxiway Intersection Information		
TW D & TW E10	TDG	6
Additional Pavement (SYD) 1646	$Cost_{Pvmt}$	493,733
Additional Shoulder (SYD) 834	$Cost_{Shoulder}$	35,033
Additional Marking	$Cost_{Marking}$	21,000
Lighting	$Cost_{Lighting}$	40,000
	$Cost_{Total}$	589,766

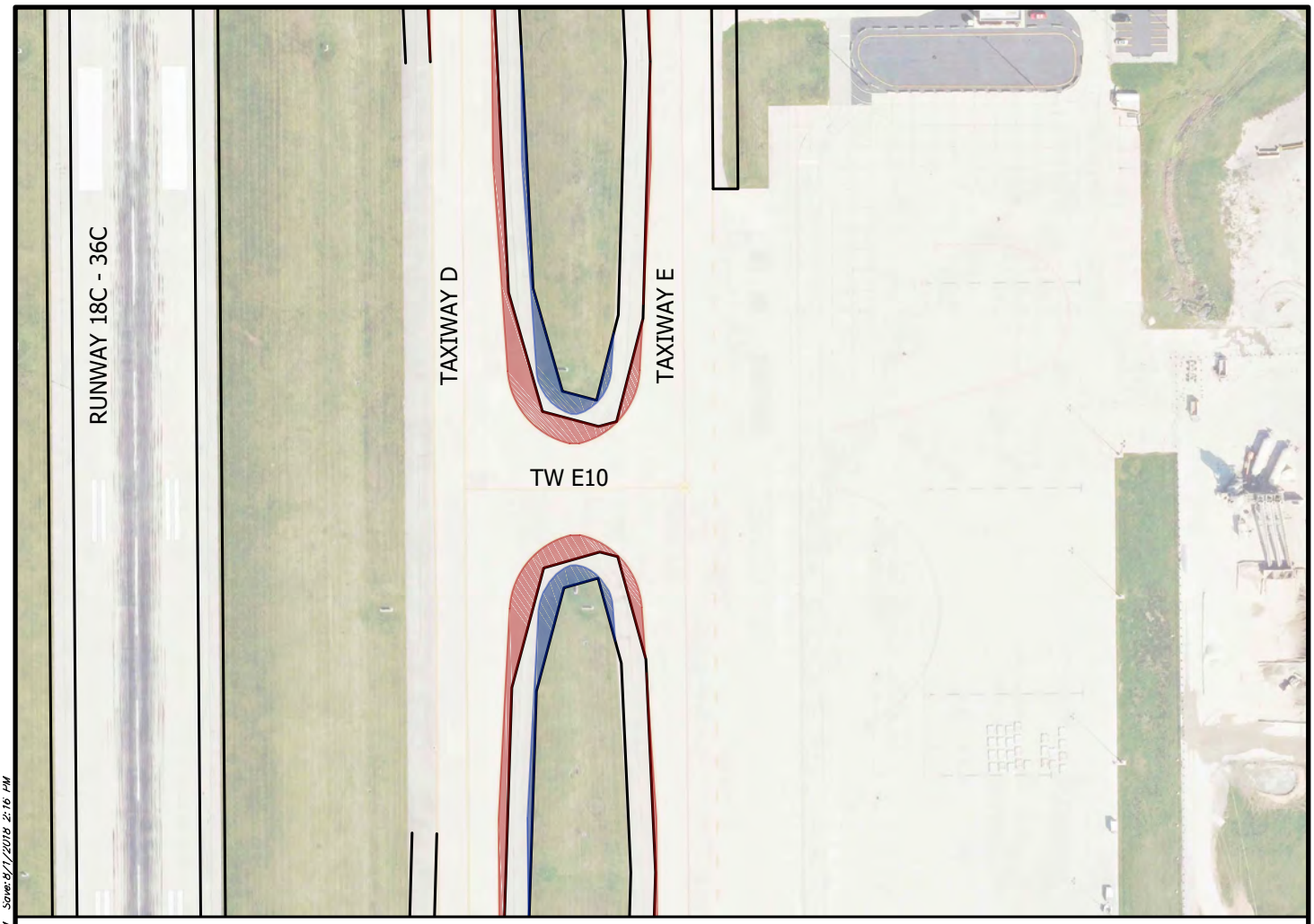
LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

Butler Fairman Seufert CIVIL ENGINEERS

CVG CINCINNATI/NORTHERN KENTUCKY INTERNATIONAL AIRPORT



Taxiway Intersection Information		
TW E & TW E10	TDG	6
Additional Pavement (SYD) 611	$Cost_{Pvmt}$	183,267
Additional Shoulder (SYD) 196	$Cost_{Shoulder}$	8,223
Additional Marking	$Cost_{Marking}$	16,625
Lighting	$Cost_{Lighting}$	26,000
	$Cost_{Total}$	234,114

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

BF&S Butler Fairman Seufert CIVIL ENGINEERS

CVG CINCINNATI/NORTHERN KENTUCKY INTERNATIONAL AIRPORT

Taxiway Intersection Information		
RW 18C & TW D9	TDG	5
Additional Pavement (SYD) 137	$Cost_{Pvmt}$	41,200
Additional Shoulder (SYD) 58	$Cost_{Shoulder}$	2,417
Additional Marking	$Cost_{Marking}$	10,500
Lighting	$Cost_{Lighting}$	28,000
	$Cost_{Total}$	82,117

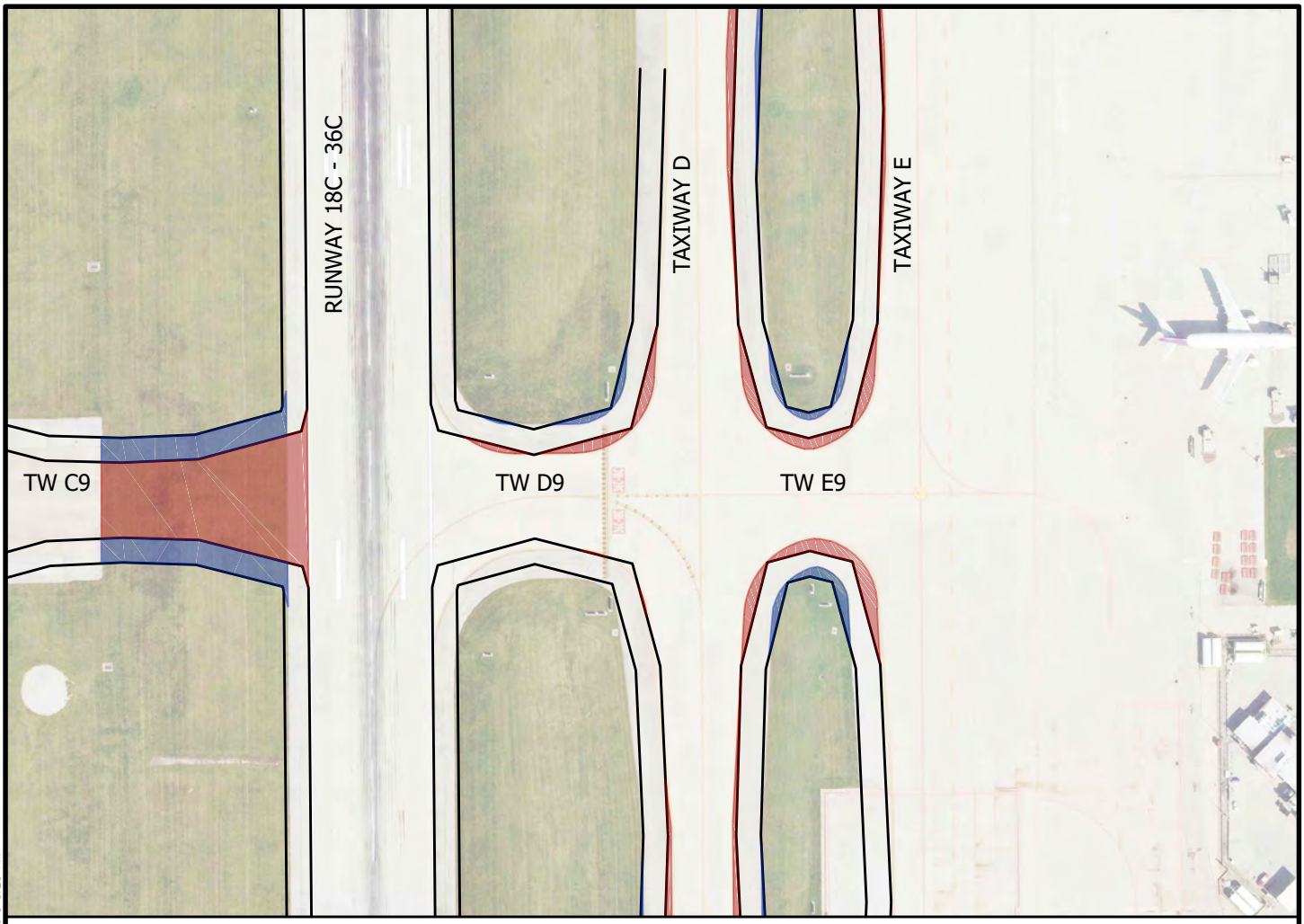
LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

Butler Fairman Seufert CIVIL ENGINEERS

CVG CINCINNATI/NORTHERN KENTUCKY INTERNATIONAL AIRPORT



Taxiway Intersection Information		
TW D & TW D9	TDG	5
Additional Pavement (SYD) 152	$Cost_{Pvmt}$	45,500
Additional Shoulder (SYD) 49	$Cost_{Shoulder}$	2,067
Additional Marking	$Cost_{Marking}$	13,125
Lighting	$Cost_{Lighting}$	24,000
	$Cost_{Total}$	84,692

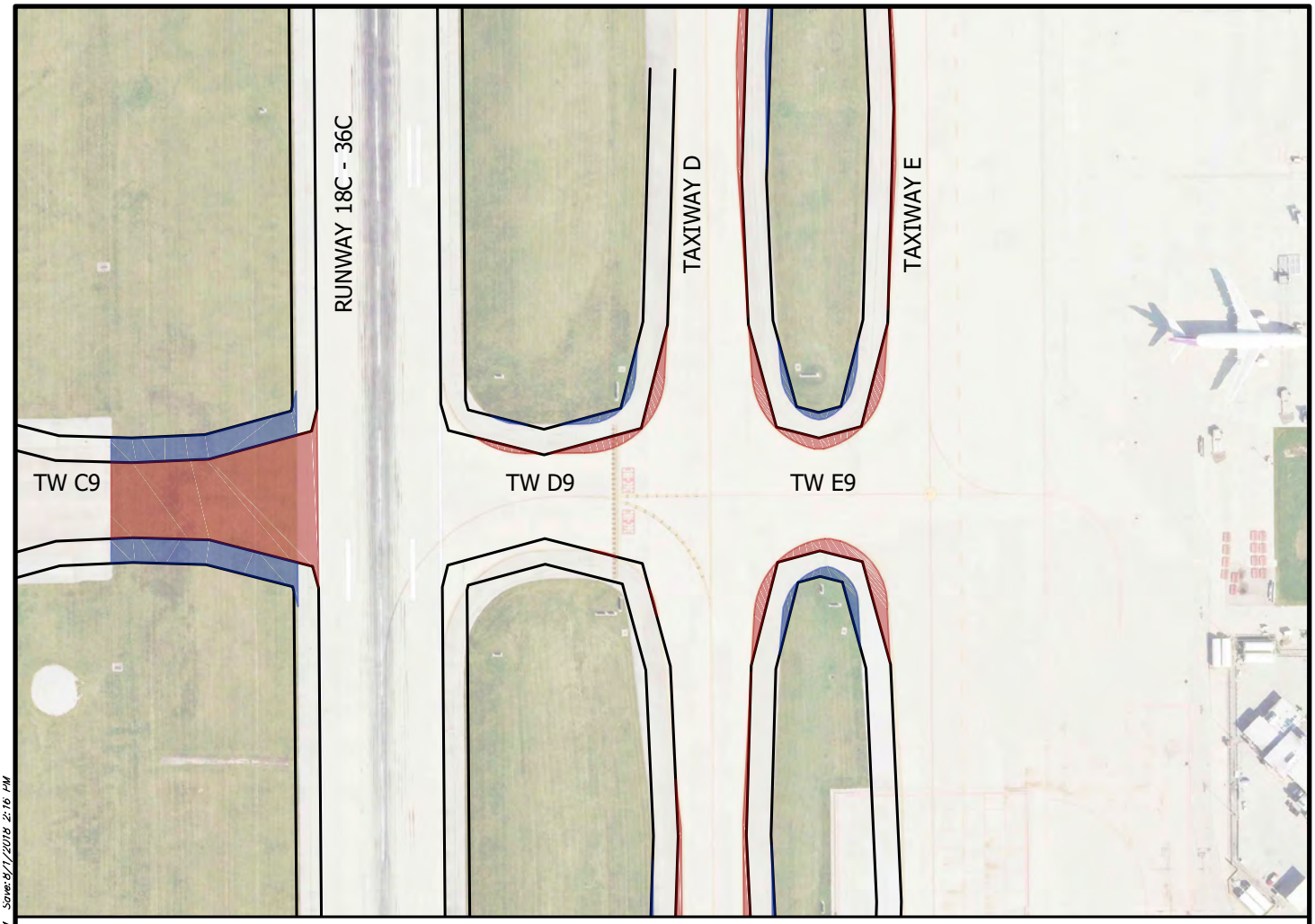
LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

Butler Fairman Seufert CIVIL ENGINEERS

CVG CINCINNATI/NORTHERN KENTUCKY INTERNATIONAL AIRPORT



Taxiway Intersection Information		
TW D & TW E9	TDG	5
Additional Pavement (SYD) 409	$Cost_{Pvmt}$	122,567
Additional Shoulder (SYD) 152	$Cost_{Shoulder}$	6,403
Additional Marking	$Cost_{Marking}$	13,125
Lighting	$Cost_{Lighting}$	28,000
	$Cost_{Total}$	170,094

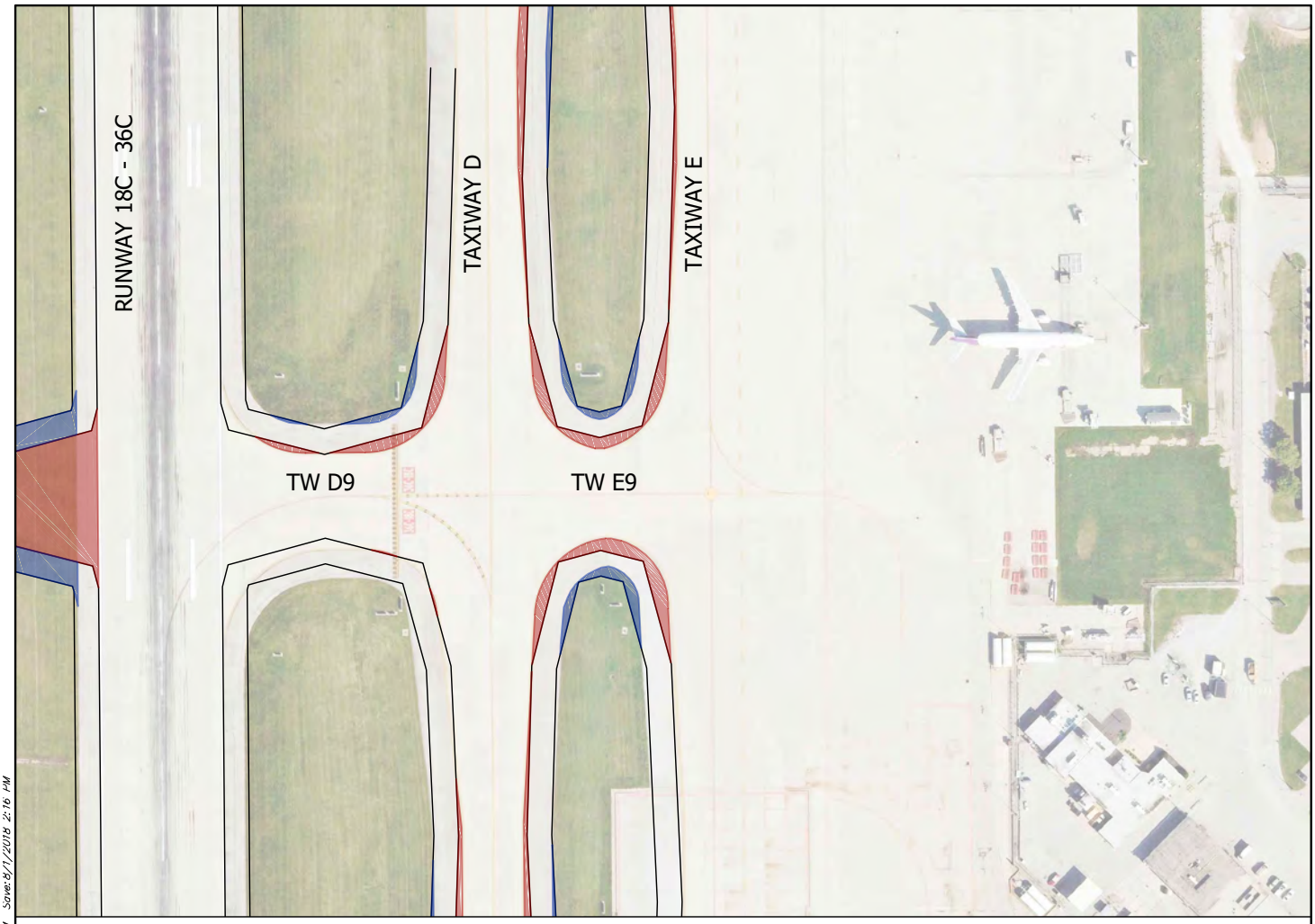
LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

Butler Fairman Seufert CIVIL ENGINEERS

CVG CINCINNATI/NORTHERN KENTUCKY INTERNATIONAL AIRPORT



Taxiway Intersection Information		
TW E & TW E9	TDG	5
Additional Pavement (SYD) 441	$Cost_{Pvmt}$	132,433
Additional Shoulder (SYD) 192	$Cost_{Shoulder}$	8,069
Additional Marking	$Cost_{Marking}$	16,625
Lighting	$Cost_{Lighting}$	28,000
	$Cost_{Total}$	185,127

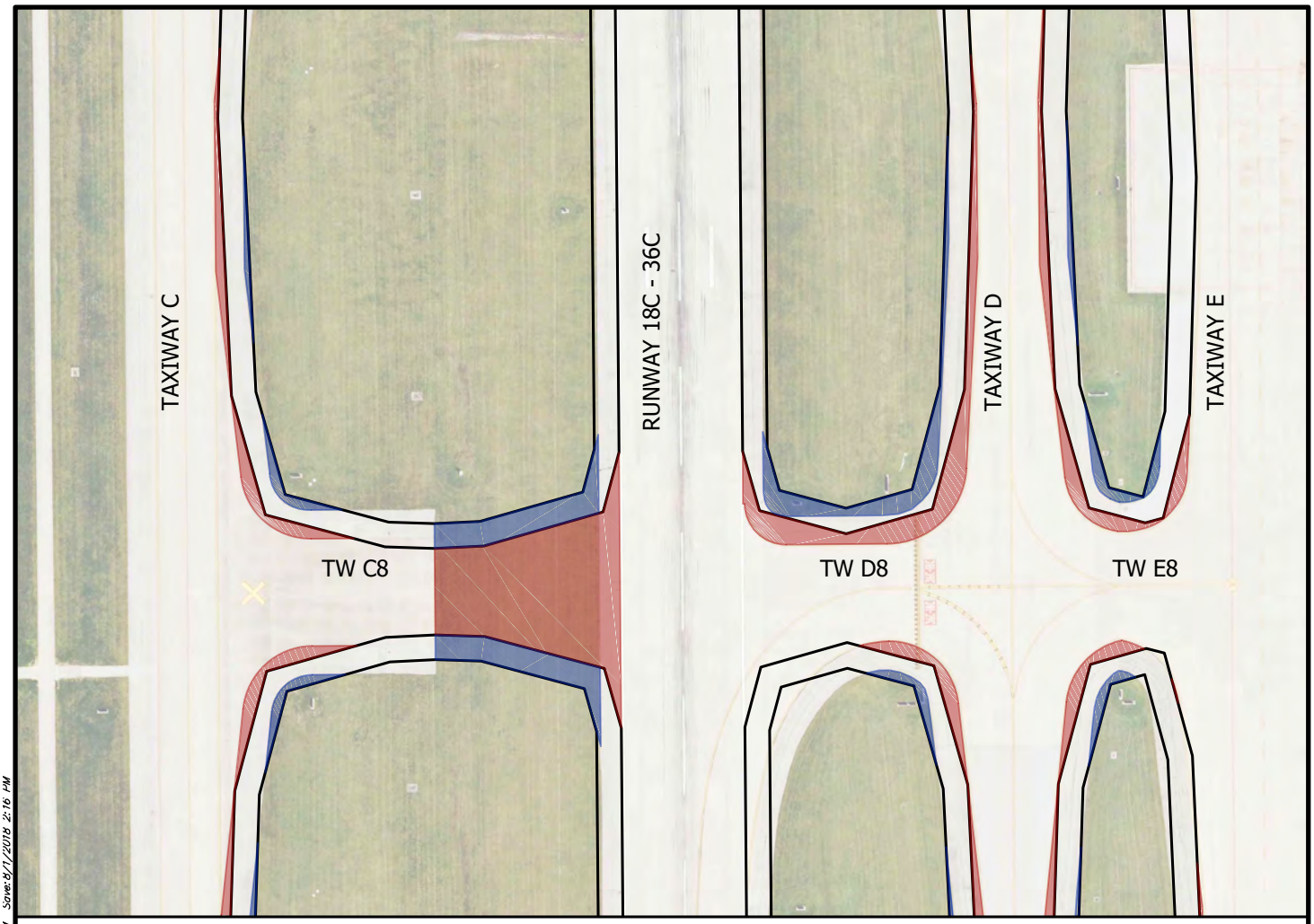
LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

BF&S Butler Fairman Seufert CIVIL ENGINEERS

CVG CINCINNATI/NORTHERN KENTUCKY INTERNATIONAL AIRPORT



Taxiway Intersection Information		
RW 18C & TW D8	TDG	6
Additional Pavement (SYD) 773	$Cost_{Pvmt}$	232,000
Additional Shoulder (SYD) 612	$Cost_{Shoulder}$	25,695
Additional Marking	$Cost_{Marking}$	14,000
Lighting	$Cost_{Lighting}$	195,000
	$Cost_{Total}$	466,695

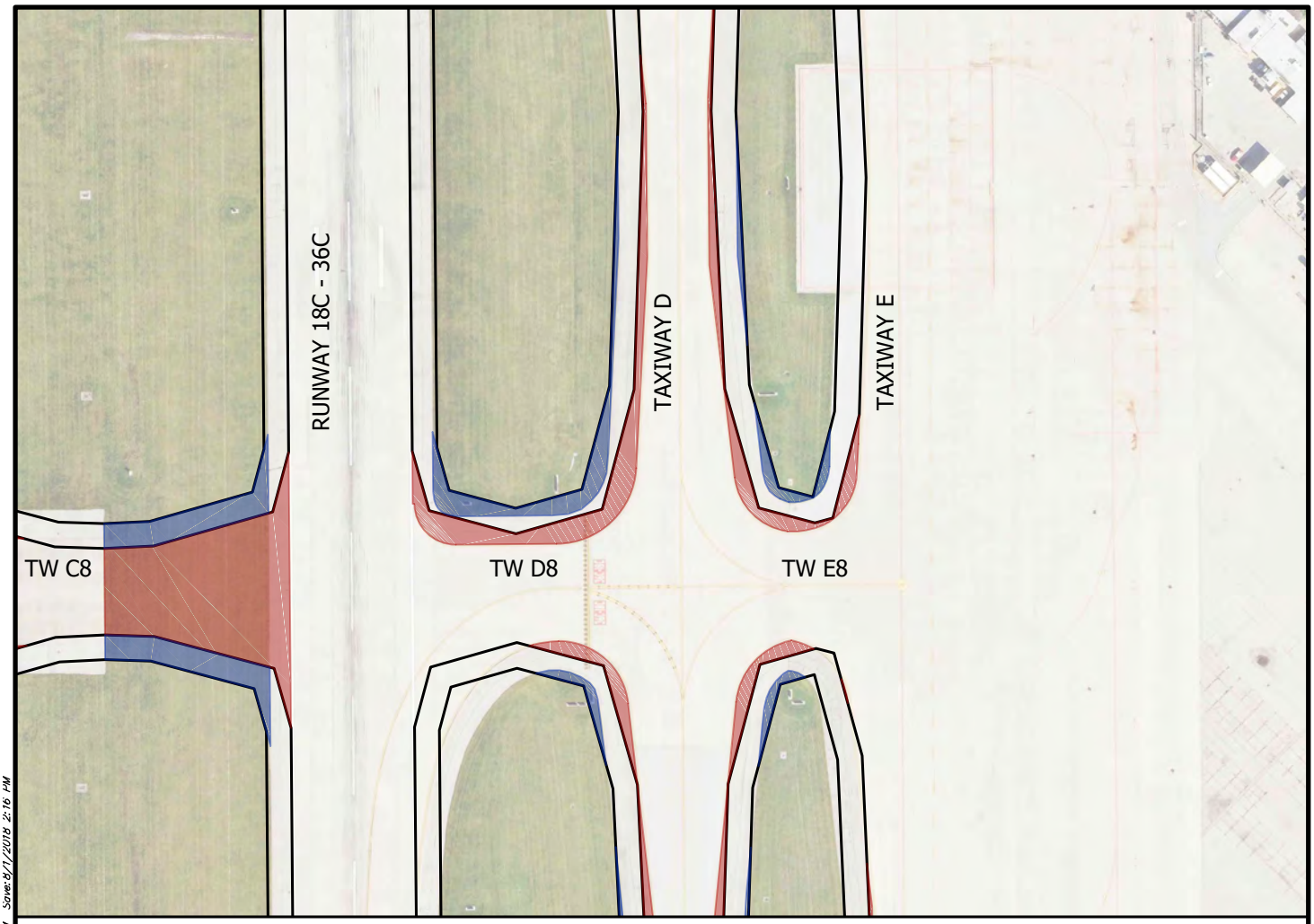
LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

Butler Fairman Seufert CIVIL ENGINEERS

CVG CINCINNATI/NORTHERN KENTUCKY INTERNATIONAL AIRPORT



Taxiway Intersection Information		
TW D & TW D8	TDG	6
Additional Pavement (SYD) 1225	$Cost_{Pvmt}$	367,600
Additional Shoulder (SYD) 435	$Cost_{Shoulder}$	18,284
Additional Marking	$Cost_{Marking}$	19,250
Lighting	$Cost_{Lighting}$	24,000
	$Cost_{Total}$	429,134

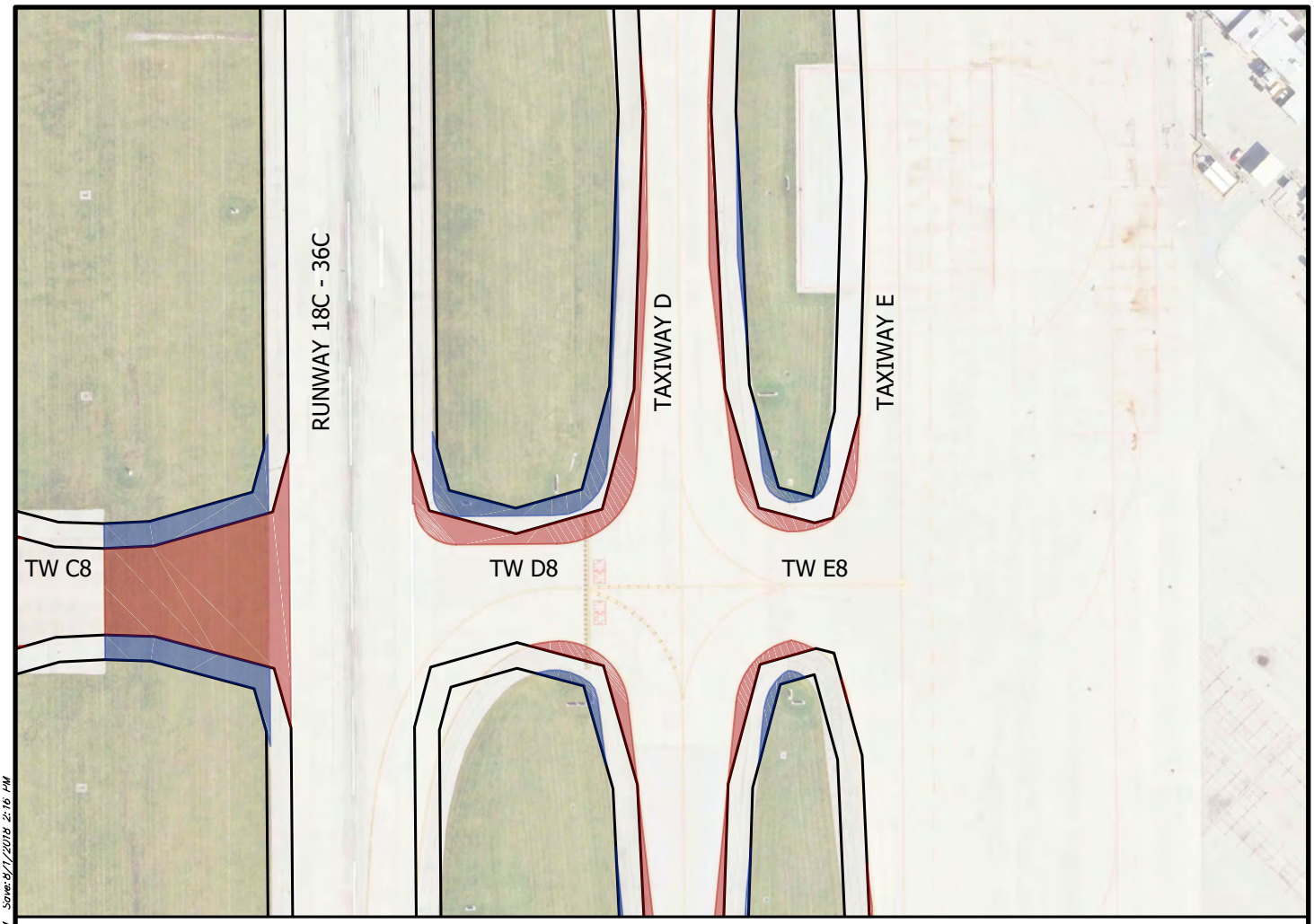
LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

Butler Fairman Seufert CIVIL ENGINEERS

CVG CINCINNATI/NORTHERN KENTUCKY INTERNATIONAL AIRPORT



Taxiway Intersection Information		
TW D & TW E8	TDG	6
Additional Pavement (SYD) 1199	$Cost_{Pvmt}$	359,600
Additional Shoulder (SYD) 422	$Cost_{Shoulder}$	17,705
Additional Marking	$Cost_{Marking}$	21,000
Lighting	$Cost_{Lighting}$	30,000
	$Cost_{Total}$	428,305

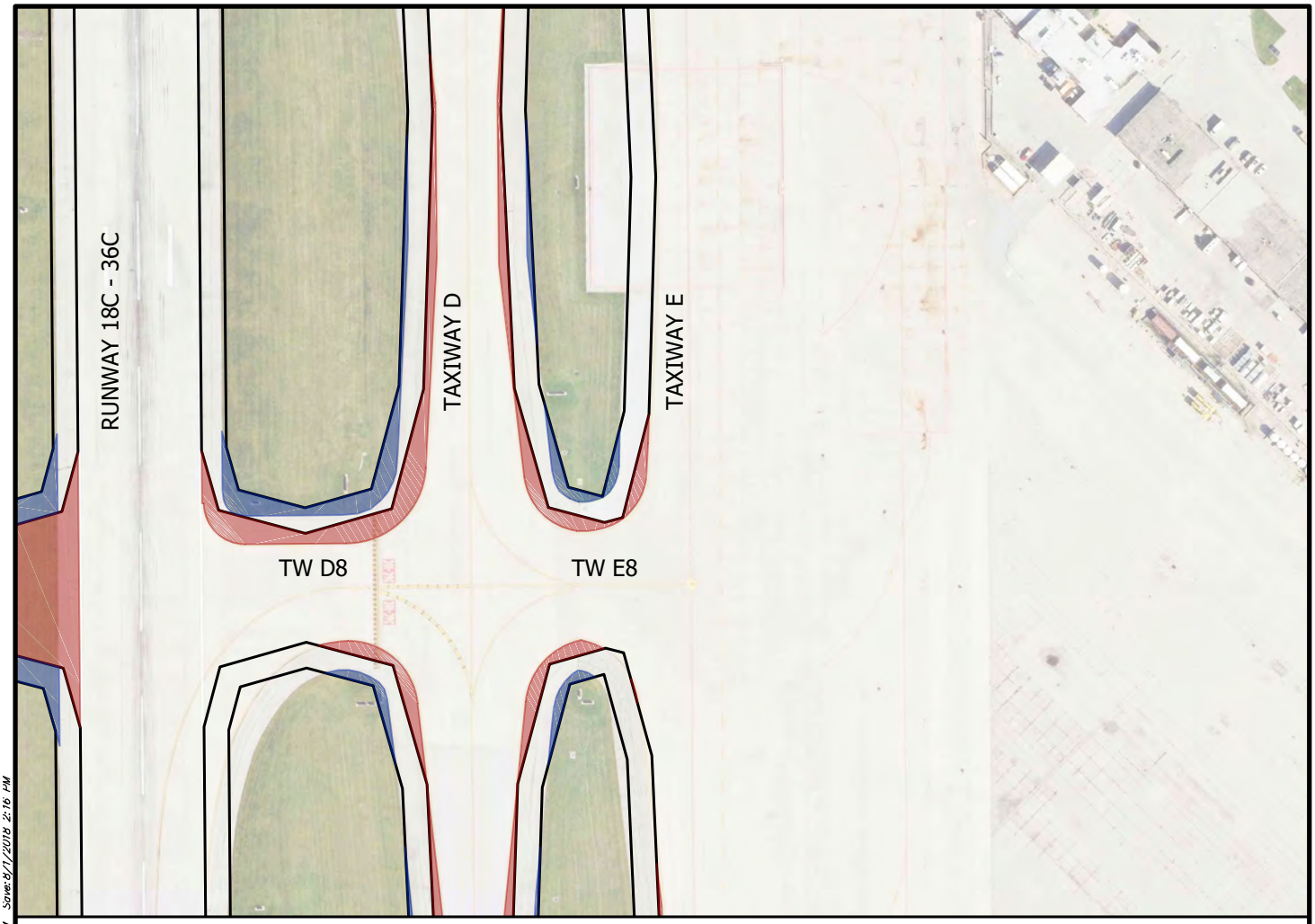
LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

BF&S Butler Fairman Seufert CIVIL ENGINEERS

CVG CINCINNATI/NORTHERN KENTUCKY INTERNATIONAL AIRPORT



Taxiway Intersection Information		
TW E & TW E8	TDG	6
Additional Pavement (SYD) 237	$Cost_{Pvmt}$	71,067
Additional Shoulder (SYD) 94	$Cost_{Shoulder}$	3,929
Additional Marking	$Cost_{Marking}$	15,750
Lighting	$Cost_{Lighting}$	22,000
	$Cost_{Total}$	112,746

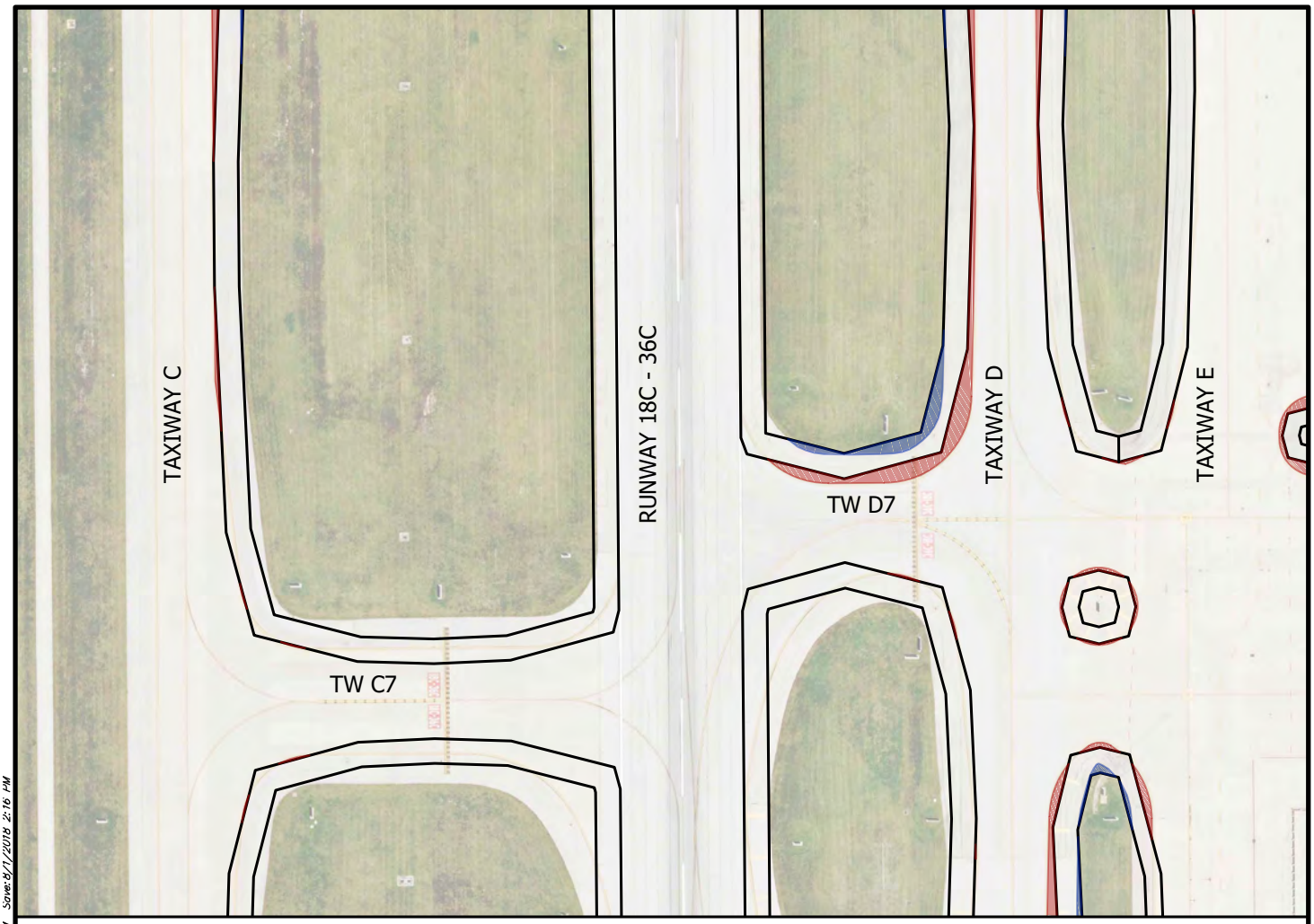
LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

Butler Fairman Seufert CIVIL ENGINEERS

CVG CINCINNATI/NORTHERN KENTUCKY INTERNATIONAL AIRPORT



Taxiway Intersection Information		
RW 18C & TW D7	TDG	5
Additional Pavement (SYD) 278	$Cost_{Pvmt}$	83,367
Additional Shoulder (SYD) 165	$Cost_{Shoulder}$	6,939
Additional Marking	$Cost_{Marking}$	14,000
Lighting	$Cost_{Lighting}$	154,000
	$Cost_{Total}$	258,306

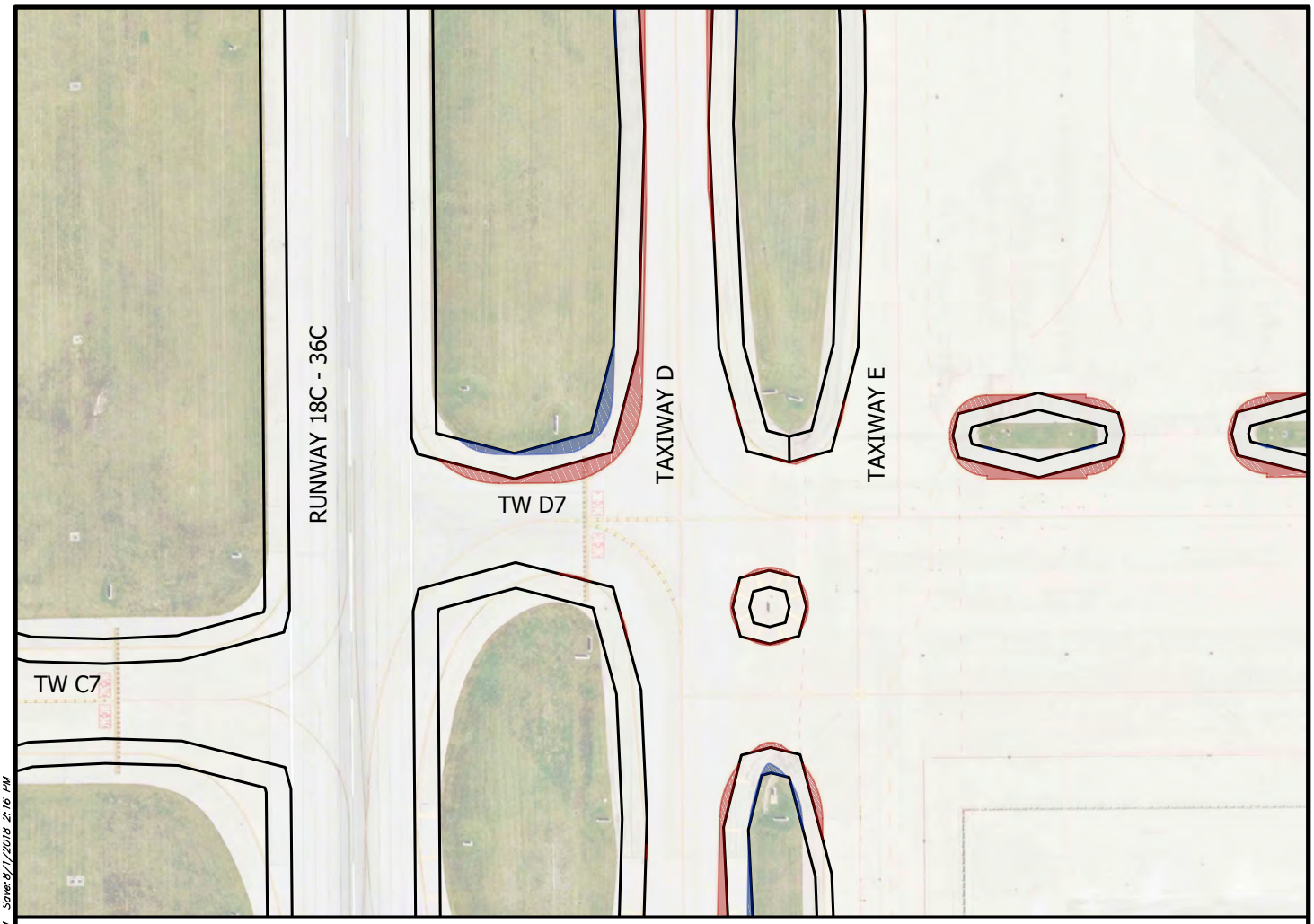
LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

BF&S Butler Fairman Seufert CIVIL ENGINEERS

CVG CINCINNATI/NORTHERN KENTUCKY INTERNATIONAL AIRPORT



Taxiway Intersection Information		
TW D & TW D7	TDG	5
Additional Pavement (SYD) 436	$Cost_{Pvmt}$	130,833
Additional Shoulder (SYD) 143	$Cost_{Shoulder}$	5,992
Additional Marking	$Cost_{Marking}$	14,000
Lighting	$Cost_{Lighting}$	24,000
	$Cost_{Total}$	174,825

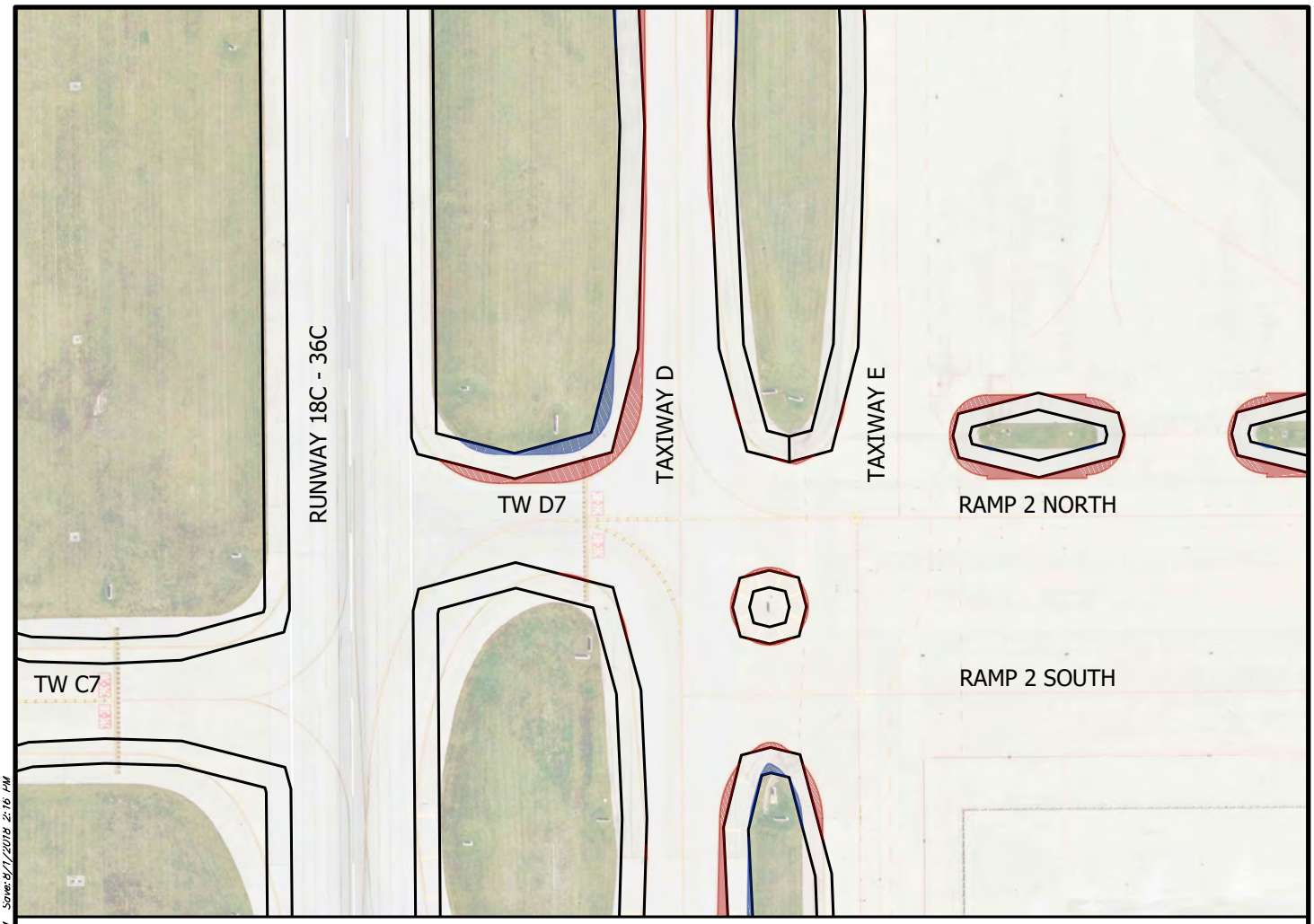
LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

BF&S Butler Fairman Seufert CIVIL ENGINEERS

CVG CINCINNATI/NORTHERN KENTUCKY INTERNATIONAL AIRPORT



Taxiway Intersection Information		
TW D & RAMP 2 NORTH TAXILANE	TDG	4
Additional Pavement (SYD) 39	$Cost_{Pvmt}$	11,833
Additional Shoulder (SYD) 0	$Cost_{Shoulder}$	0
Additional Marking	$Cost_{Marking}$	9,625
Lighting	$Cost_{Lighting}$	22,000
	$Cost_{Total}$	43,458

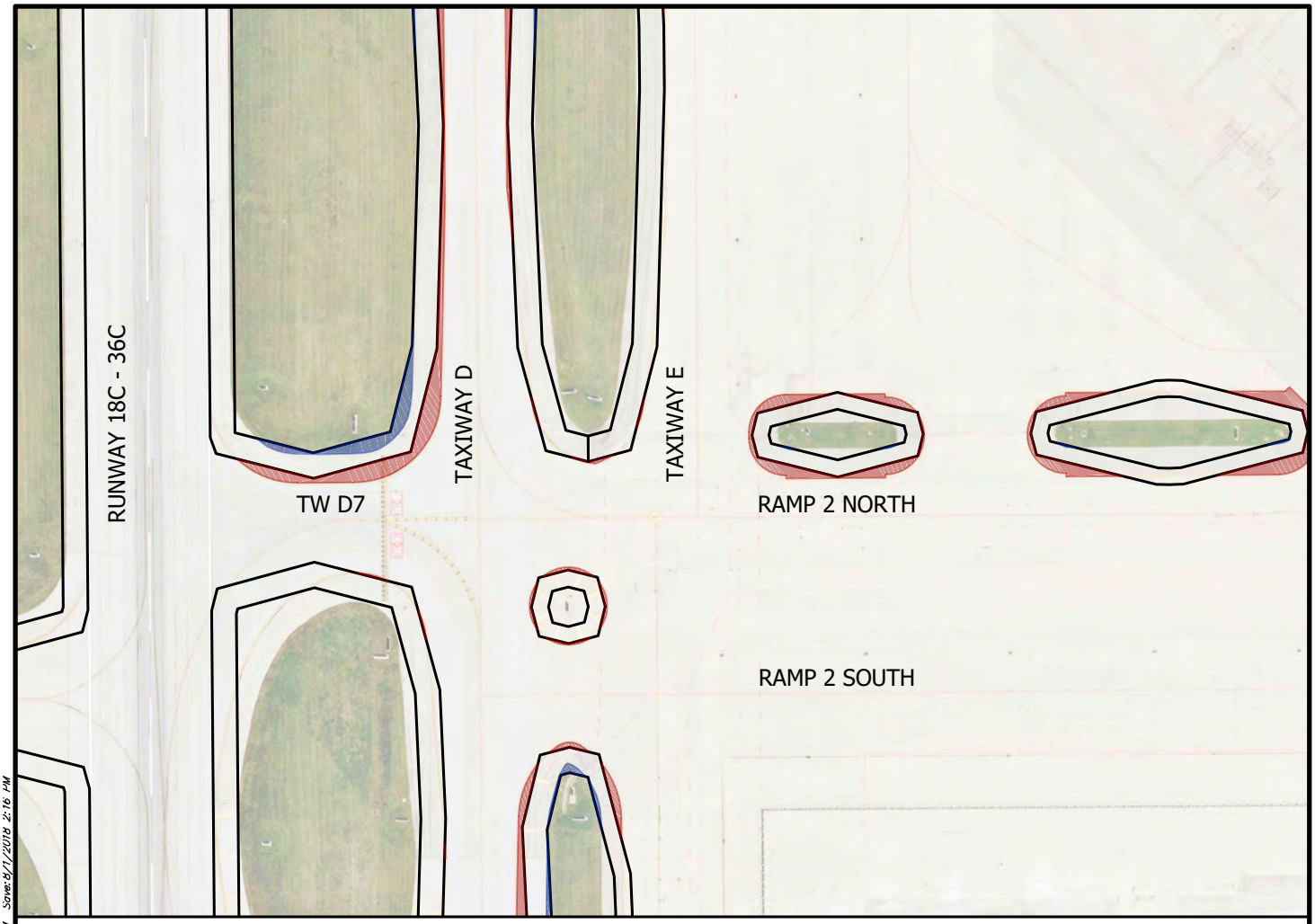
LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

Butler Fairman Seufert CIVIL ENGINEERS

CVG CINCINNATI/NORTHERN KENTUCKY INTERNATIONAL AIRPORT



Taxiway Intersection Information		
TW E & RAMP 2 NORTH TAXILANE	TDG	4
Additional Pavement (SYD) 17	$Cost_{Pvmt}$	5,067
Additional Shoulder (SYD) 0	$Cost_{Shoulder}$	0
Additional Marking	$Cost_{Marking}$	12,250
Lighting	$Cost_{Lighting}$	20,000
	$Cost_{Total}$	37,317

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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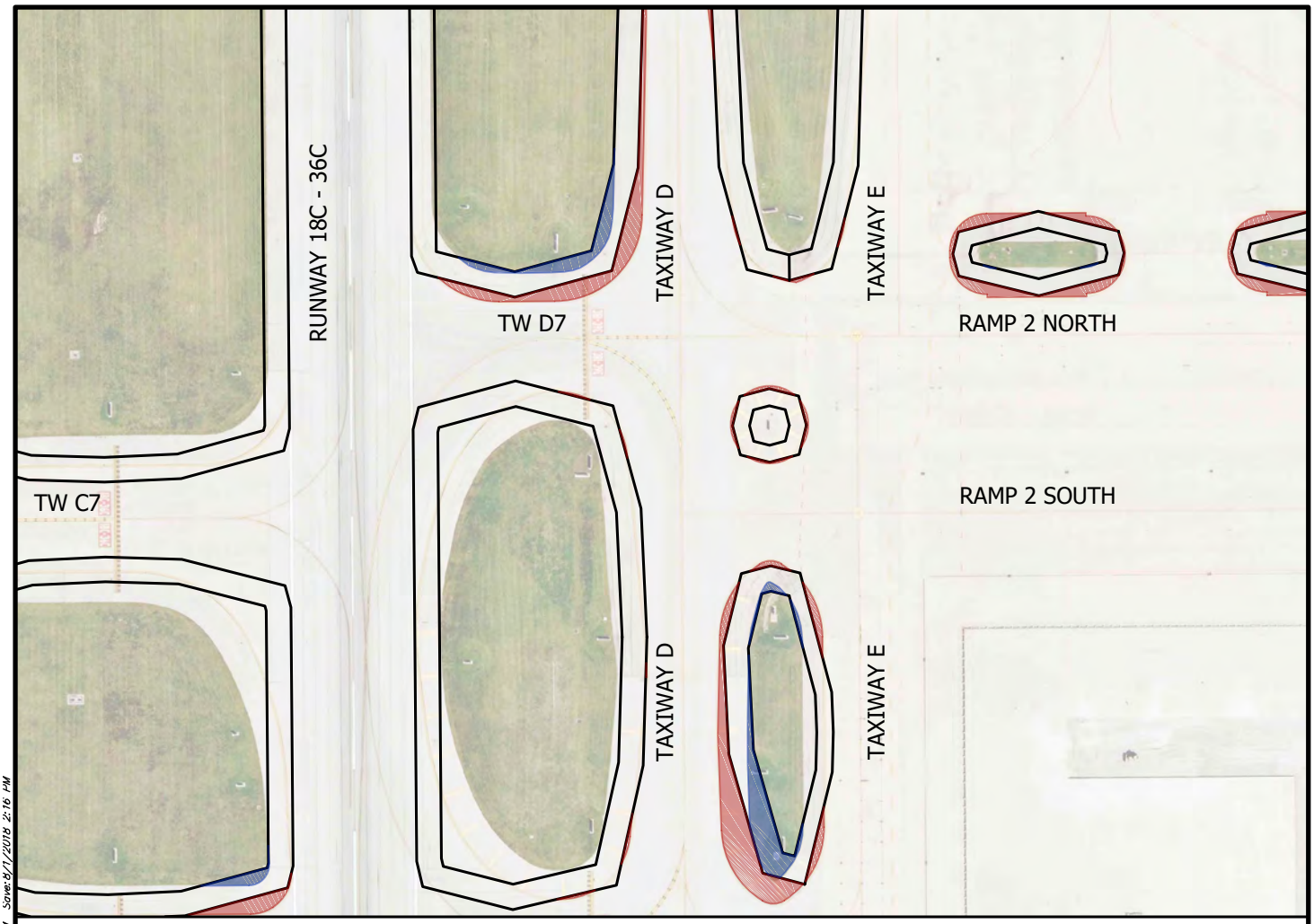
CVG CINCINNATI/NORTHERN KENTUCKY INTERNATIONAL AIRPORT



Taxiway Intersection Information		
TW D & RAMP 2 SOUTH TAXILANE	TDG	4
Additional Pavement (SYD) 117	$Cost_{Pvmt}$	35,033
Additional Shoulder (SYD) 38	$Cost_{Shoulder}$	1,610
Additional Marking	$Cost_{Marking}$	5,250
Lighting	$Cost_{Lighting}$	18,000
	$Cost_{Total}$	59,893

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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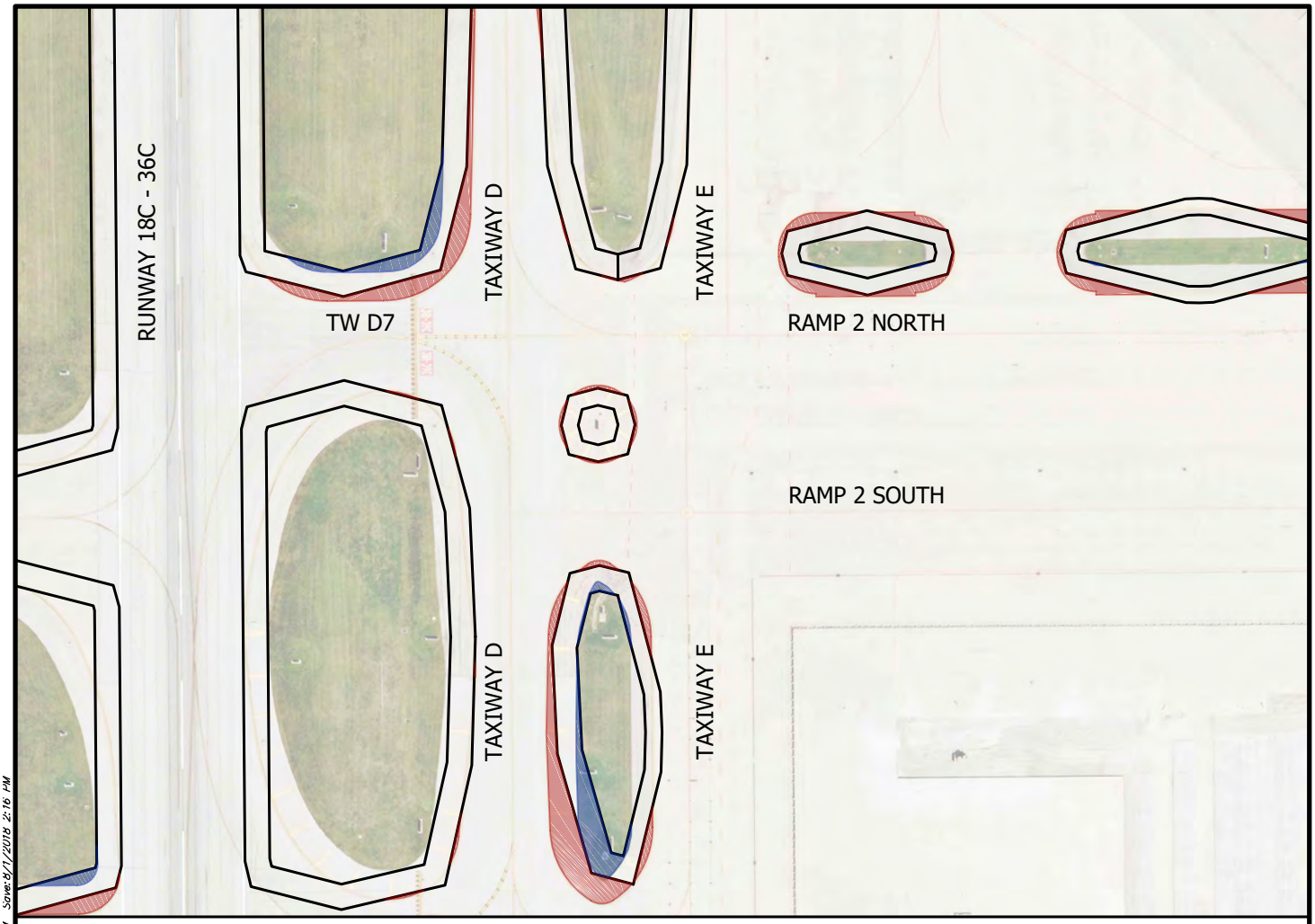

Taxiway Intersection Information		
TW E & RAMP 2 SOUTH TAXILANE	TDG	4
Additional Pavement (SYD) 88	$Cost_{Pvmt}$	26,367
Additional Shoulder (SYD) 20	$Cost_{Shoulder}$	831
Additional Marking	$Cost_{Marking}$	6,125
Lighting	$Cost_{Lighting}$	16,000
	$Cost_{Total}$	49,322

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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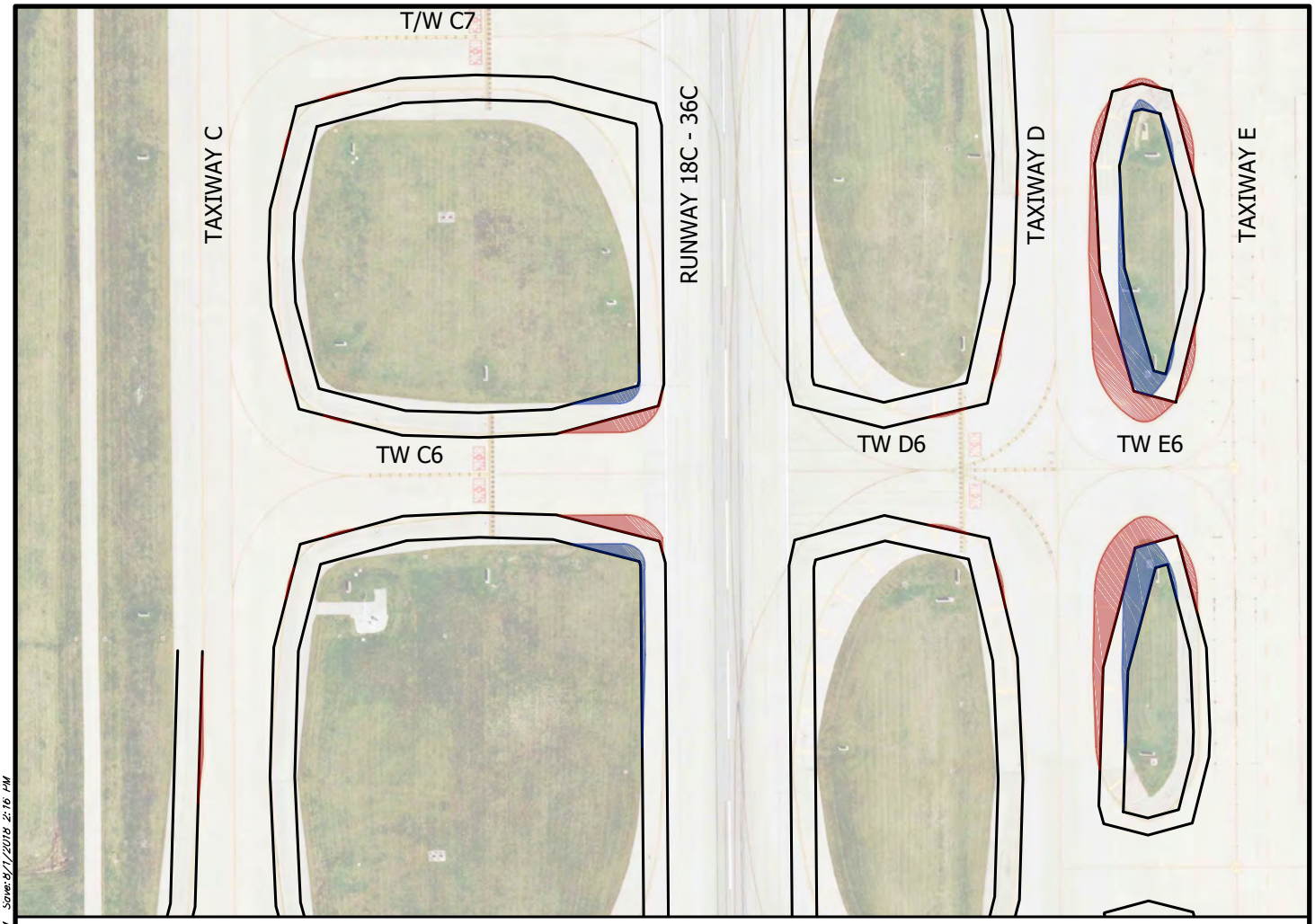

Taxiway Intersection Information		
RW 18C & TW D6	TDG	5
Additional Pavement (SYD) 26	$Cost_{Pvmt}$	7,800
Additional Shoulder (SYD) 0	$Cost_{Shoulder}$	0
Additional Marking	$Cost_{Marking}$	17,500
Lighting	$Cost_{Lighting}$	40,000
	$Cost_{Total}$	65,300

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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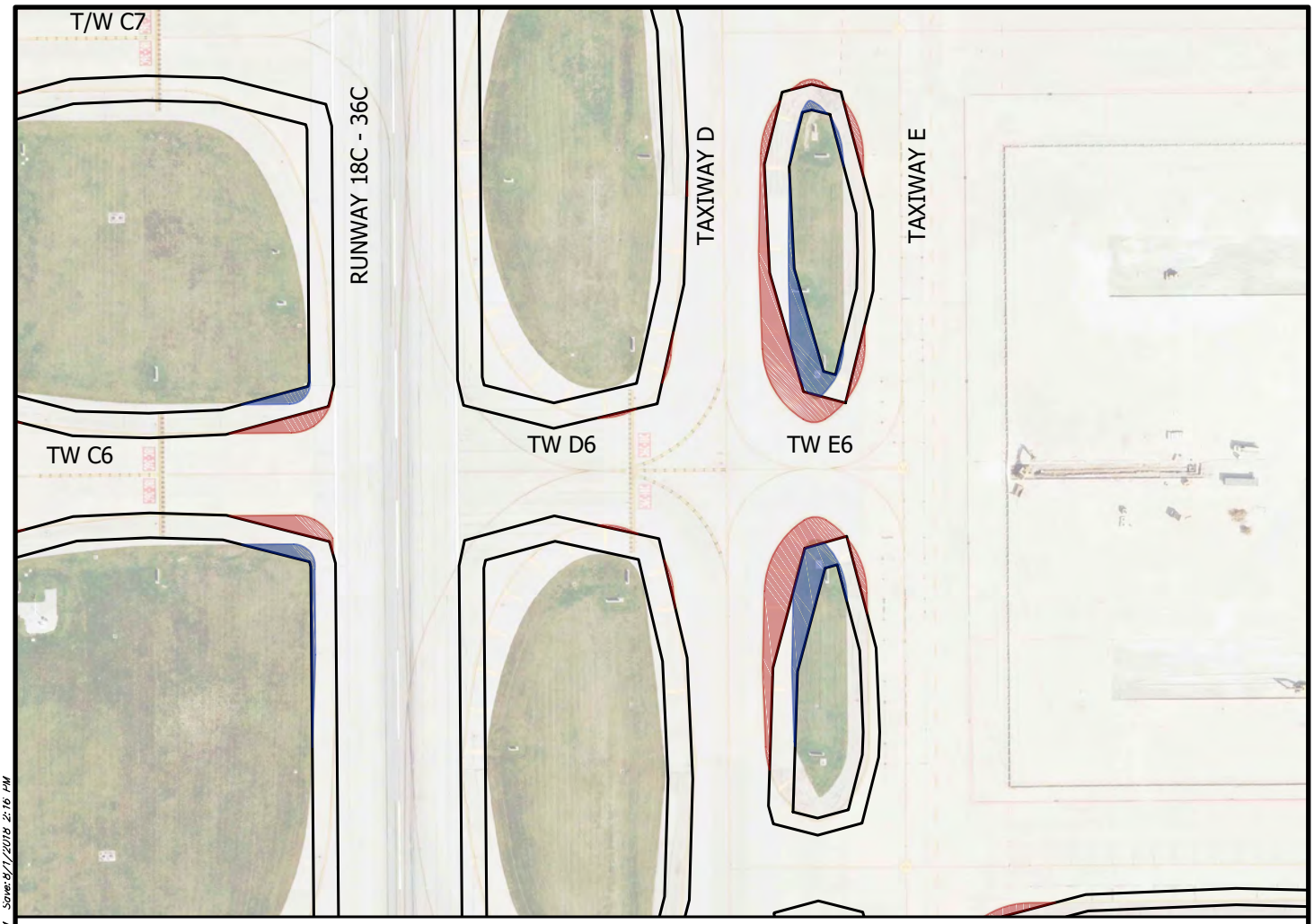

Taxiway Intersection Information		
TW D & TW D6	TDG	5
Additional Pavement (SYD) 32	$Cost_{Pvmt}$	9,733
Additional Shoulder (SYD) 0	$Cost_{Shoulder}$	0
Additional Marking	$Cost_{Marking}$	10,500
Lighting	$Cost_{Lighting}$	18,000
	$Cost_{Total}$	38,233

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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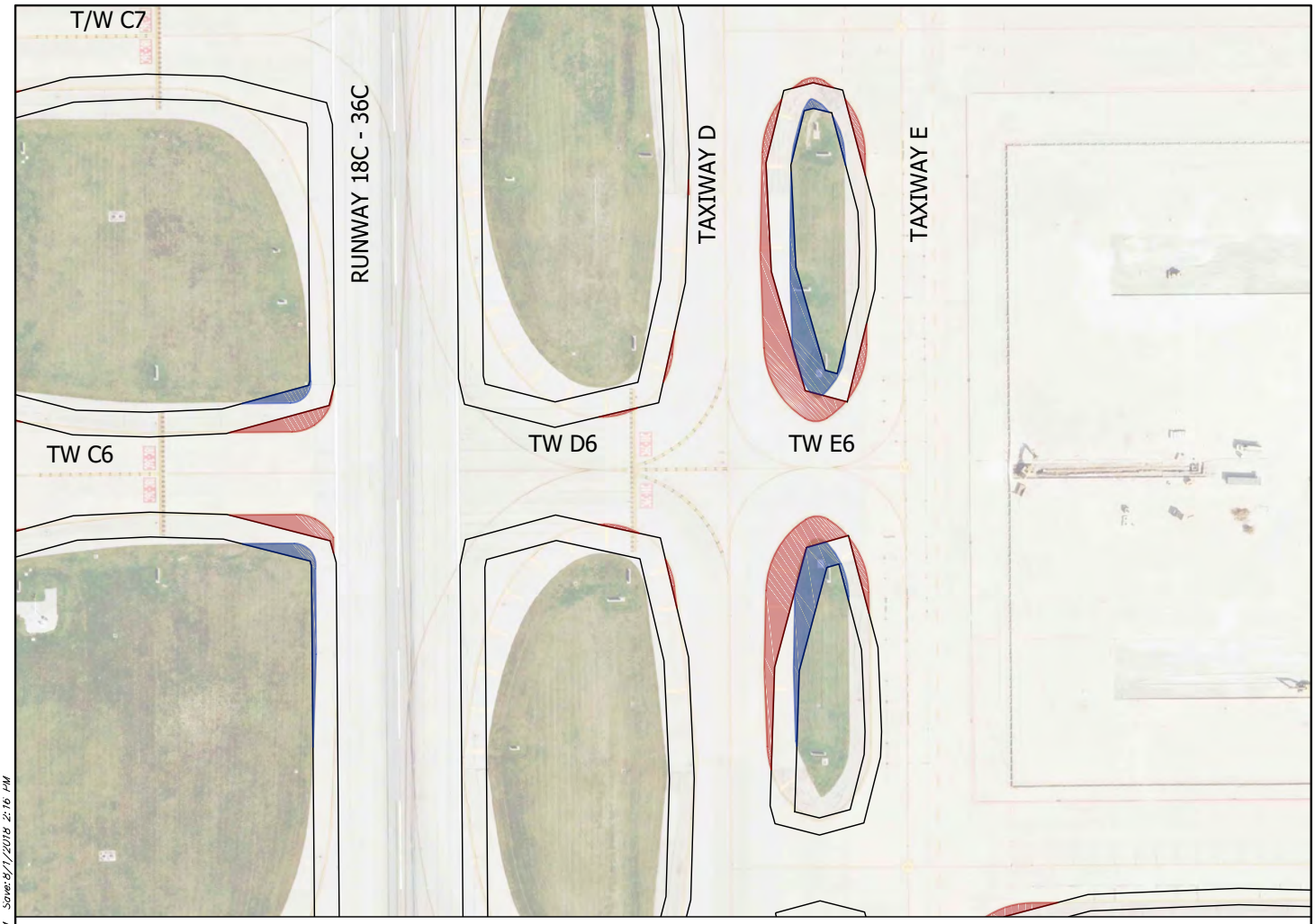

Taxiway Intersection Information		
TW D & TW E6	TDG	6
Additional Pavement (SYD) 1564	$Cost_{Pvmt}$	469,067
Additional Shoulder (SYD) 917	$Cost_{Shoulder}$	38,509
Additional Marking	$Cost_{Marking}$	10,500
Lighting	$Cost_{Lighting}$	37,000
	$Cost_{Total}$	555,076

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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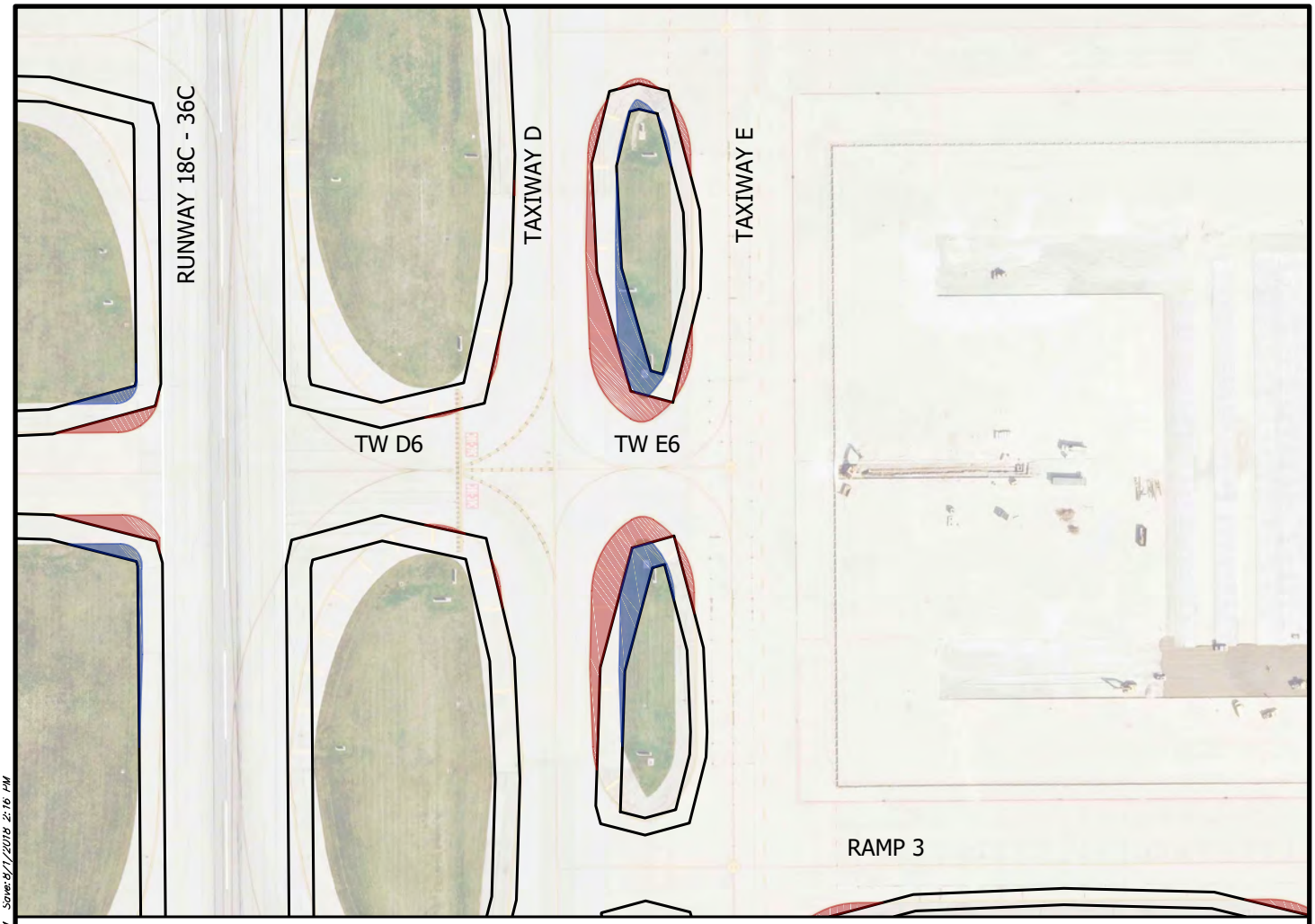

Taxiway Intersection Information		
TW E & TW E6	TDG	4
Additional Pavement (SYD) 145	$Cost_{Pvmt}$	43,467
Additional Shoulder (SYD) 28	$Cost_{Shoulder}$	1,181
Additional Marking	$Cost_{Marking}$	7,000
Lighting	$Cost_{Lighting}$	18,000
	$Cost_{Total}$	69,647

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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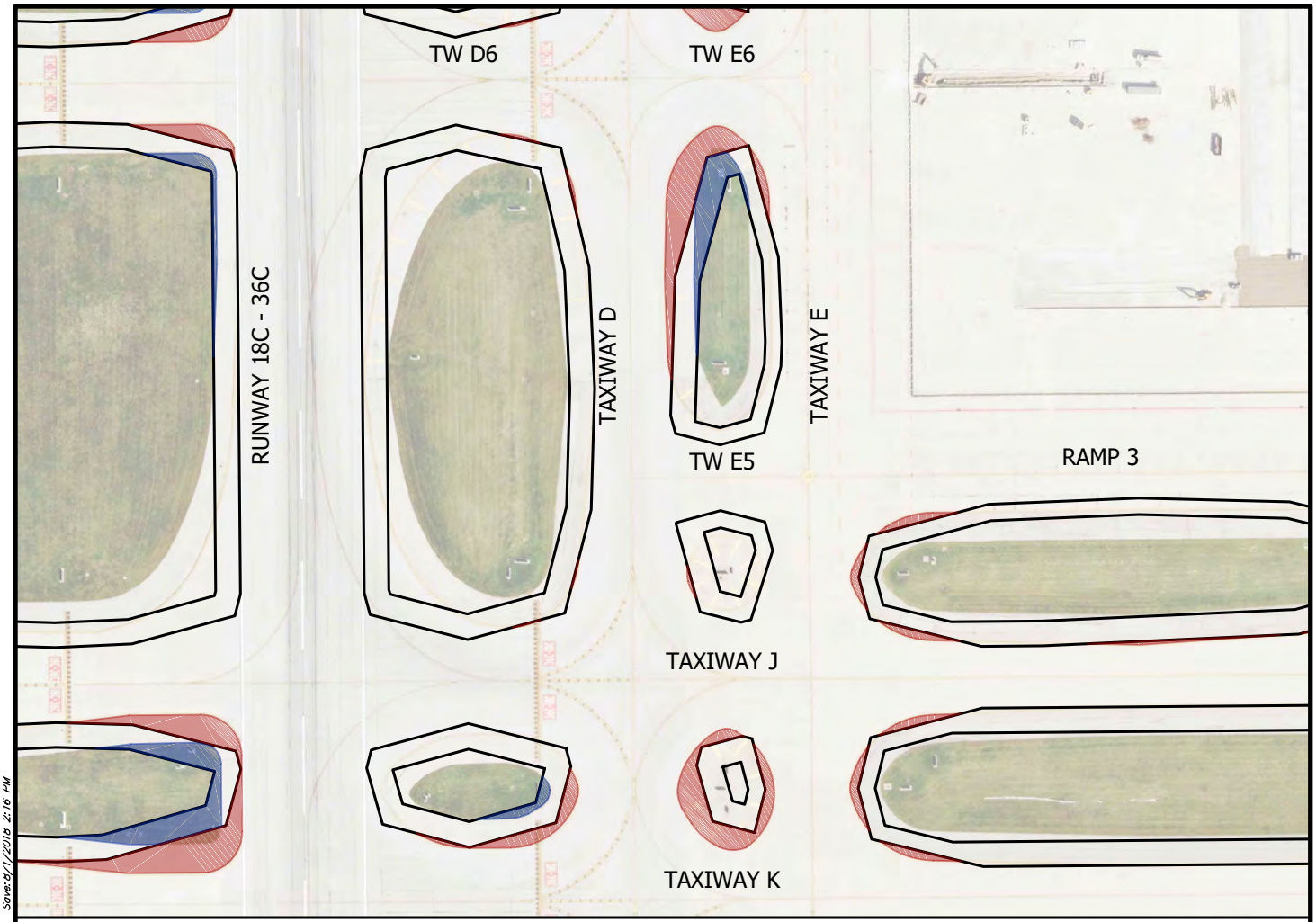

Taxiway Intersection Information		
TW D & TW E5	TDG	3
Additional Pavement (SYD) 0	$Cost_{Pvmt}$	0
Additional Shoulder (SYD) 0	$Cost_{Shoulder}$	0
Additional Marking	$Cost_{Marking}$	7,000
Lighting	$Cost_{Lighting}$	18,000
	$Cost_{Total}$	25,000

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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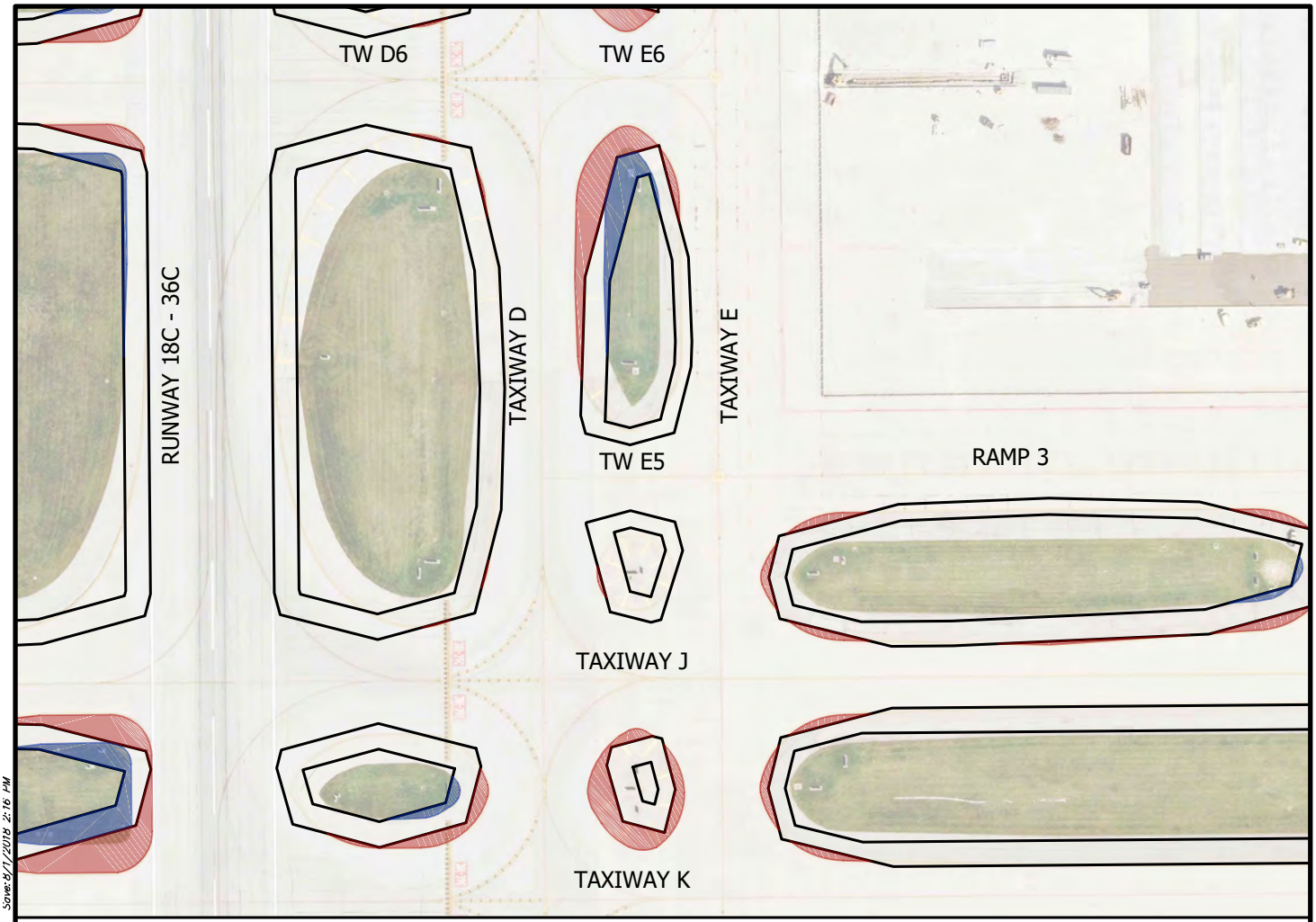

Taxiway Intersection Information		
TW E & TW E5	TDG	4
Additional Pavement (SYD) 0	$Cost_{Pvmt}$	0
Additional Shoulder (SYD) 0	$Cost_{Shoulder}$	0
Additional Marking	$Cost_{Marking}$	5,250
Lighting	$Cost_{Lighting}$	12,000
	$Cost_{Total}$	17,250

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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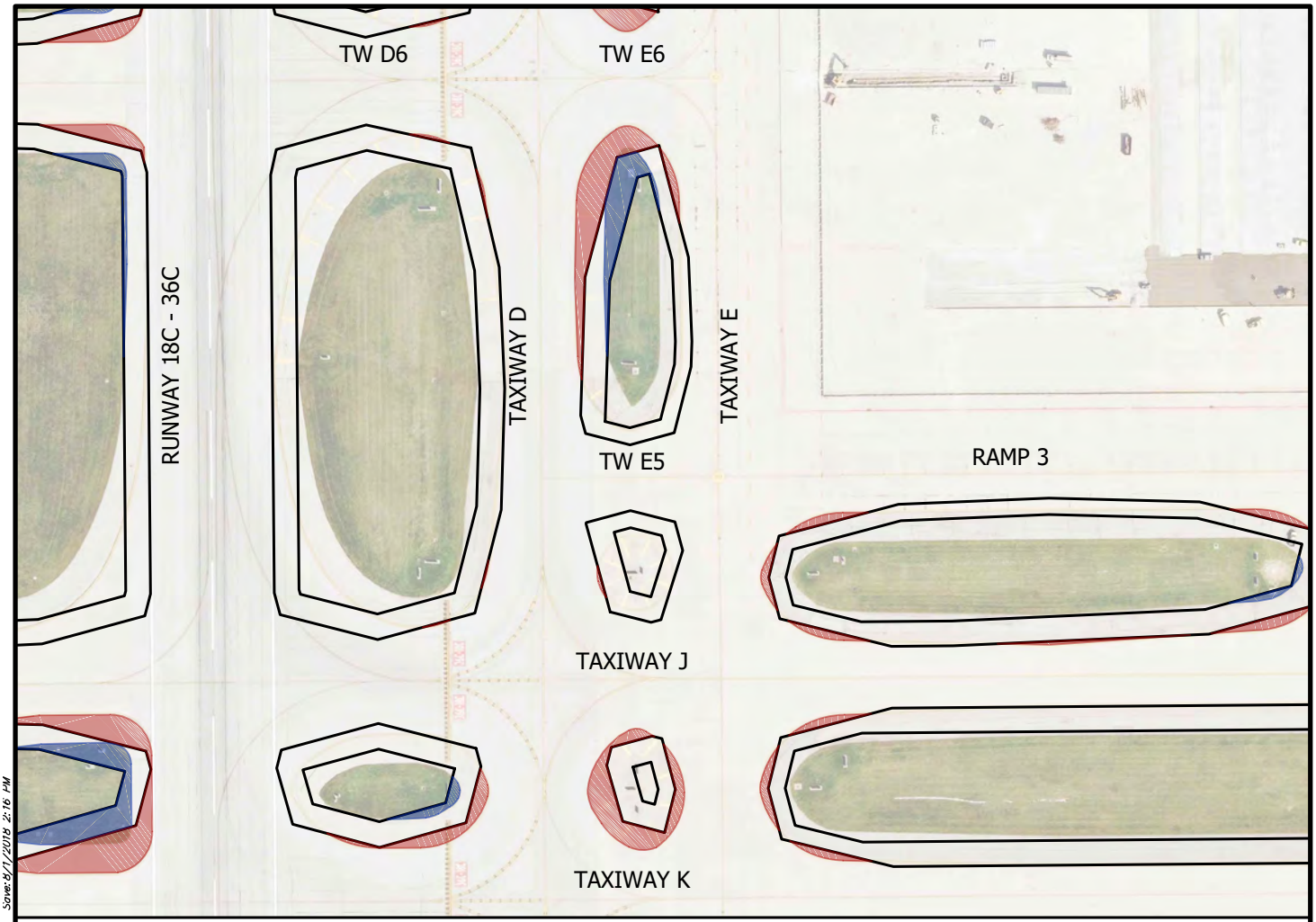
CVG CINCINNATI/NORTHERN KENTUCKY INTERNATIONAL AIRPORT



Taxiway Intersection Information		
TW E & RAMP 3 TAXILANE	TDG	4
Additional Pavement (SYD) 146	$Cost_{Pvmt}$	43,867
Additional Shoulder (SYD) 0	$Cost_{Shoulder}$	0
Additional Marking	$Cost_{Marking}$	7,000
Lighting	$Cost_{Lighting}$	14,000
	$Cost_{Total}$	64,867

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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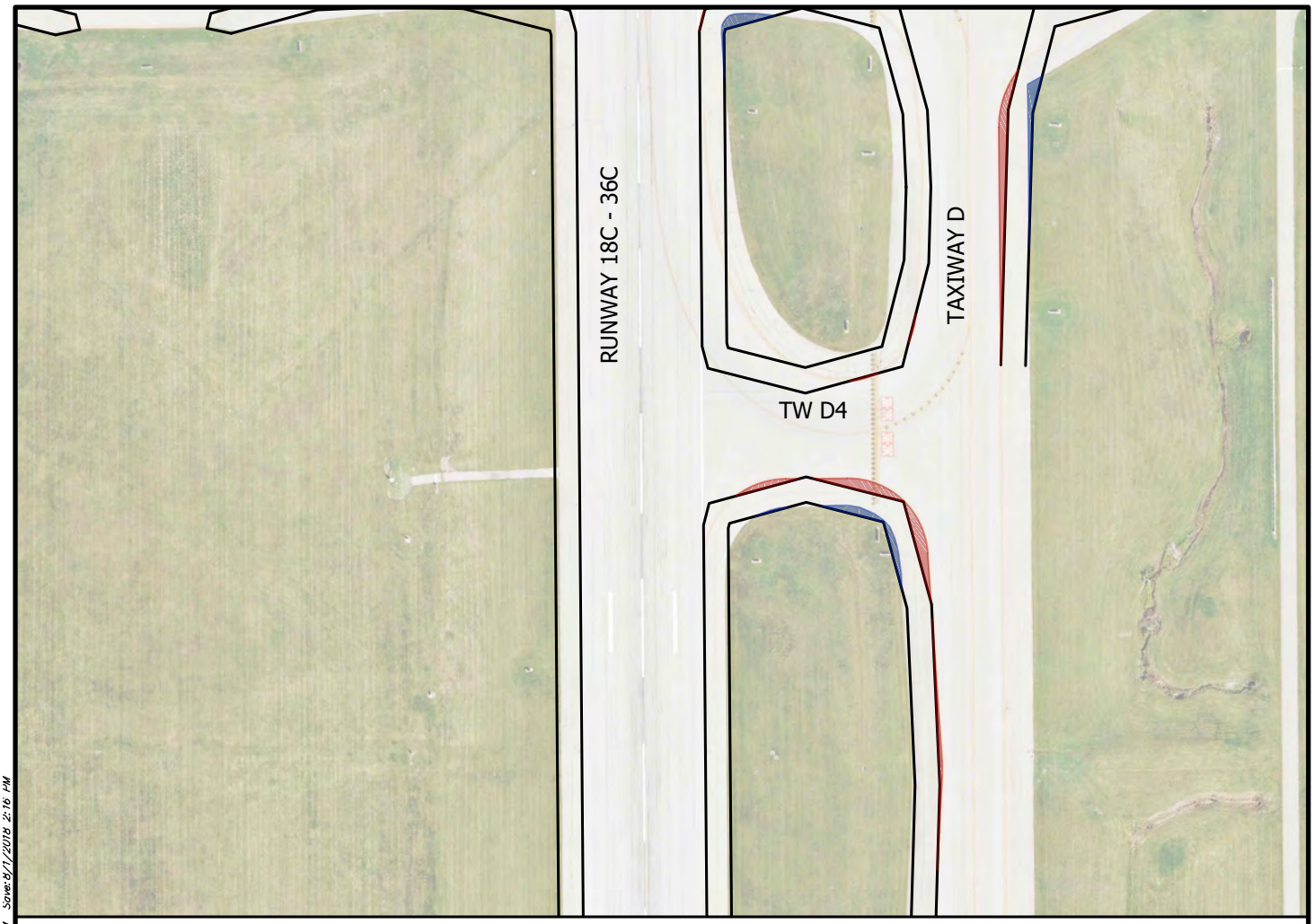

Taxiway Intersection Information		
RW 18C & TW D4	TDG	5
Additional Pavement (SYD) 136	$Cost_{Pvmt}$	40,833
Additional Shoulder (SYD) 64	$Cost_{Shoulder}$	2,674
Additional Marking	$Cost_{Marking}$	14,875
Lighting	$Cost_{Lighting}$	36,000
	$Cost_{Total}$	94,382

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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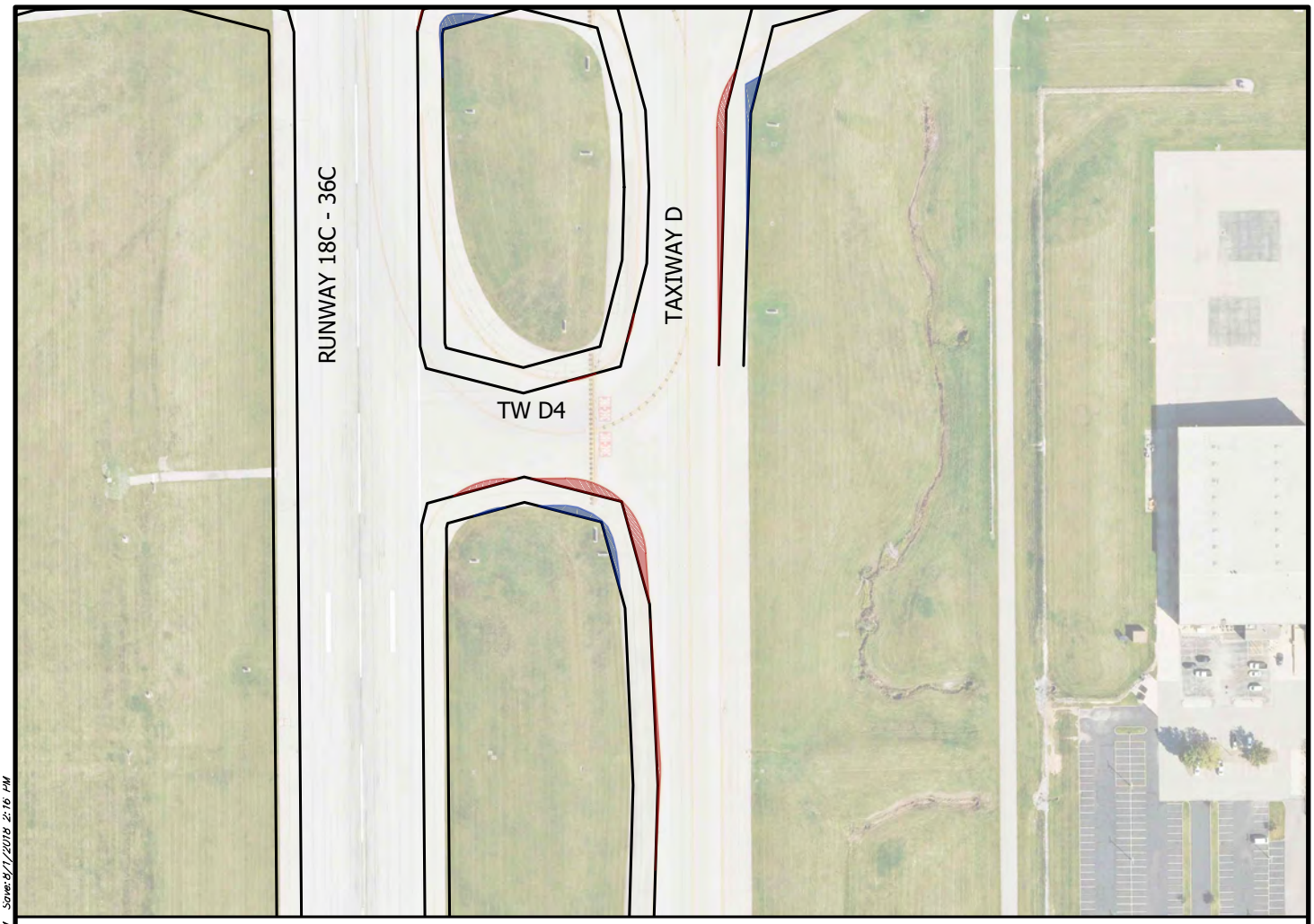

Taxiway Intersection Information		
TW D & TW D4	TDG	5
Additional Pavement (SYD) 214	$Cost_{Pvmt}$	64,200
Additional Shoulder (SYD) 53	$Cost_{Shoulder}$	2,231
Additional Marking	$Cost_{Marking}$	13,125
Lighting	$Cost_{Lighting}$	22,000
	$Cost_{Total}$	101,556

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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Taxiway Intersection Information		
RW 18C & TW D3	TDG	5
Additional Pavement (SYD) 251	$Cost_{Pvmt}$	75,433
Additional Shoulder (SYD) 173	$Cost_{Shoulder}$	7,280
Additional Marking	$Cost_{Marking}$	11,375
Lighting	$Cost_{Lighting}$	38,000
	$Cost_{Total}$	132,088

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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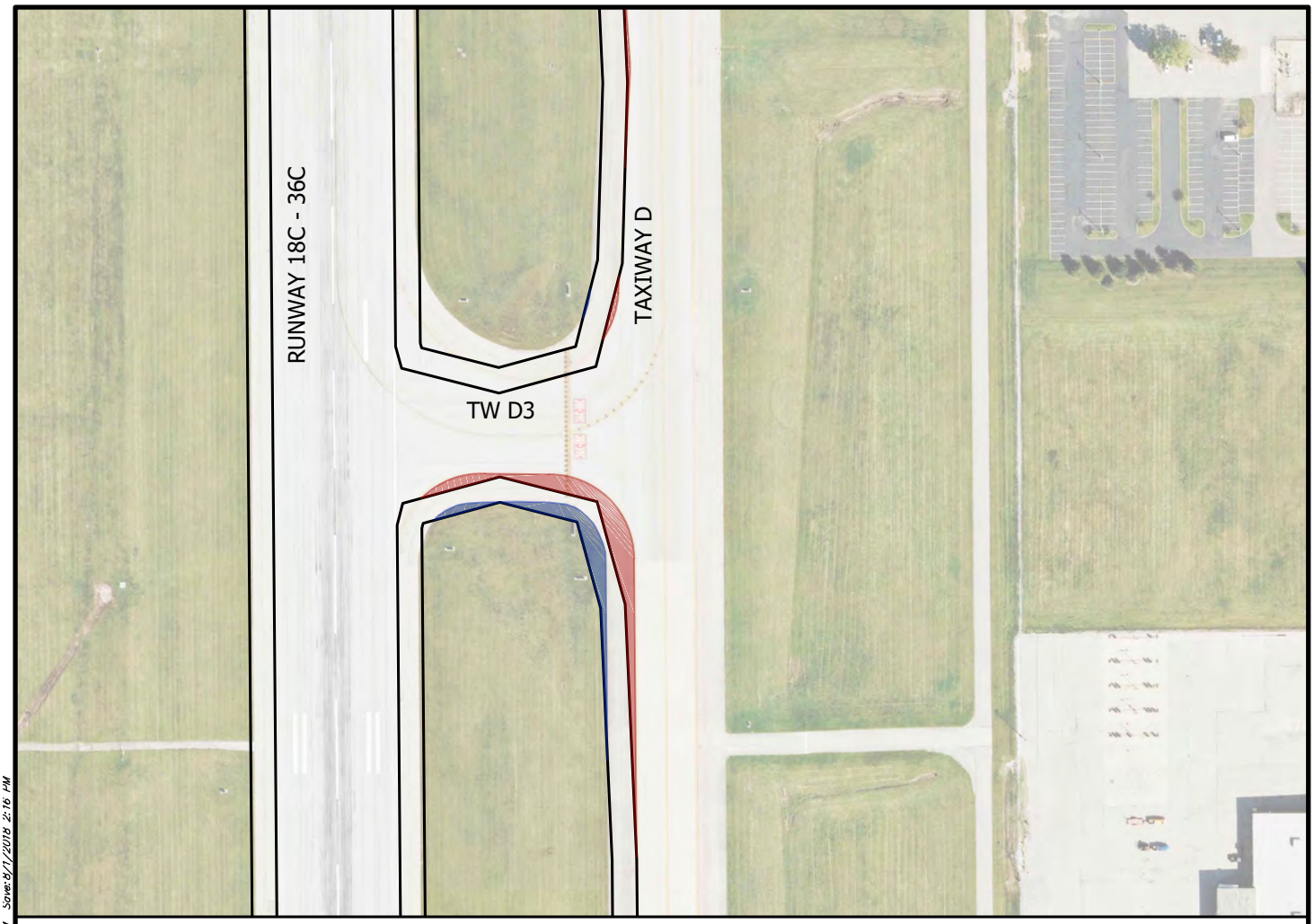

Taxiway Intersection Information		
TW D & TW D3	TDG	5
Additional Pavement (SYD) 630	$Cost_{Pvmt}$	188,900
Additional Shoulder (SYD) 311	$Cost_{Shoulder}$	13,043
Additional Marking	$Cost_{Marking}$	14,000
Lighting	$Cost_{Lighting}$	24,000
	$Cost_{Total}$	239,943

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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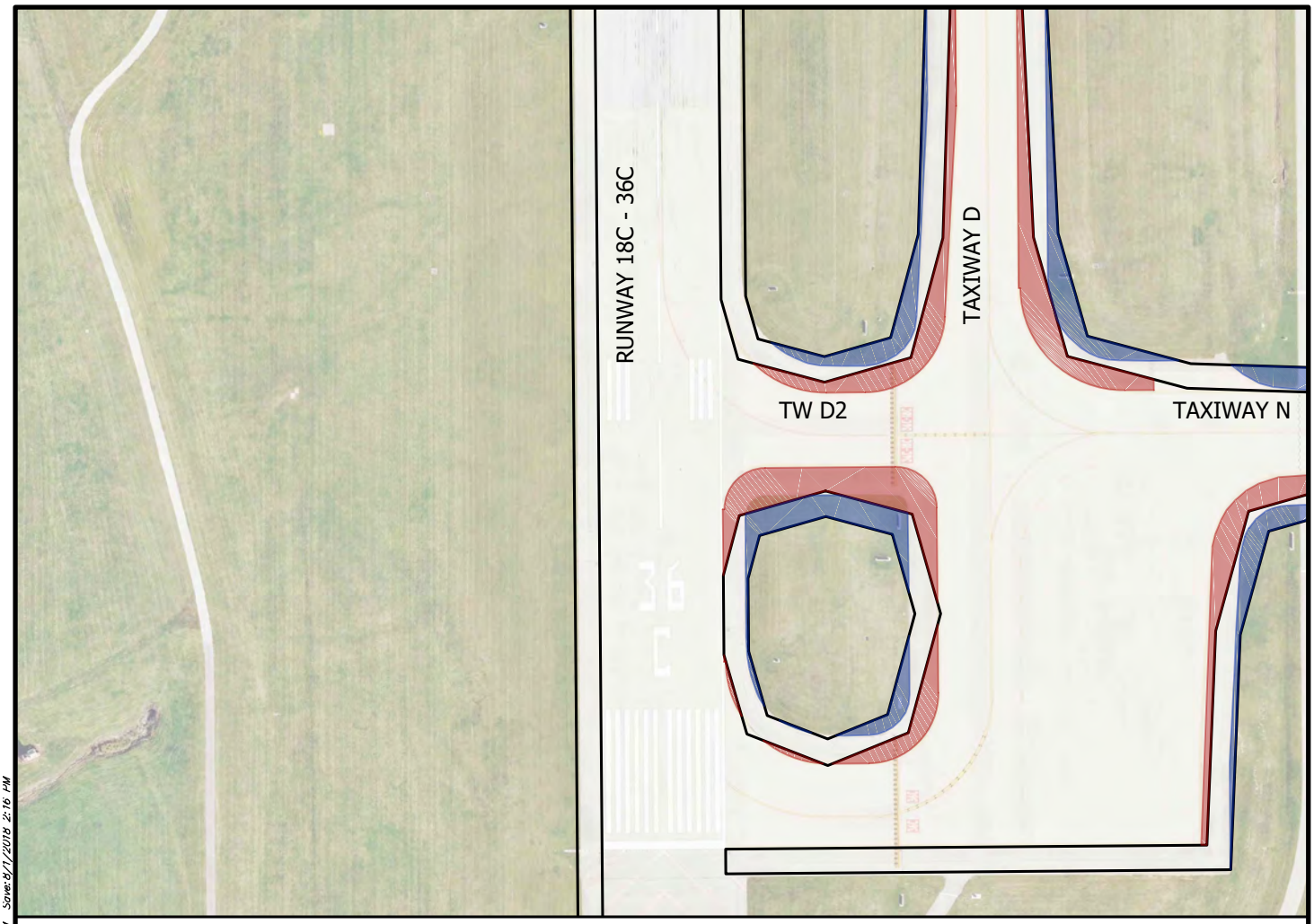

Taxiway Intersection Information		
RW 18C & TW D2	TDG	6
Additional Pavement (SYD) 1431	$Cost_{Pvmt}$	429,200
Additional Shoulder (SYD) 1082	$Cost_{Shoulder}$	45,444
Additional Marking	$Cost_{Marking}$	14,975
Lighting	$Cost_{Lighting}$	44,000
	$Cost_{Total}$	533,619

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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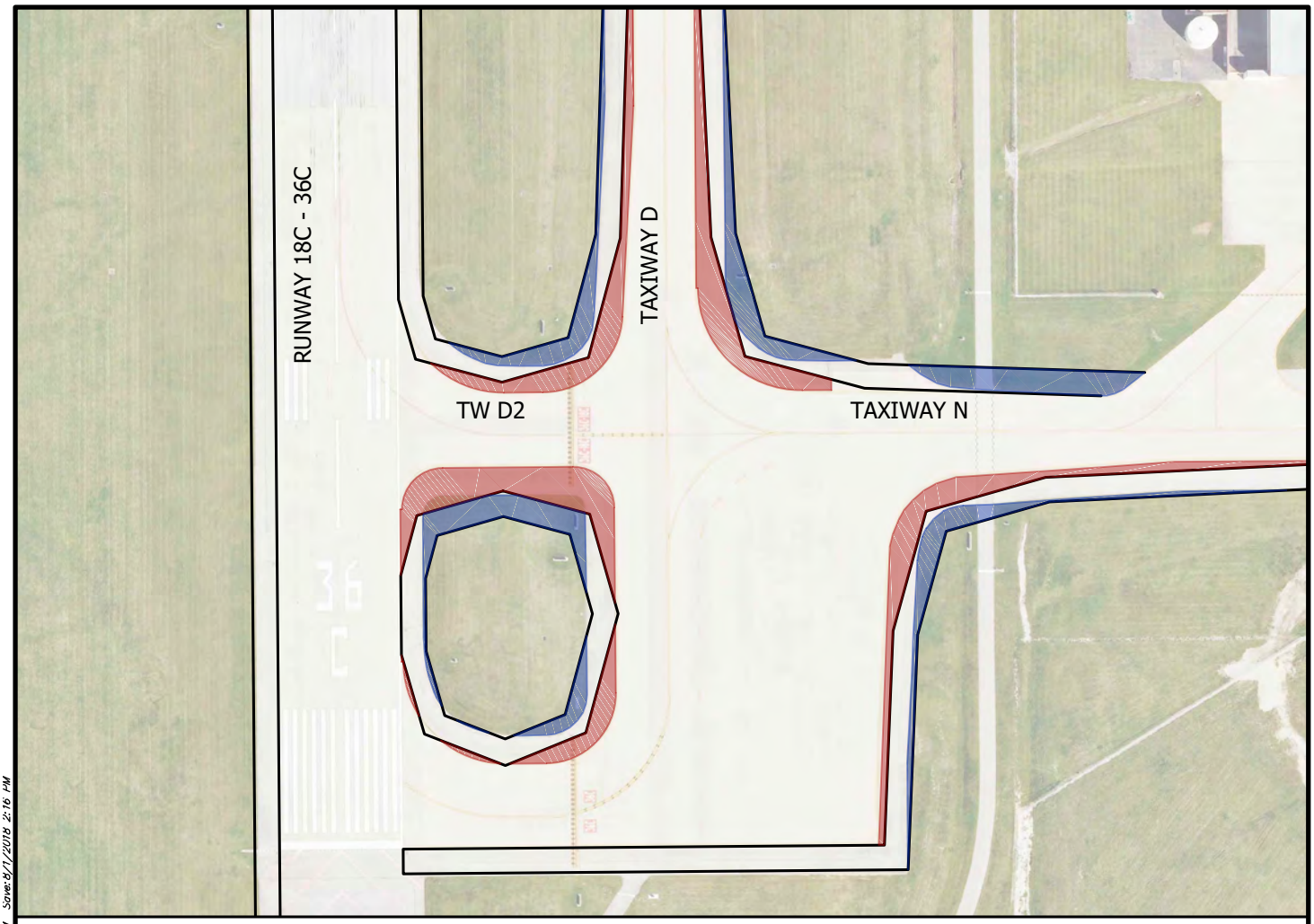

Taxiway Intersection Information		
TW D & TW D2	TDG	6
Additional Pavement (SYD) 1174	$Cost_{Pvmt}$	352,333
Additional Shoulder (SYD) 437	$Cost_{Shoulder}$	18,368
Additional Marking	$Cost_{Marking}$	14,000
Lighting	$Cost_{Lighting}$	24,000
	$Cost_{Total}$	408,701

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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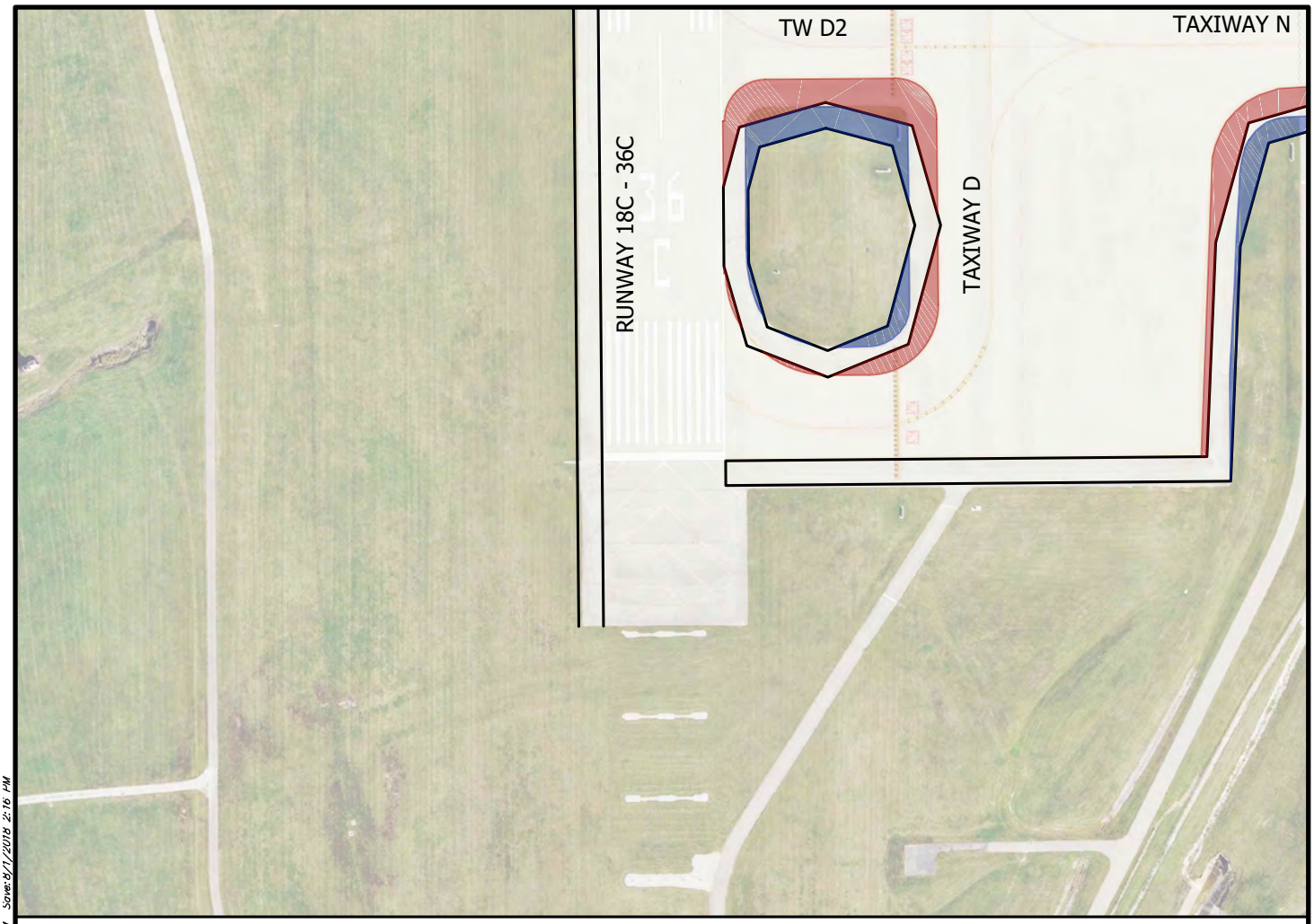

Taxiway Intersection Information		
RW 18C & TW D1 END CONN	TDG	6
Additional Pavement (SYD) 210	$Cost_{Pvmt}$	62,933
Additional Shoulder (SYD) 175	$Cost_{Shoulder}$	7,359
Additional Marking	$Cost_{Marking}$	5,720
Lighting	$Cost_{Lighting}$	16,000
	$Cost_{Total}$	92,013

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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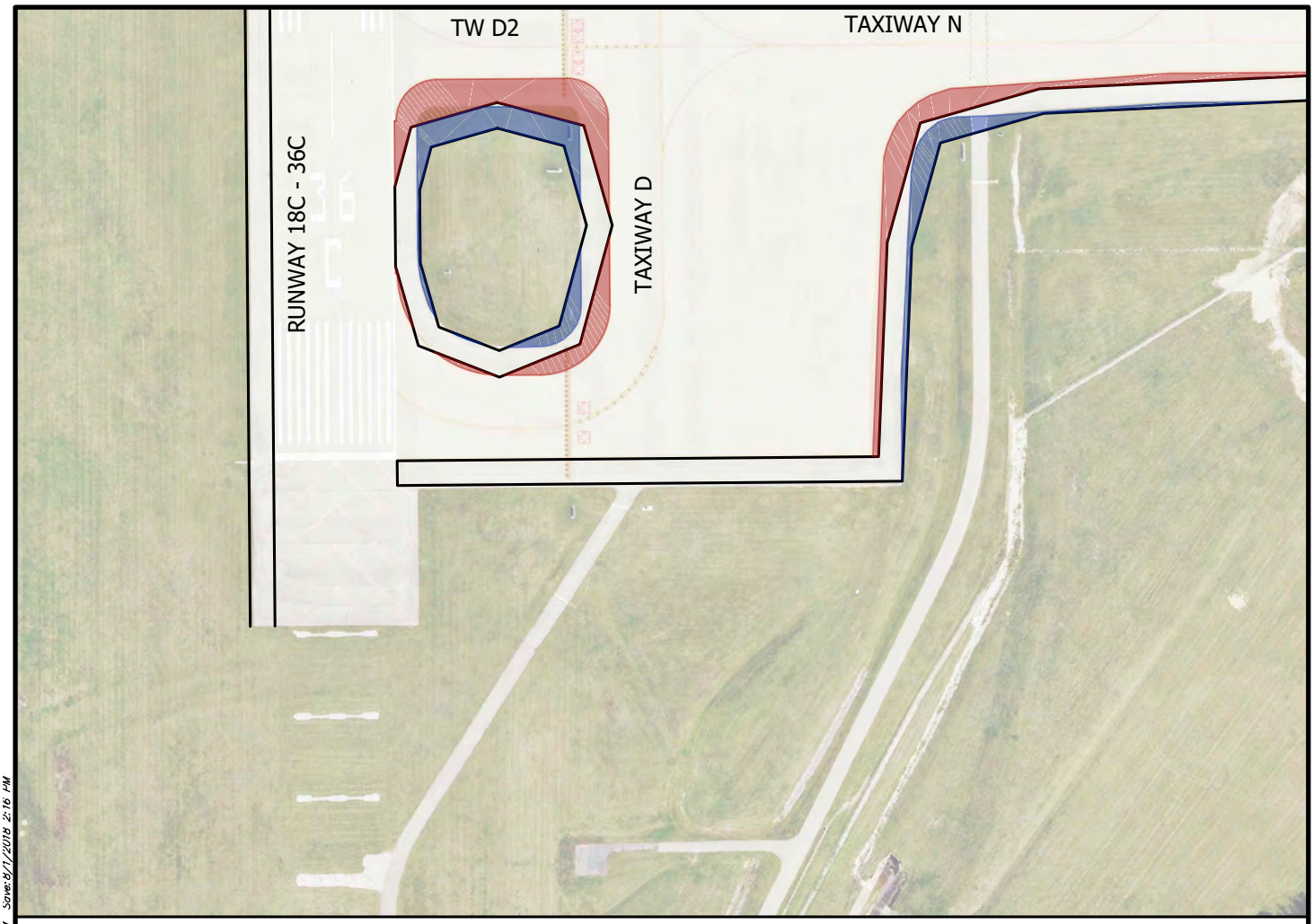

Taxiway Intersection Information		
TW D & TW D1 END CONN	TDG	6
Additional Pavement (SYD) 298	$Cost_{Pvmt}$	89,500
Additional Shoulder (SYD) 75	$Cost_{Shoulder}$	3,145
Additional Marking	$Cost_{Marking}$	3,100
Lighting	$Cost_{Lighting}$	8,000
	$Cost_{Total}$	103,745

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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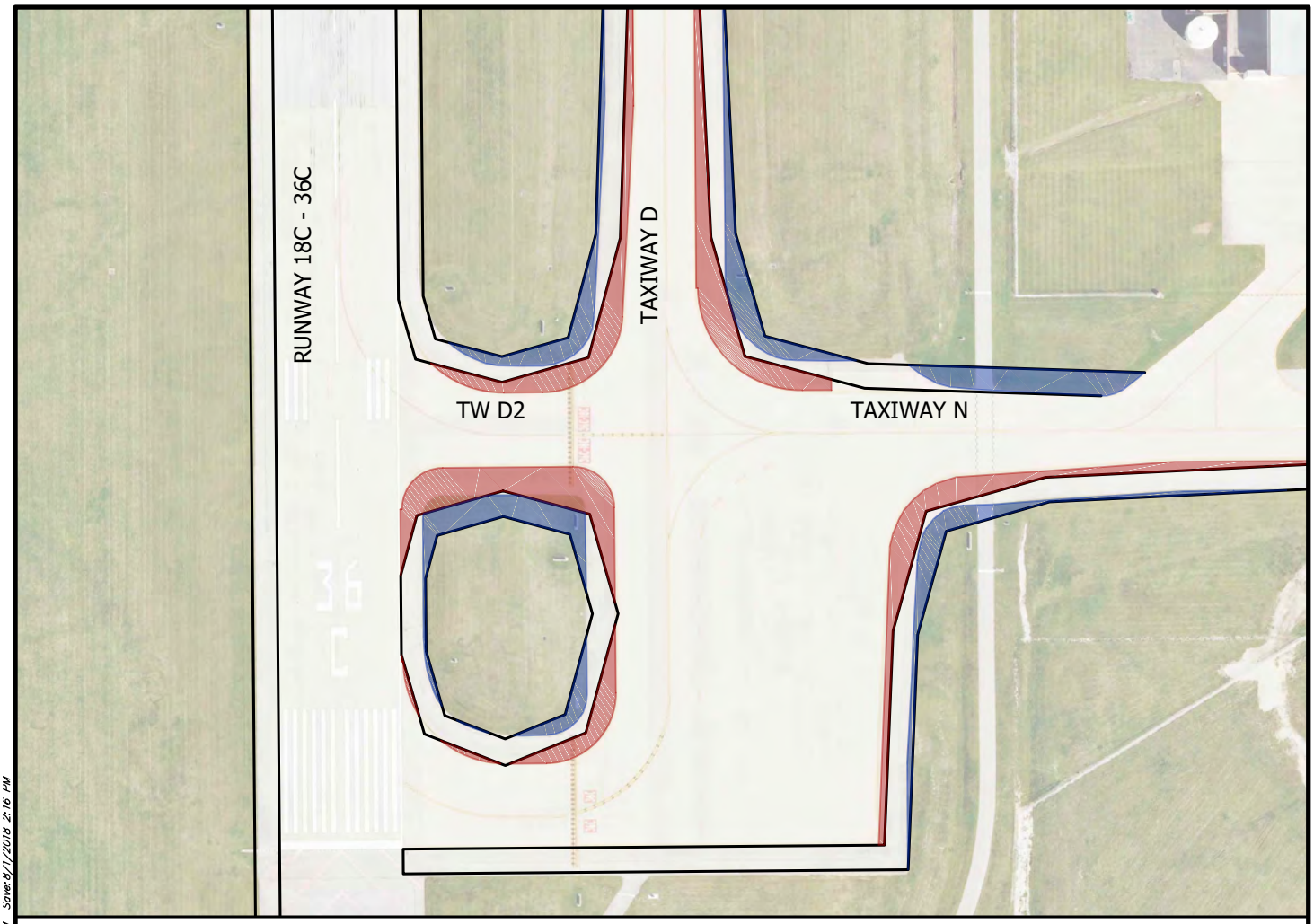

Taxiway Intersection Information		
TW D & TW N	TDG	6
Additional Pavement (SYD) 1256	$Cost_{Pvmt}$	376,733
Additional Shoulder (SYD) 1559	$Cost_{Shoulder}$	65,469
Additional Marking	$Cost_{Marking}$	13,125
Lighting	$Cost_{Lighting}$	31,000
	$Cost_{Total}$	486,327

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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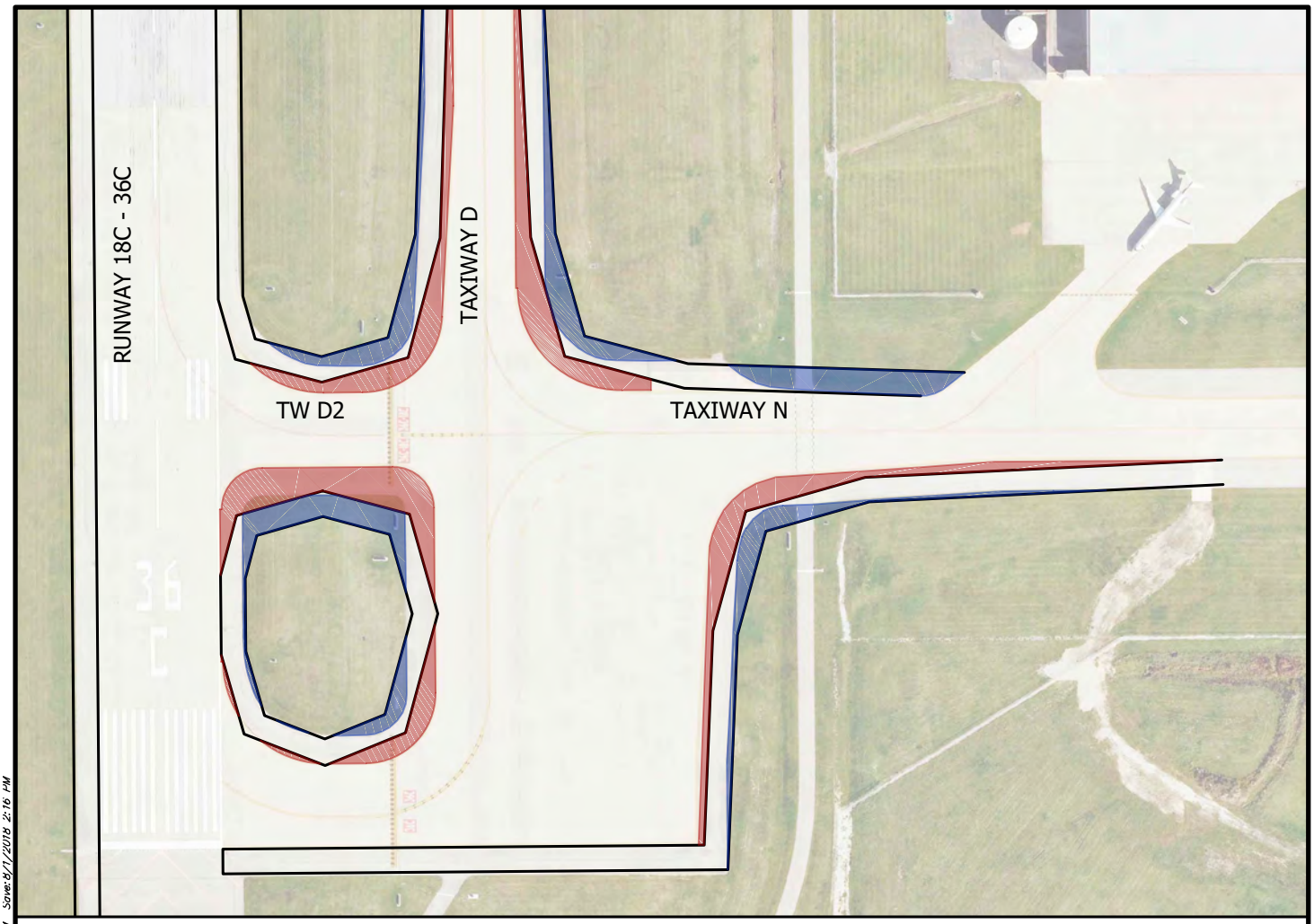
CVG CINCINNATI/NORTHERN KENTUCKY INTERNATIONAL AIRPORT



Taxiway Intersection Information		
TW N & APRON	TDG	6
Additional Pavement (SYD) 1256	$Cost_{Pvmt}$	376,733
Additional Shoulder (SYD) 1559	$Cost_{Shoulder}$	65,469
Additional Marking	$Cost_{Marking}$	17,500
Lighting	$Cost_{Lighting}$	32,000
	$Cost_{Total}$	491,702

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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Taxiway Intersection Information			
RW 18L AND NORTH END CONN		TDG	5
Additional Pavement (SYD)	0	$Cost_{Pvmt}$	0
Additional Shoulder (SYD)	0	$Cost_{Shoulder}$	0
Additional Marking		$Cost_{Marking}$	6,125
Lighting		$Cost_{Lighting}$	48,000
		$Cost_{Total}$	54,125

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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Taxiway Intersection Information		
RW 18L AND TW T8	TDG	5
Additional Pavement (SYD) 428	$Cost_{Pvmt}$	128,267
Additional Shoulder (SYD) 128	$Cost_{Shoulder}$	5,381
Additional Marking	$Cost_{Marking}$	8,750
Lighting	$Cost_{Lighting}$	26,000
	$Cost_{Total}$	168,397

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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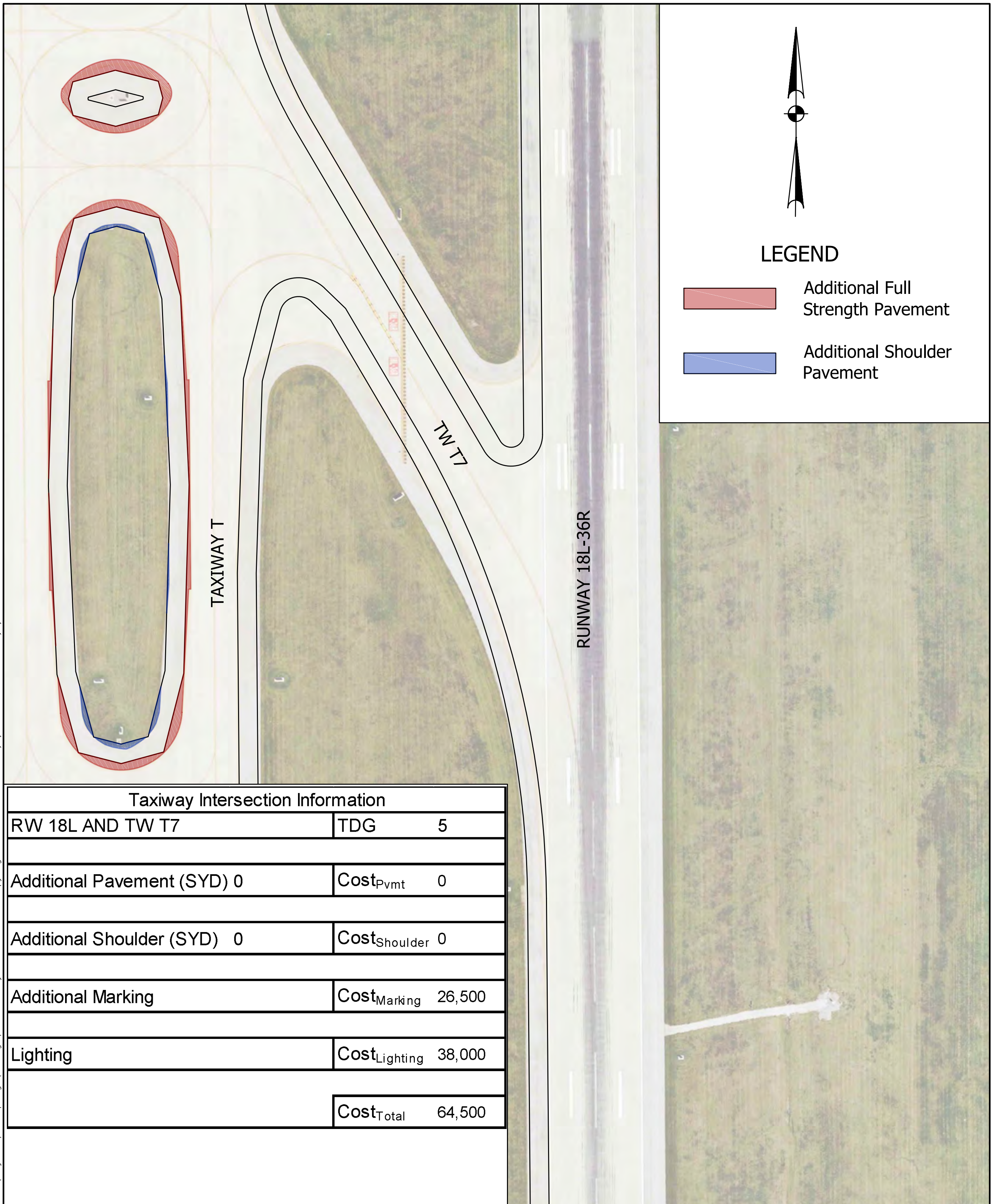
CINCINNATI/NORTHERN KENTUCKY INTERNATIONAL AIRPORT



Taxiway Intersection Information	
RW 18L AND TW T7	TDG 5
Additional Pavement (SYD) 0	$Cost_{Pvmt}$ 0
Additional Shoulder (SYD) 0	$Cost_{Shoulder}$ 0
Additional Marking	$Cost_{Marking}$ 26,500
Lighting	$Cost_{Lighting}$ 38,000
	$Cost_{Total}$ 64,500

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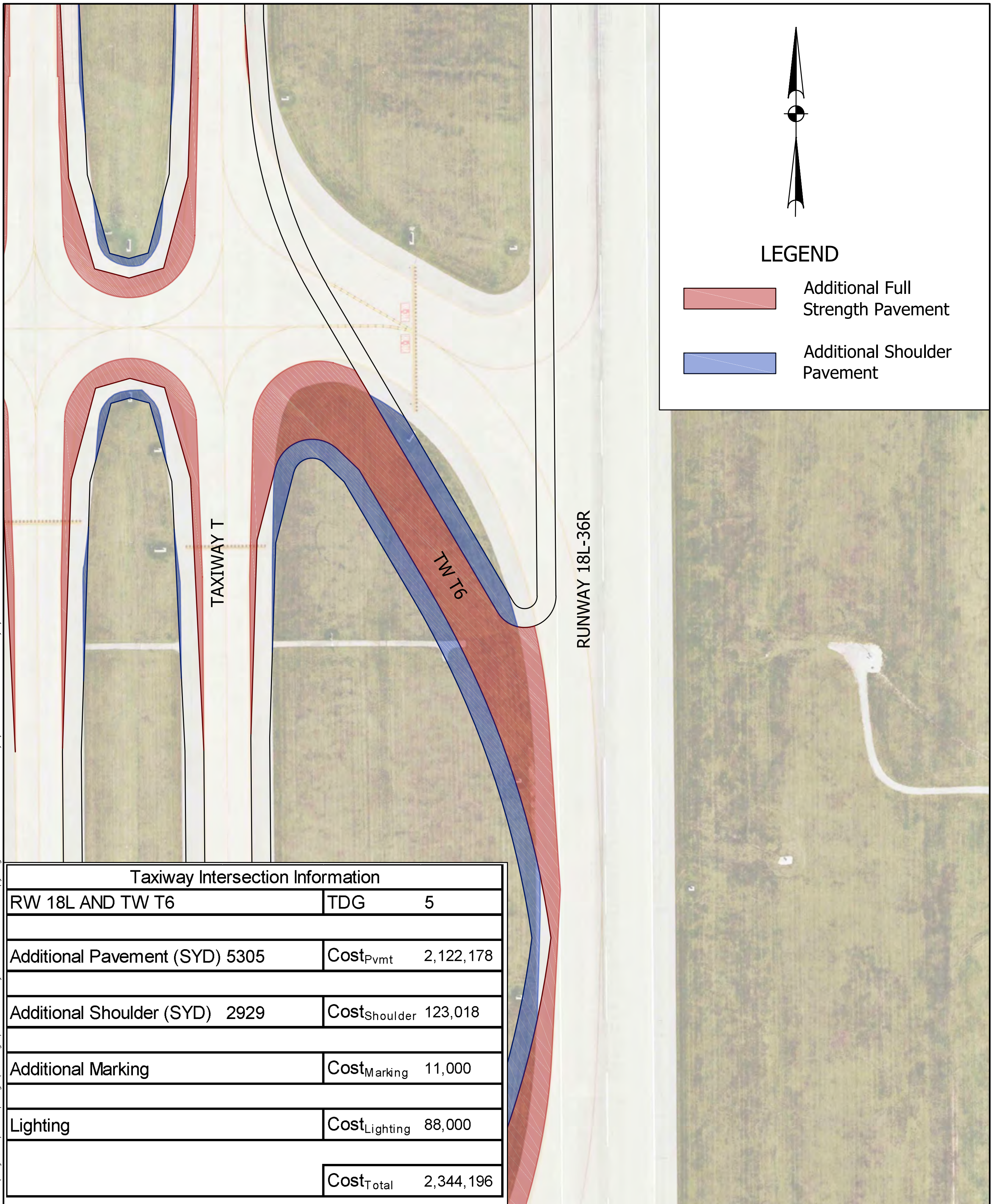

Taxiway Intersection Information	
RW 18L AND TW T6	TDG 5
Additional Pavement (SYD) 5305	$Cost_{Pvmt}$ 2,122,178
Additional Shoulder (SYD) 2929	$Cost_{Shoulder}$ 123,018
Additional Marking	$Cost_{Marking}$ 11,000
Lighting	$Cost_{Lighting}$ 88,000
	$Cost_{Total}$ 2,344,196

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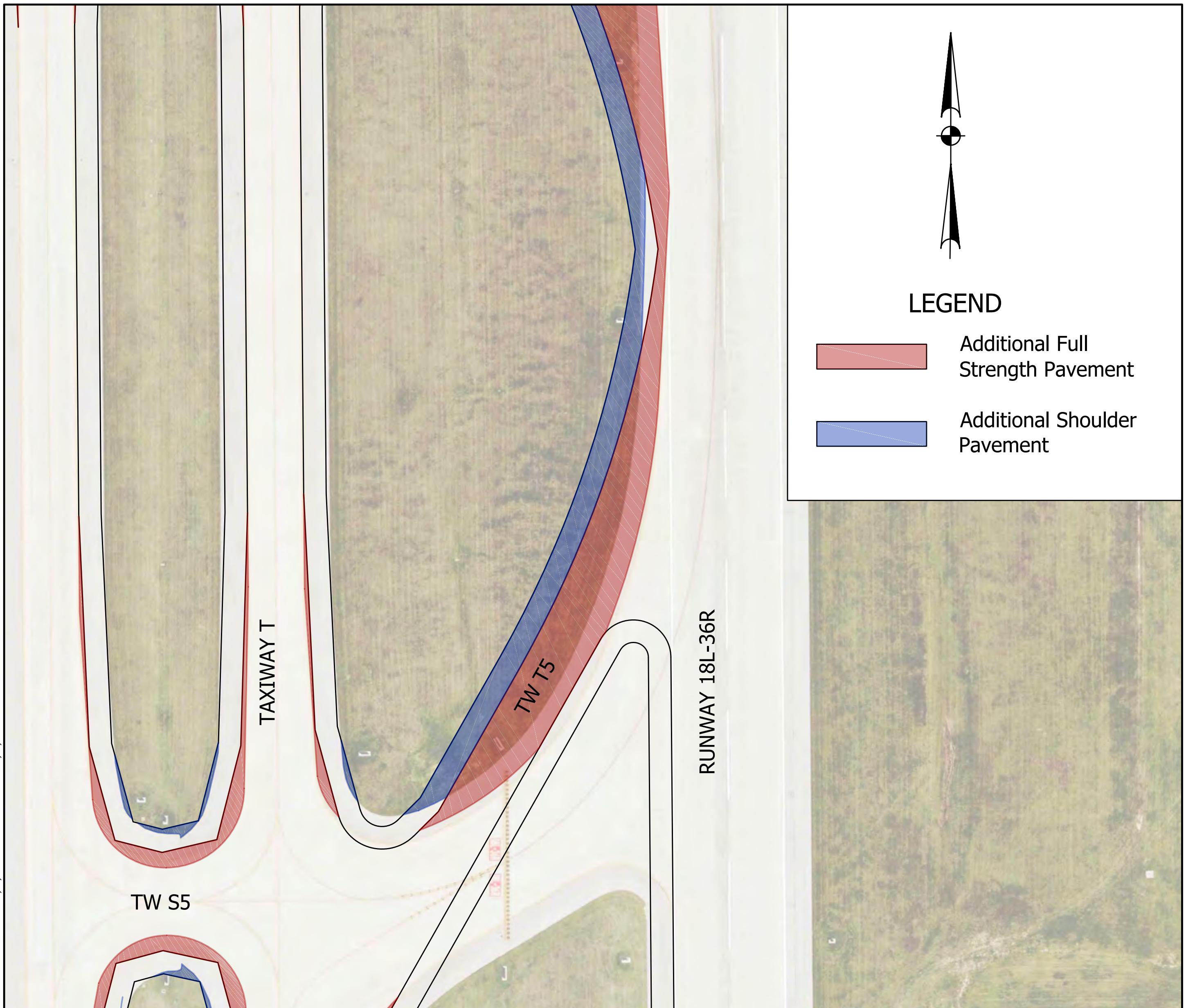

Taxiway Intersection Information	
RW 18L AND TW T5	TDG 5
Additional Pavement (SYD) 4253	$Cost_{Pvmt}$ 1,275,767
Additional Shoulder (SYD) 1854	$Cost_{Shoulder}$ 77,873
Additional Marking	$Cost_{Marking}$ 11,000
Lighting	$Cost_{Lighting}$ 68,000
	$Cost_{Total}$ 1,432,639

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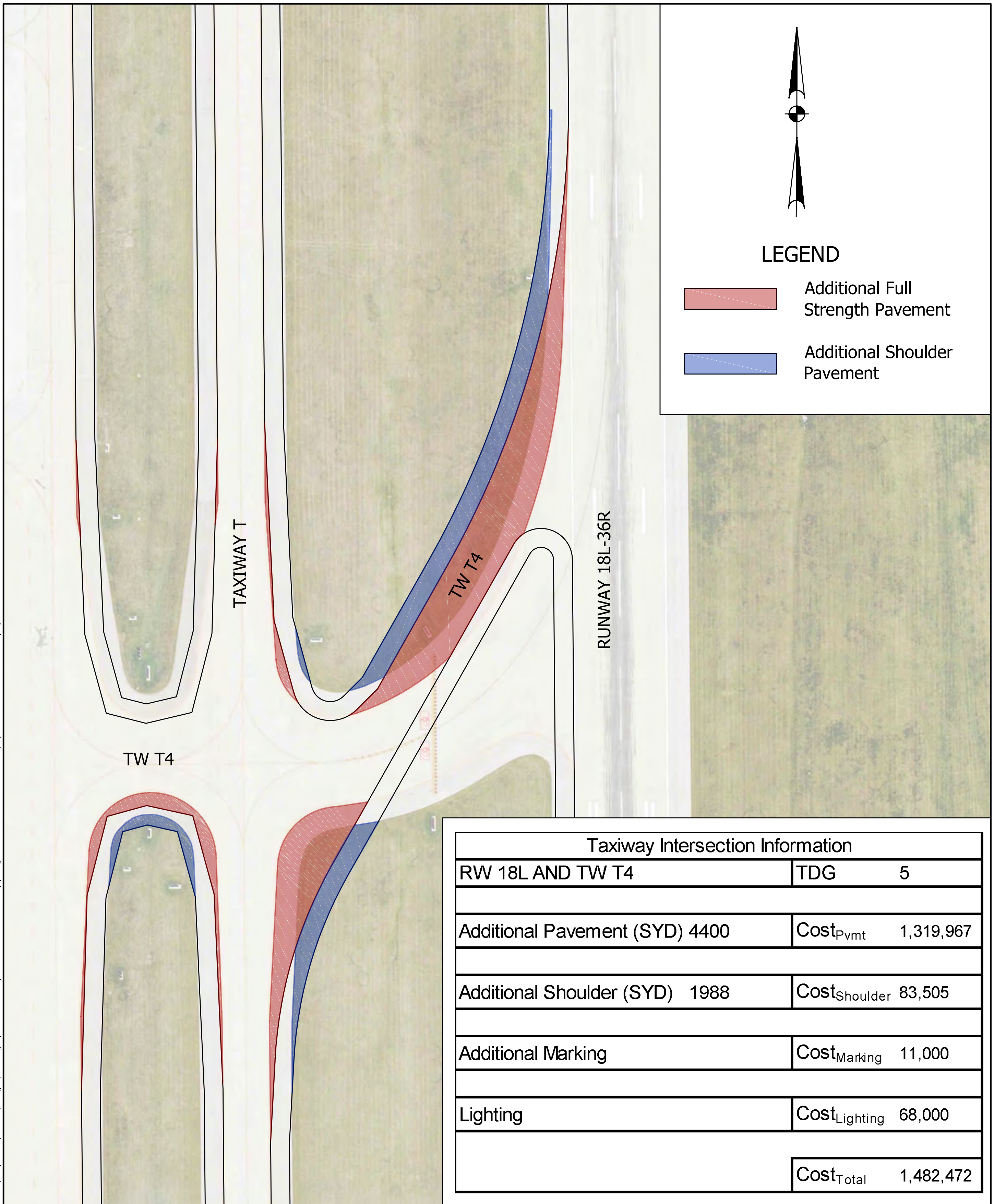

Taxiway Intersection Information	
RW 18L AND TW T4	TDG 5
Additional Pavement (SYD) 4400	$Cost_{Pvmt}$ 1,319,967
Additional Shoulder (SYD) 1988	$Cost_{Shoulder}$ 83,505
Additional Marking	$Cost_{Marking}$ 11,000
Lighting	$Cost_{Lighting}$ 68,000
	$Cost_{Total}$ 1,482,472

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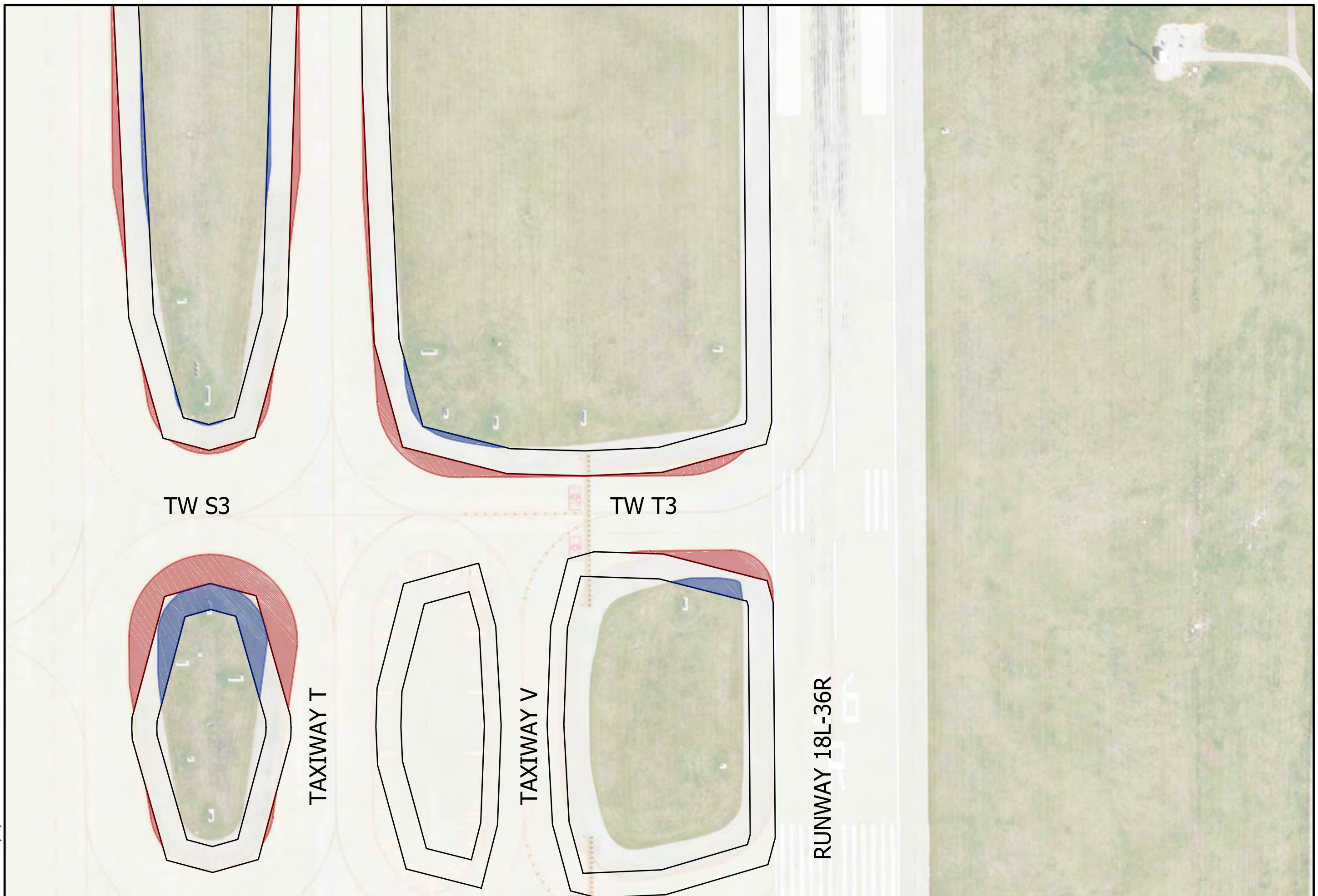

Taxiway Intersection Information	
RW 18L AND TW T3	TDG 5
Additional Pavement (SYD) 412	$Cost_{Pvmt}$ 123,467
Additional Shoulder (SYD) 131	$Cost_{Shoulder}$ 5,511
Additional Marking	$Cost_{Marking}$ 8,750
Lighting	$Cost_{Lighting}$ 26,000
	$Cost_{Total}$ 163,728

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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Taxiway Intersection Information		
RW 18L AND SOUTH END CONN	TDG	5
Additional Pavement (SYD) 11	$Cost_{Pvmt}$	3,300
Additional Shoulder (SYD) 0	$Cost_{Shoulder}$	0
Additional Marking	$Cost_{Marking}$	6,125
Lighting	$Cost_{Lighting}$	18,000
	$Cost_{Total}$	27,425

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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Taxiway Intersection Information		
TW U AND NORTH END CONN	TDG	3
Additional Pavement (SYD) 0	$Cost_{Pvmt}$	0
Additional Shoulder (SYD) 0	$Cost_{Shoulder}$	0
Additional Marking	$Cost_{Marking}$	7,000
Lighting	$Cost_{Lighting}$	7,000
	$Cost_{Total}$	14,000

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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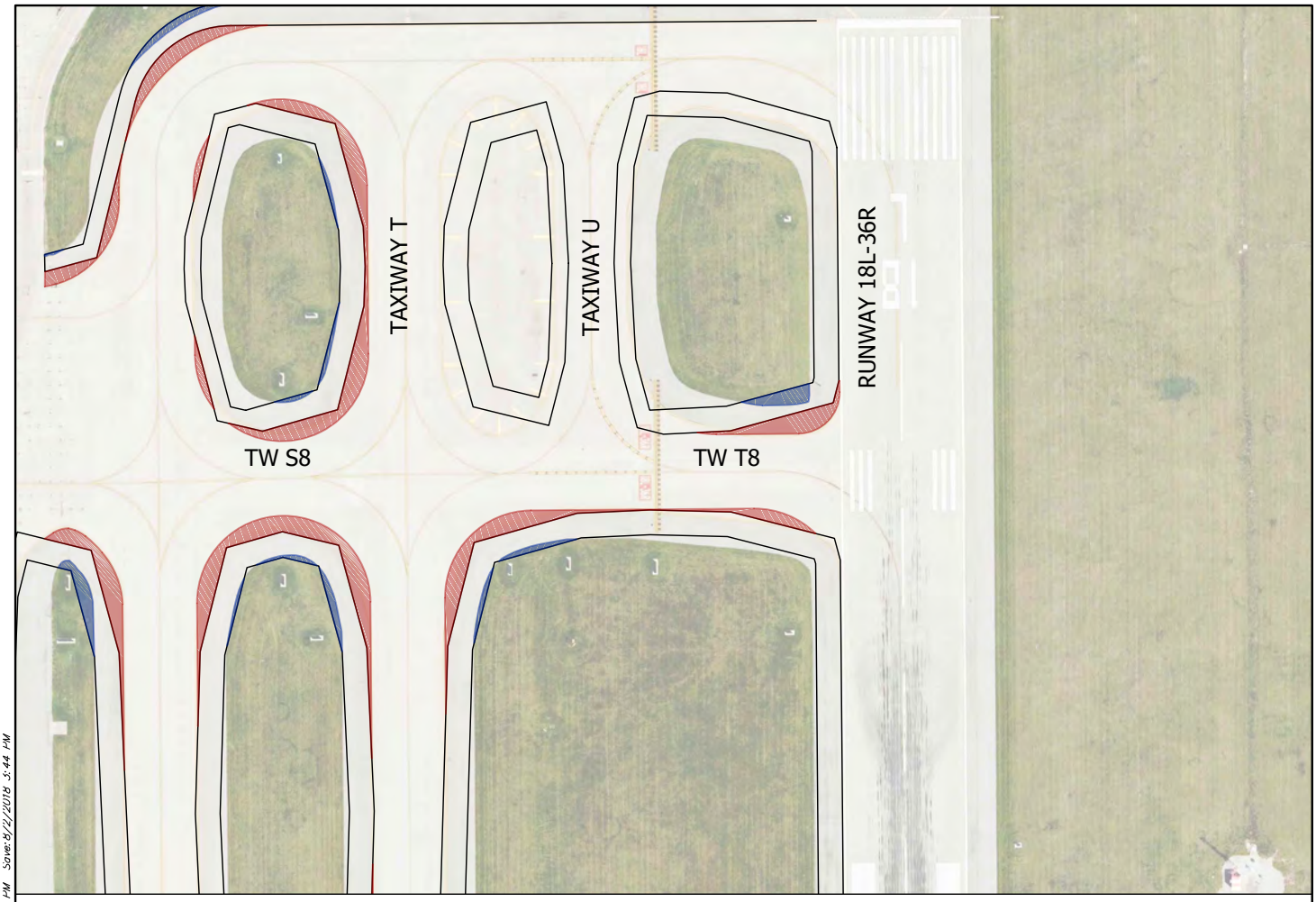
CINCINNATI/NORTHERN KENTUCKY INTERNATIONAL AIRPORT



Taxiway Intersection Information		
TW U AND TW T8	TDG	3
Additional Pavement (SYD) 491	$Cost_{Pvmt}$	147,267
Additional Shoulder (SYD) 50	$Cost_{Shoulder}$	2,119
Additional Marking	$Cost_{Marking}$	8,500
Lighting	$Cost_{Lighting}$	13,000
	$Cost_{Total}$	170,885

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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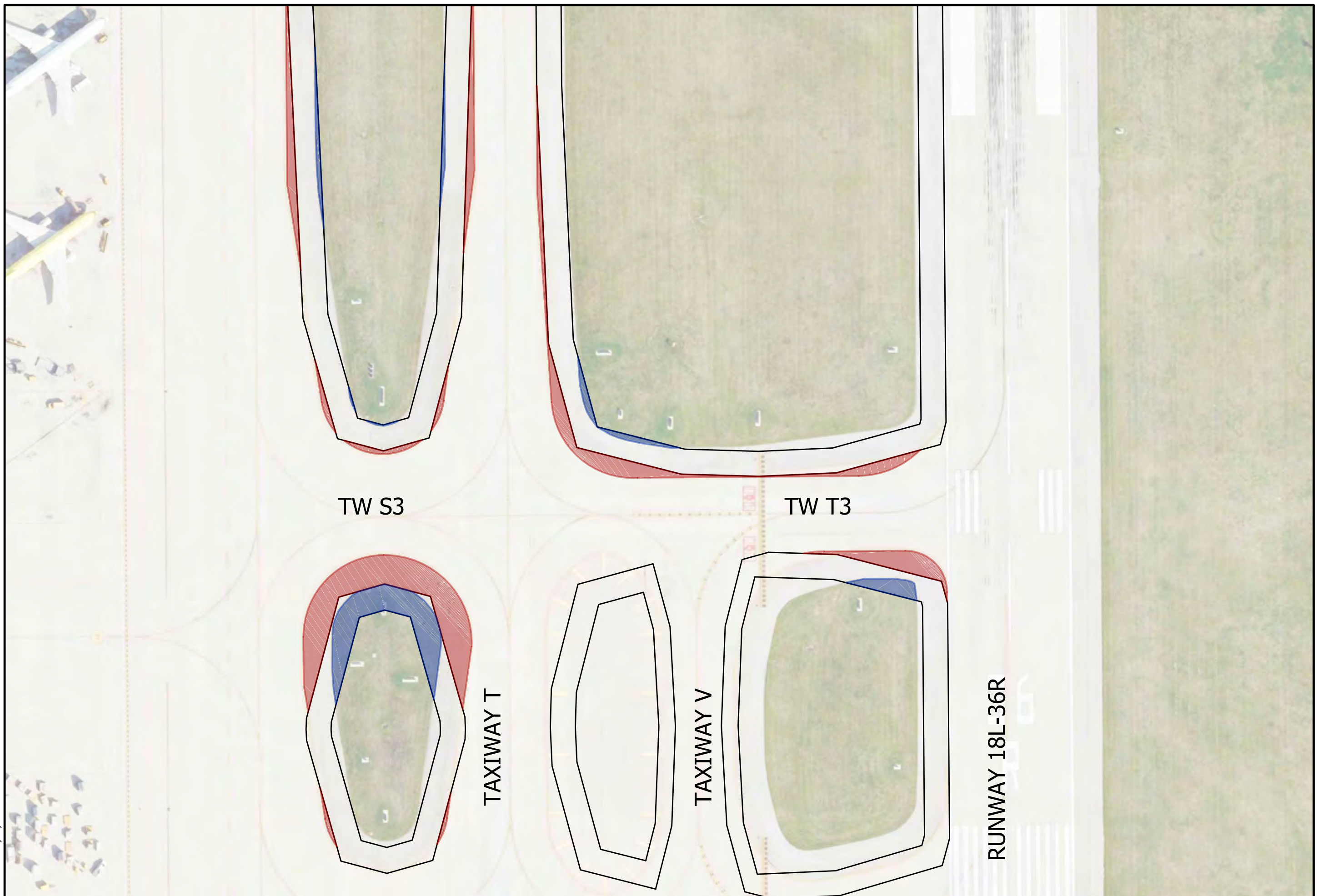

Taxiway Intersection Information	
TW V AND TW T3	TDG 3
Additional Pavement (SYD) 137	$Cost_{Pvmt}$ 41,033
Additional Shoulder (SYD) 38	$Cost_{Shoulder}$ 1,596
Additional Marking	$Cost_{Marking}$ 8,500
Lighting	$Cost_{Lighting}$ 13,000
	$Cost_{Total}$ 64,129

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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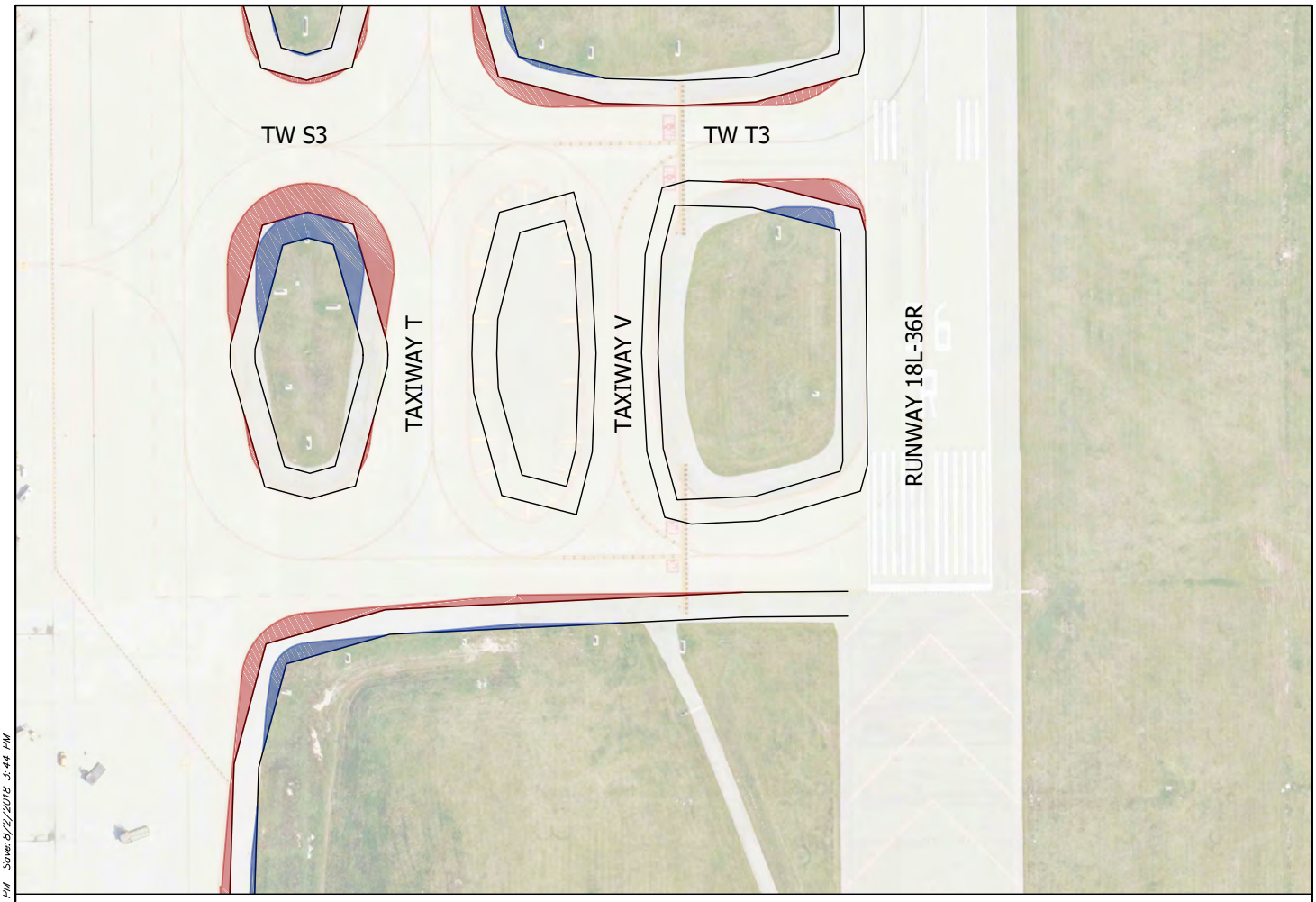

Taxiway Intersection Information		
TW V AND SOUTH END CONN	TDG	3
Additional Pavement (SYD) 107	$Cost_{Pvmt}$	32,067
Additional Shoulder (SYD) 19	$Cost_{Shoulder}$	812
Additional Marking	$Cost_{Marking}$	7,000
Lighting	$Cost_{Lighting}$	7,000
	$Cost_{Total}$	46,879

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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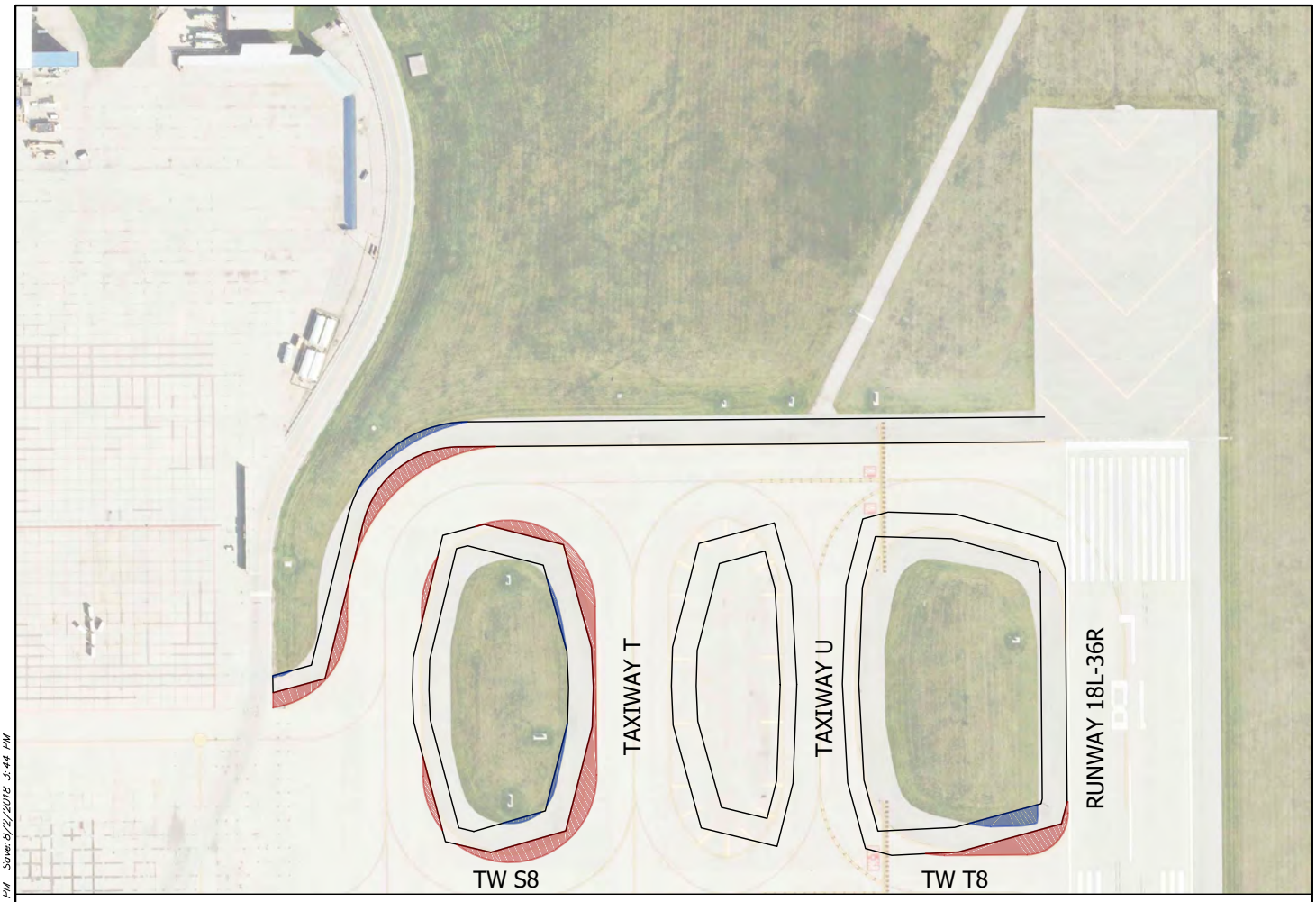

Taxiway Intersection Information		
TW T AND NORTH END CONN	TDG	5
Additional Pavement (SYD) 367	$Cost_{Pvmt}$	110,100
Additional Shoulder (SYD) 26	$Cost_{Shoulder}$	1,087
Additional Marking	$Cost_{Marking}$	10,500
Lighting	$Cost_{Lighting}$	68,000
	$Cost_{Total}$	189,687

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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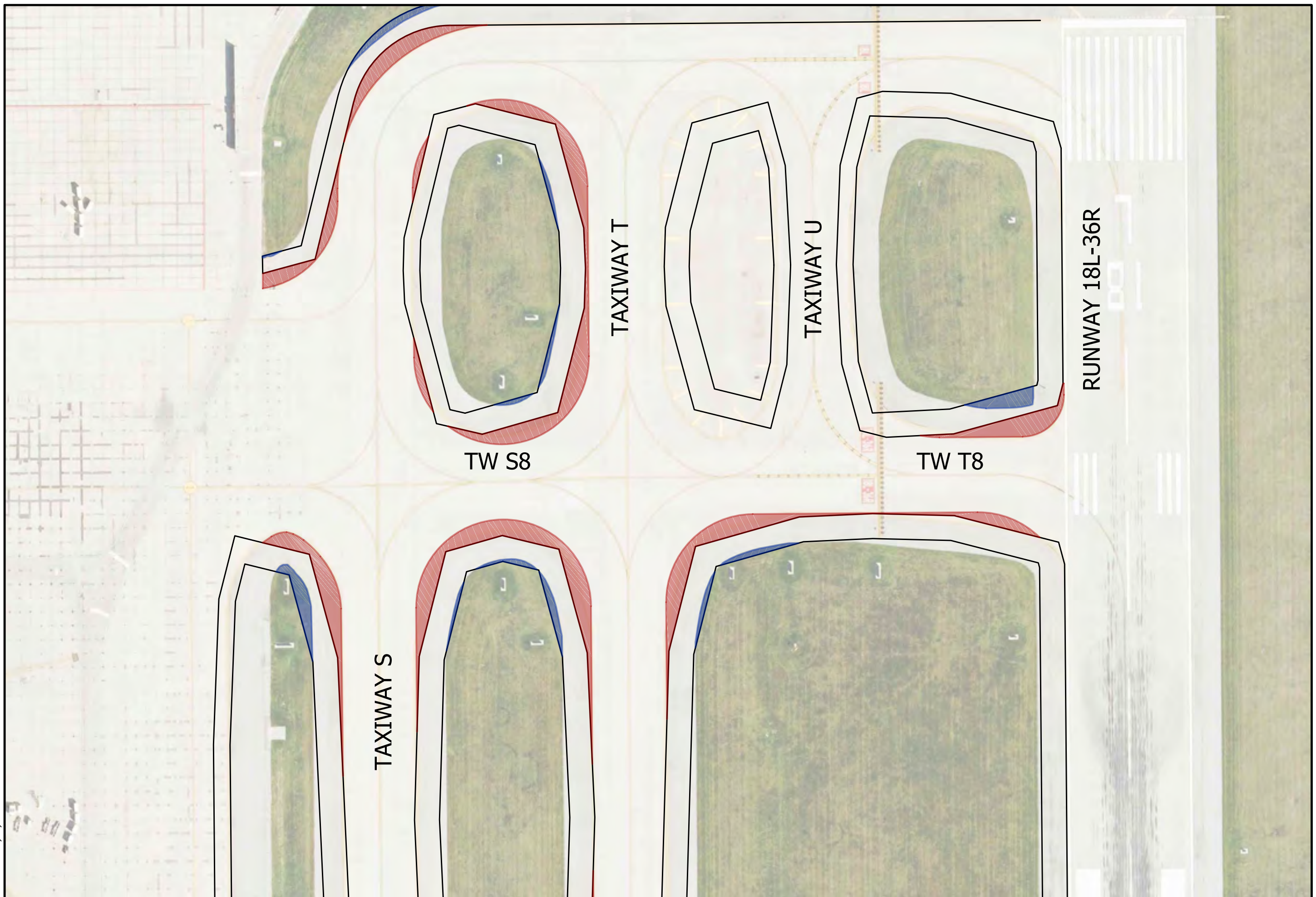

Taxiway Intersection Information			
TW T AND TW S8		TDG	5
Additional Pavement (SYD)	875	$Cost_{Pvmt}$	262,367
Additional Shoulder (SYD)	176	$Cost_{Shoulder}$	7,411
Additional Marking		$Cost_{Marking}$	21,000
Lighting		$Cost_{Lighting}$	36,000
		$Cost_{Total}$	326,777

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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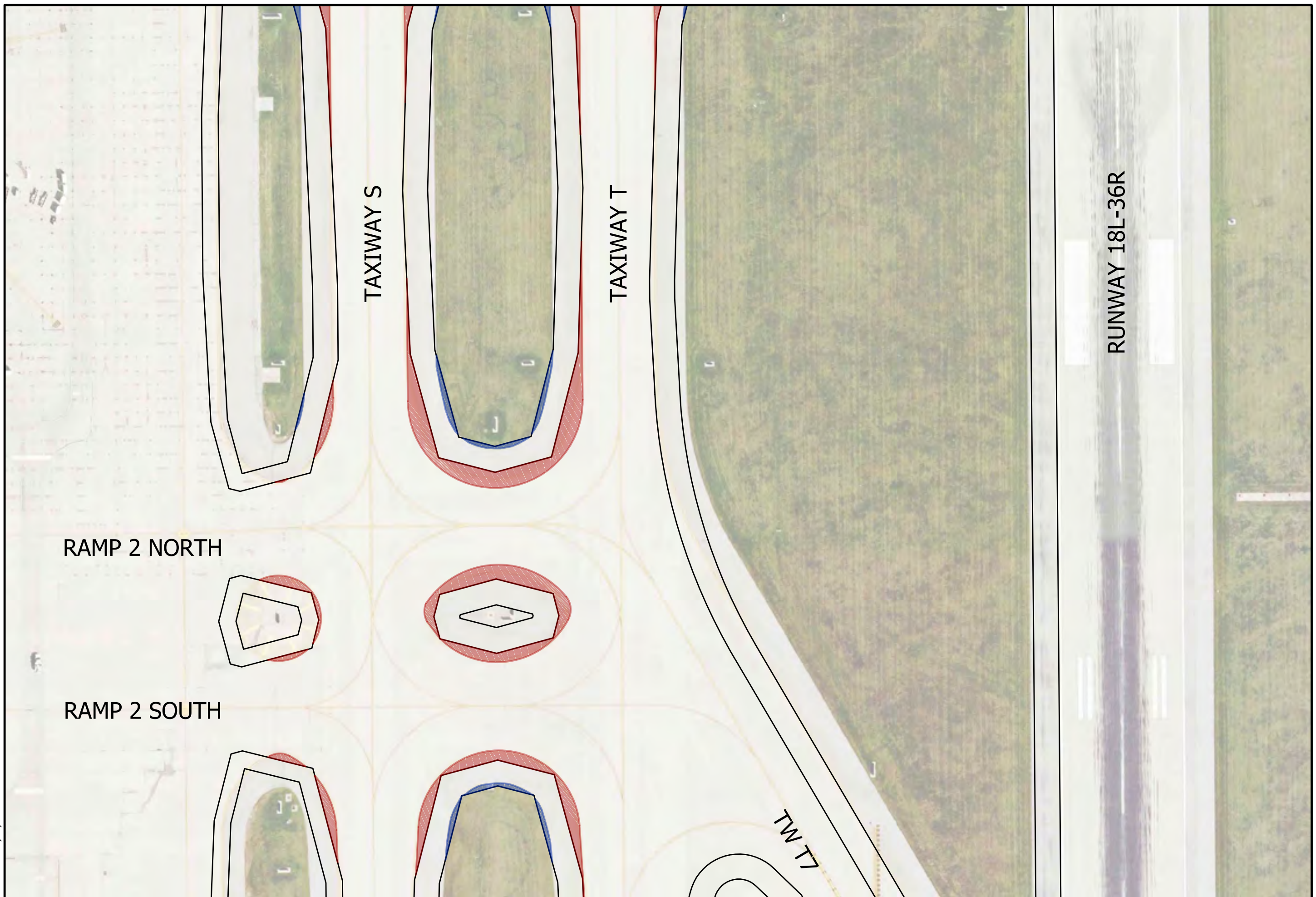

Taxiway Intersection Information	
TW T AND RAMP 2N	TDG 5
Additional Pavement (SYD) 720	$Cost_{Pvmt}$ 216,067
Additional Shoulder (SYD) 64	$Cost_{Shoulder}$ 2,679
Additional Marking	$Cost_{Marking}$ 7,875
Lighting	$Cost_{Lighting}$ 20,000
	$Cost_{Total}$ 246,620

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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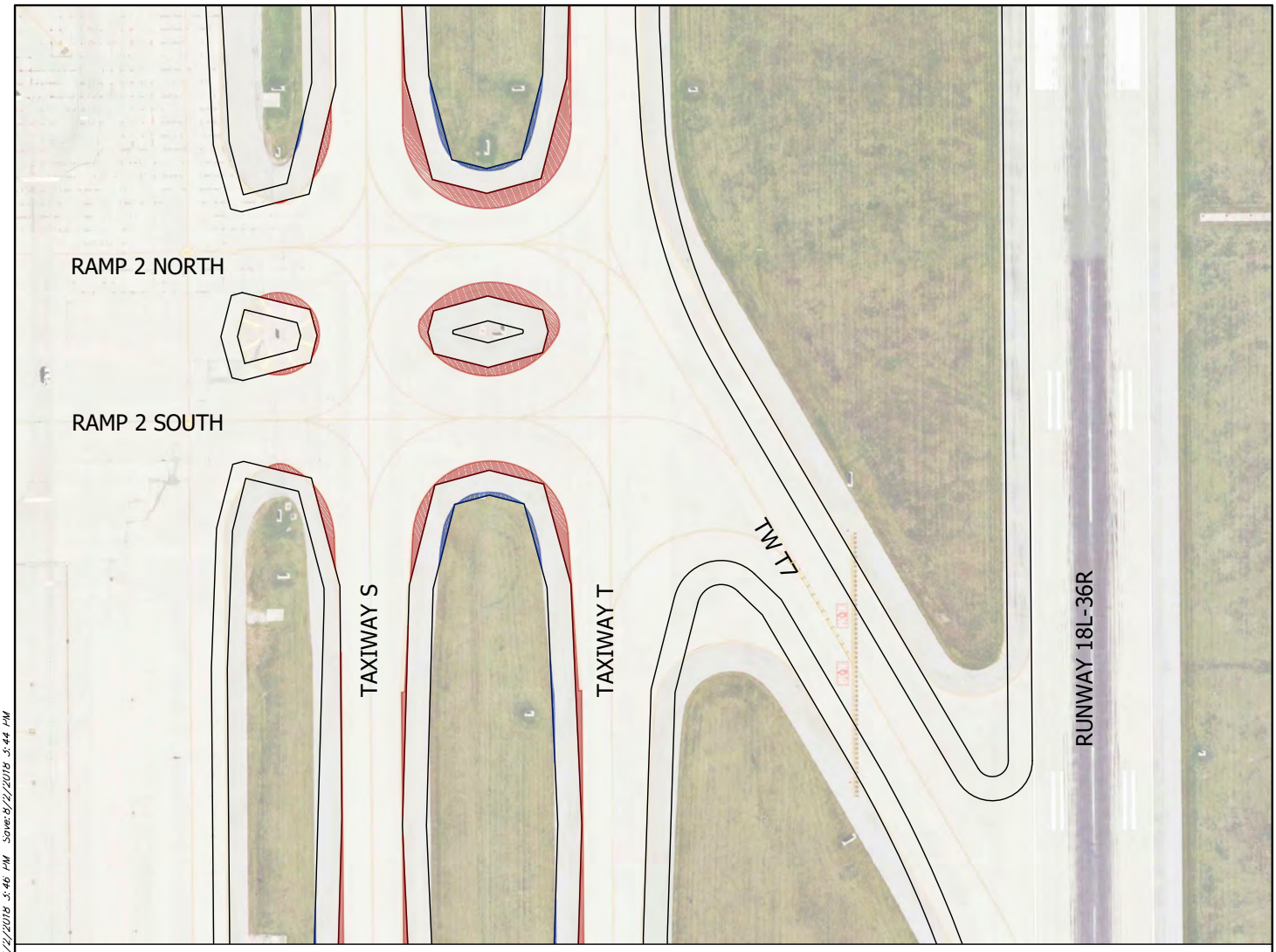

Taxiway Intersection Information		
TW T AND RAMP 2S	TDG	5
Additional Pavement (SYD) 481	$Cost_{Pvmt}$	144,367
Additional Shoulder (SYD) 68	$Cost_{Shoulder}$	2,865
Additional Marking	$Cost_{Marking}$	8,000
Lighting	$Cost_{Lighting}$	28,000
	$Cost_{Total}$	183,232

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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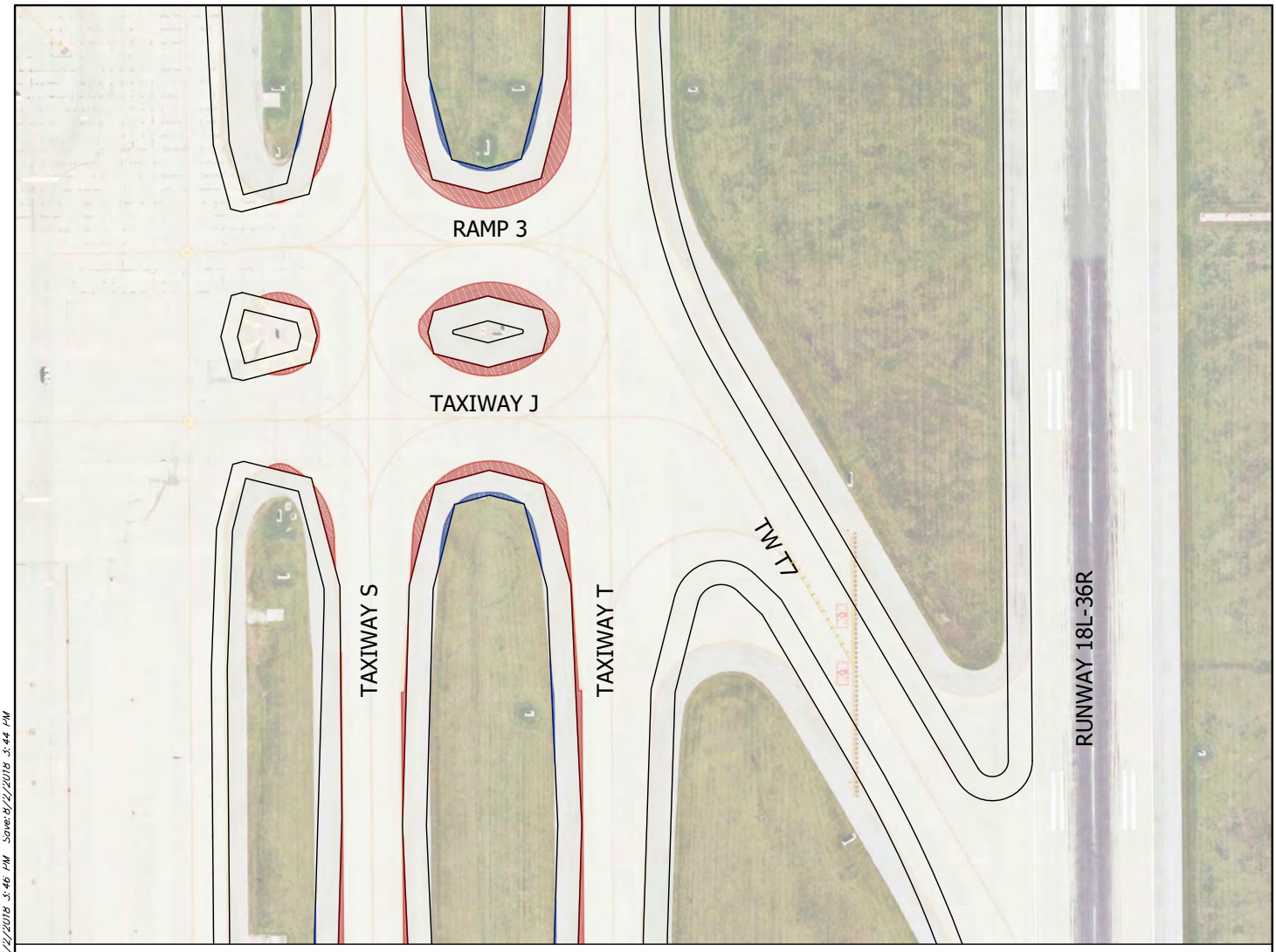

Taxiway Intersection Information		
TW T AND TW T7	TDG	5
Additional Pavement (SYD) 0	$Cost_{Pvmt}$	0
Additional Shoulder (SYD) 0	$Cost_{Shoulder}$	0
Additional Marking	$Cost_{Marking}$	29,250
Lighting	$Cost_{Lighting}$	132,000
	$Cost_{Total}$	161,250

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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Taxiway Intersection Information	
TW T AND RAMP 3	TDG 5
Additional Pavement (SYD) 452	$Cost_{Pvmt}$ 135,667
Additional Shoulder (SYD) 120	$Cost_{Shoulder}$ 5,026
Additional Marking	$Cost_{Marking}$ 10,500
Lighting	$Cost_{Lighting}$ 20,000
	$Cost_{Total}$ 171,193

LEGEND

- Additional Full Strength Pavement
- Additional Shoulder Pavement

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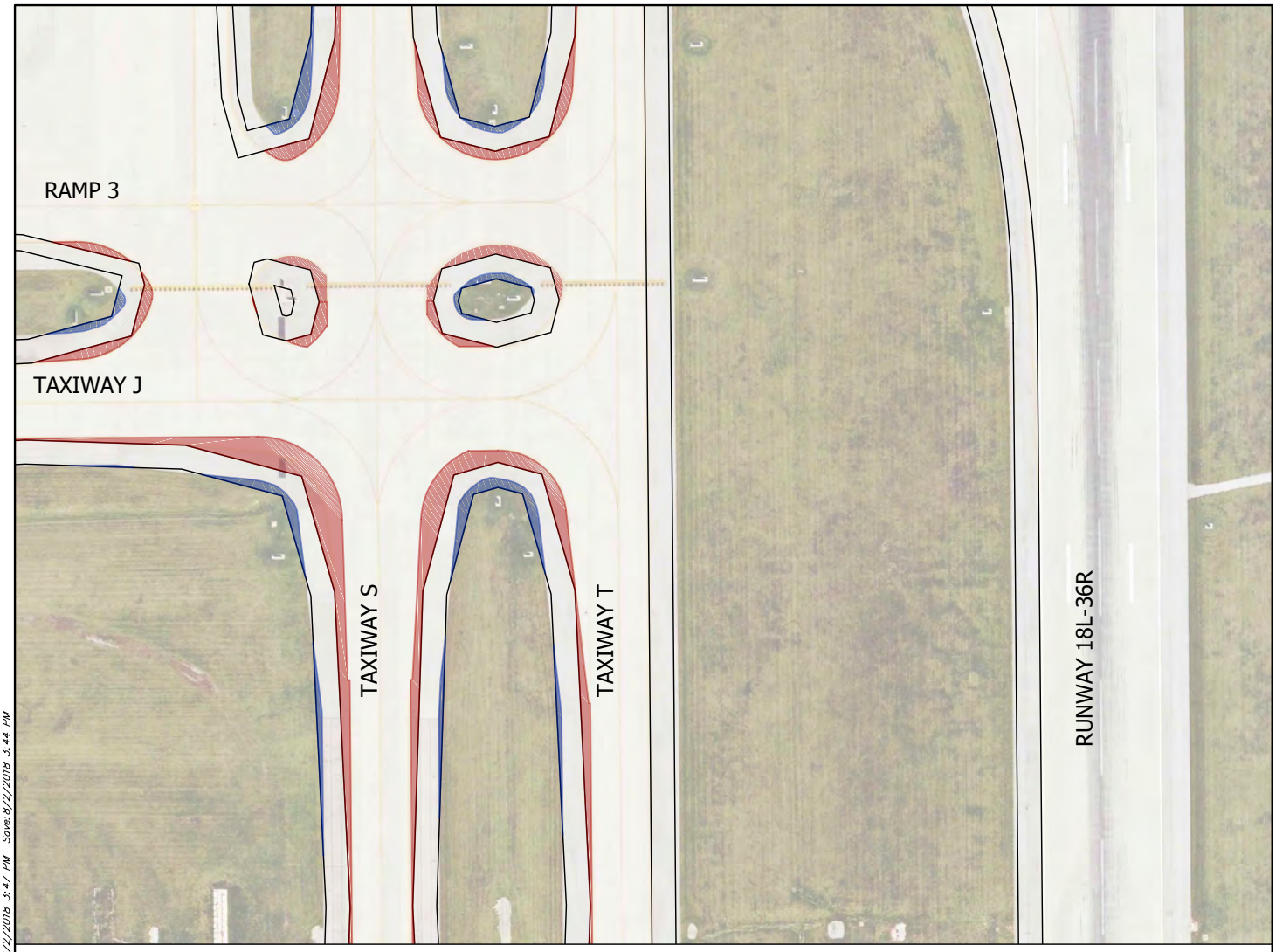

Taxiway Intersection Information		
TW T AND TW J	TDG	6
Additional Pavement (SYD) 570	$Cost_{Pvmt}$	171,000
Additional Shoulder (SYD) 205	$Cost_{Shoulder}$	8,619
Additional Marking	$Cost_{Marking}$	10,500
Lighting	$Cost_{Lighting}$	142,000
	$Cost_{Total}$	332,119

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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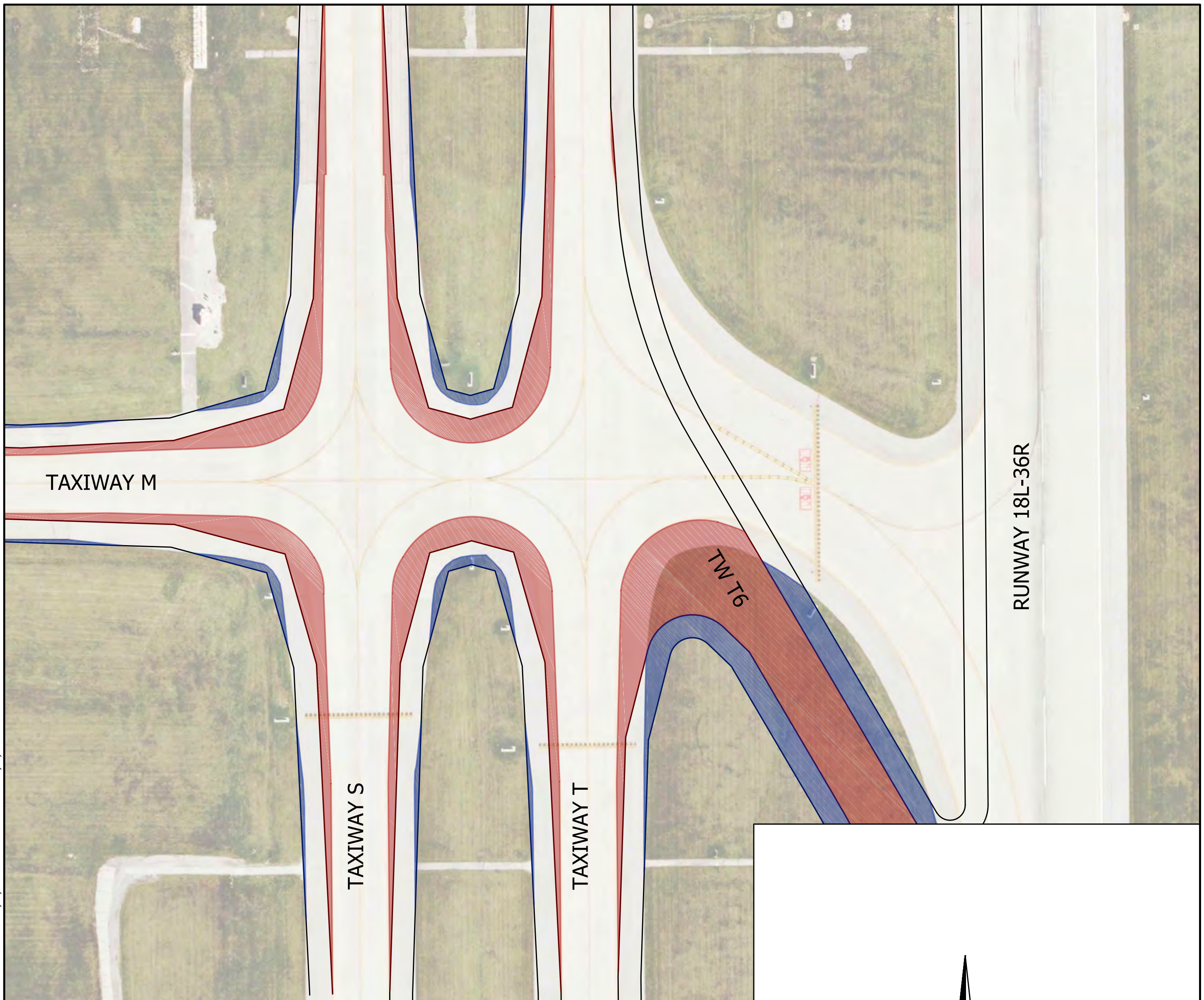

Taxiway Intersection Information		
TW T AND TW T6	TDG	5
Additional Pavement (SYD) 4392	$Cost_{Pvmt}$	1,756,933
Additional Shoulder (SYD) 1698	$Cost_{Shoulder}$	71,311
Additional Marking	$Cost_{Marking}$	17,750
Lighting	$Cost_{Lighting}$	165,000
	$Cost_{Total}$	2,010,995

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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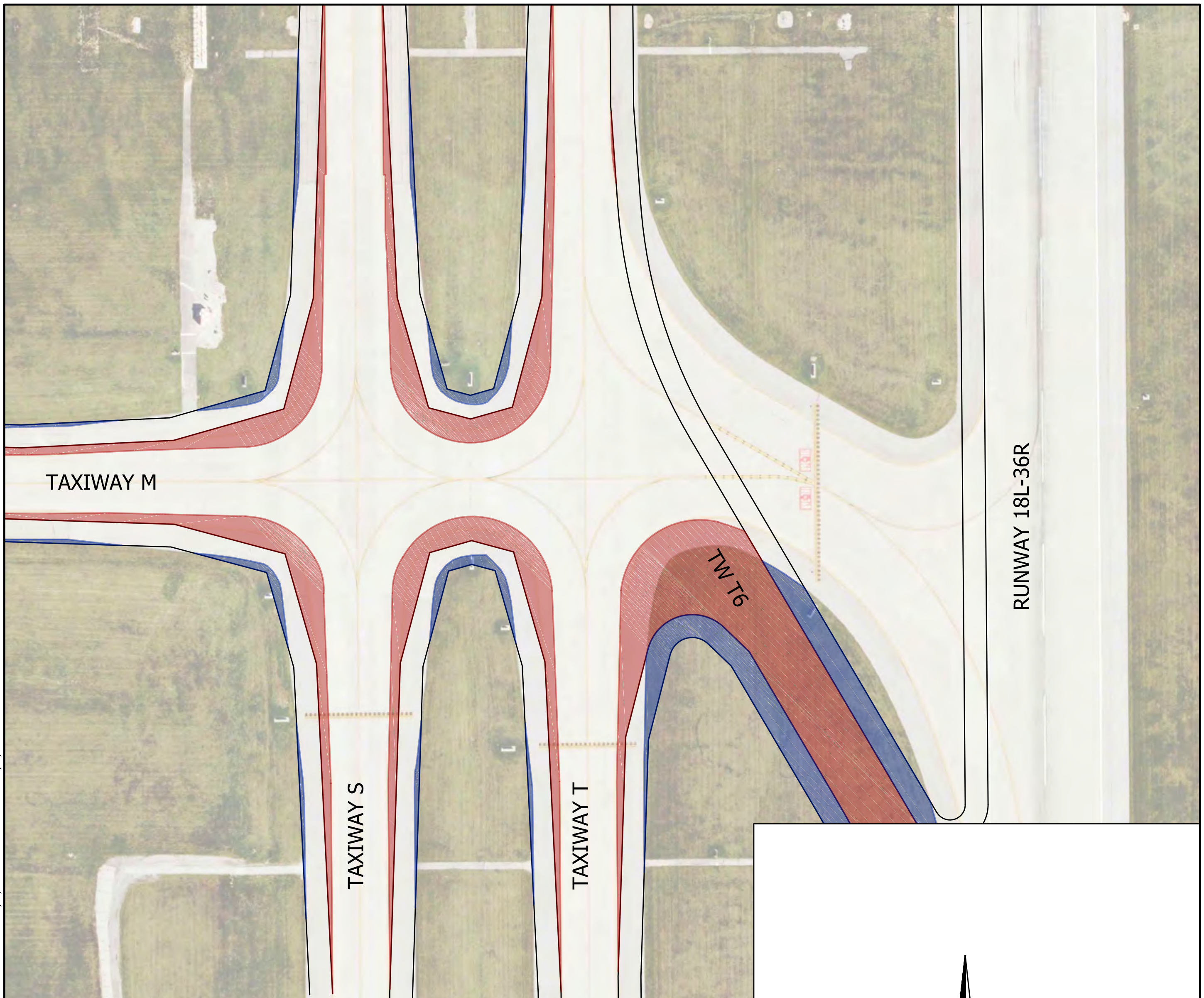

Taxiway Intersection Information	
TW T AND TW M	TDG 6
Additional Pavement (SYD) 2283	$Cost_{Pvmt}$ 685,033
Additional Shoulder (SYD) 382	$Cost_{Shoulder}$ 16,035
Additional Marking	$Cost_{Marking}$ 22,750
Lighting	$Cost_{Lighting}$ 45,000
	$Cost_{Total}$ 768,818

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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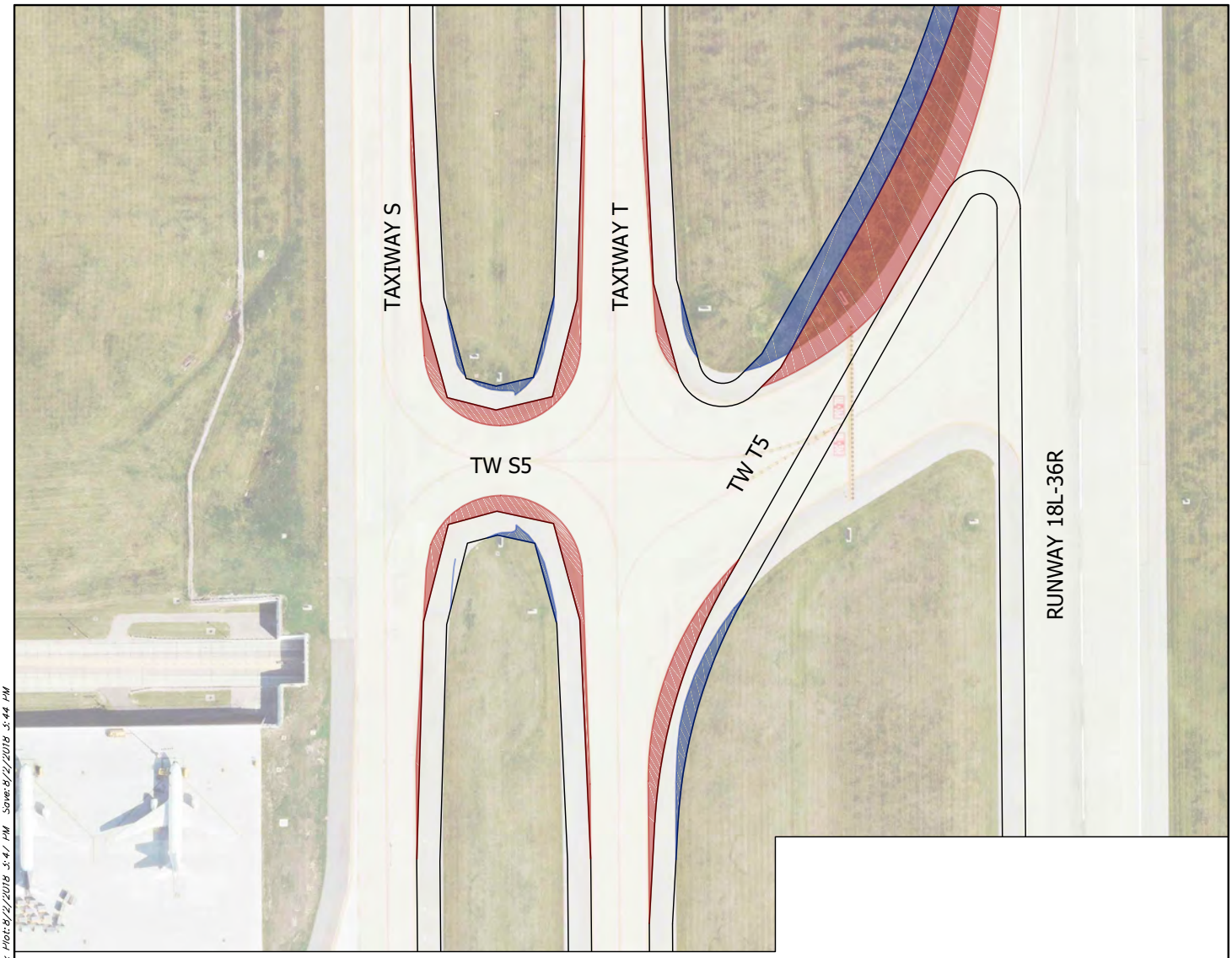

Taxiway Intersection Information		
TW T AND TW T5	TDG	5
Additional Pavement (SYD) 1564	$Cost_{Pvmt}$	625,422
Additional Shoulder (SYD) 1103	$Cost_{Shoulder}$	46,340
Additional Marking	$Cost_{Marking}$	17,750
Lighting	$Cost_{Lighting}$	45,000
	$Cost_{Total}$	734,512

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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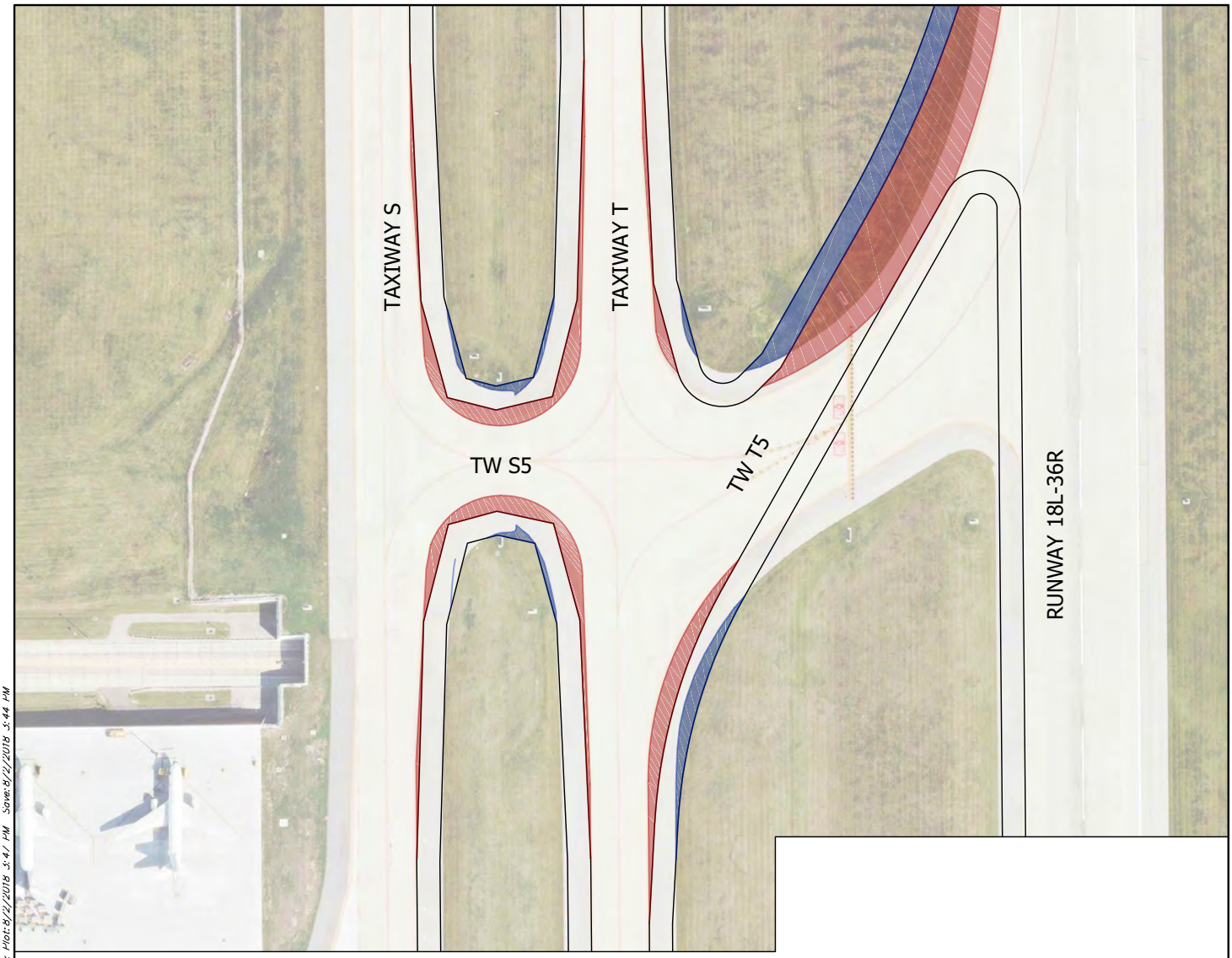

Taxiway Intersection Information		
TW T AND TW S5	TDG	5
Additional Pavement (SYD) 1085	$Cost_{Pvmt}$	325,500
Additional Shoulder (SYD) 180	$Cost_{Shoulder}$	7,541
Additional Marking	$Cost_{Marking}$	19,250
Lighting	$Cost_{Lighting}$	48,000
	$Cost_{Total}$	400,291

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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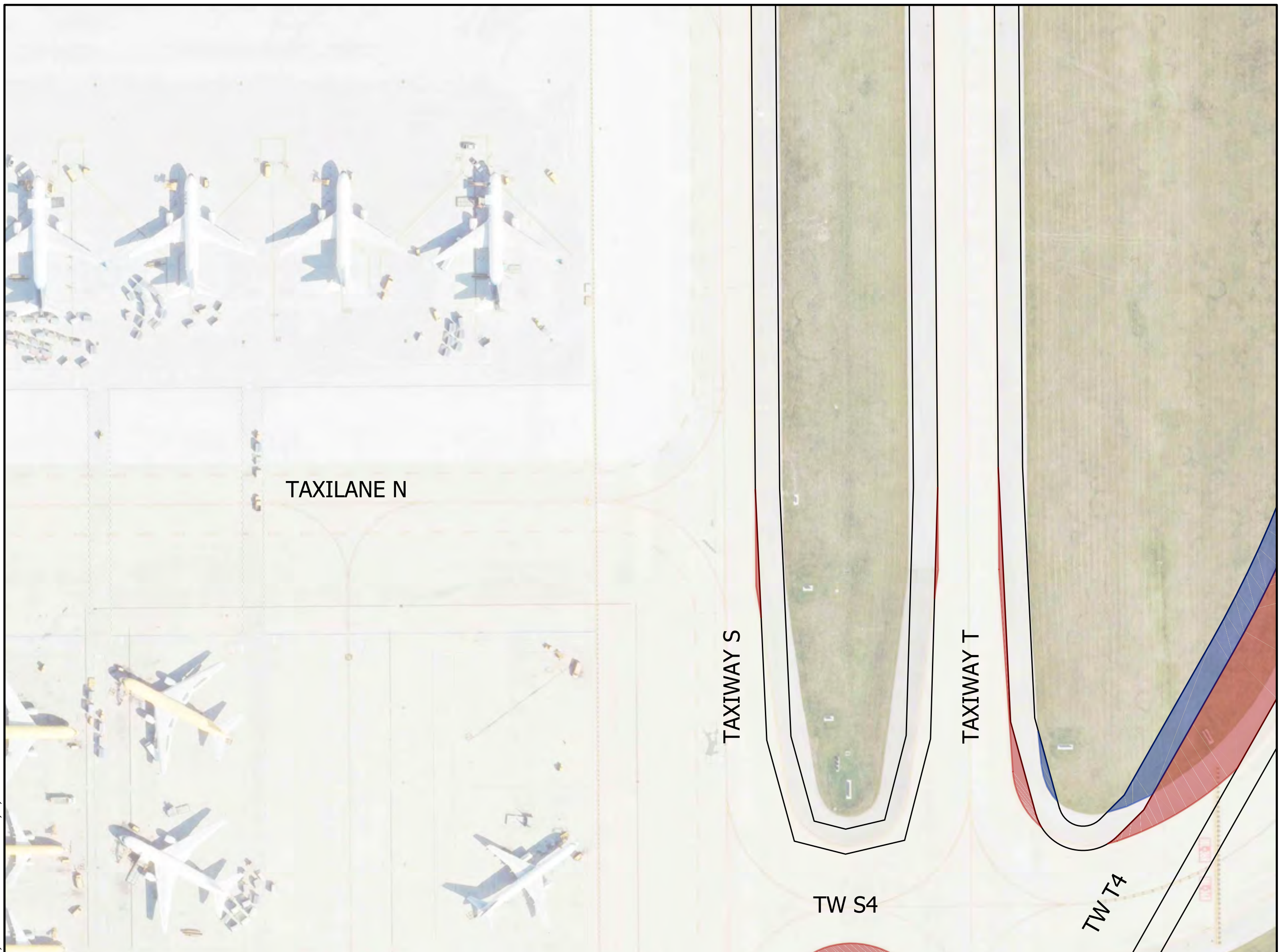

Taxiway Intersection Information		
TW S AND TL N	TDG	5
Additional Pavement (SYD) 0	$Cost_{Pvmt}$	0
Additional Shoulder (SYD) 0	$Cost_{Shoulder}$	0
Additional Marking	$Cost_{Marking}$	8,750
Lighting	$Cost_{Lighting}$	0
	$Cost_{Total}$	8,750

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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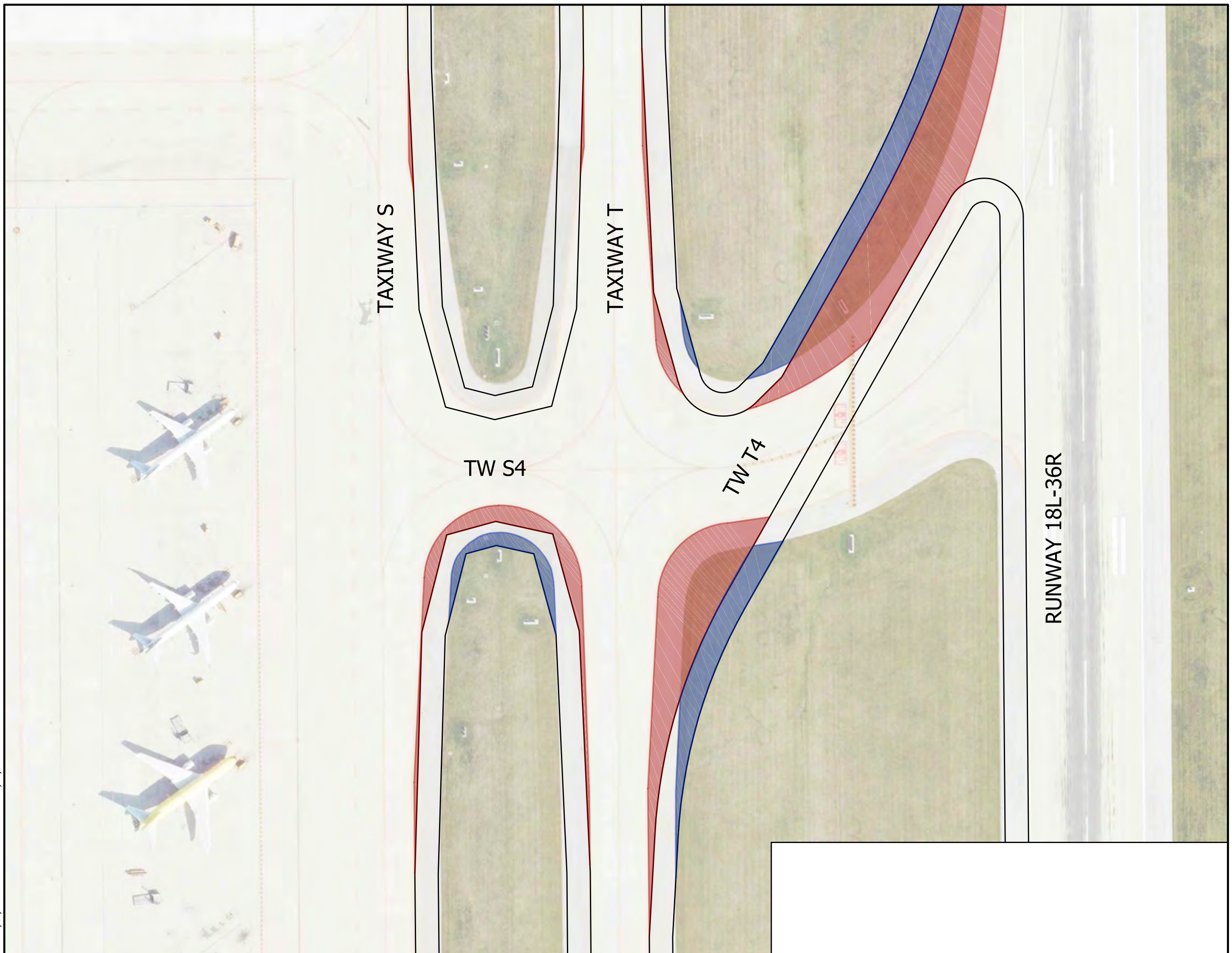

Taxiway Intersection Information	
TW T AND TW T4	TDG 5
Additional Pavement (SYD) 3316	$Cost_{Pvmt}$ 1,326,356
Additional Shoulder (SYD) 1753	$Cost_{Shoulder}$ 73,607
Additional Marking	$Cost_{Marking}$ 17,750
Lighting	$Cost_{Lighting}$ 45,000
	$Cost_{Total}$ 1,462,713

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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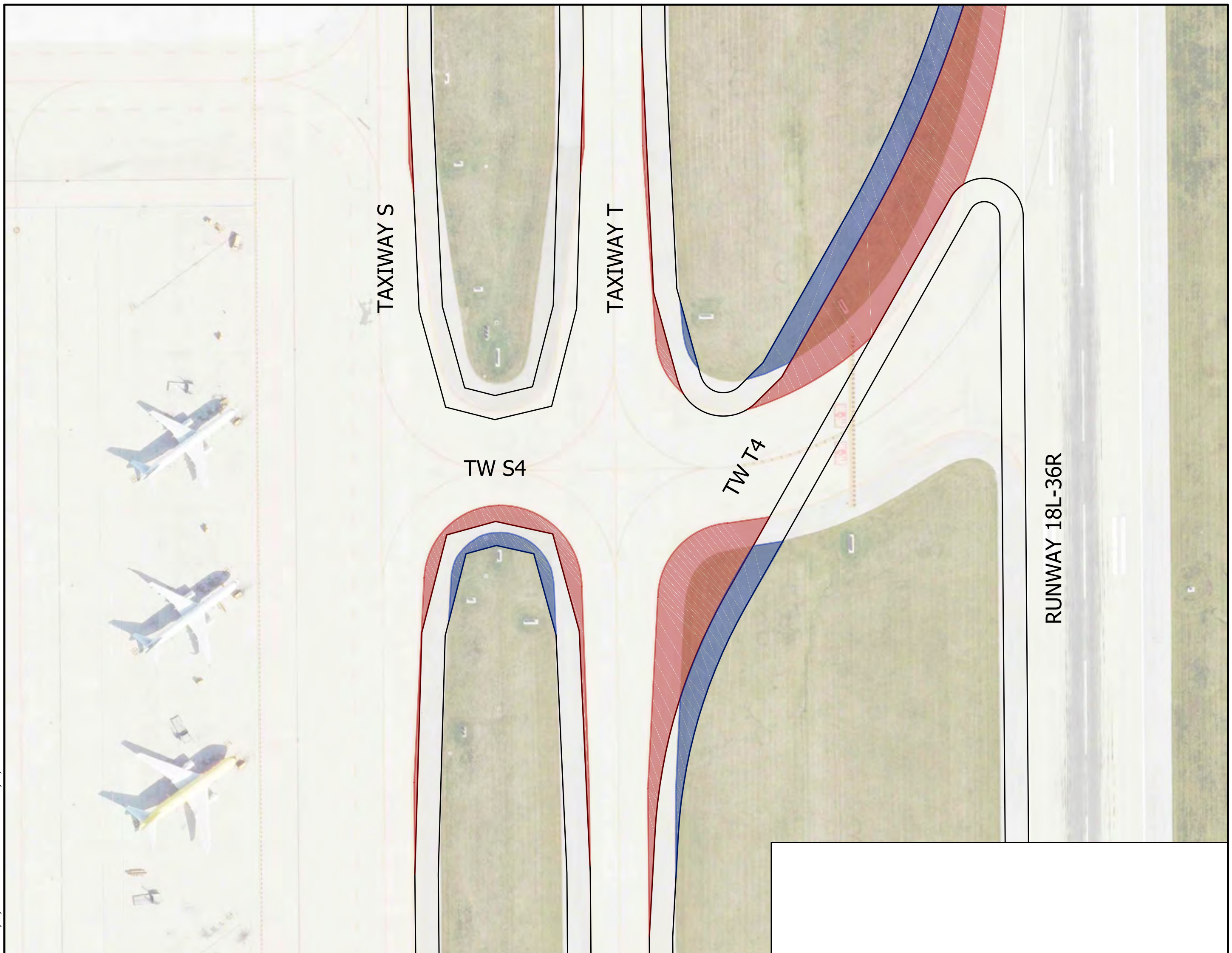

Taxiway Intersection Information	
TW T AND TW S4	TDG 5
Additional Pavement (SYD) 530	$Cost_{Pvmt}$ 158,967
Additional Shoulder (SYD) 222	$Cost_{Shoulder}$ 9,319
Additional Marking	$Cost_{Marking}$ 19,250
Lighting	$Cost_{Lighting}$ 36,000
	$Cost_{Total}$ 223,536

LEGEND

- Additional Full Strength Pavement
- Additional Shoulder Pavement

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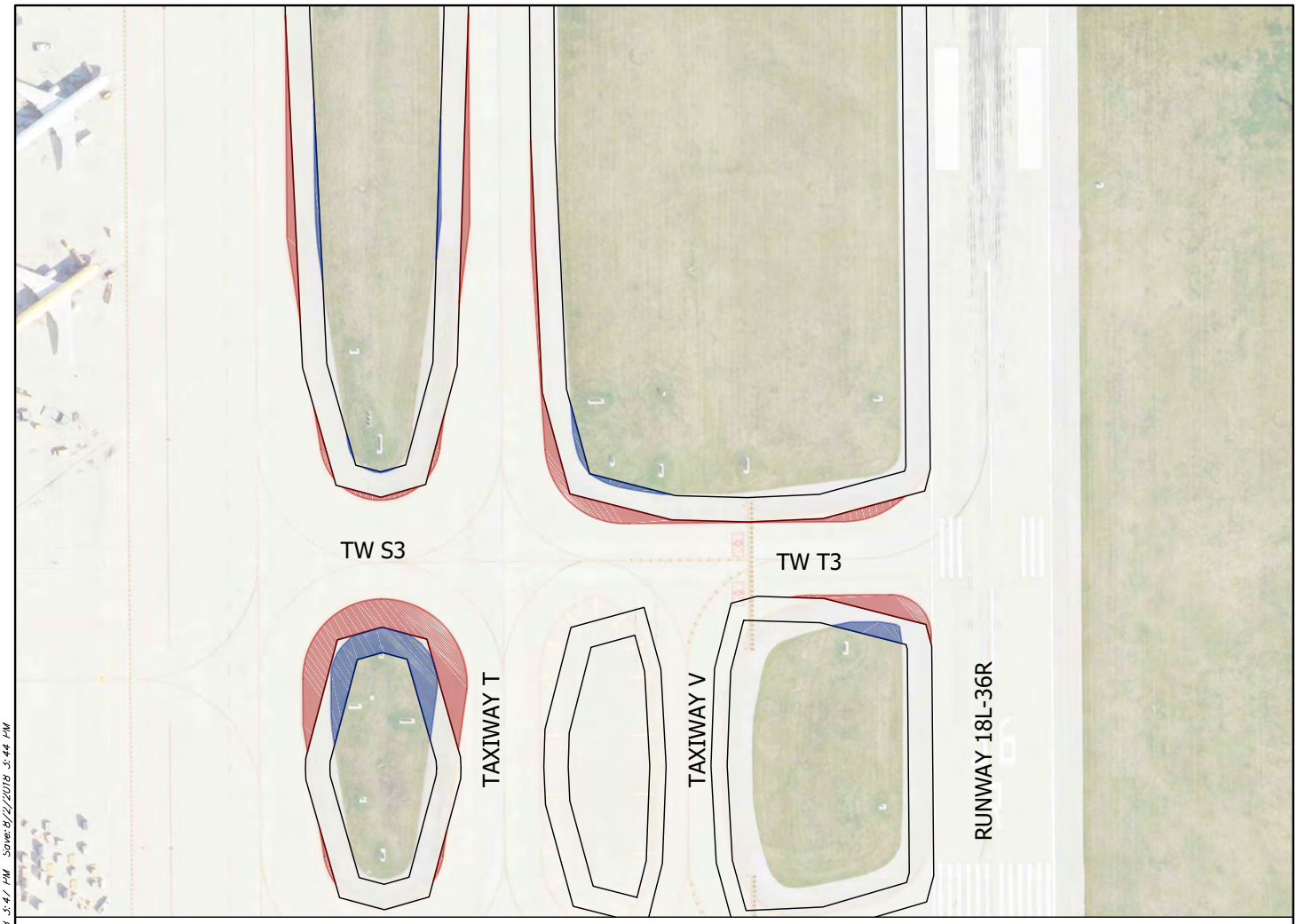

Taxiway Intersection Information		
TW T AND TW T3	TDG	5
Additional Pavement (SYD) 378	$Cost_{Pvmt}$	113,400
Additional Shoulder (SYD) 61	$Cost_{Shoulder}$	2,581
Additional Marking	$Cost_{Marking}$	17,500
Lighting	$Cost_{Lighting}$	23,000
	$Cost_{Total}$	156,481

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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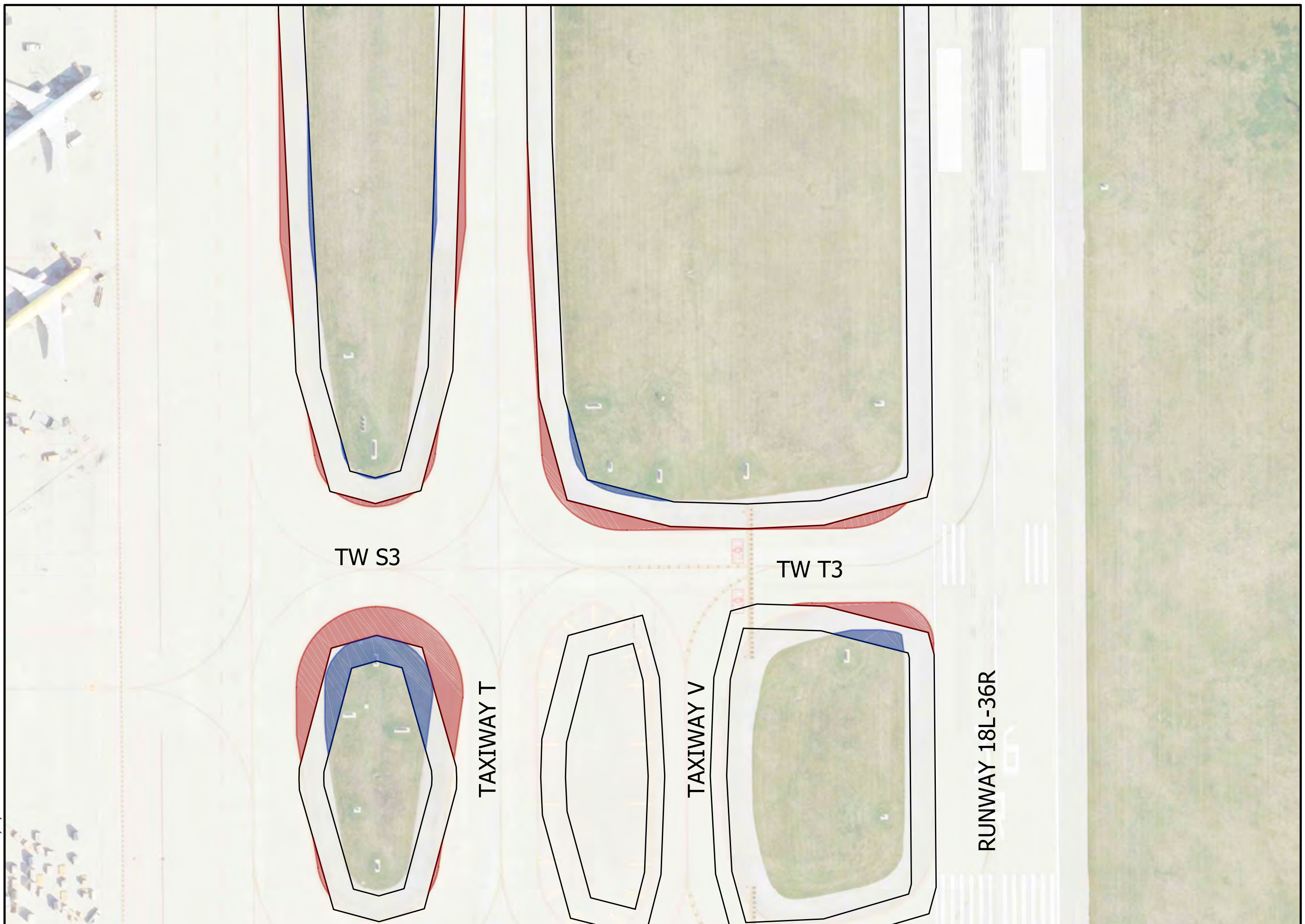

Taxiway Intersection Information	
TW T AND TW S3	TDG 6
Additional Pavement (SYD) 1156	$Cost_{Pvmt}$ 346,733
Additional Shoulder (SYD) 430	$Cost_{Shoulder}$ 18,041
Additional Marking	$Cost_{Marking}$ 15,750
Lighting	$Cost_{Lighting}$ 31,000
	$Cost_{Total}$ 411,525

LEGEND

- Additional Full Strength Pavement
- Additional Shoulder Pavement

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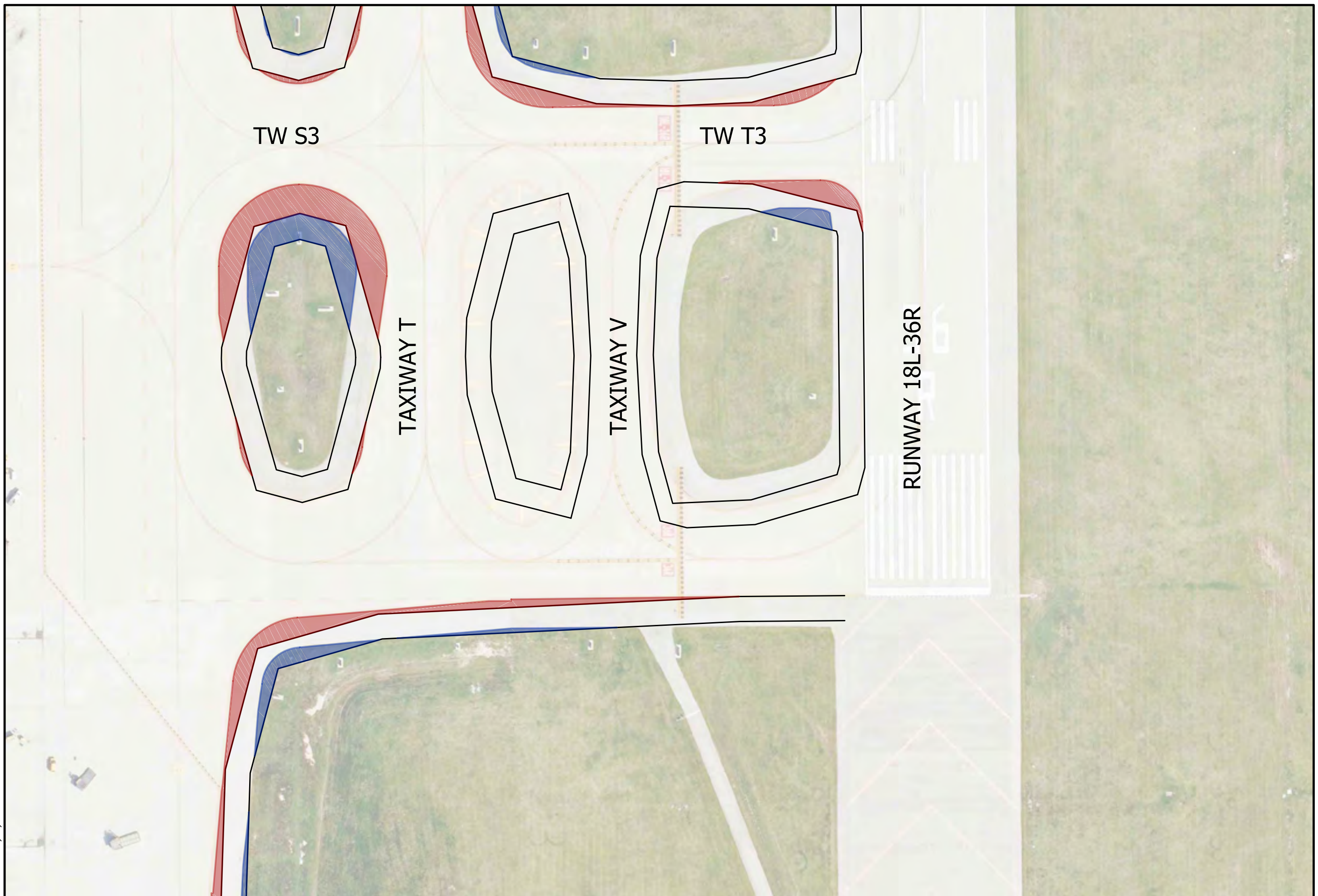

Taxiway Intersection Information	
TW T AND SOUTH END CONN	TDG 6
Additional Pavement (SYD) 310	$Cost_{Pvmt}$ 92,967
Additional Shoulder (SYD) 143	$Cost_{Shoulder}$ 5,997
Additional Marking	$Cost_{Marking}$ 10,500
Lighting	$Cost_{Lighting}$ 76,000
	$Cost_{Total}$ 185,463

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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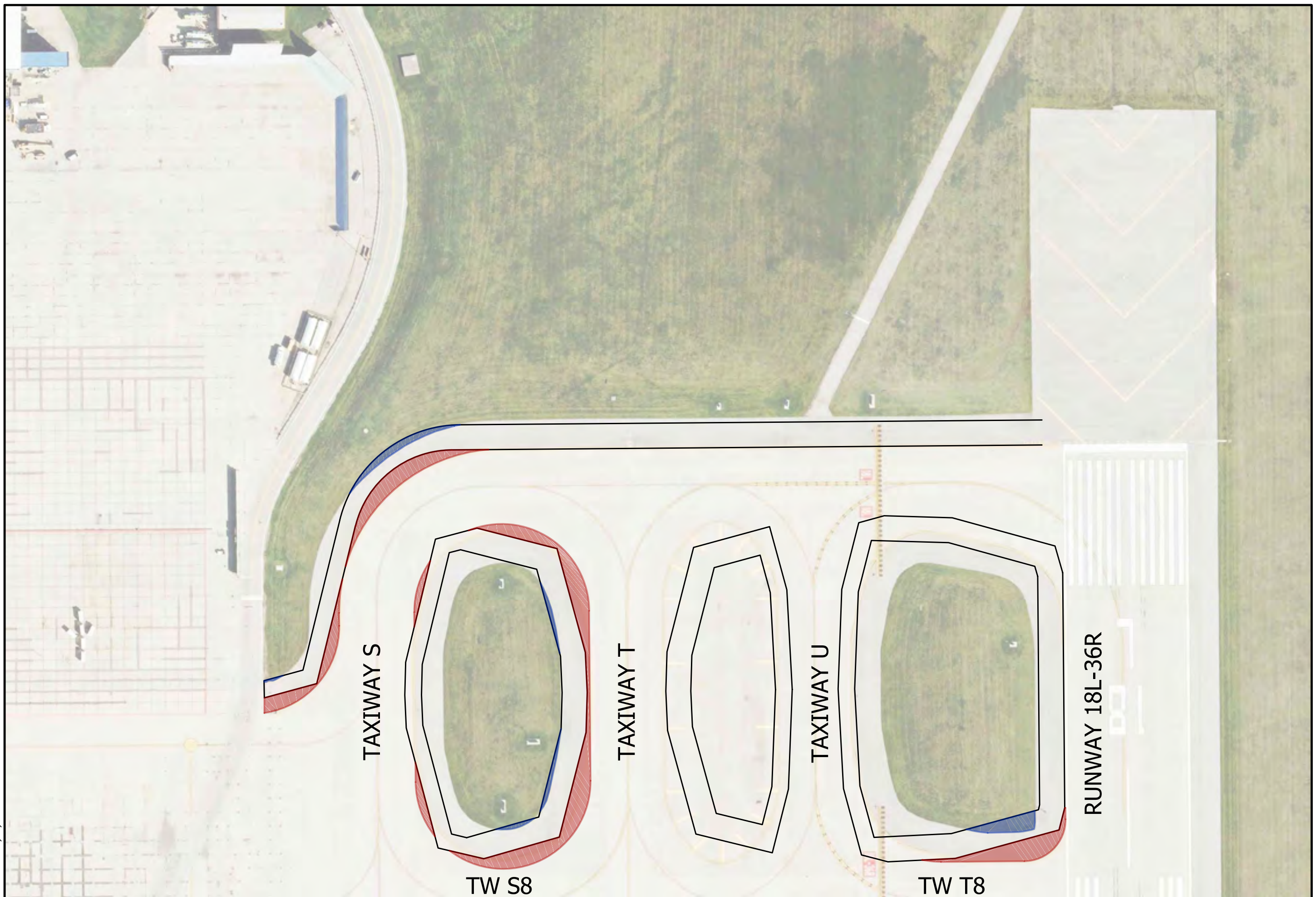

Taxiway Intersection Information	
TW S AND NORTH END CONN	TDG 4
Additional Pavement (SYD) 339	$Cost_{Pvmt}$ 101,667
Additional Shoulder (SYD) 102	$Cost_{Shoulder}$ 4,289
Additional Marking	$Cost_{Marking}$ 13,325
Lighting	$Cost_{Lighting}$ 74,000
	$Cost_{Total}$ 193,280

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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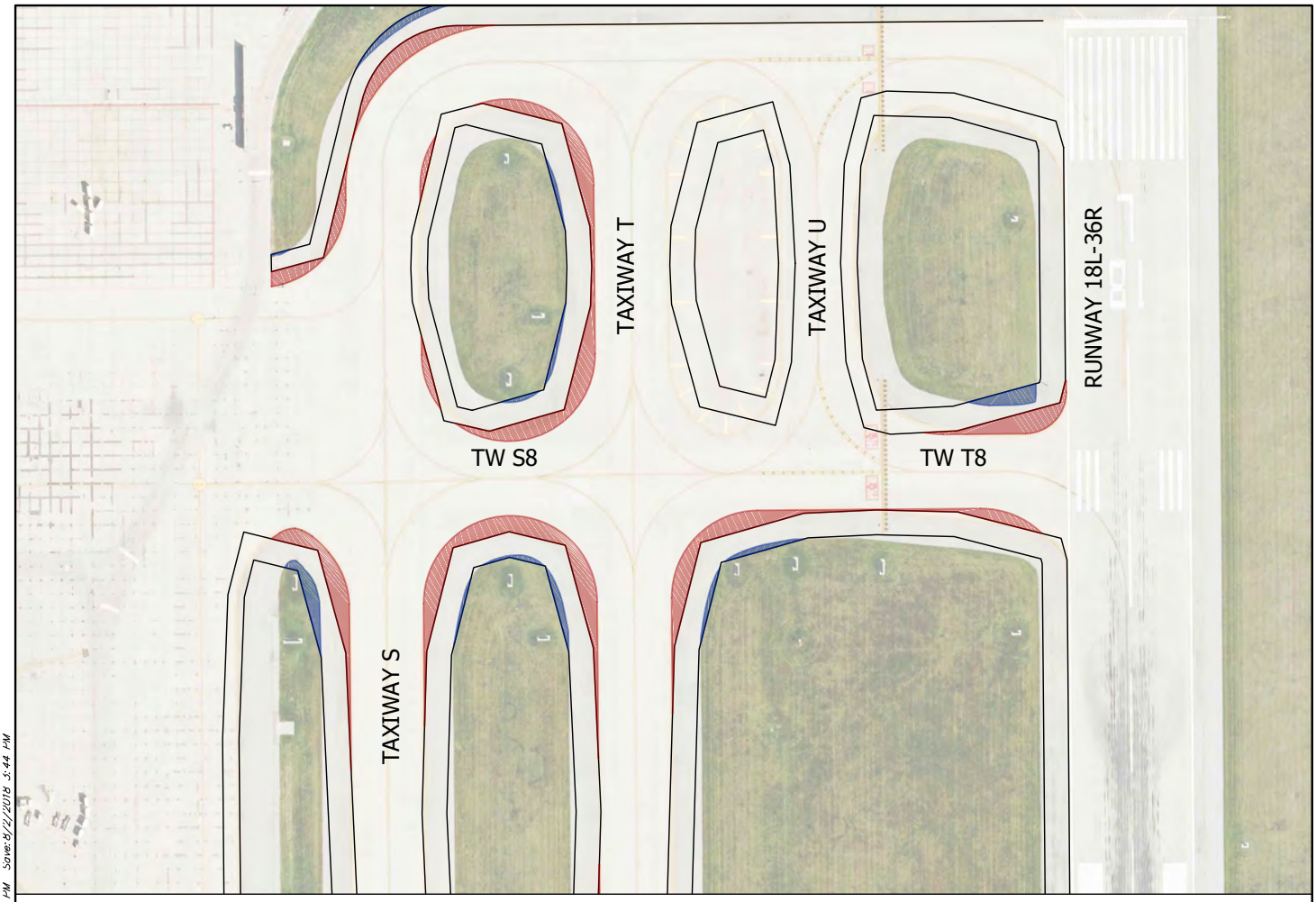

Taxiway Intersection Information		
TW S AND TW S8	TDG	5
Additional Pavement (SYD) 895	$Cost_{Pvmt}$	268,367
Additional Shoulder (SYD) 171	$Cost_{Shoulder}$	7,191
Additional Marking	$Cost_{Marking}$	17,500
Lighting	$Cost_{Lighting}$	42,000
	$Cost_{Total}$	335,058

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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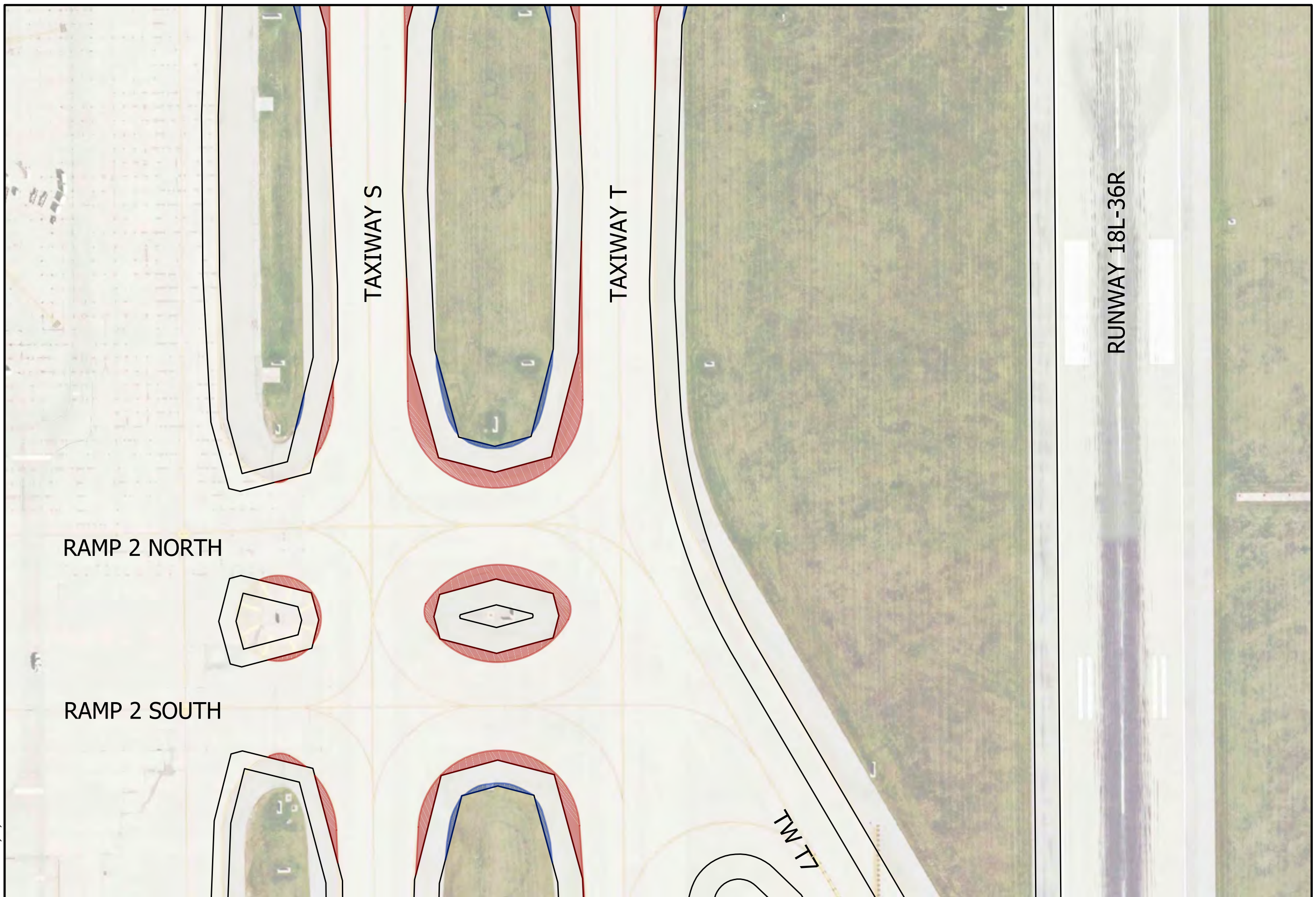

Taxiway Intersection Information			
TW S AND RAMP 2N		TDG	5
Additional Pavement (SYD)	628	$Cost_{Pvmt}$	188,267
Additional Shoulder (SYD)	74	$Cost_{Shoulder}$	3,094
Additional Marking		$Cost_{Marking}$	19,700
Lighting		$Cost_{Lighting}$	48,000
		$Cost_{Total}$	259,061

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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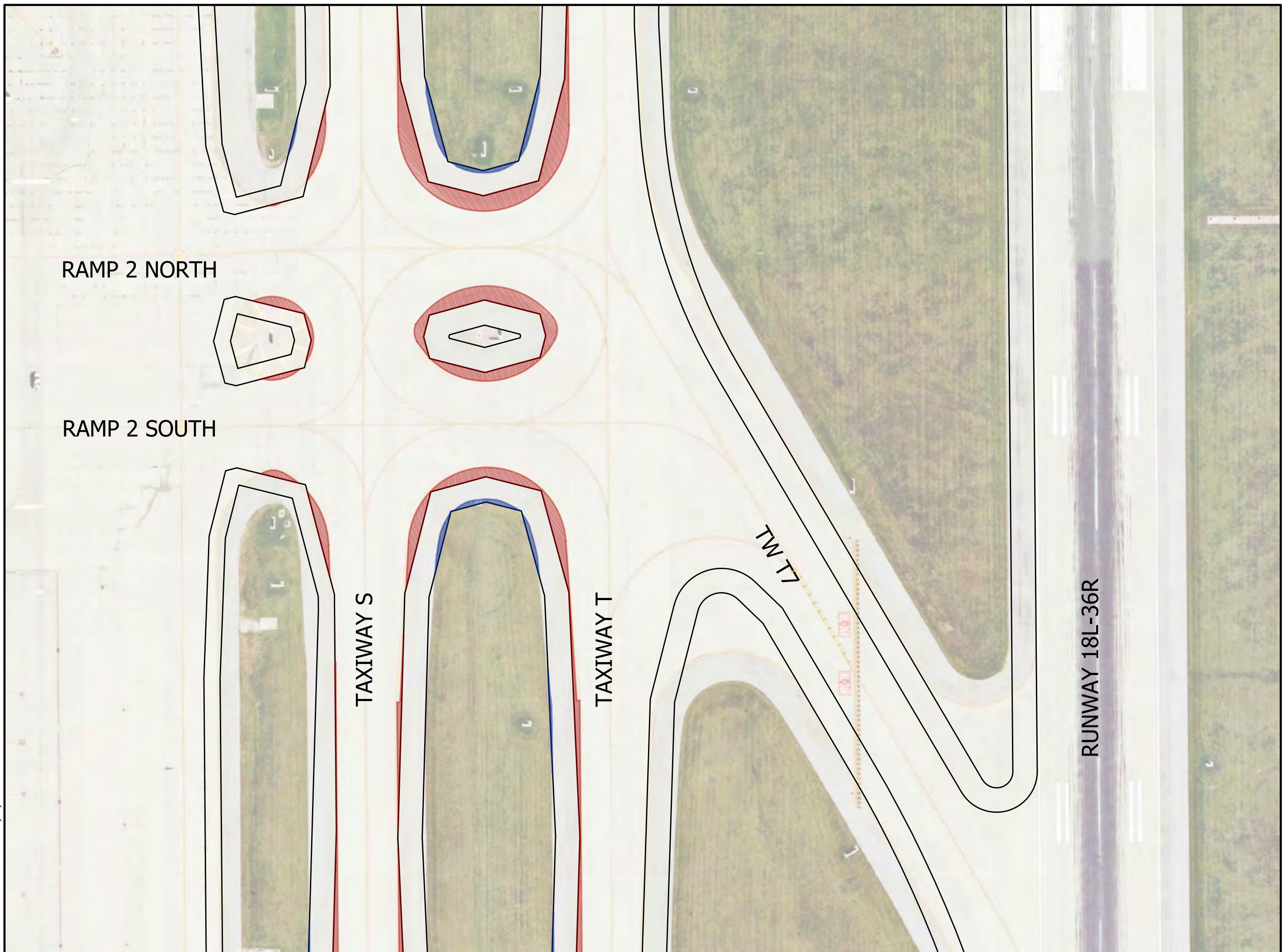

Taxiway Intersection Information	
TW S AND RAMP 2S	TDG 5
Additional Pavement (SYD) 483	$Cost_{Pvmt}$ 145,033
Additional Shoulder (SYD) 52	$Cost_{Shoulder}$ 2,175
Additional Marking	$Cost_{Marking}$ 21,440
Lighting	$Cost_{Lighting}$ 40,000
	$Cost_{Total}$ 208,648

LEGEND

- Additional Full Strength Pavement
- Additional Shoulder Pavement

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Taxiway Intersection Information			
TW S AND RAMP 3		TDG	5
Additional Pavement (SYD)	1017	$Cost_{Pvmt}$	305,067
Additional Shoulder (SYD)	352	$Cost_{Shoulder}$	14,793
Additional Marking		$Cost_{Marking}$	21,875
Lighting		$Cost_{Lighting}$	42,000
		$Cost_{Total}$	383,735

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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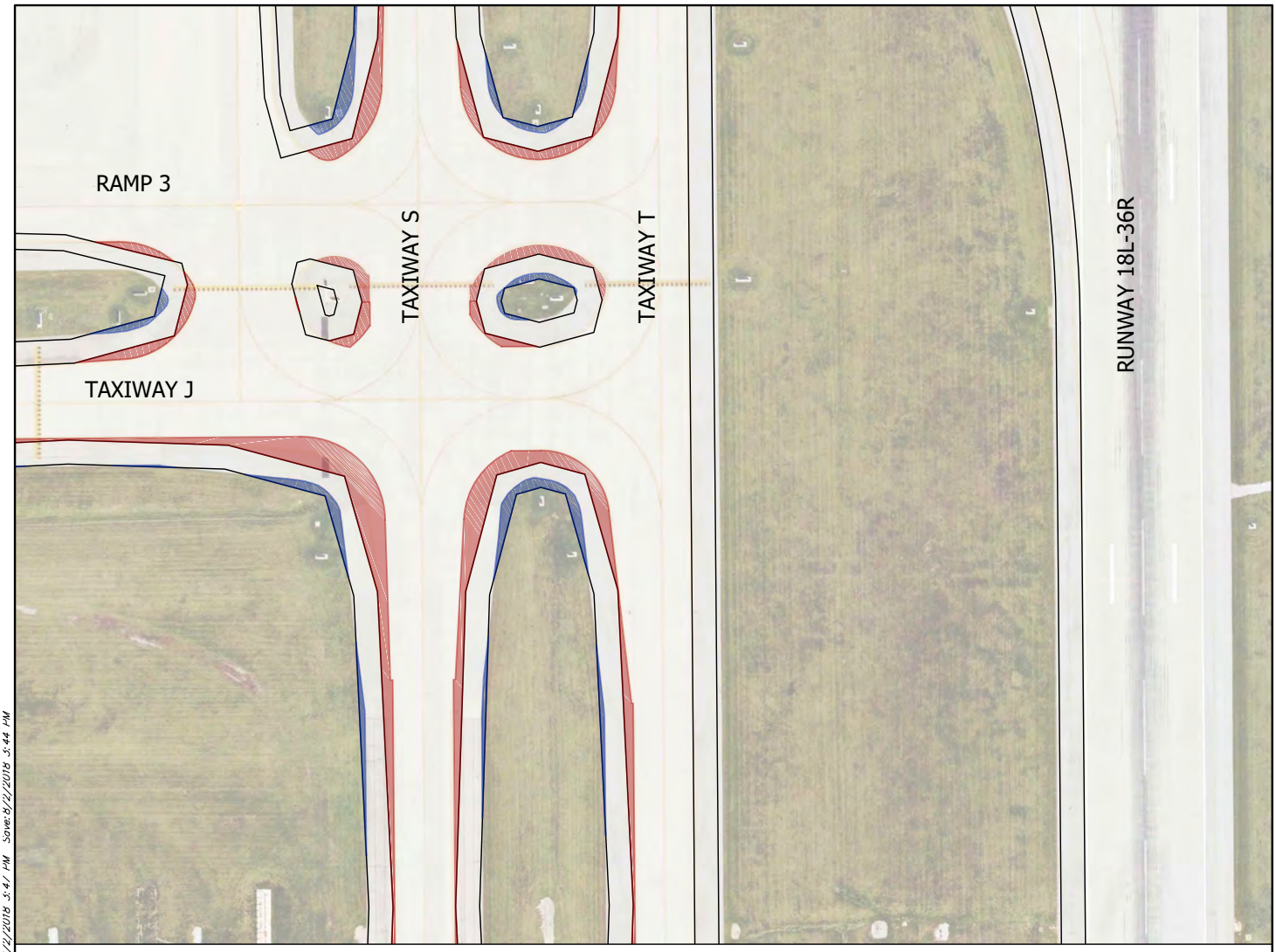

Taxiway Intersection Information		
TW S AND TW J	TDG	6
Additional Pavement (SYD) 2011	$Cost_{Pvmt}$	603,433
Additional Shoulder (SYD) 426	$Cost_{Shoulder}$	17,892
Additional Marking	$Cost_{Marking}$	24,500
Lighting	$Cost_{Lighting}$	44,000
	$Cost_{Total}$	689,825

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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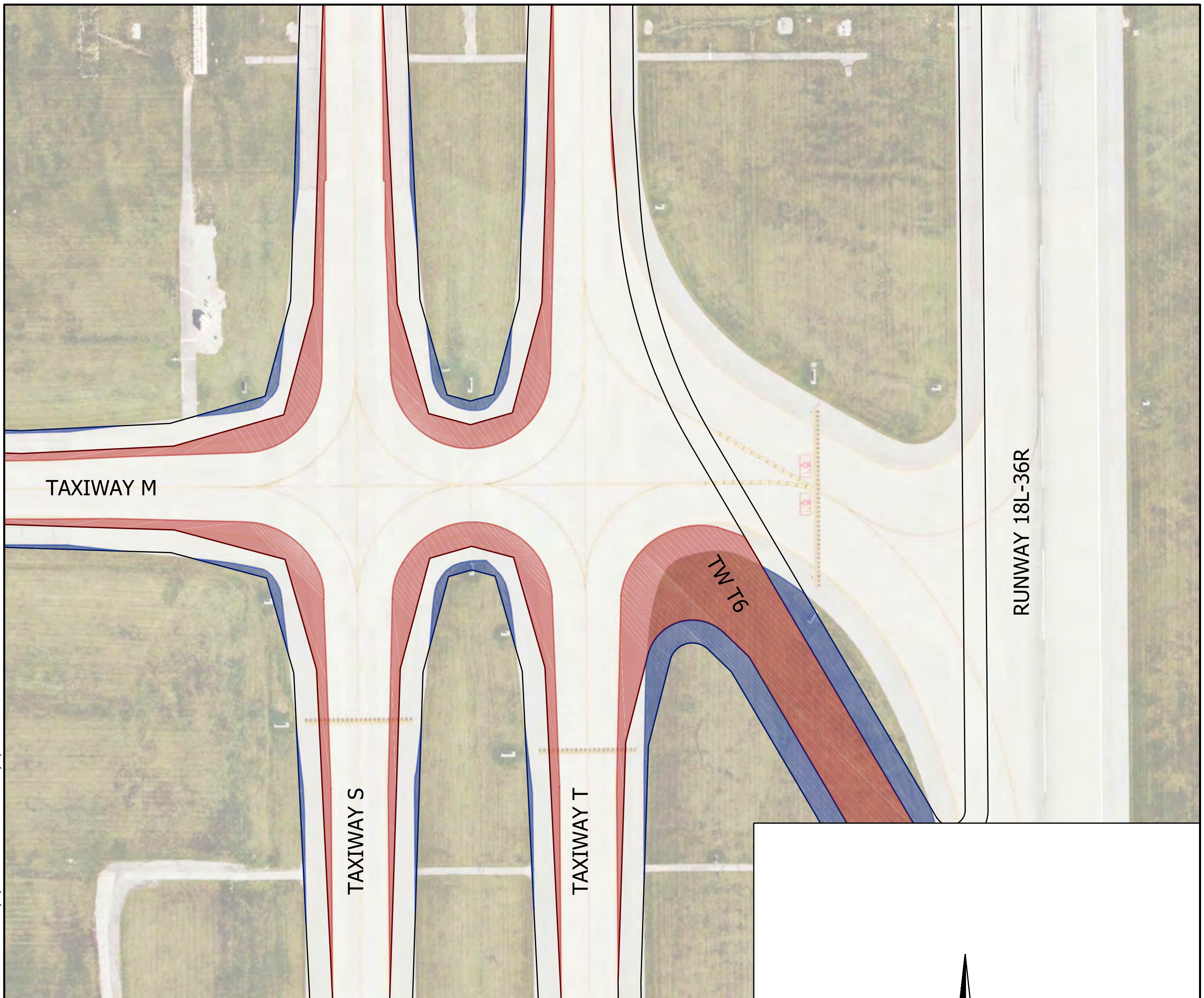

Taxiway Intersection Information	
TW S AND TW M	TDG 6
Additional Pavement (SYD) 5668	$Cost_{Pvmt}$ 1,700,367
Additional Shoulder (SYD) 1062	$Cost_{Shoulder}$ 44,609
Additional Marking	$Cost_{Marking}$ 62,125
Lighting	$Cost_{Lighting}$ 190,000
	$Cost_{Total}$ 1,997,100

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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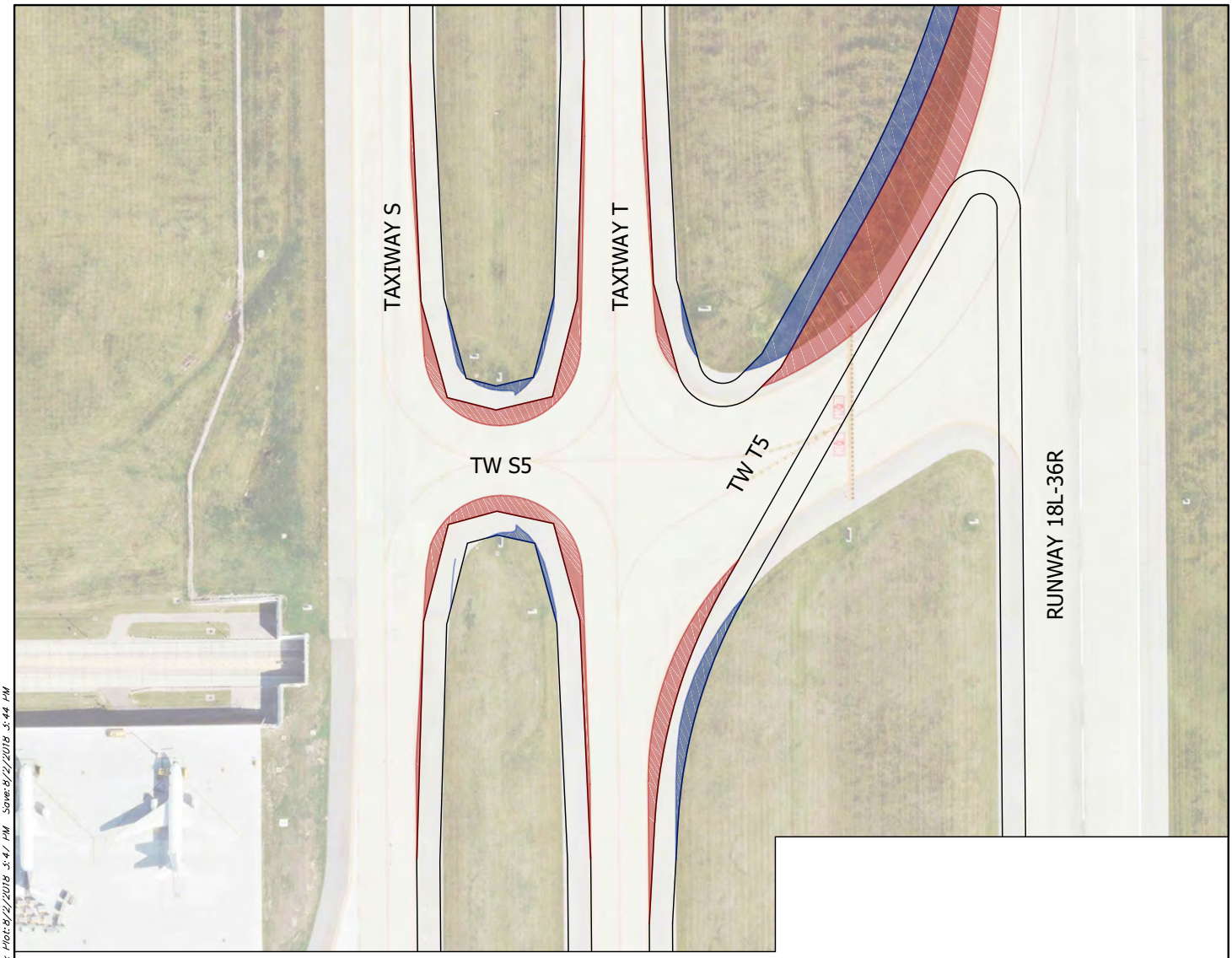

Taxiway Intersection Information		
TW S AND TW S5	TDG	5
Additional Pavement (SYD) 743	$Cost_{Pvmt}$	222,967
Additional Shoulder (SYD) 53	$Cost_{Shoulder}$	2,235
Additional Marking	$Cost_{Marking}$	17,500
Lighting	$Cost_{Lighting}$	56,000
	$Cost_{Total}$	298,702

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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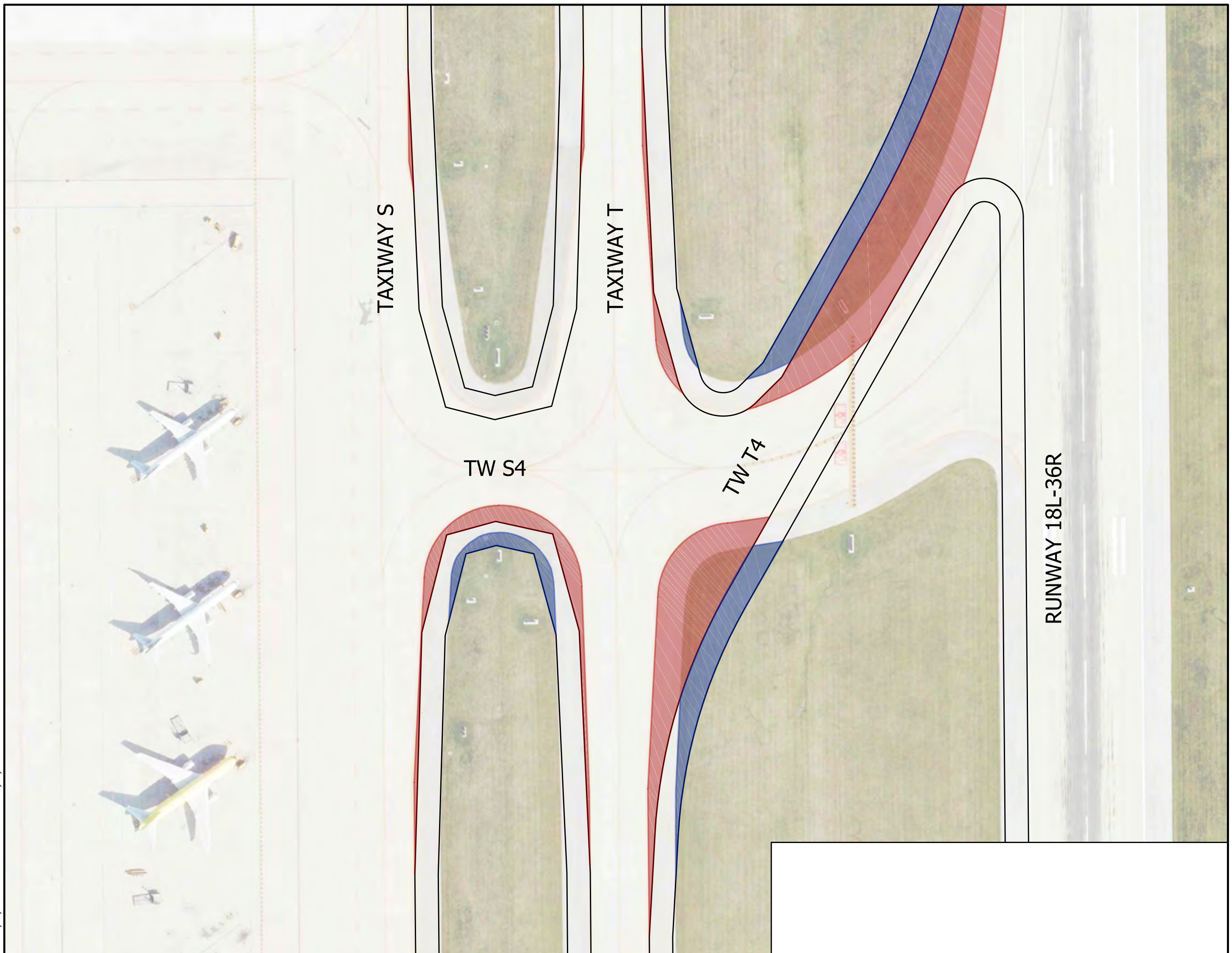

Taxiway Intersection Information		
TW S AND TW S4	TDG	5
Additional Pavement (SYD) 409	$Cost_{Pvmt}$	122,733
Additional Shoulder (SYD) 148	$Cost_{Shoulder}$	6,225
Additional Marking	$Cost_{Marking}$	17,500
Lighting	$Cost_{Lighting}$	36,000
	$Cost_{Total}$	182,459

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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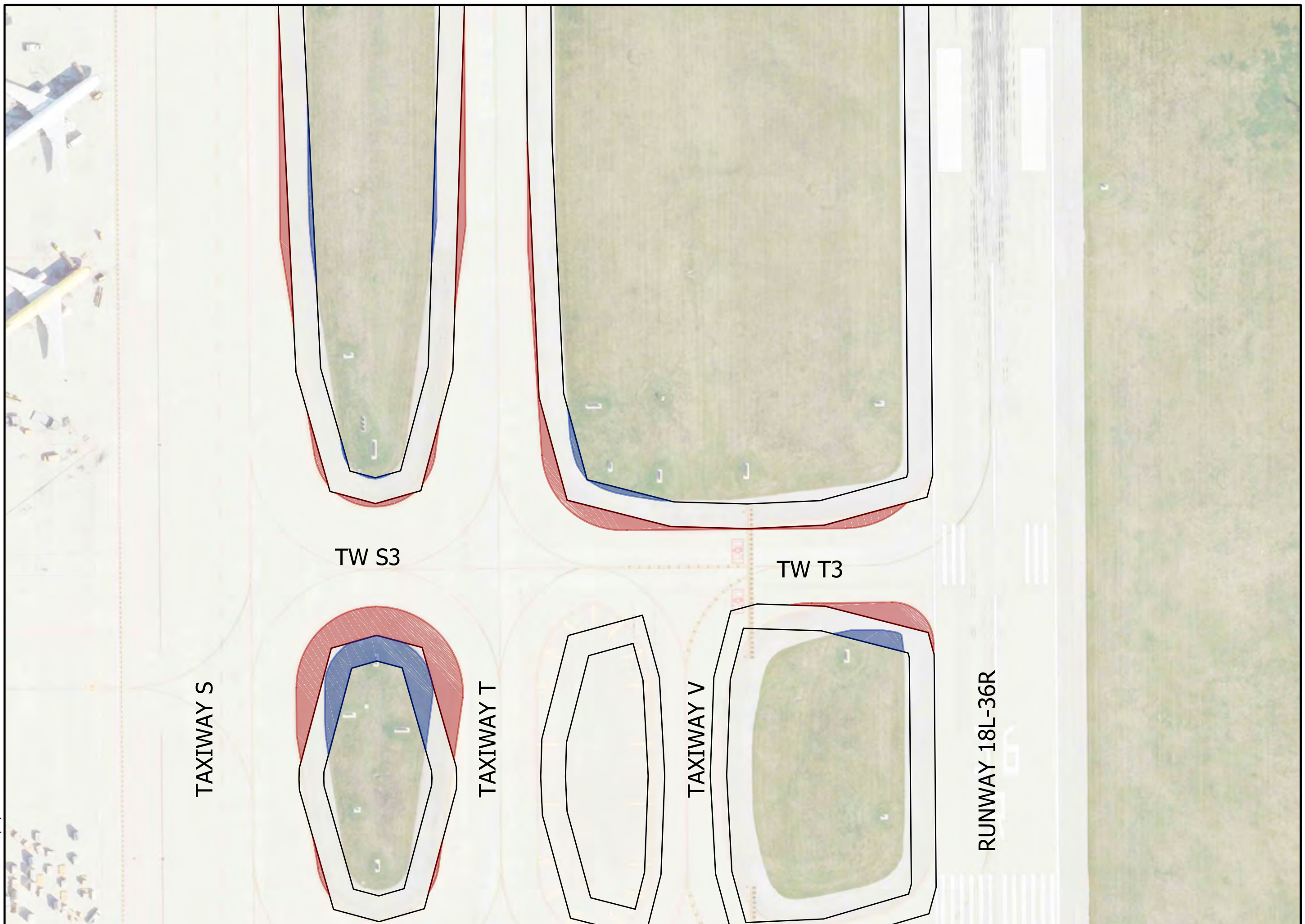
CVG CINCINNATI/NORTHERN KENTUCKY INTERNATIONAL AIRPORT



Taxiway Intersection Information		
TW S AND TW S3	TDG	6
Additional Pavement (SYD) 932	$Cost_{Pvmt}$	279,467
Additional Shoulder (SYD) 446	$Cost_{Shoulder}$	18,732
Additional Marking	$Cost_{Marking}$	15,750
Lighting	$Cost_{Lighting}$	32,000
	$Cost_{Total}$	345,949

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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CINCINNATI/NORTHERN KENTUCKY INTERNATIONAL AIRPORT

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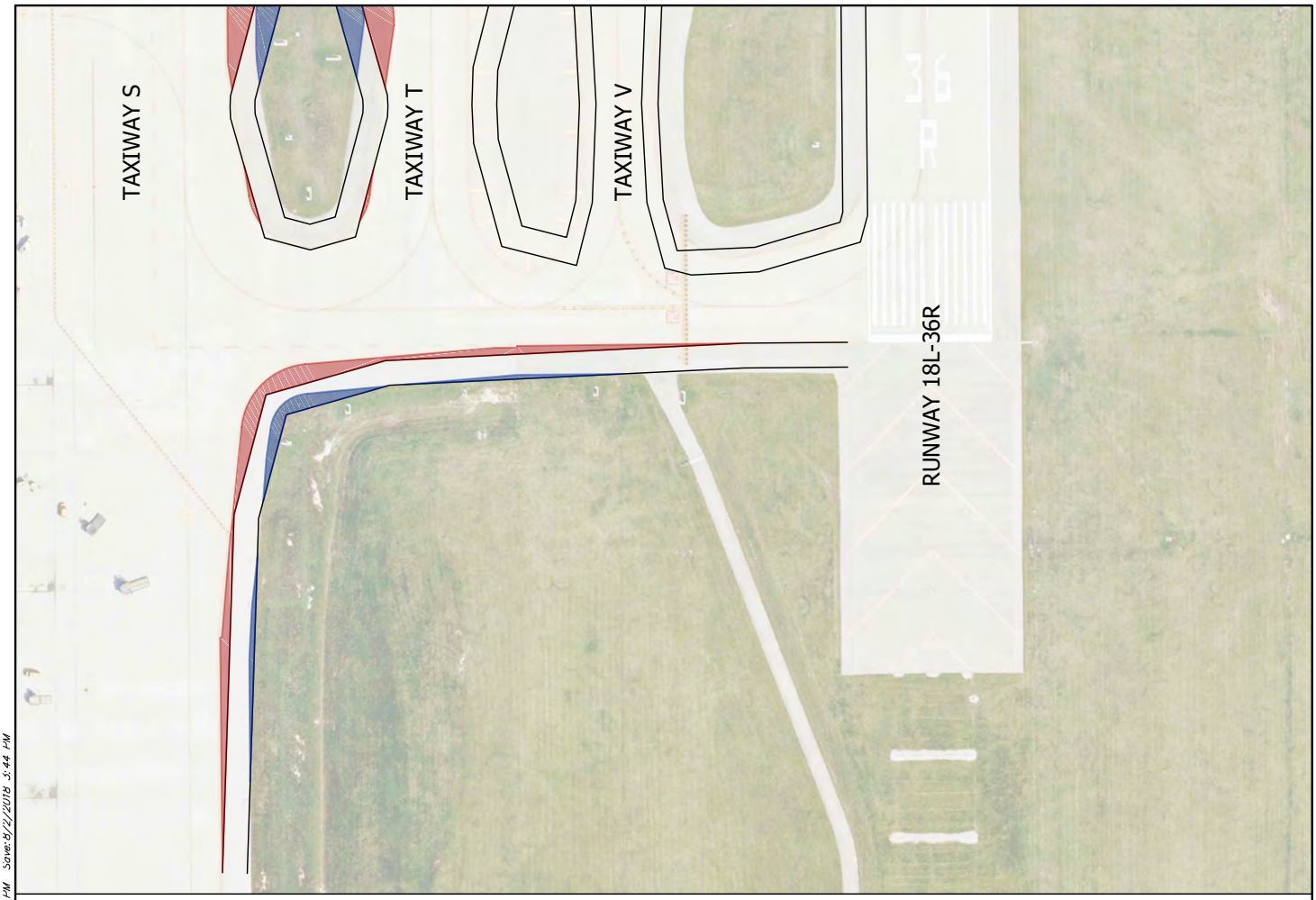

Taxiway Intersection Information	
TW S AND SOUTH END CONN	TDG 6
Additional Pavement (SYD) 675	$Cost_{Pvmt}$ 202,633
Additional Shoulder (SYD) 285	$Cost_{Shoulder}$ 11,961
Additional Marking	$Cost_{Marking}$ 17,500
Lighting	$Cost_{Lighting}$ 82,000
	$Cost_{Total}$ 314,094

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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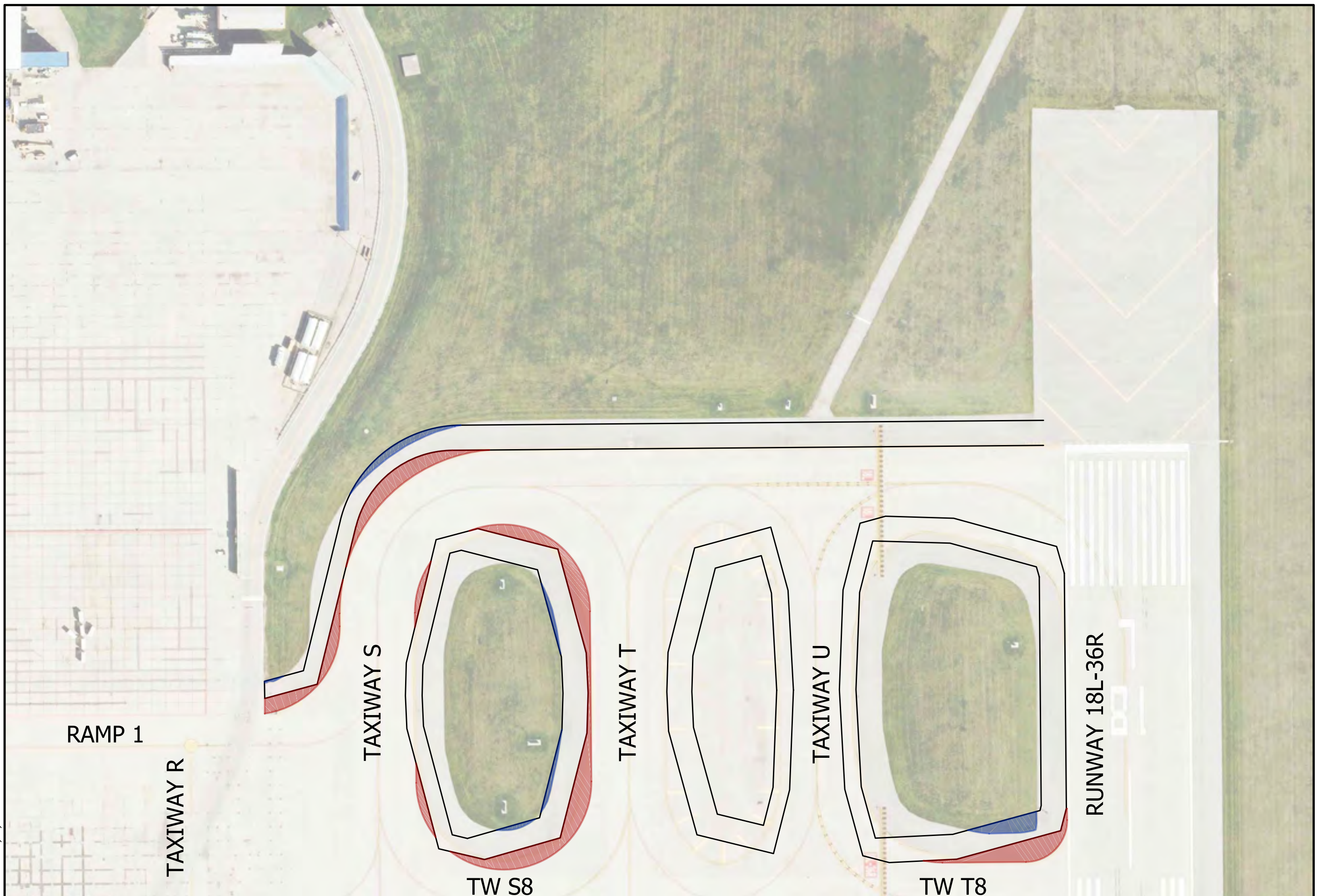

Taxiway Intersection Information	
TW R AND RAMP 1 N TL	TDG 4
Additional Pavement (SYD) 209	$Cost_{Pvmt}$ 62,733
Additional Shoulder (SYD) 4	$Cost_{Shoulder}$ 187
Additional Marking	$Cost_{Marking}$ 1,140
Lighting	$Cost_{Lighting}$ 2,000
	$Cost_{Total}$ 66,060

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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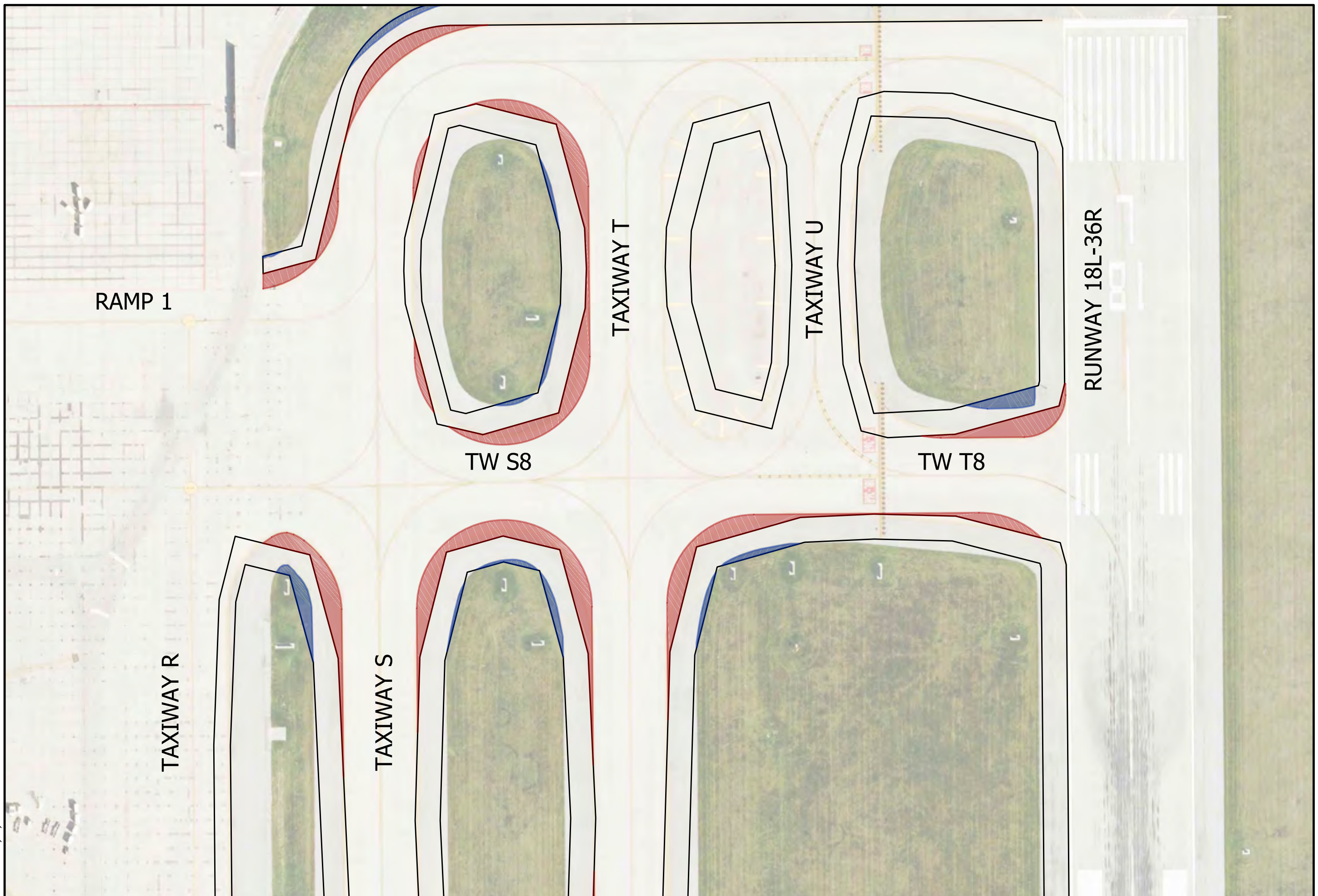

Taxiway Intersection Information	
TW R AND TW S8	TDG 3
Additional Pavement (SYD) 0	$Cost_{Pvmt}$ 0
Additional Shoulder (SYD) 0	$Cost_{Shoulder}$ 0
Additional Marking	$Cost_{Marking}$ 6,125
Lighting	$Cost_{Lighting}$ 14,000
	$Cost_{Total}$ 20,125

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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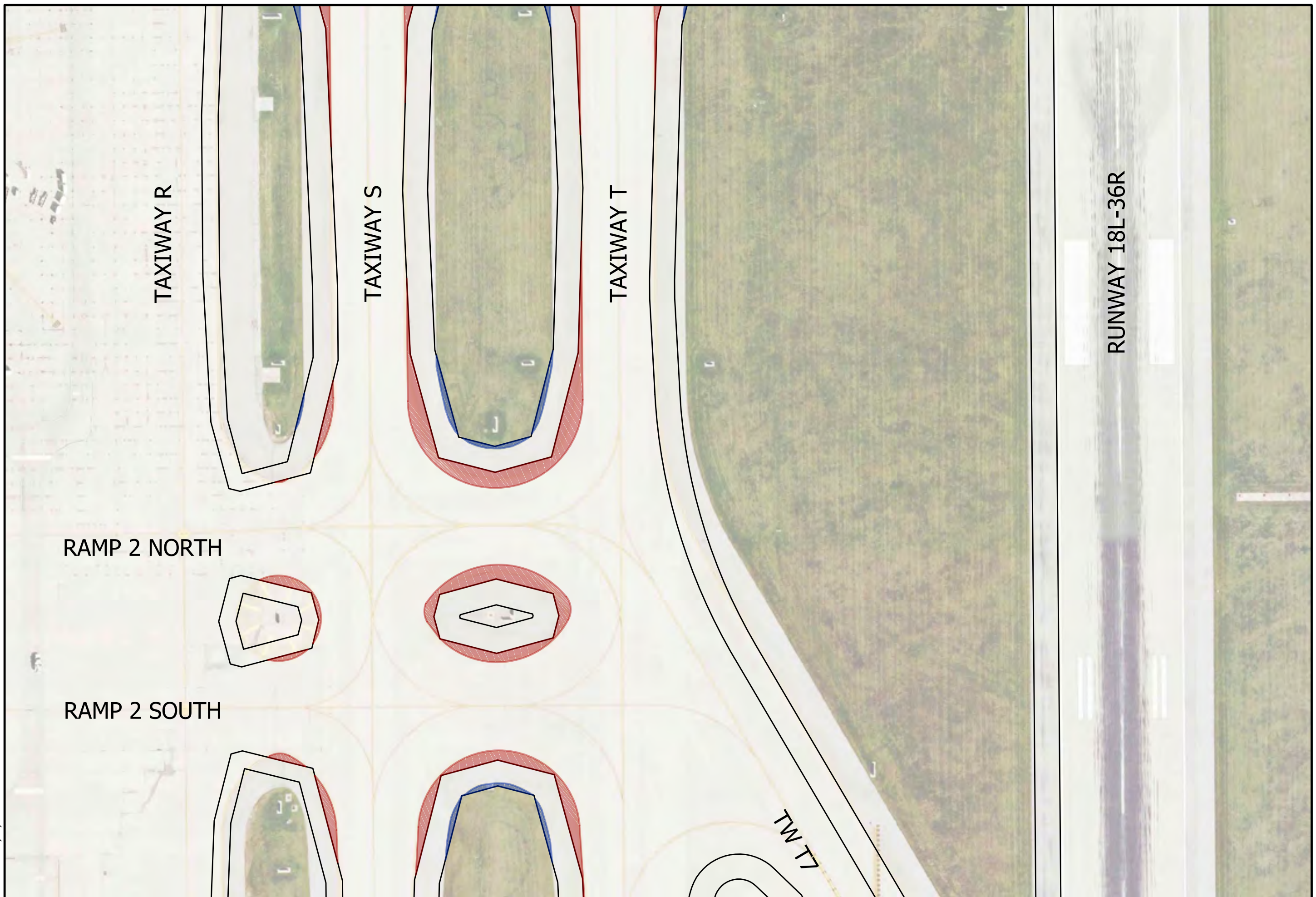

Taxiway Intersection Information		
TW R AND RAMP 2N	TDG	4
Additional Pavement (SYD) 0	$Cost_{Pvmt}$	0
Additional Shoulder (SYD) 0	$Cost_{Shoulder}$	0
Additional Marking	$Cost_{Marking}$	7,000
Lighting	$Cost_{Lighting}$	22,000
	$Cost_{Total}$	29,000

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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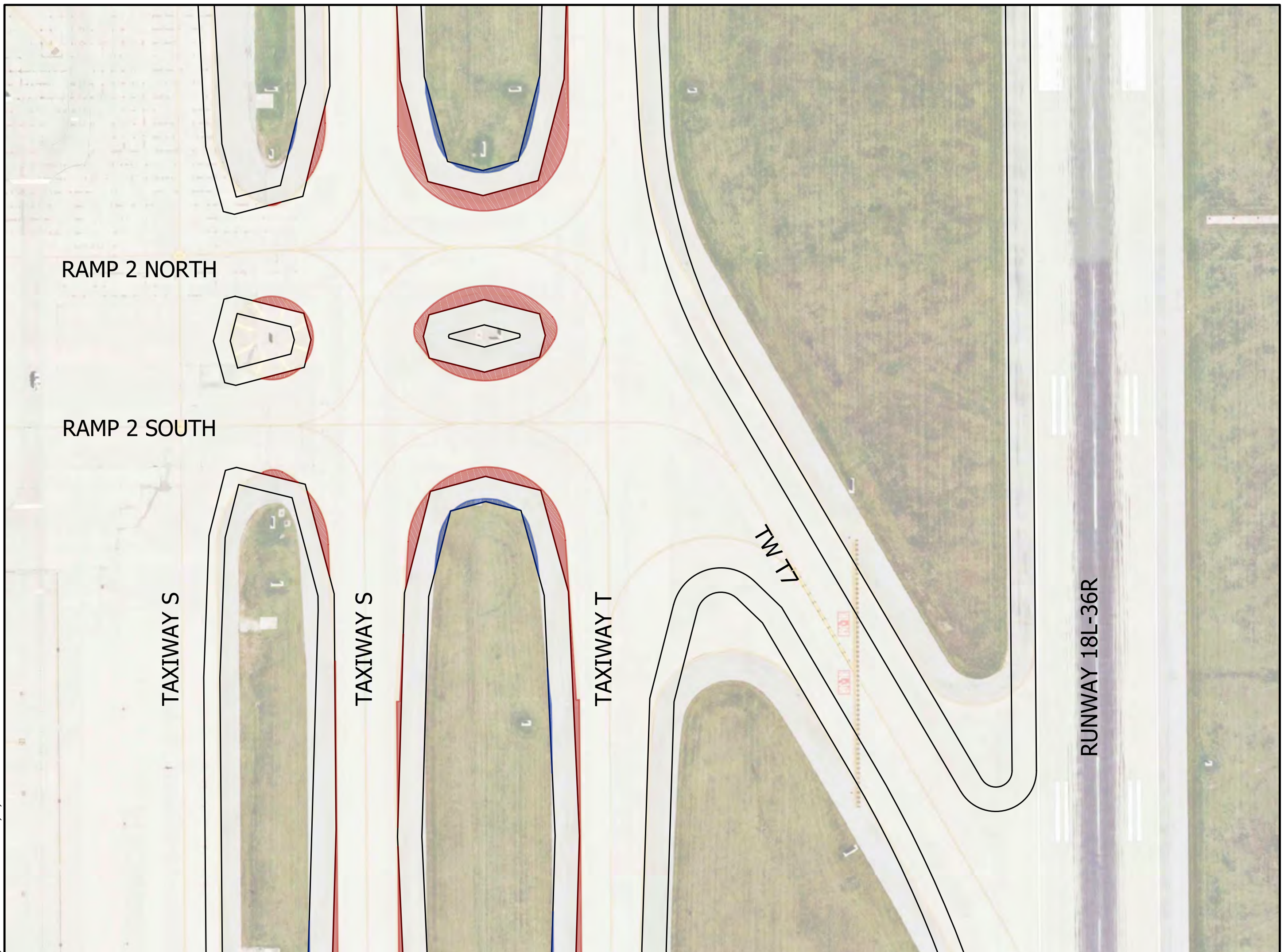

Taxiway Intersection Information	
TW R AND RAMP 2S	TDG 4
Additional Pavement (SYD) 0	$Cost_{Pvmt}$ 0
Additional Shoulder (SYD) 0	$Cost_{Shoulder}$ 0
Additional Marking	$Cost_{Marking}$ 8,750
Lighting	$Cost_{Lighting}$ 20,000
	$Cost_{Total}$ 28,750

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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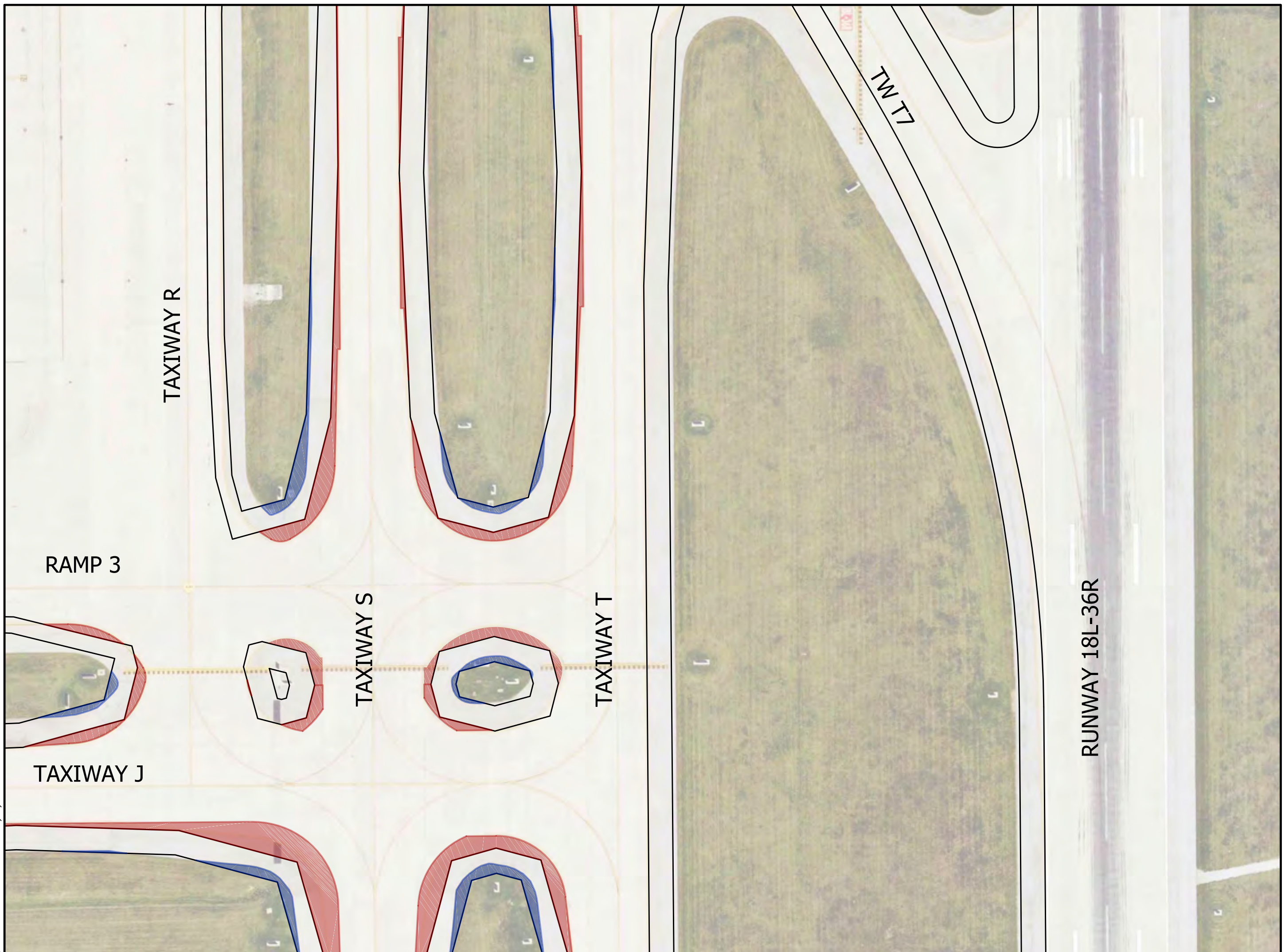

Taxiway Intersection Information		
TW R AND RAMP 3	TDG	5
Additional Pavement (SYD) 132	$Cost_{Pvmt}$	39,467
Additional Shoulder (SYD) 9	$Cost_{Shoulder}$	373
Additional Marking	$Cost_{Marking}$	14,000
Lighting	$Cost_{Lighting}$	36,000
	$Cost_{Total}$	89,840

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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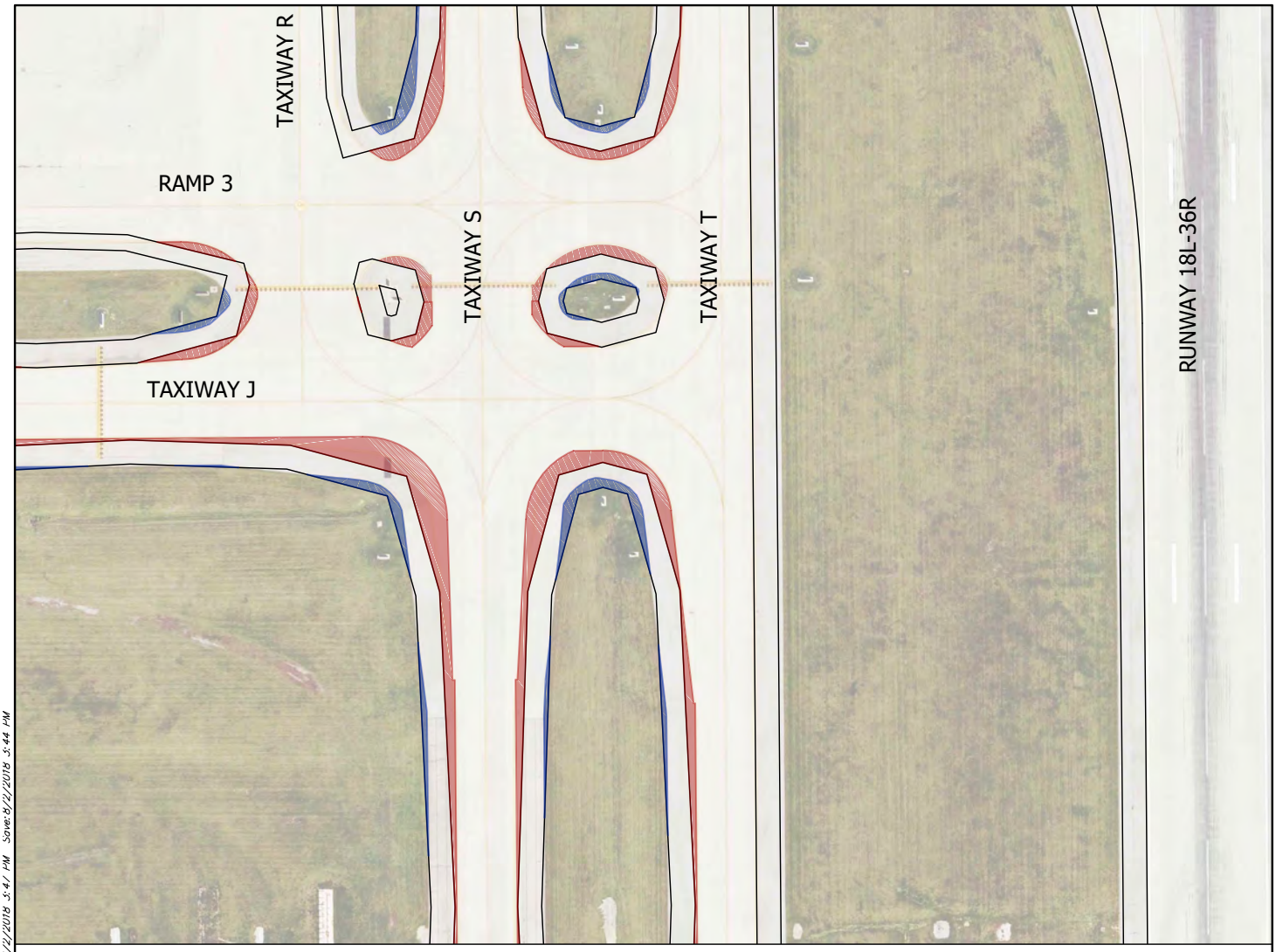

Taxiway Intersection Information		
TW R AND TW J	TDG	5
Additional Pavement (SYD) 631	$Cost_{Pvmt}$	189,400
Additional Shoulder (SYD) 157	$Cost_{Shoulder}$	6,585
Additional Marking	$Cost_{Marking}$	17,500
Lighting	$Cost_{Lighting}$	28,000
	$Cost_{Total}$	241,485

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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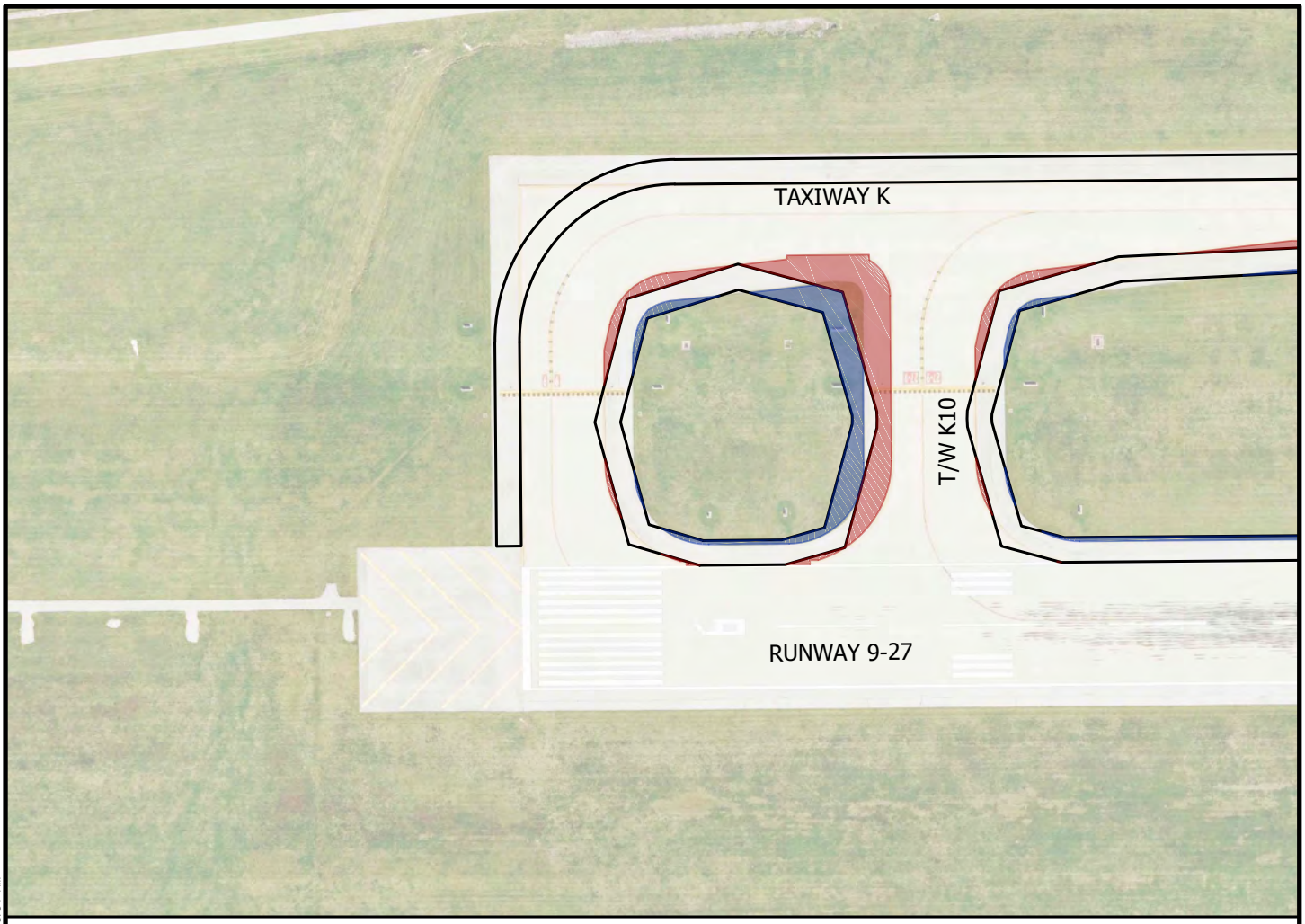

Taxiway Intersection Information		
RW 9 & TW K WEST END	TDG	6
Additional Pavement (SYD) 40	$Cost_{Pvmt}$	11,933
Additional Shoulder (SYD) 68	$Cost_{Shoulder}$	2,842
Additional Marking	$Cost_{Marking}$	2,070
Lighting	$Cost_{Lighting}$	10,000
	$Cost_{Total}$	26,845

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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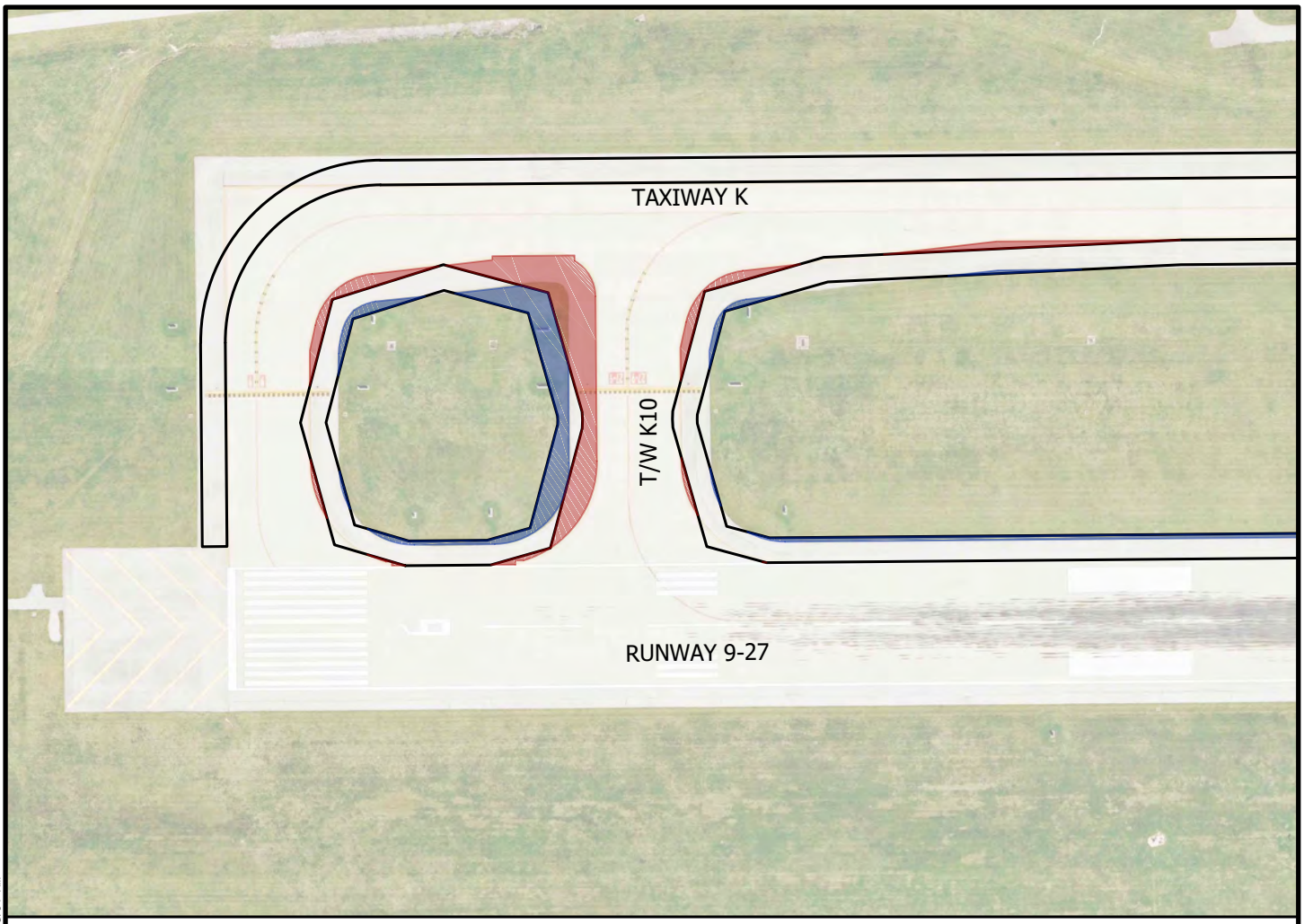

Taxiway Intersection Information		
RW 9 & TW K10	TDG	6
Additional Pavement (SYD) 575	$Cost_{Pvmt}$	172,467
Additional Shoulder (SYD) 865	$Cost_{Shoulder}$	36,330
Additional Marking	$Cost_{Marking}$	4,110
Lighting	$Cost_{Lighting}$	20,000
	$Cost_{Total}$	232,907

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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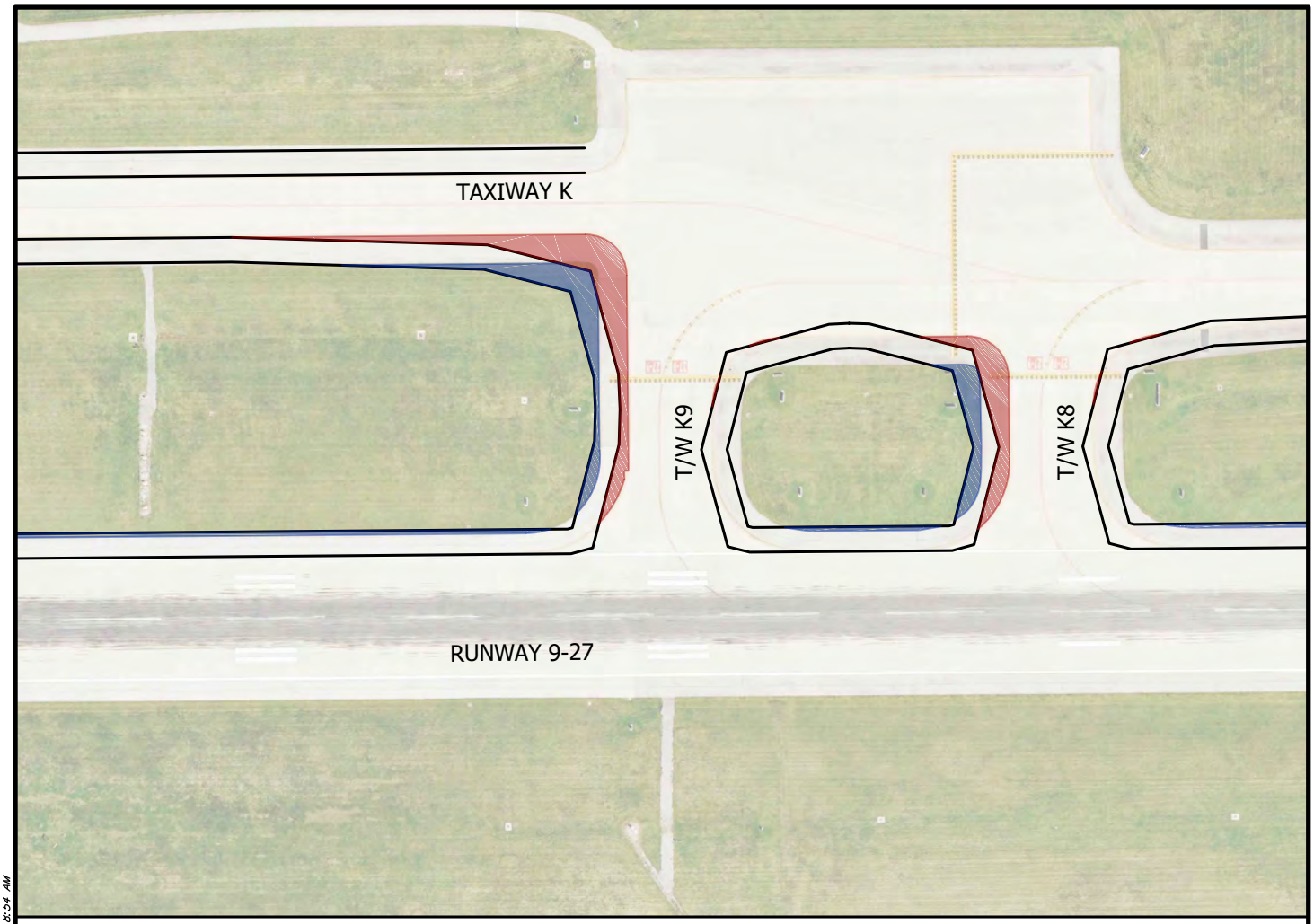

Taxiway Intersection Information		
RW 9 & TW K9	TDG	5
Additional Pavement (SYD) 240	$Cost_{Pvmt}$	71,867
Additional Shoulder (SYD) 541	$Cost_{Shoulder}$	22,708
Additional Marking	$Cost_{Marking}$	3,950
Lighting	$Cost_{Lighting}$	26,000
	$Cost_{Total}$	124,525

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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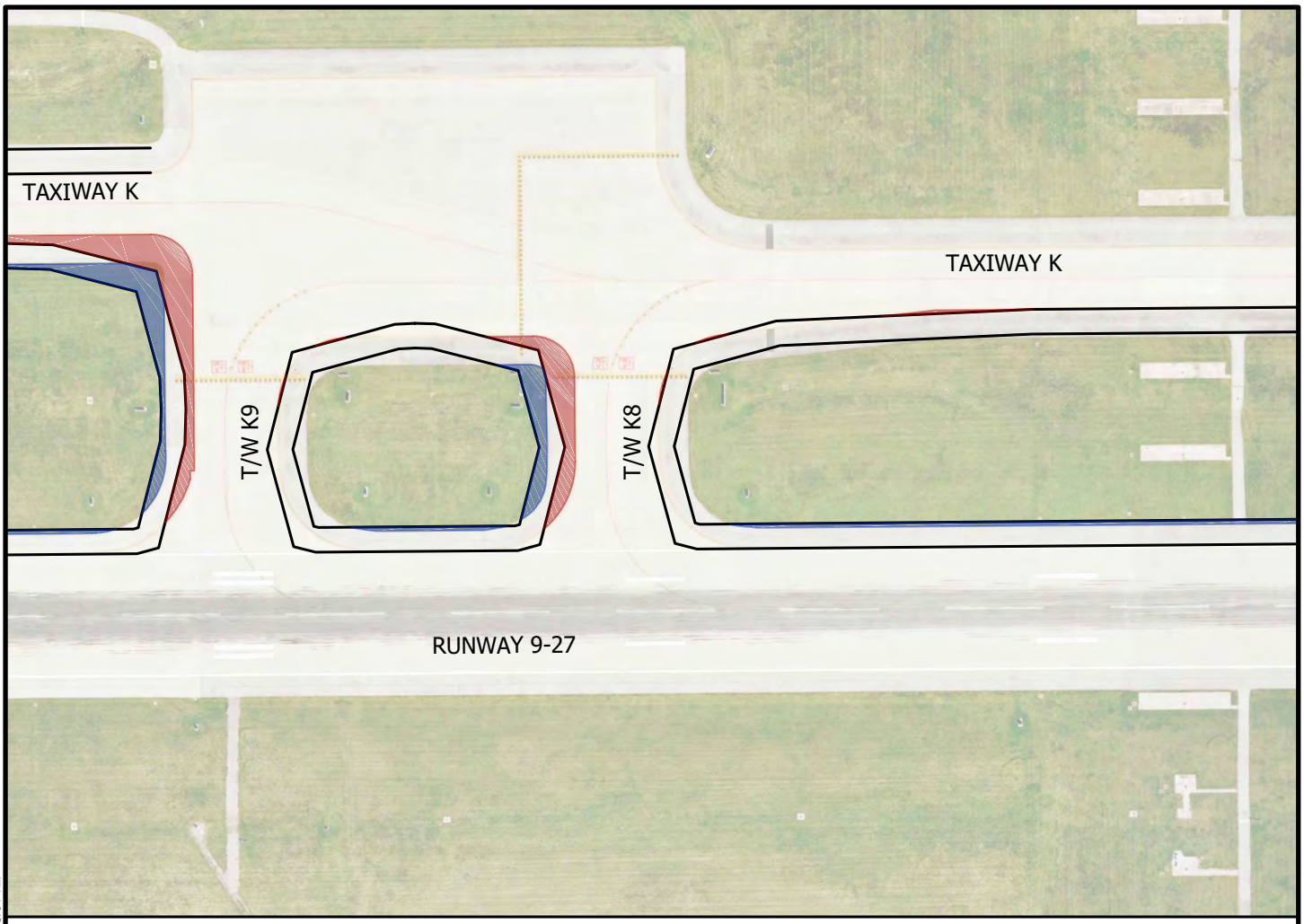

Taxiway Intersection Information		
RW 9 & TW K8	TDG	5
Additional Pavement (SYD) 421	$Cost_{Pvmt}$	126,367
Additional Shoulder (SYD) 797	$Cost_{Shoulder}$	33,474
Additional Marking	$Cost_{Marking}$	3,950
Lighting	$Cost_{Lighting}$	41,000
	$Cost_{Total}$	204,791

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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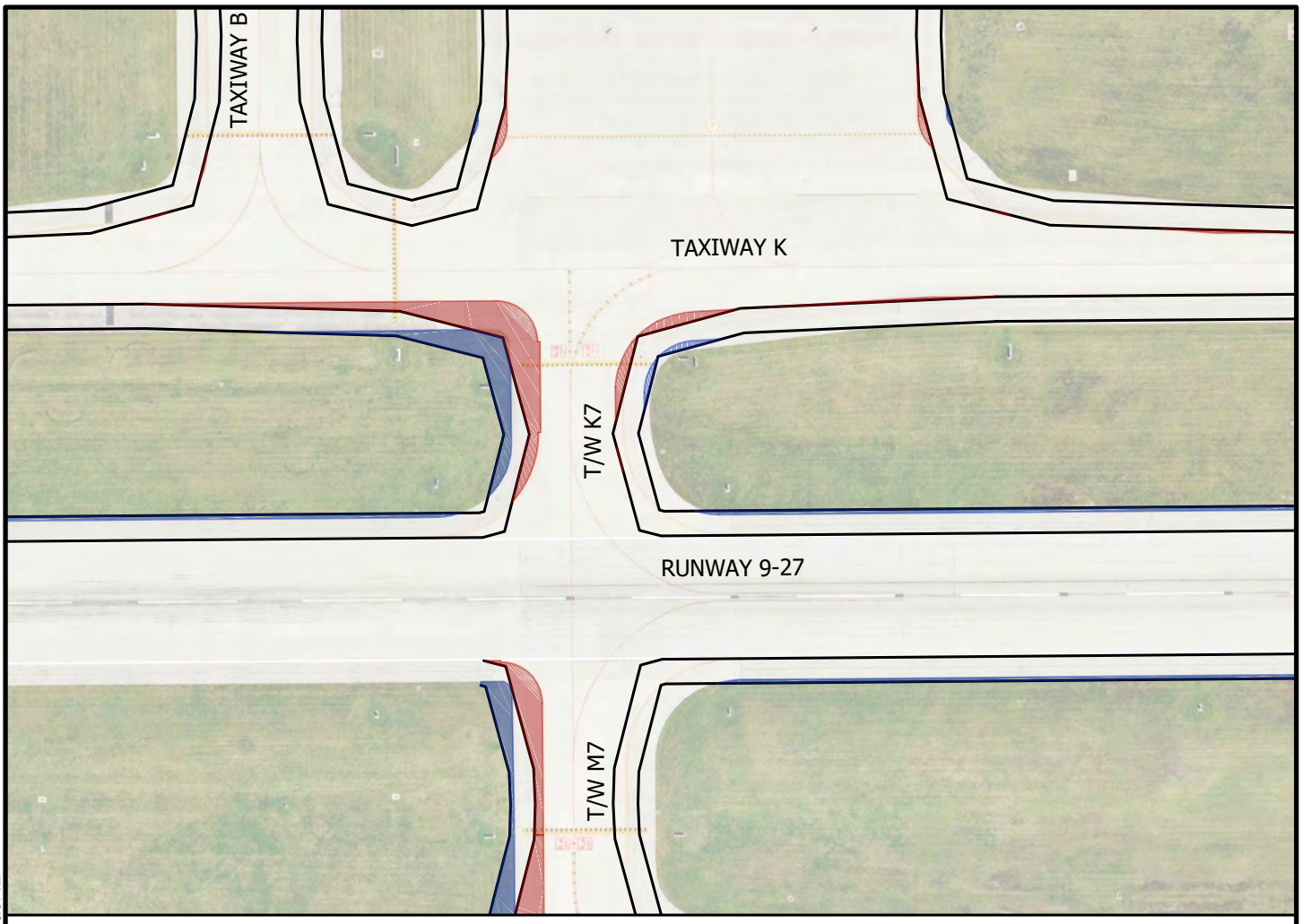

Taxiway Intersection Information		
RW 9 & TW K7	TDG	5
Additional Pavement (SYD) 370	$Cost_{Pvmt}$	111,000
Additional Shoulder (SYD) 1125	$Cost_{Shoulder}$	47,231
Additional Marking	$Cost_{Marking}$	4,150
Lighting	$Cost_{Lighting}$	33,000
	$Cost_{Total}$	195,381

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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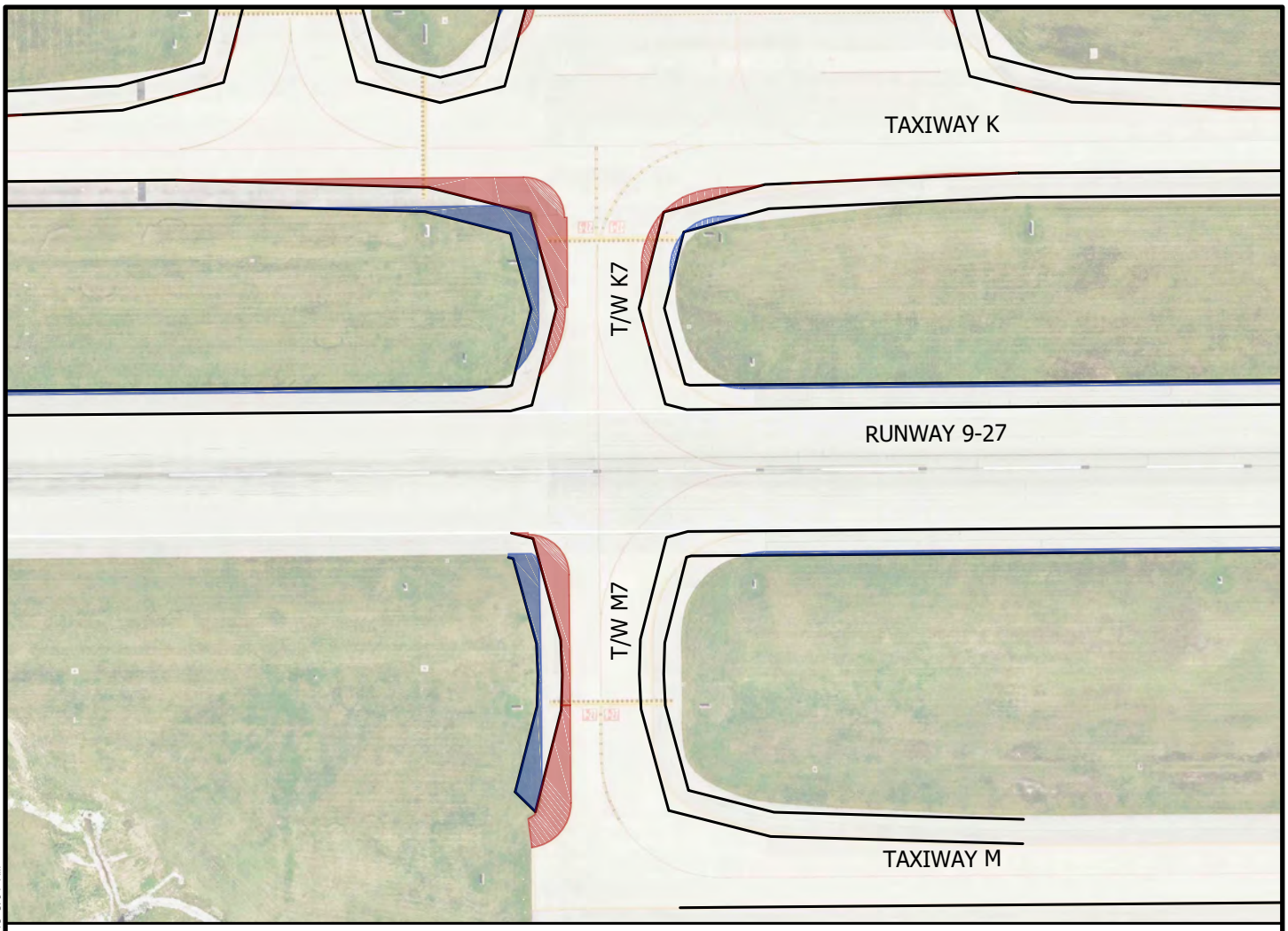

Taxiway Intersection Information		
RW 9 & TW M7	TDG	5
Additional Pavement (SYD) 450	$Cost_{Pvmt}$	135,000
Additional Shoulder (SYD) 607	$Cost_{Shoulder}$	25,489
Additional Marking	$Cost_{Marking}$	4,000
Lighting	$Cost_{Lighting}$	38,000
	$Cost_{Total}$	202,489

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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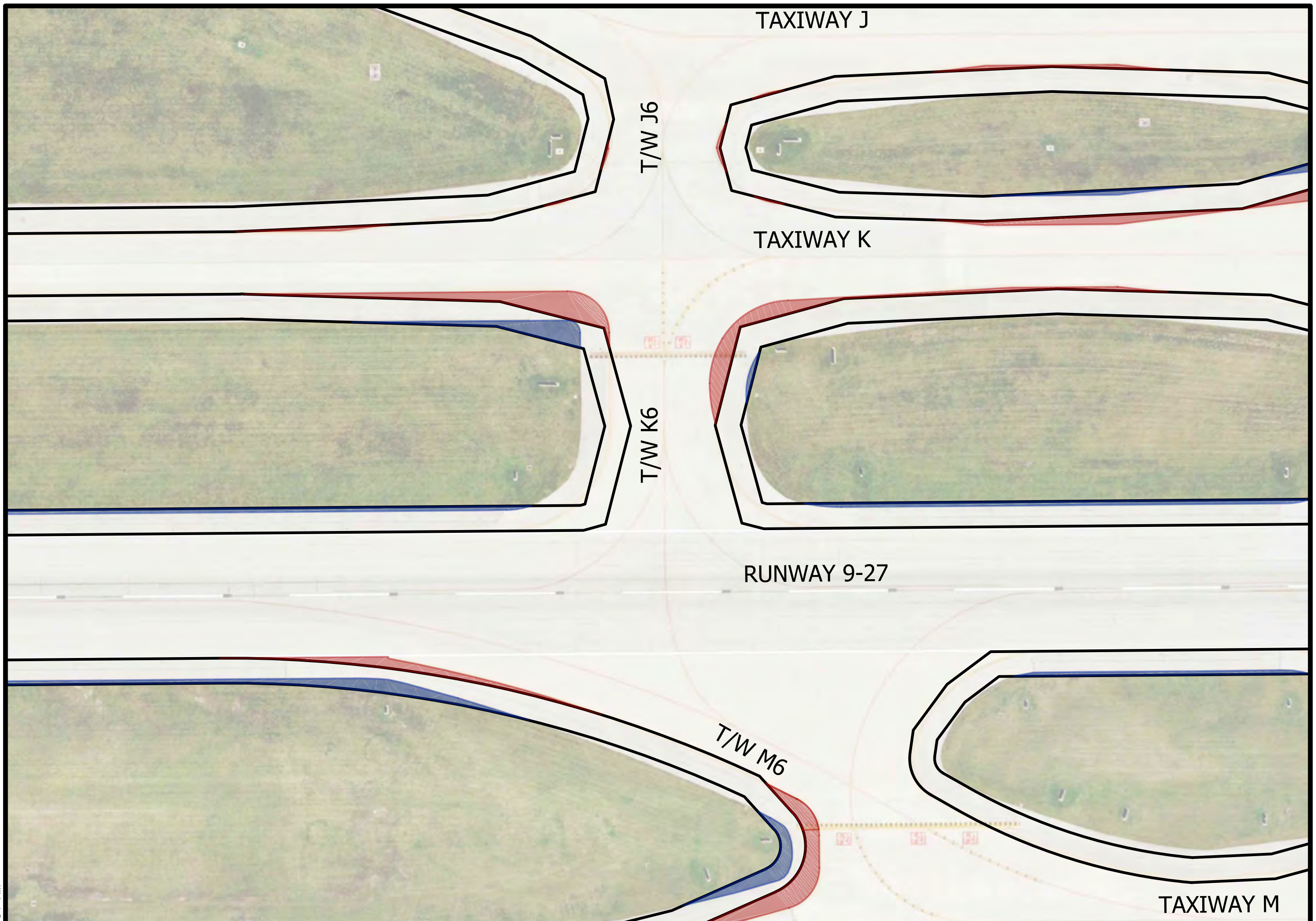
CVG CINCINNATI/NORTHERN KENTUCKY INTERNATIONAL AIRPORT



Taxiway Intersection Information		
RW 9 & TW K6	TDG	5
Additional Pavement (SYD) 151	$Cost_{Pvmt}$	45,267
Additional Shoulder (SYD) 575	$Cost_{Shoulder}$	24,136
Additional Marking	$Cost_{Marking}$	5,000
Lighting	$Cost_{Lighting}$	38,000
	$Cost_{Total}$	112,403

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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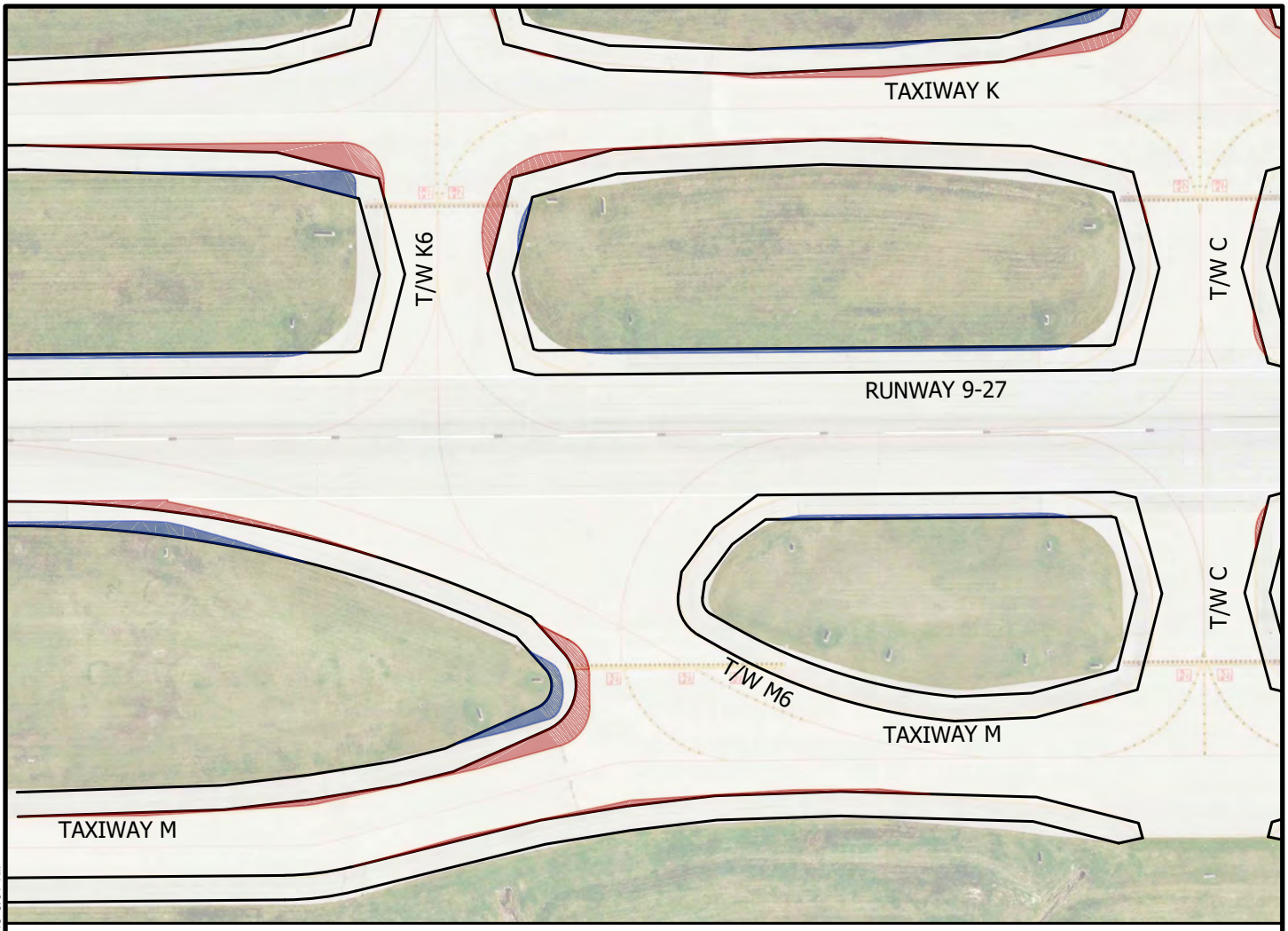

Taxiway Intersection Information		
RW 9 & TW M6	TDG	5
Additional Pavement (SYD) 382	$Cost_{Pvmt}$	114,600
Additional Shoulder (SYD) 633	$Cost_{Shoulder}$	26,572
Additional Marking	$Cost_{Marking}$	6,000
Lighting	$Cost_{Lighting}$	17,000
	$Cost_{Total}$	164,172

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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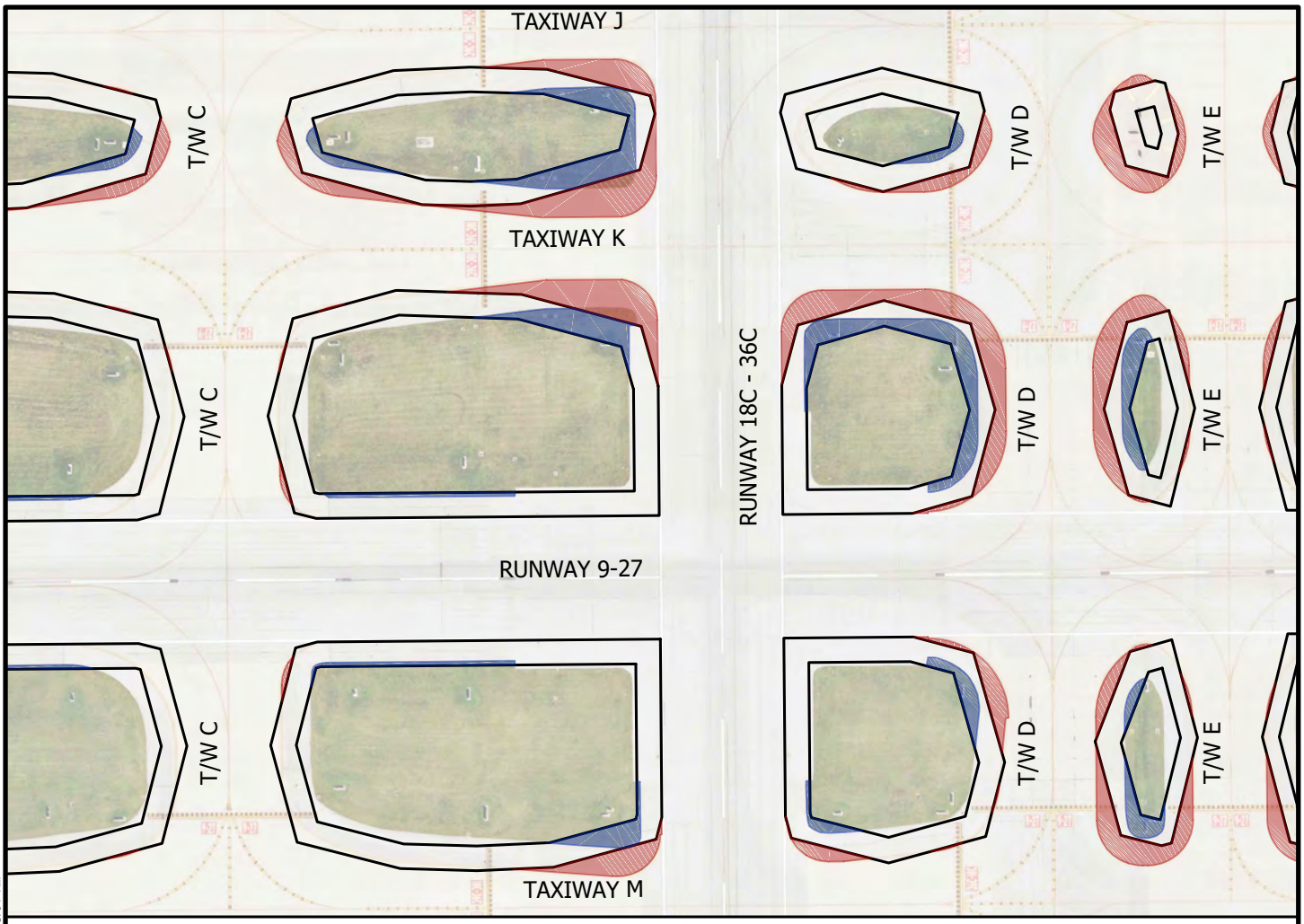

Taxiway Intersection Information		
RW 9 & RW 18C	TDG	6
Additional Pavement (SYD) 0	$Cost_{Pvmt}$	0
Additional Shoulder (SYD) 0	$Cost_{Shoulder}$	0
Additional Marking	$Cost_{Marking}$	0
Lighting	$Cost_{Lighting}$	0
	$Cost_{Total}$	0

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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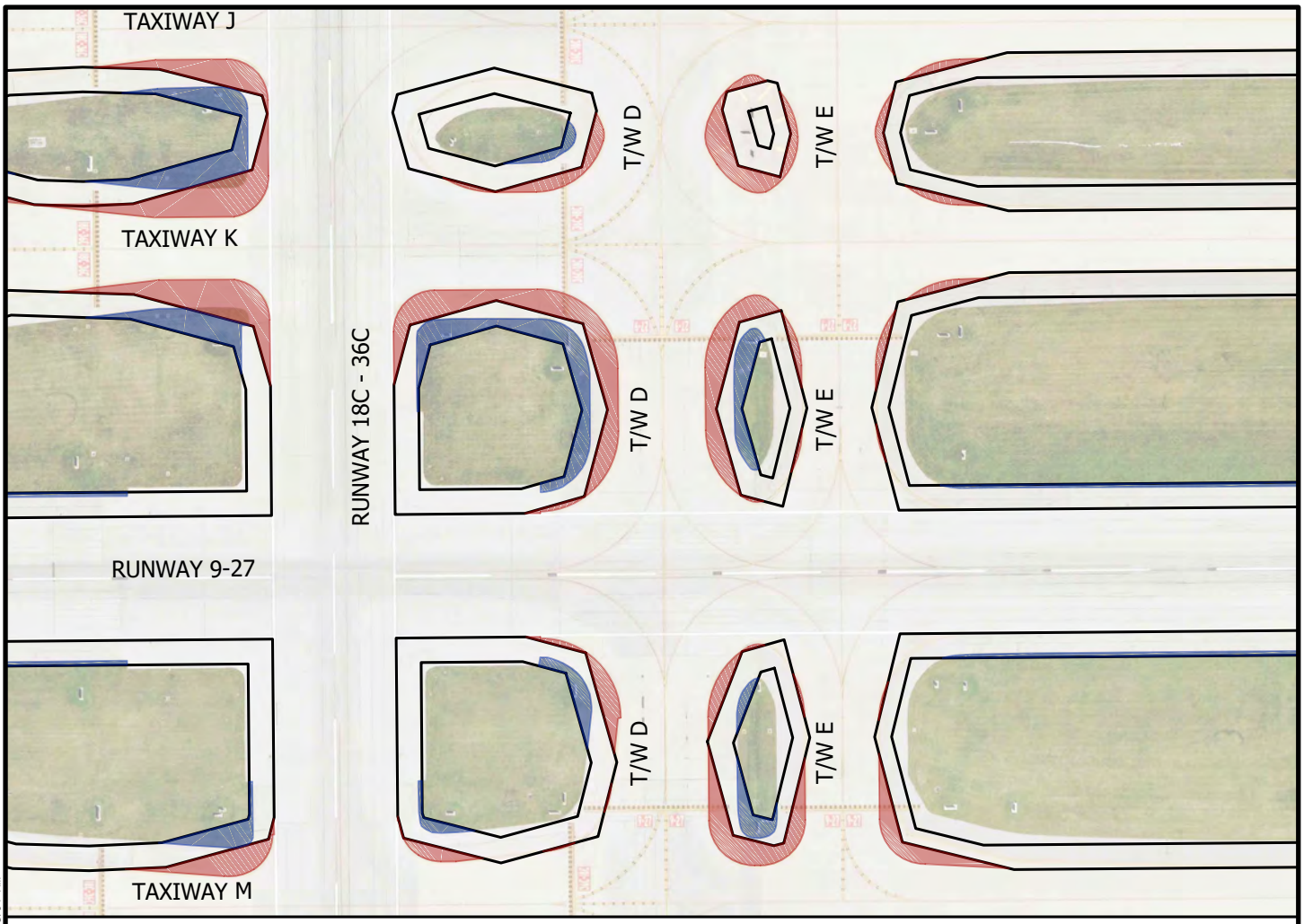

Taxiway Intersection Information		
RW 9 & TW D	TDG	6
Additional Pavement (SYD) 1431	$Cost_{Pvmt}$	429,233
Additional Shoulder (SYD) 1054	$Cost_{Shoulder}$	44,277
Additional Marking	$Cost_{Marking}$	10,000
Lighting	$Cost_{Lighting}$	84,000
	$Cost_{Total}$	567,511

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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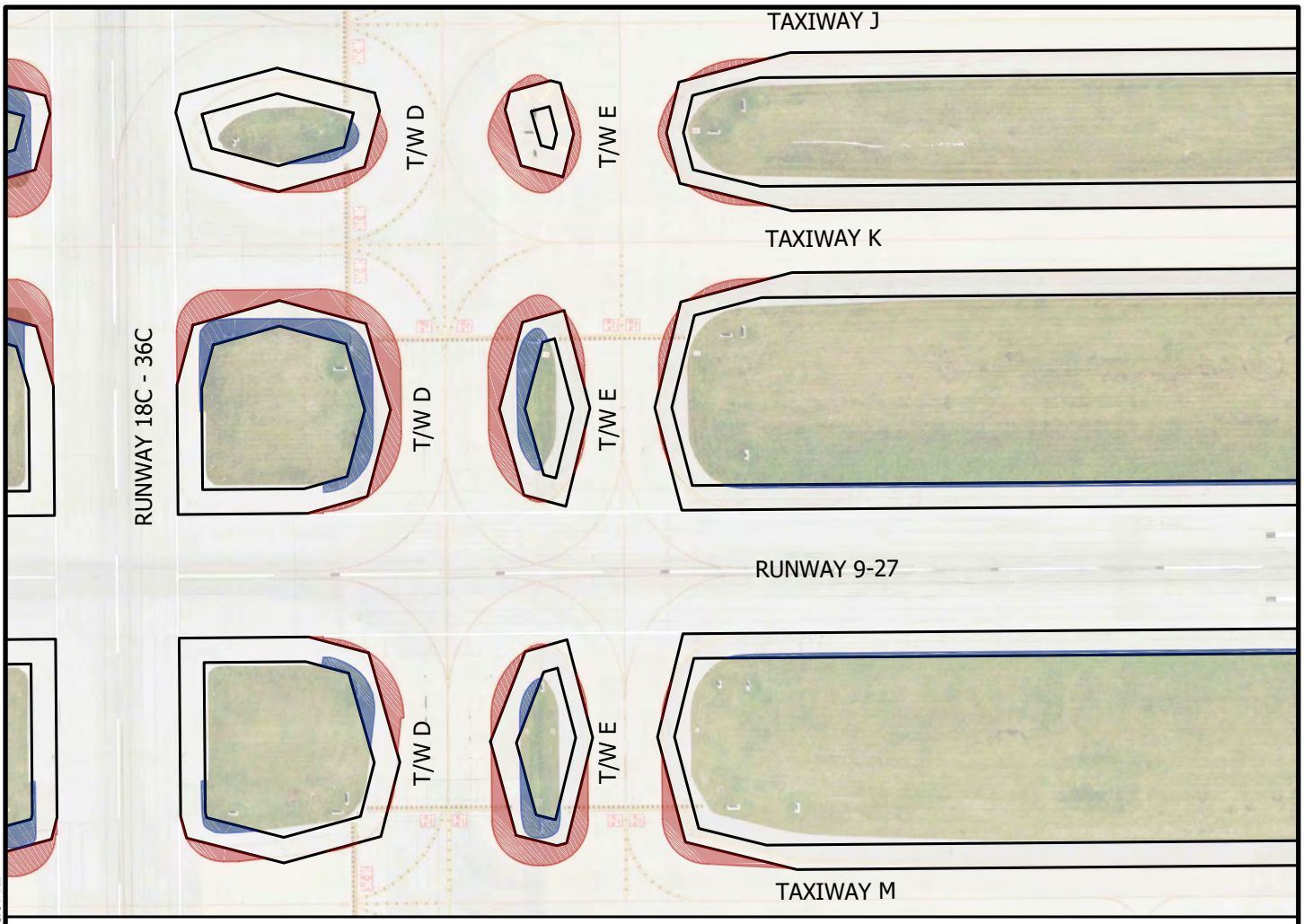

Taxiway Intersection Information		
RW 9 & TW E	TDG	4
Additional Pavement (SYD) 127	$Cost_{Pvmt}$	38,200
Additional Shoulder (SYD) 473	$Cost_{Shoulder}$	19,847
Additional Marking	$Cost_{Marking}$	10,000
Lighting	$Cost_{Lighting}$	69,000
	$Cost_{Total}$	137,047

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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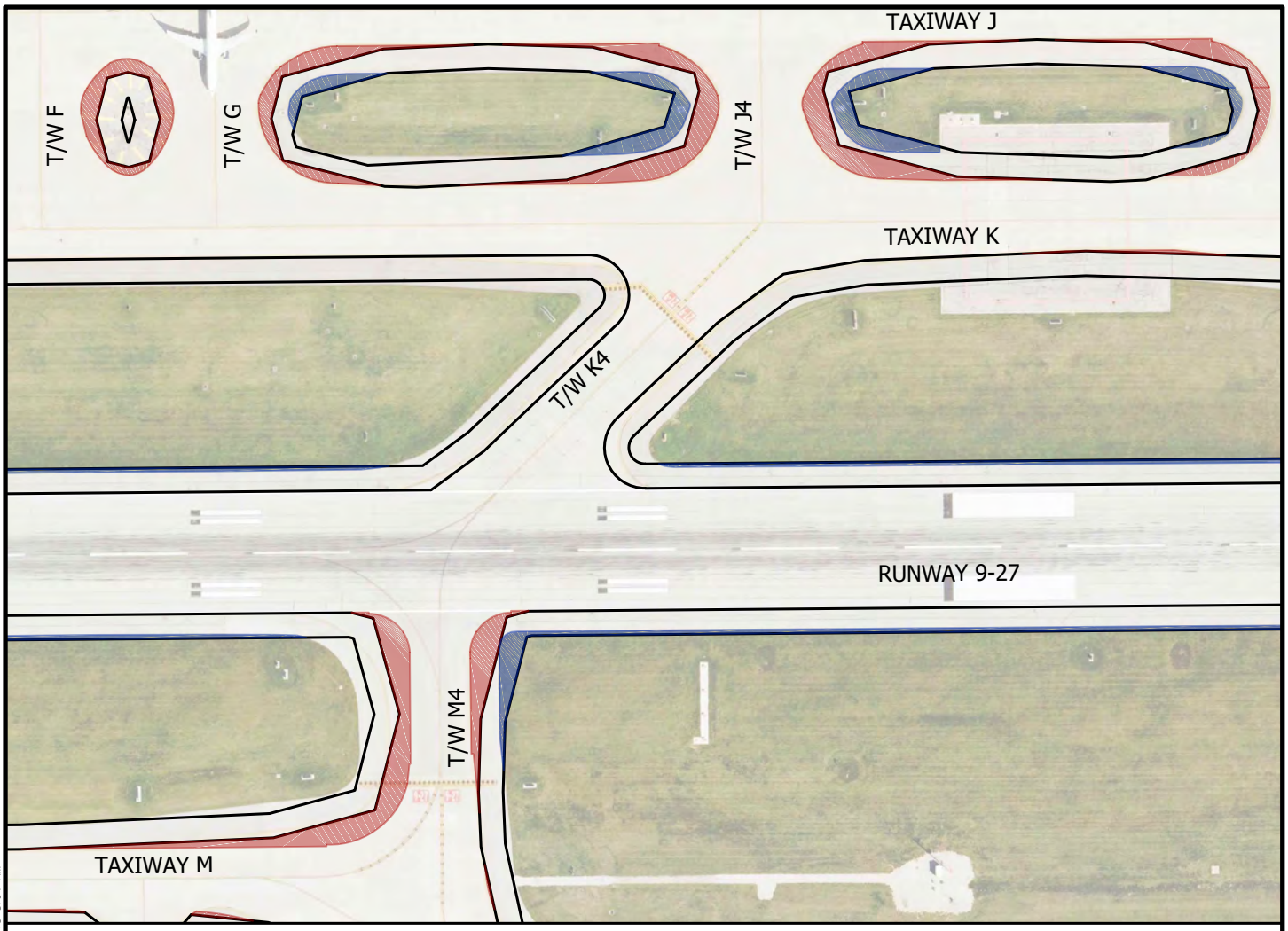

Taxiway Intersection Information		
RW 9 & TW K4	TDG	5
Additional Pavement (SYD) 0	$Cost_{Pvmt}$	0
Additional Shoulder (SYD) 731	$Cost_{Shoulder}$	30,683
Additional Marking	$Cost_{Marking}$	5,000
Lighting	$Cost_{Lighting}$	28,000
	$Cost_{Total}$	63,683

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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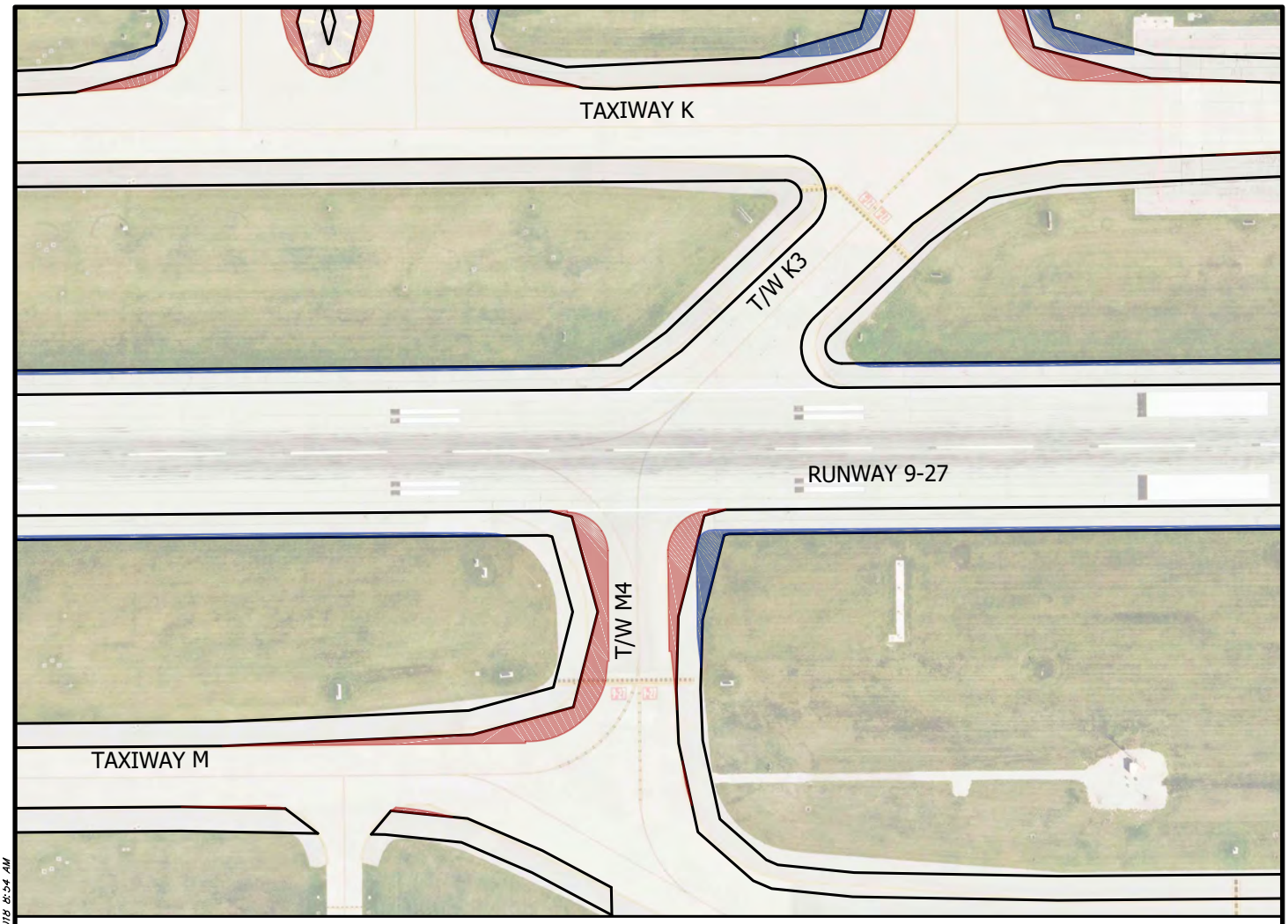

Taxiway Intersection Information		
RW 9 & TW M4	TDG	5
Additional Pavement (SYD) 1050	$Cost_{Pvmt}$	314,933
Additional Shoulder (SYD) 1187	$Cost_{Shoulder}$	49,863
Additional Marking	$Cost_{Marking}$	5,000
Lighting	$Cost_{Lighting}$	38,000
	$Cost_{Total}$	407,797

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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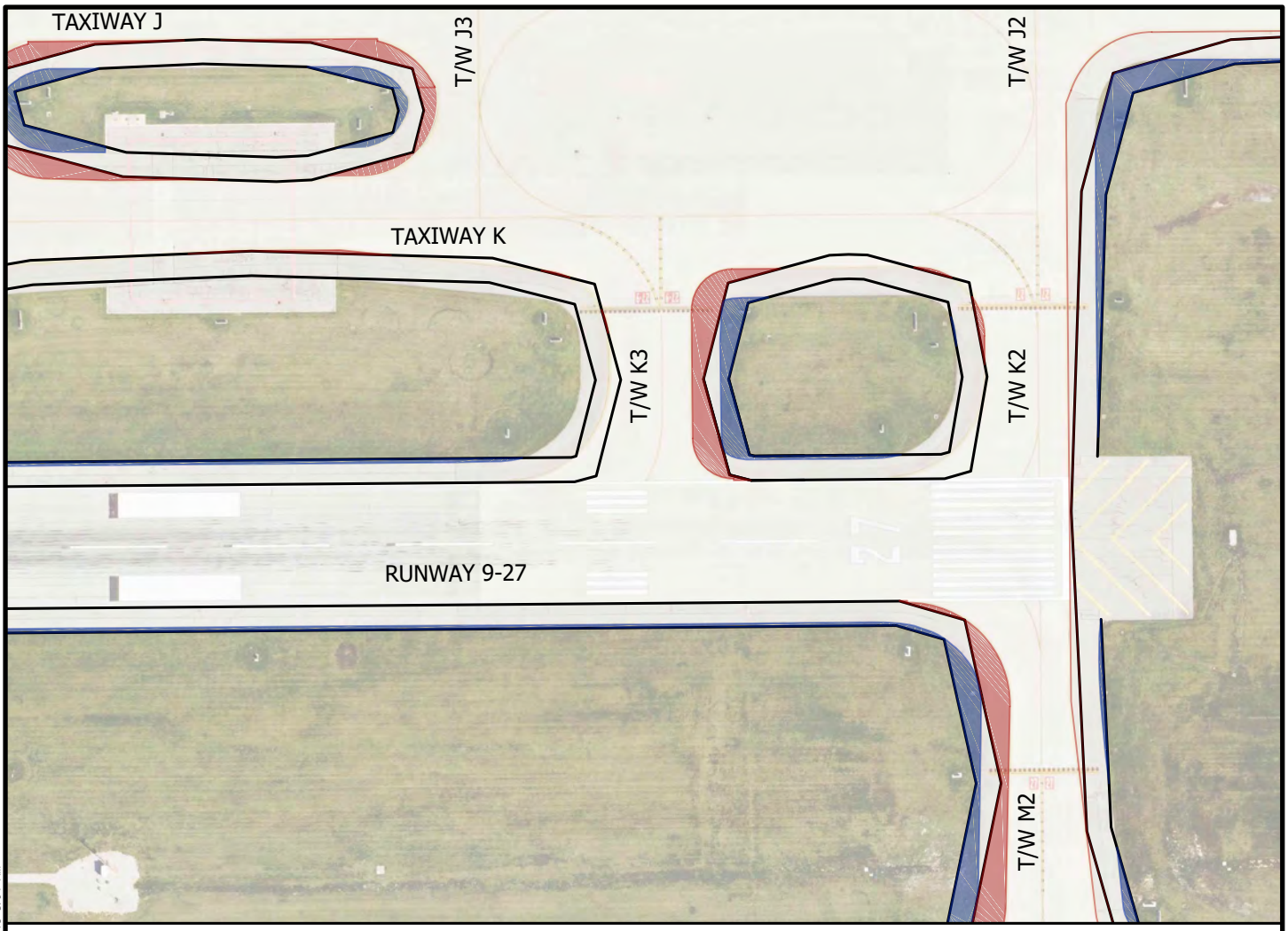

Taxiway Intersection Information		
RW 9 & TW K3	TDG	5
Additional Pavement (SYD) 617	$Cost_{Pvmt}$	185,233
Additional Shoulder (SYD) 533	$Cost_{Shoulder}$	22,381
Additional Marking	$Cost_{Marking}$	5,000
Lighting	$Cost_{Lighting}$	38,000
	$Cost_{Total}$	250,615

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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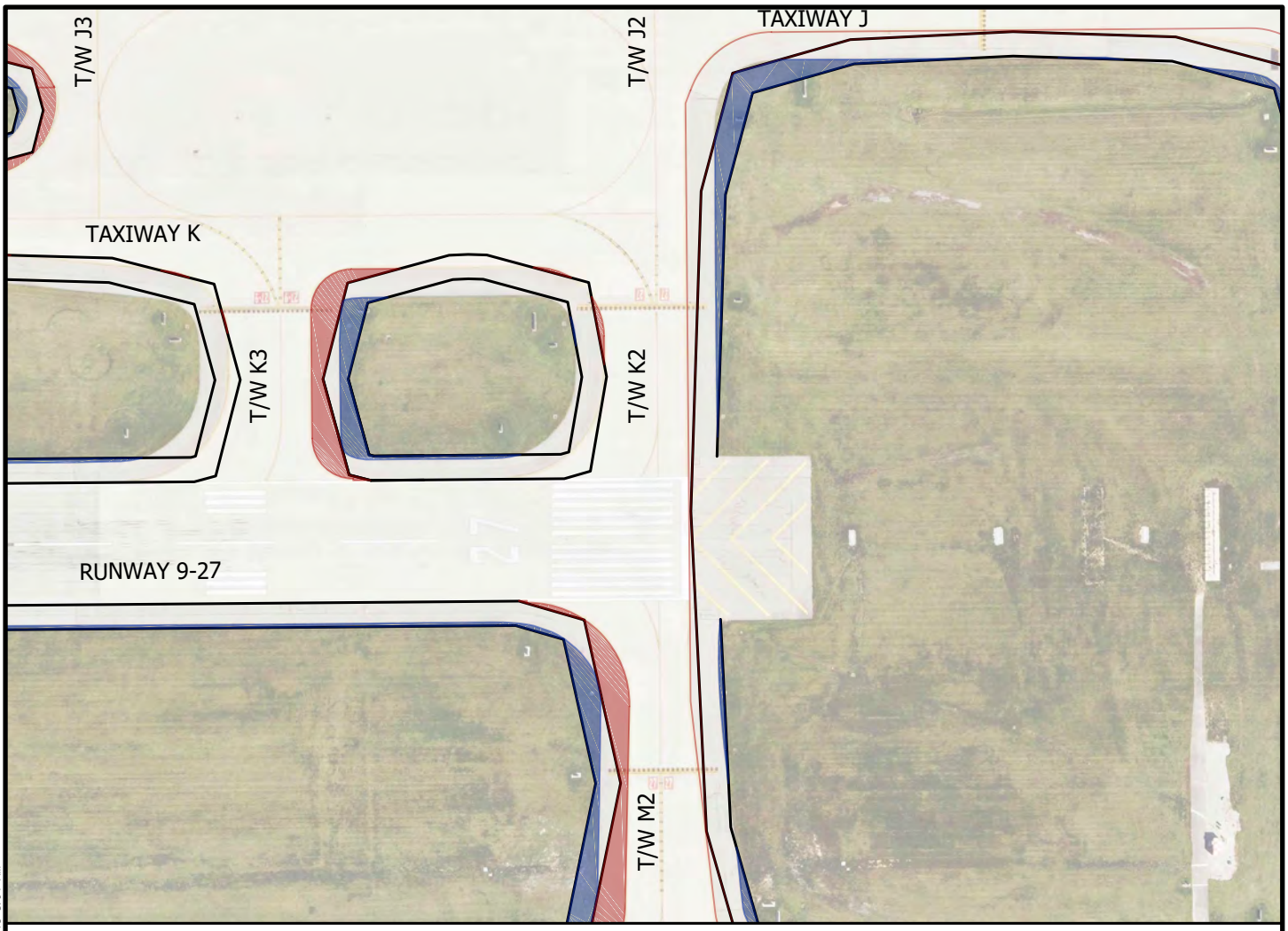

Taxiway Intersection Information		
RW 9 & TW K2	TDG	6
Additional Pavement (SYD) 265	$Cost_{Pvmt}$	79,600
Additional Shoulder (SYD) 74	$Cost_{Shoulder}$	3,127
Additional Marking	$Cost_{Marking}$	5,000
Lighting	$Cost_{Lighting}$	24,000
	$Cost_{Total}$	111,727

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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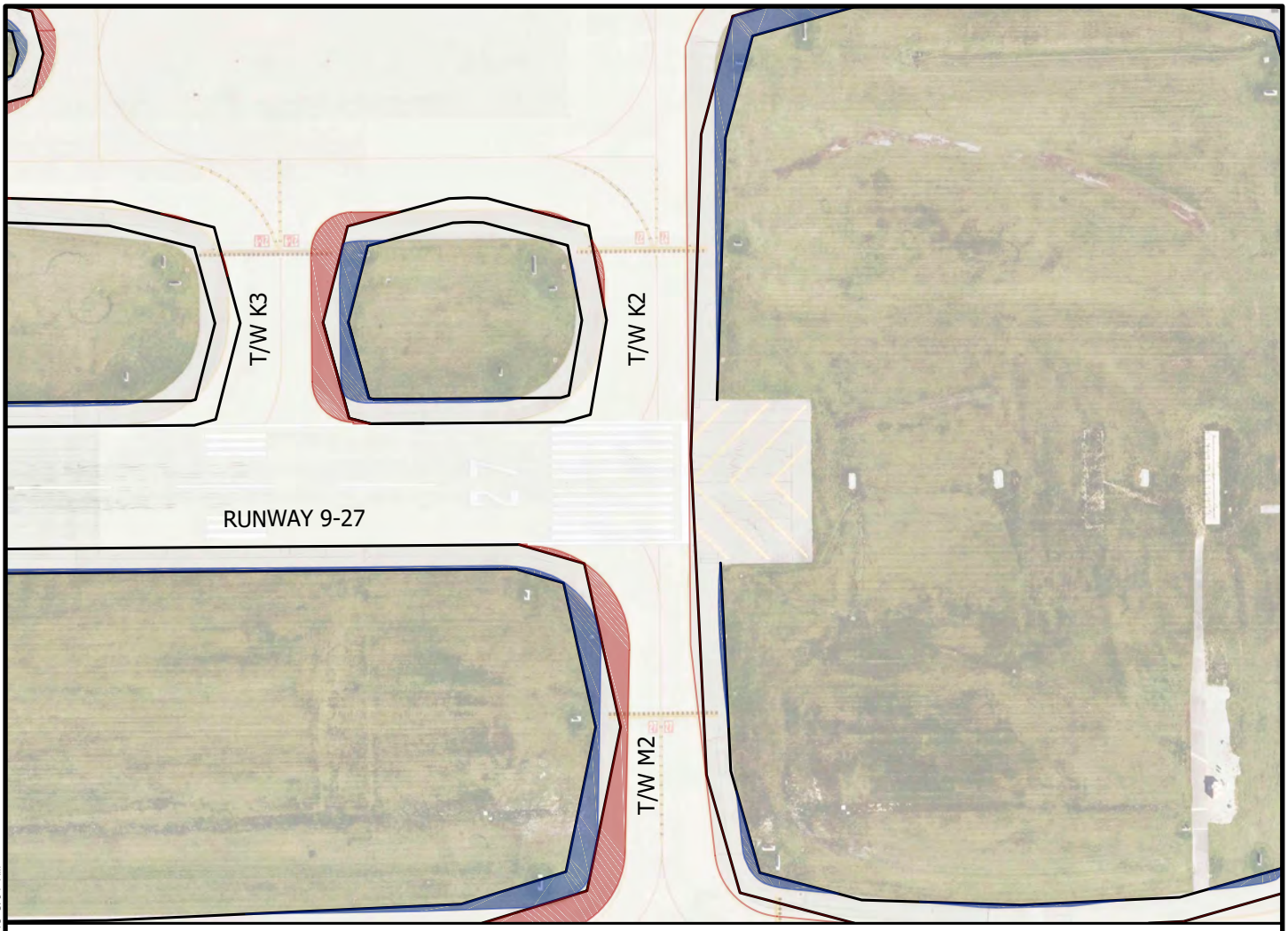

Taxiway Intersection Information		
RW 9 & TW M2	TDG	6
Additional Pavement (SYD) 824	$Cost_{Pvmt}$	247,100
Additional Shoulder (SYD) 850	$Cost_{Shoulder}$	35,714
Additional Marking	$Cost_{Marking}$	5,000
Lighting	$Cost_{Lighting}$	29,000
	$Cost_{Total}$	316,814

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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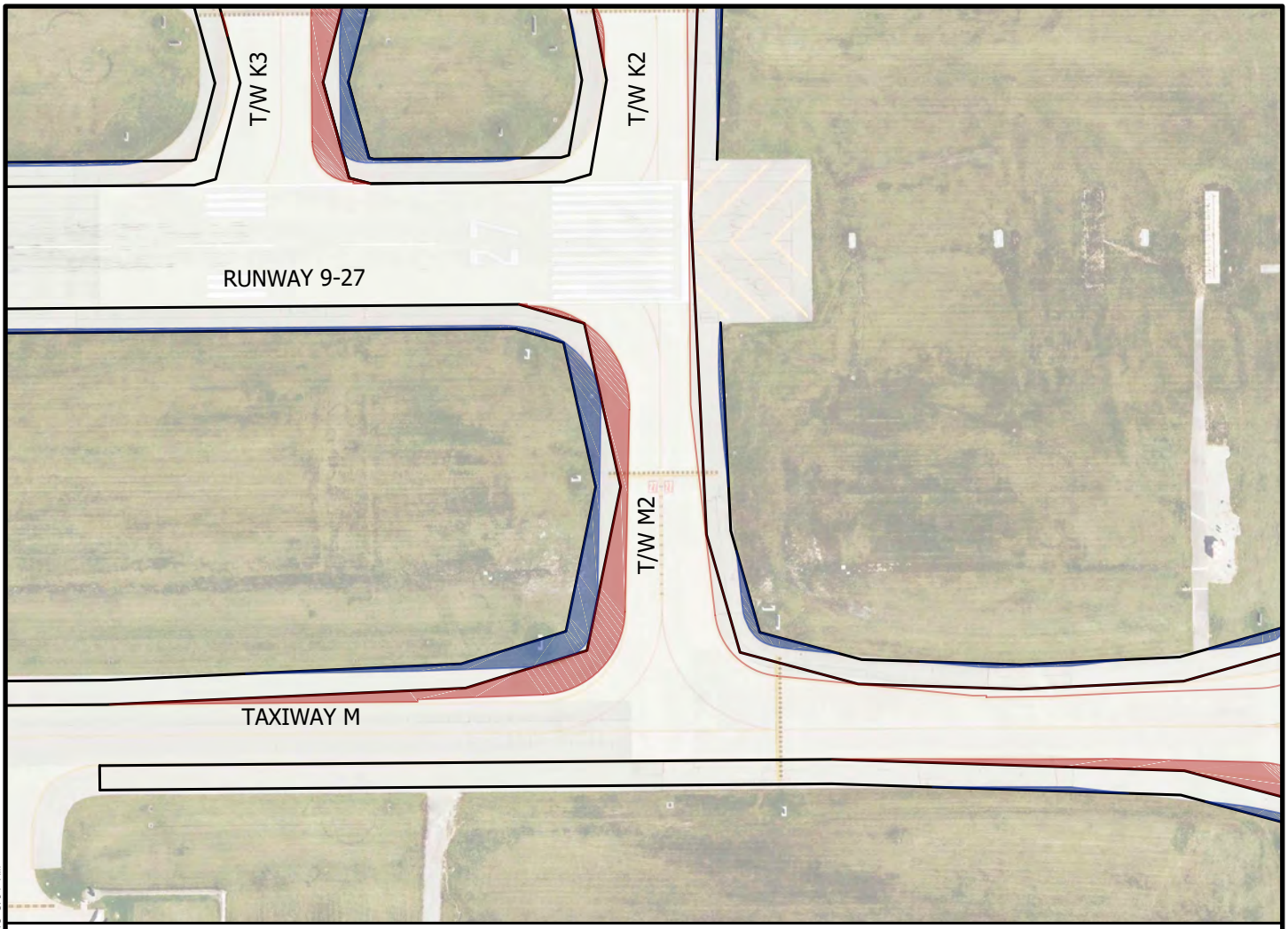

Taxiway Intersection Information		
TW M & TW M2	TDG	6
Additional Pavement (SYD) 1963	$Cost_{Pvmt}$	588,900
Additional Shoulder (SYD) 1115	$Cost_{Shoulder}$	46,811
Additional Marking	$Cost_{Marking}$	9,400
Lighting	$Cost_{Lighting}$	43,000
	$Cost_{Total}$	688,111

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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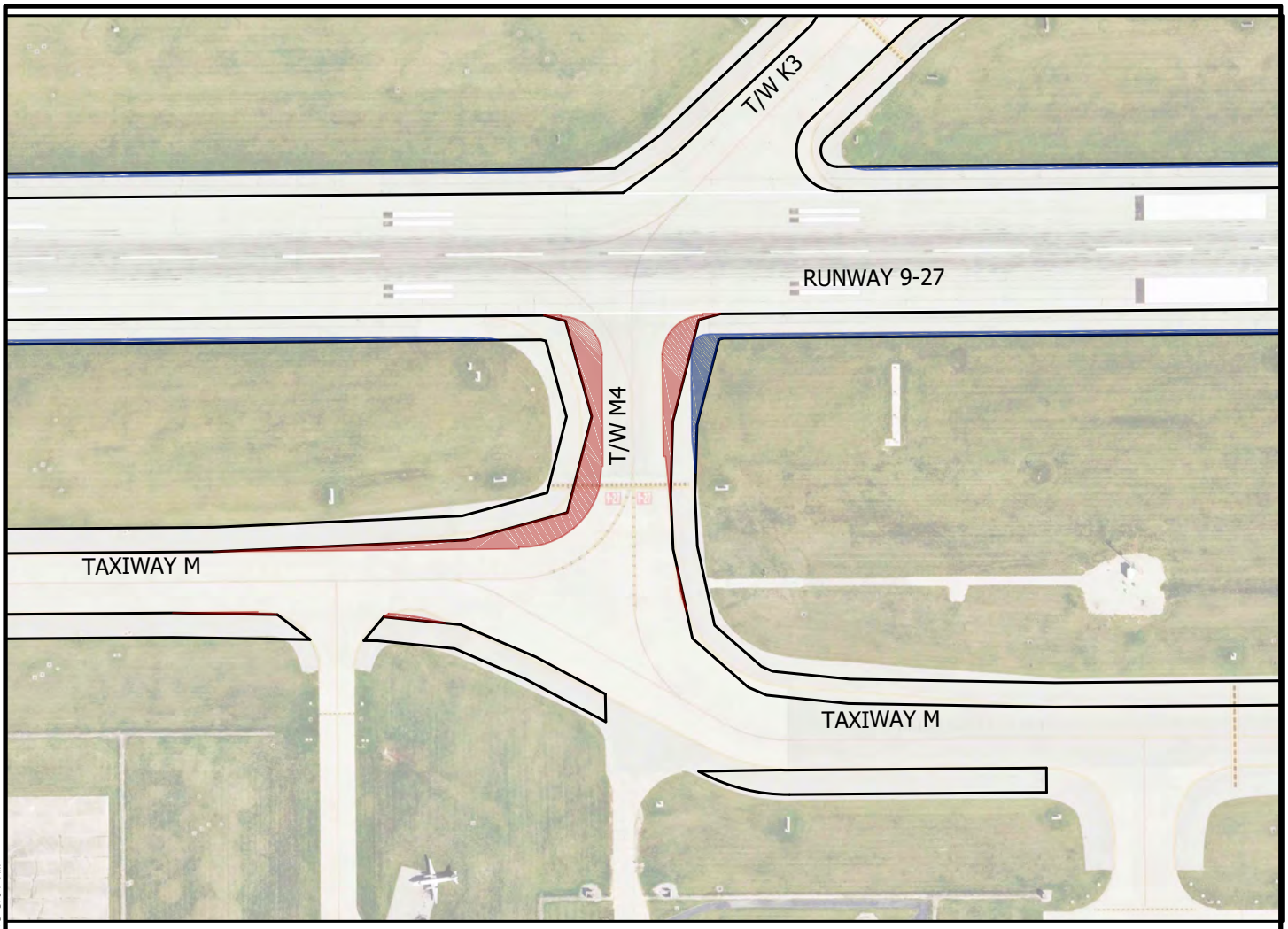

Taxiway Intersection Information		
TW M & TW M4	TDG	5
Additional Pavement (SYD) 675	$Cost_{Pvmt}$	202,500
Additional Shoulder (SYD) 0	$Cost_{Shoulder}$	0
Additional Marking	$Cost_{Marking}$	3,100
Lighting	$Cost_{Lighting}$	14,000
	$Cost_{Total}$	219,600

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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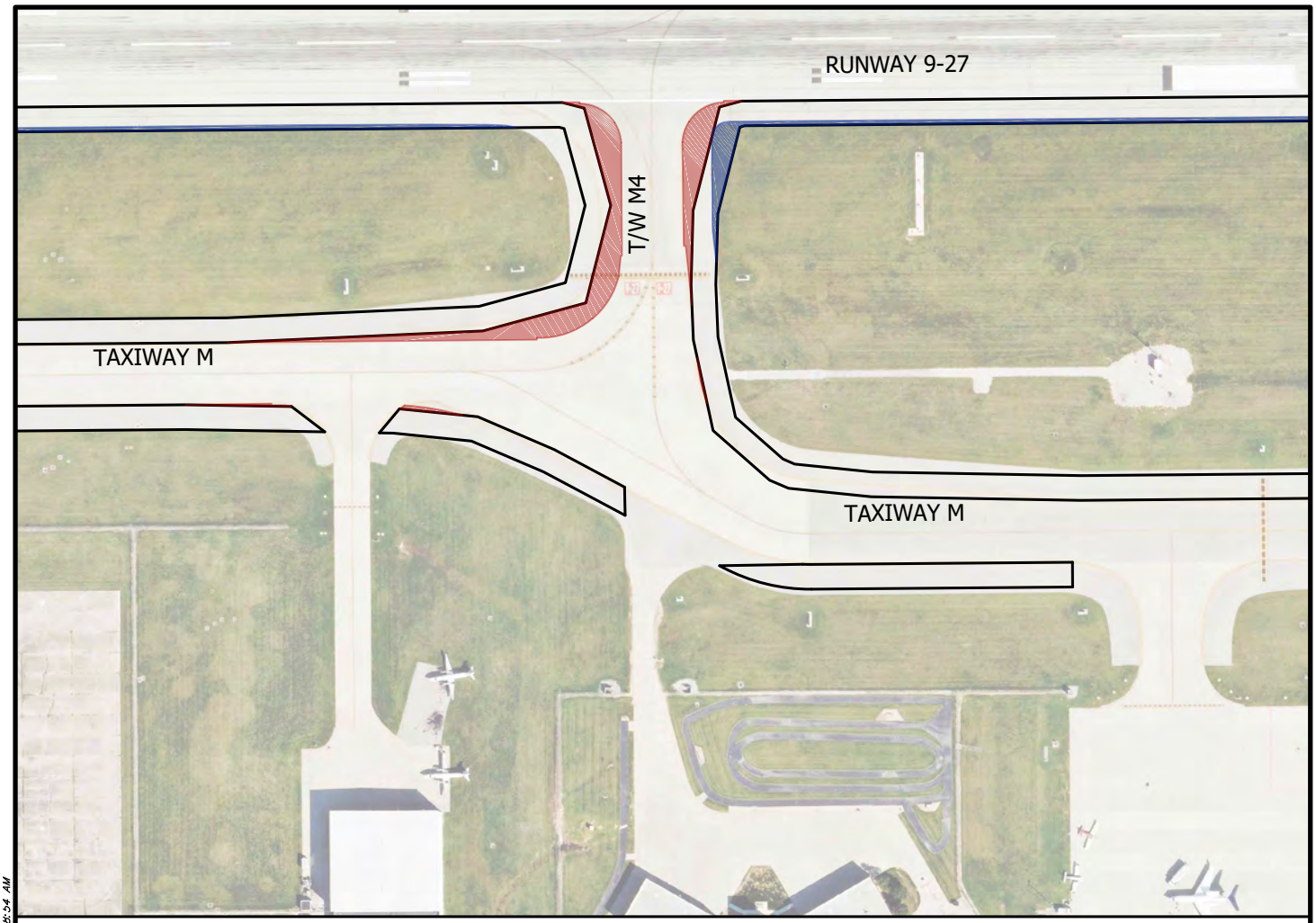


Taxiway Intersection Information		
TW M & TW M	TDG	5
Additional Pavement (SYD) 62	$Cost_{Pvmt}$	18,467
Additional Shoulder (SYD) 0	$Cost_{Shoulder}$	0
Additional Marking	$Cost_{Marking}$	700
Lighting	$Cost_{Lighting}$	8,000
	$Cost_{Total}$	27,167

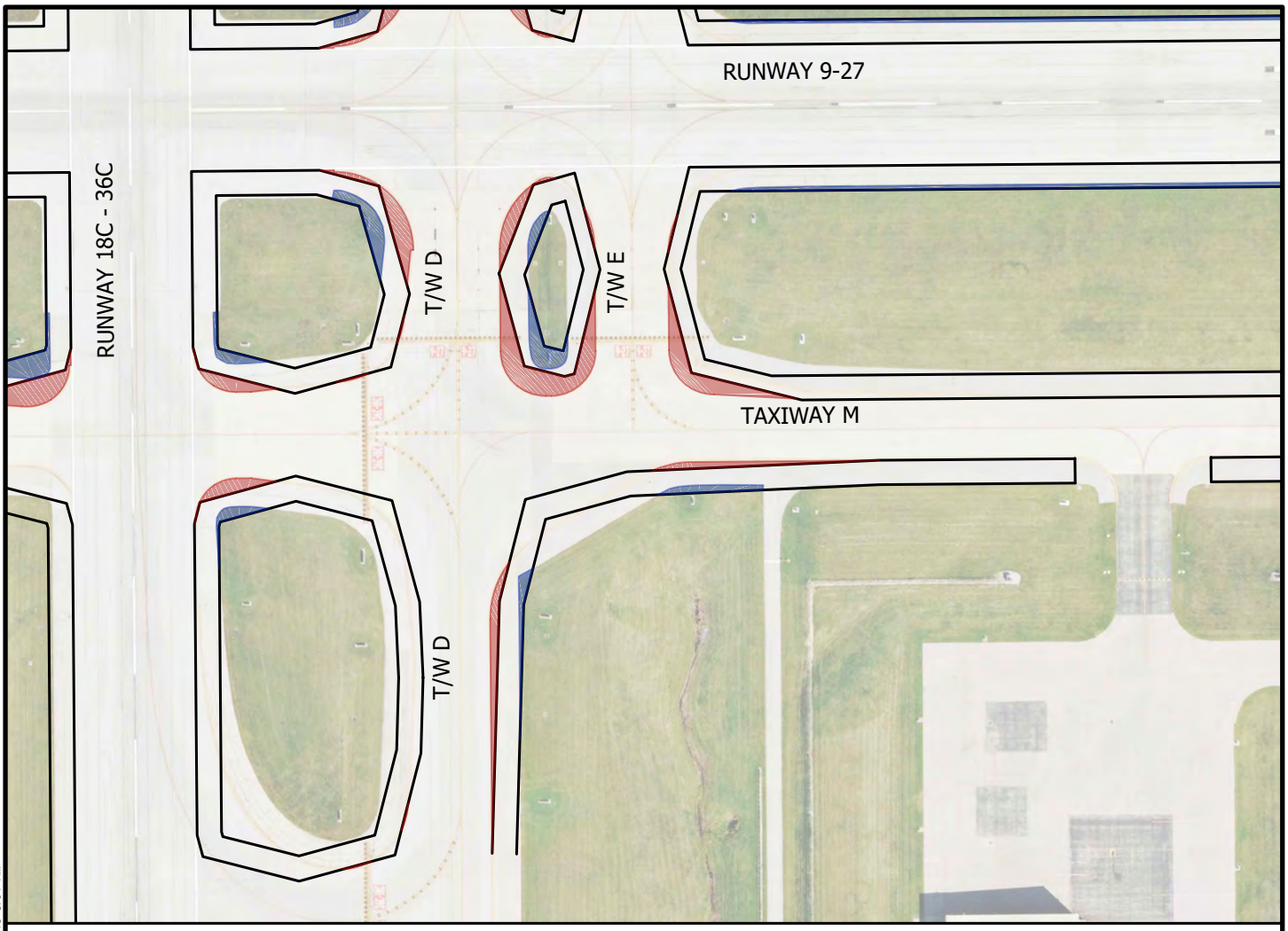
LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

Butler Fairman Seufert CIVIL ENGINEERS

CVG CINCINNATI/NORTHERN KENTUCKY INTERNATIONAL AIRPORT



Taxiway Intersection Information		
TW M & TW E	TDG	4
Additional Pavement (SYD) 483	$Cost_{Pvmt}$	144,767
Additional Shoulder (SYD) 52	$Cost_{Shoulder}$	2,193
Additional Marking	$Cost_{Marking}$	3,000
Lighting	$Cost_{Lighting}$	8,000
	$Cost_{Total}$	157,960

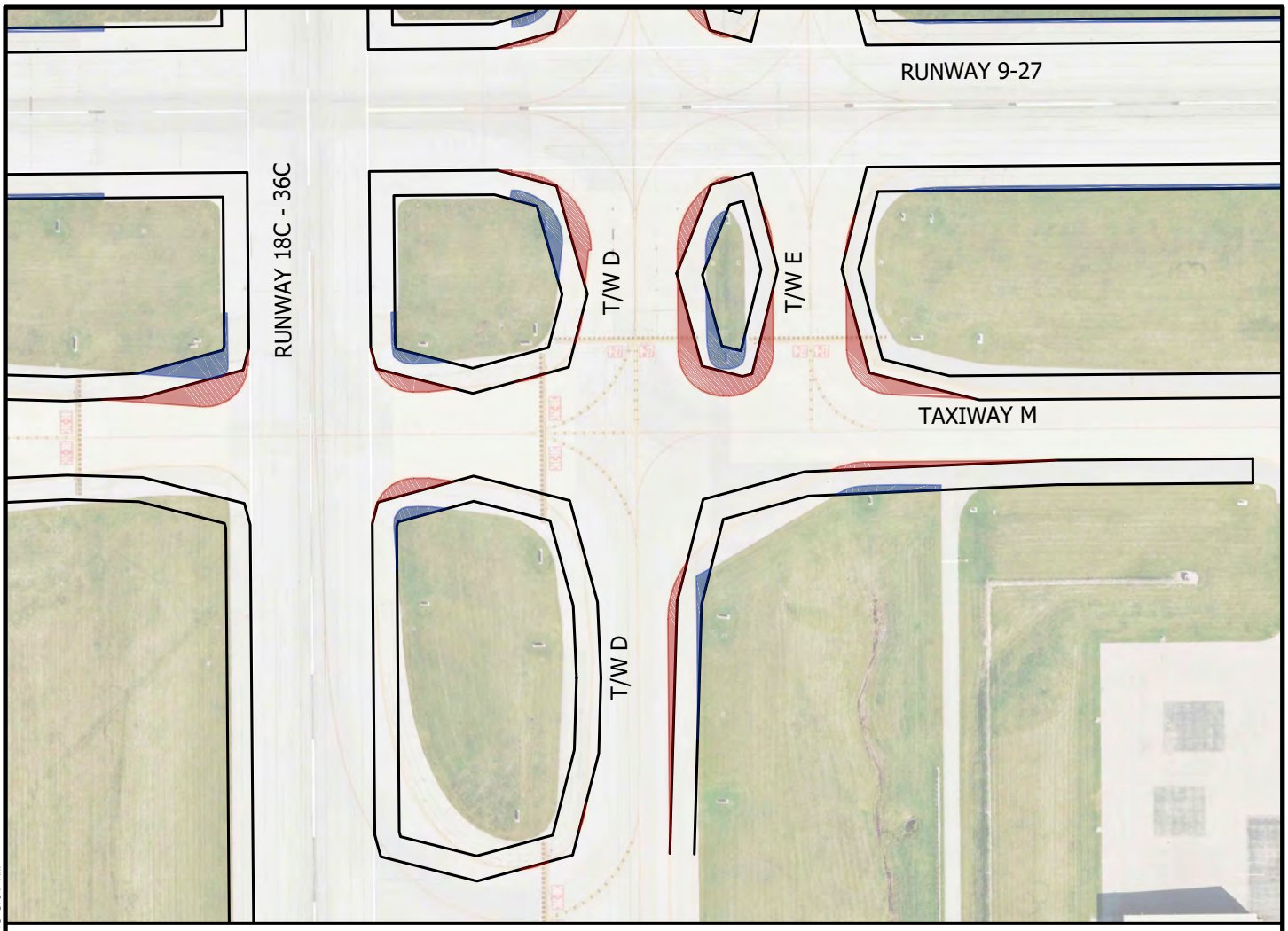
LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

Butler Fairman Seufert CIVIL ENGINEERS

CVG CINCINNATI/NORTHERN KENTUCKY INTERNATIONAL AIRPORT



Taxiway Intersection Information		
TW M & TW D	TDG	5
Additional Pavement (SYD) 635	$Cost_{Pvmt}$	190,633
Additional Shoulder (SYD) 291	$Cost_{Shoulder}$	12,203
Additional Marking	$Cost_{Marking}$	4,700
Lighting	$Cost_{Lighting}$	42,000
	$Cost_{Total}$	249,537

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

Butler Fairman Seufert CIVIL ENGINEERS

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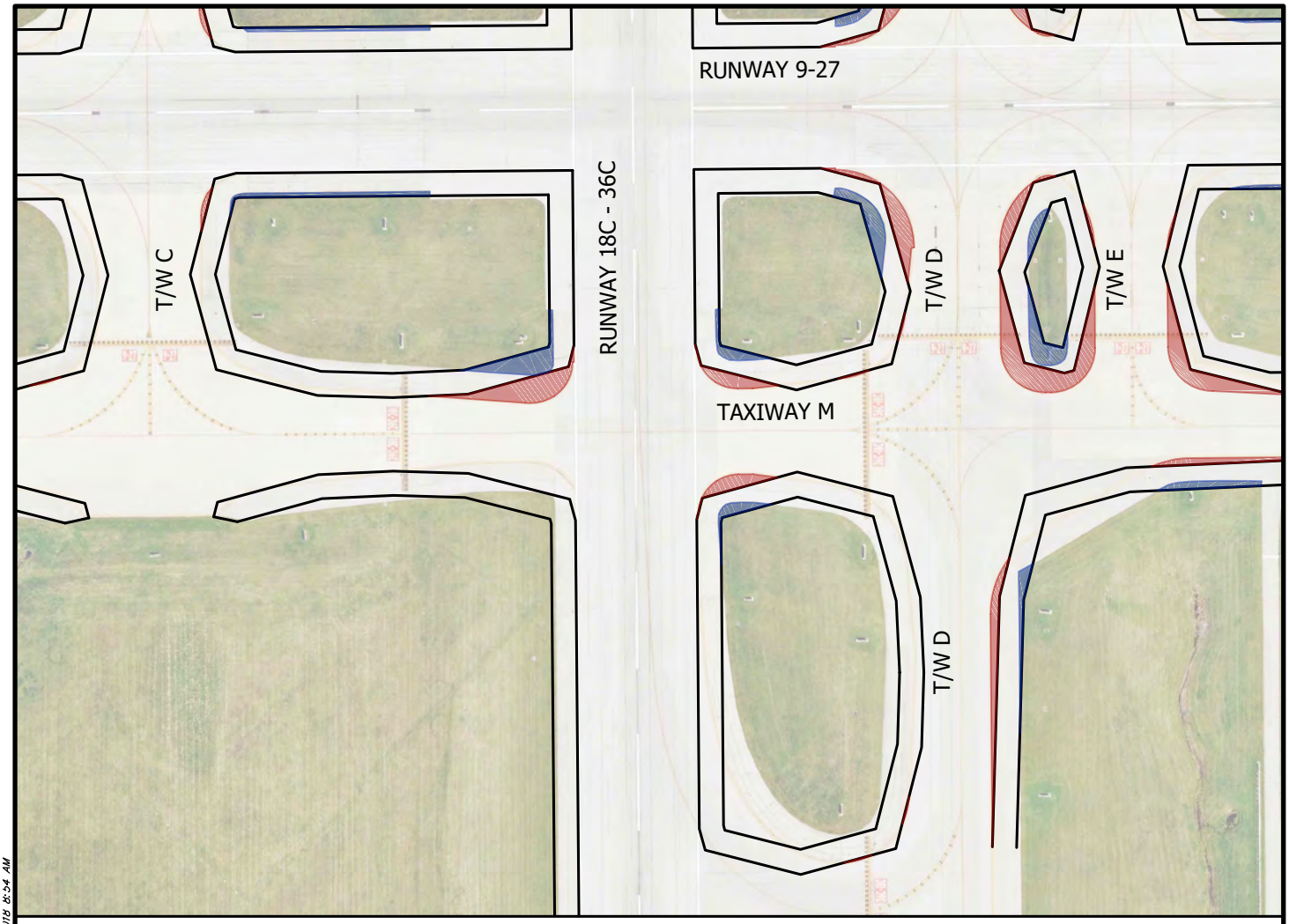

Taxiway Intersection Information		
TW M & RW 18C	TDG	5
Additional Pavement (SYD) 614	$Cost_{Pvmt}$	184,200
Additional Shoulder (SYD) 385	$Cost_{Shoulder}$	16,161
Additional Marking	$Cost_{Marking}$	1,500
Lighting	$Cost_{Lighting}$	32,000
	$Cost_{Total}$	233,861

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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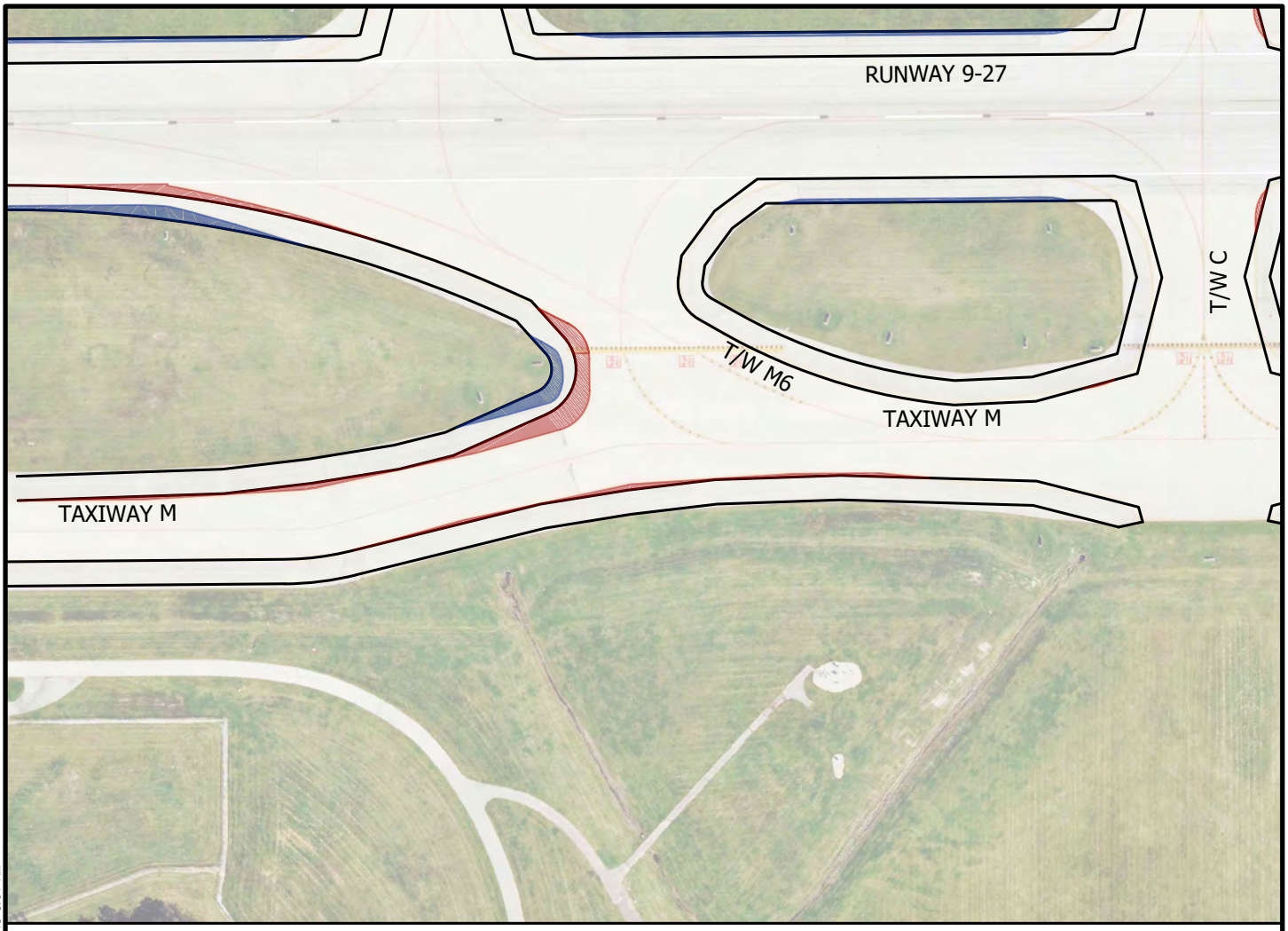


Taxiway Intersection Information		
TW M & TW M6	TDG	5
Additional Pavement (SYD) 855	$Cost_{Pvmt}$	256,500
Additional Shoulder (SYD) 232	$Cost_{Shoulder}$	9,763
Additional Marking	$Cost_{Marking}$	7,700
Lighting	$Cost_{Lighting}$	19,000
	$Cost_{Total}$	292,963

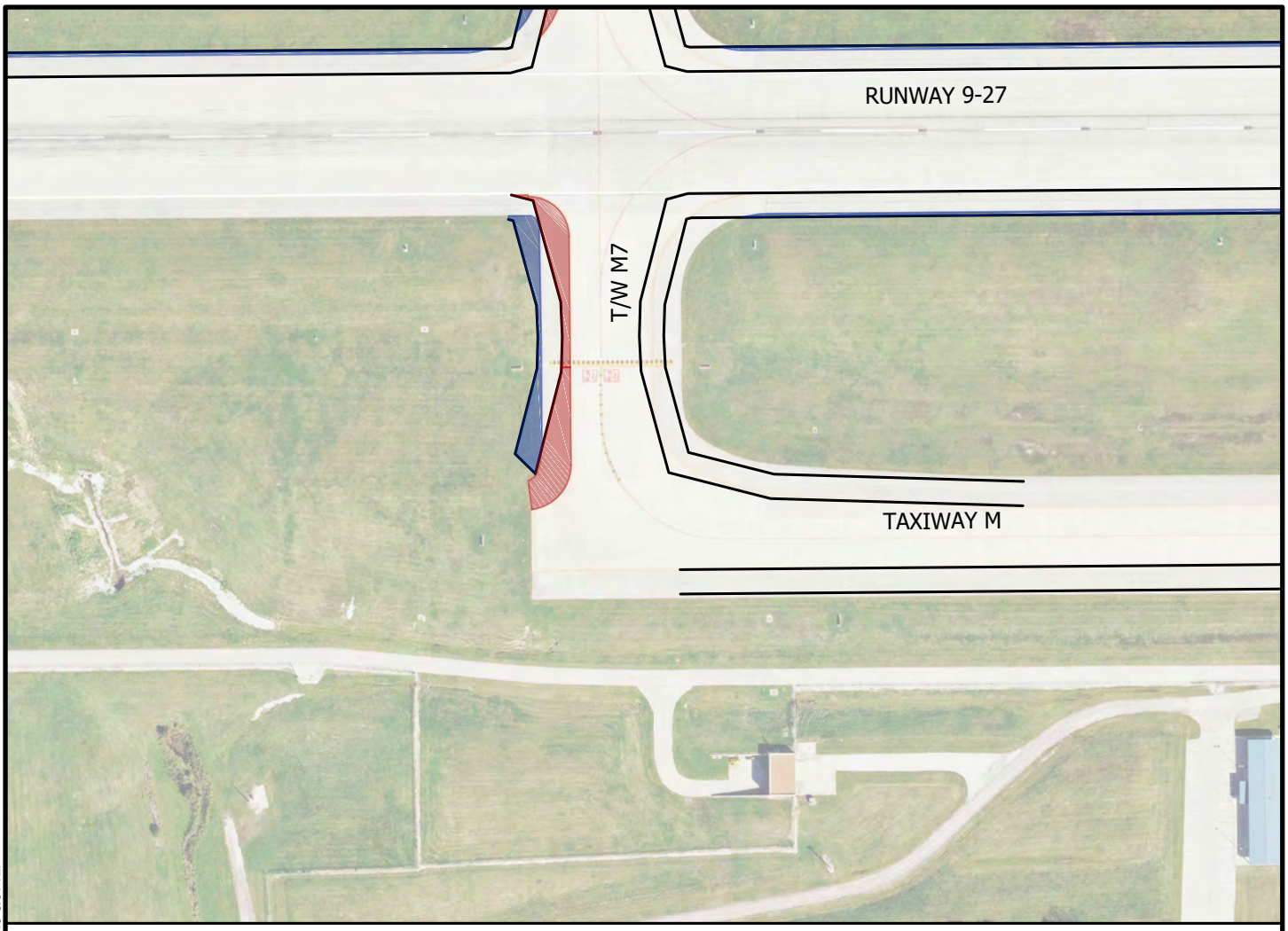
LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

Butler Fairman Seufert CIVIL ENGINEERS

CVG CINCINNATI/NORTHERN KENTUCKY INTERNATIONAL AIRPORT



Taxiway Intersection Information		
TW M & TW M7	TDG	5
Additional Pavement (SYD) 579	$Cost_{Pvmt}$	173,633
Additional Shoulder (SYD) 268	$Cost_{Shoulder}$	11,275
Additional Marking	$Cost_{Marking}$	3,000
Lighting	$Cost_{Lighting}$	22,000
	$Cost_{Total}$	209,908

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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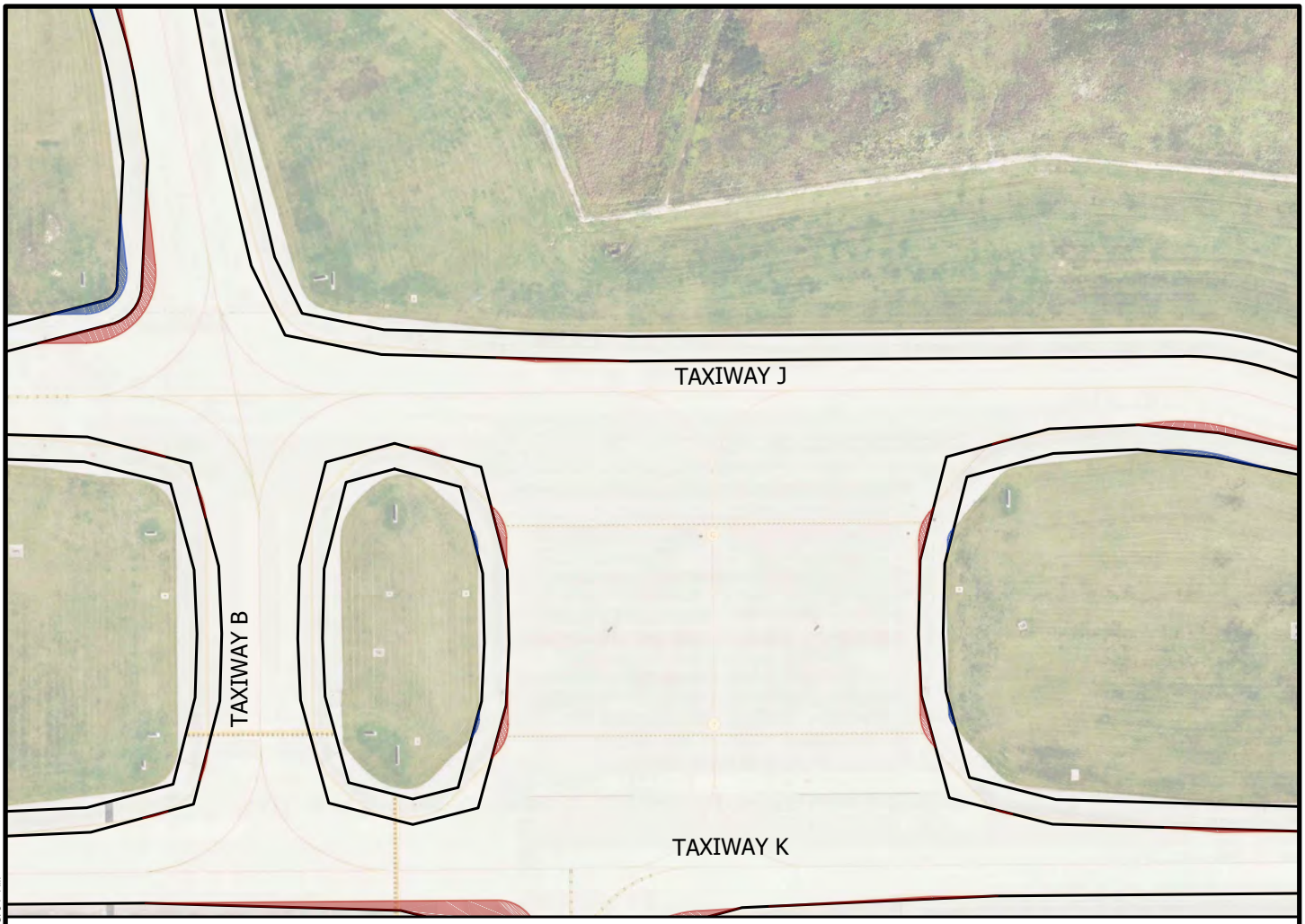

Taxiway Intersection Information		
TW J & HOLD APRON	TDG	5
Additional Pavement (SYD) 149	$Cost_{Pvmt}$	44,600
Additional Shoulder (SYD) 16	$Cost_{Shoulder}$	677
Additional Marking	$Cost_{Marking}$	1,500
Lighting	$Cost_{Lighting}$	20,000
	$Cost_{Total}$	66,777

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

Butler Fairman Seufert CIVIL ENGINEERS

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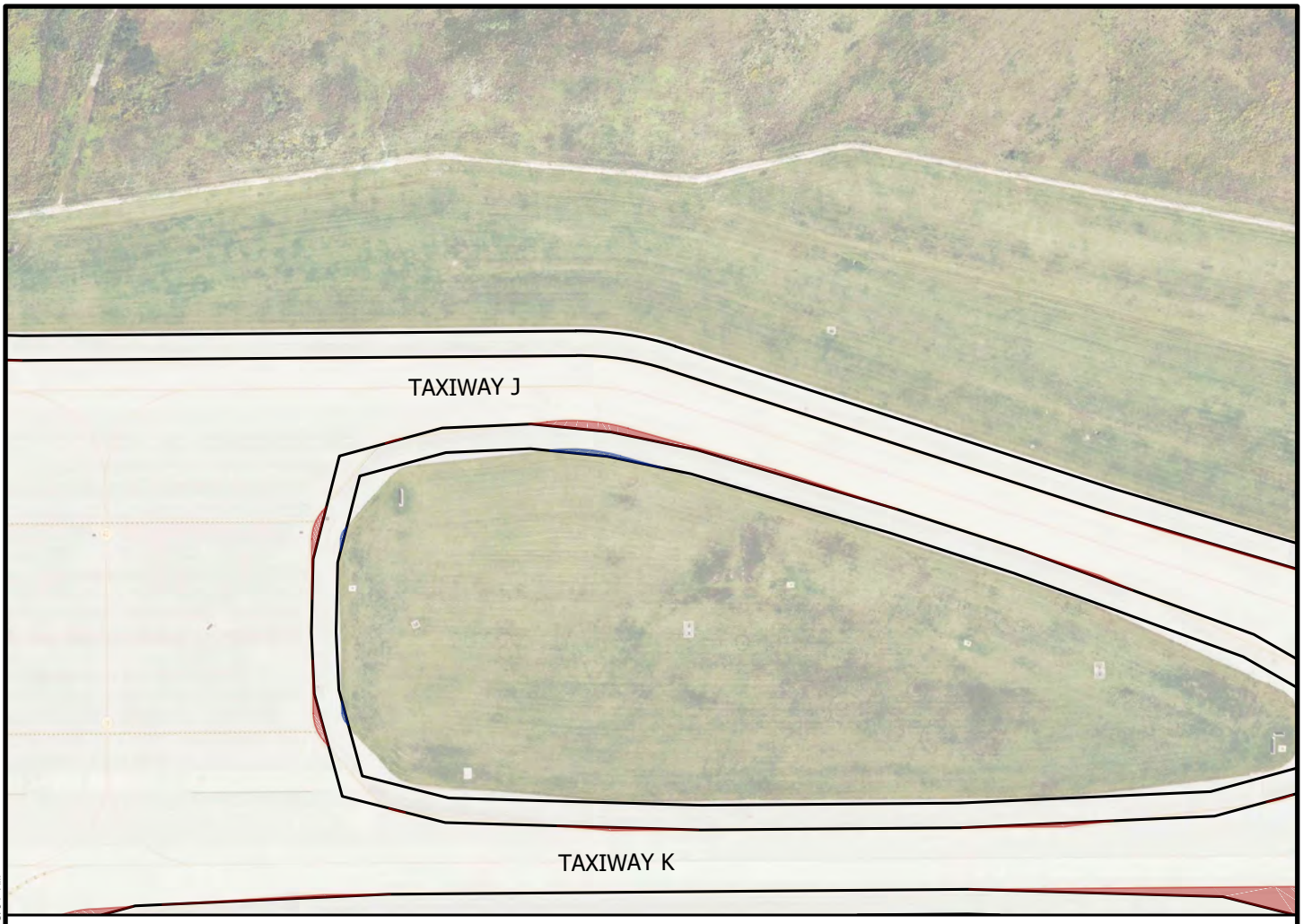

Taxiway Intersection Information		
TW J & TW J	TDG	5
Additional Pavement (SYD) 231	$Cost_{Pvmt}$	69,300
Additional Shoulder (SYD) 50	$Cost_{Shoulder}$	2,119
Additional Marking	$Cost_{Marking}$	3,150
Lighting	$Cost_{Lighting}$	14,000
	$Cost_{Total}$	88,569

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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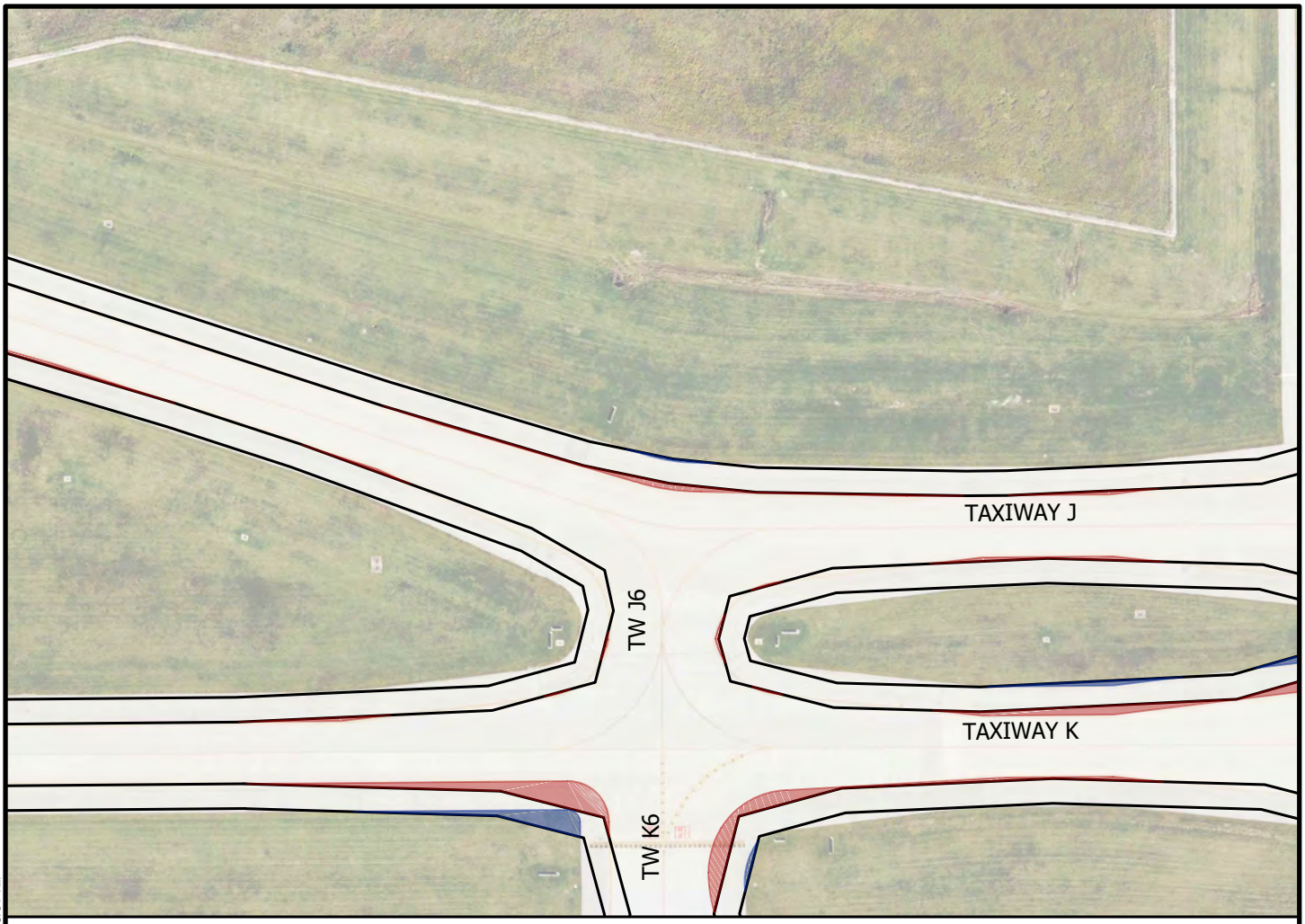
CVG CINCINNATI/NORTHERN KENTUCKY INTERNATIONAL AIRPORT



Taxiway Intersection Information		
TW J & TW J6	TDG	5
Additional Pavement (SYD) 381	$Cost_{Pvmt}$	114,200
Additional Shoulder (SYD) 24	$Cost_{Shoulder}$	1,017
Additional Marking	$Cost_{Marking}$	7,400
Lighting	$Cost_{Lighting}$	28,000
	$Cost_{Total}$	150,617

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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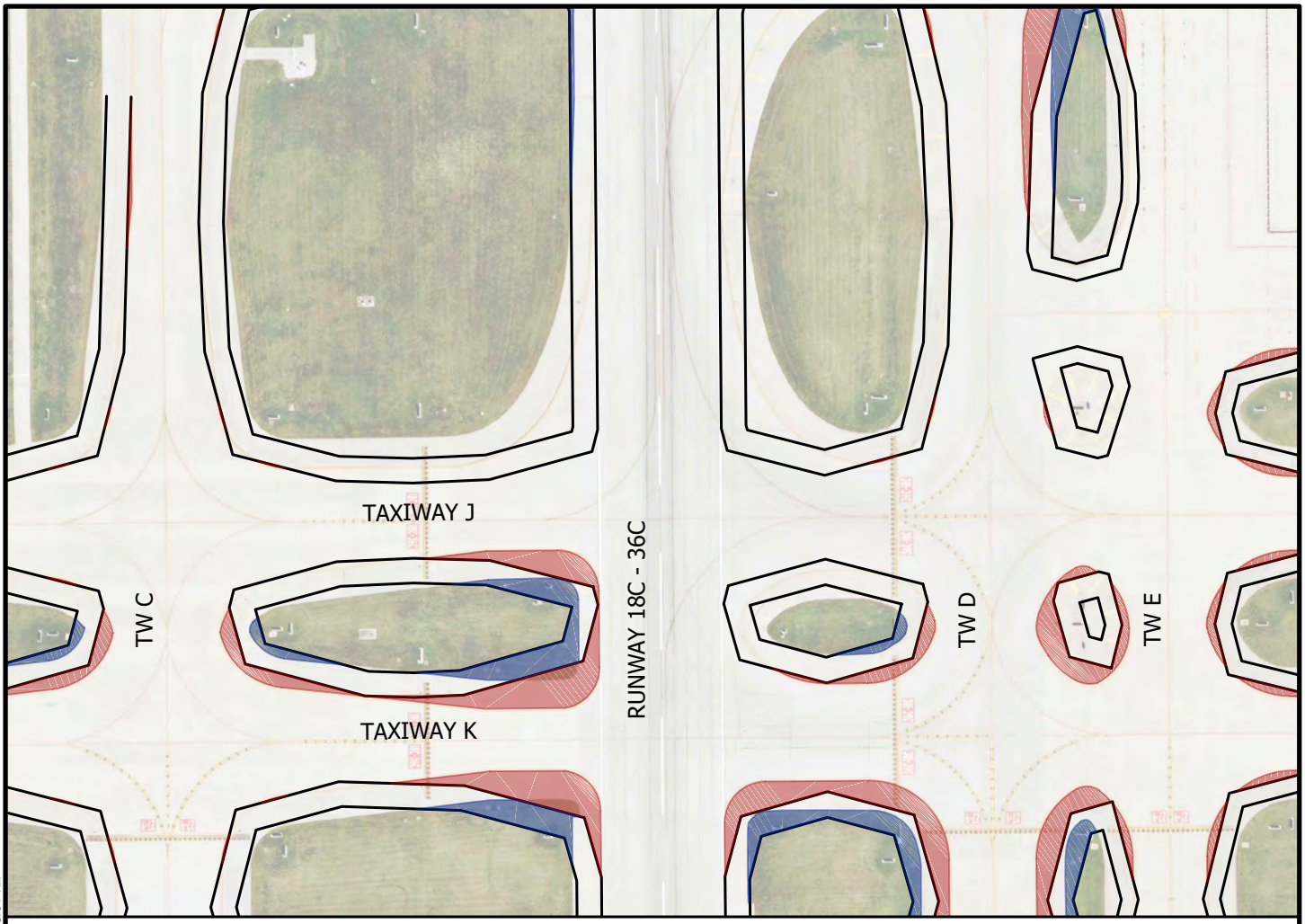

Taxiway Intersection Information		
TW J & RW 18C	TDG	5
Additional Pavement (SYD) 427	$Cost_{Pvmt}$	128,100
Additional Shoulder (SYD) 266	$Cost_{Shoulder}$	11,177
Additional Marking	$Cost_{Marking}$	3,500
Lighting	$Cost_{Lighting}$	69,000
	$Cost_{Total}$	211,777

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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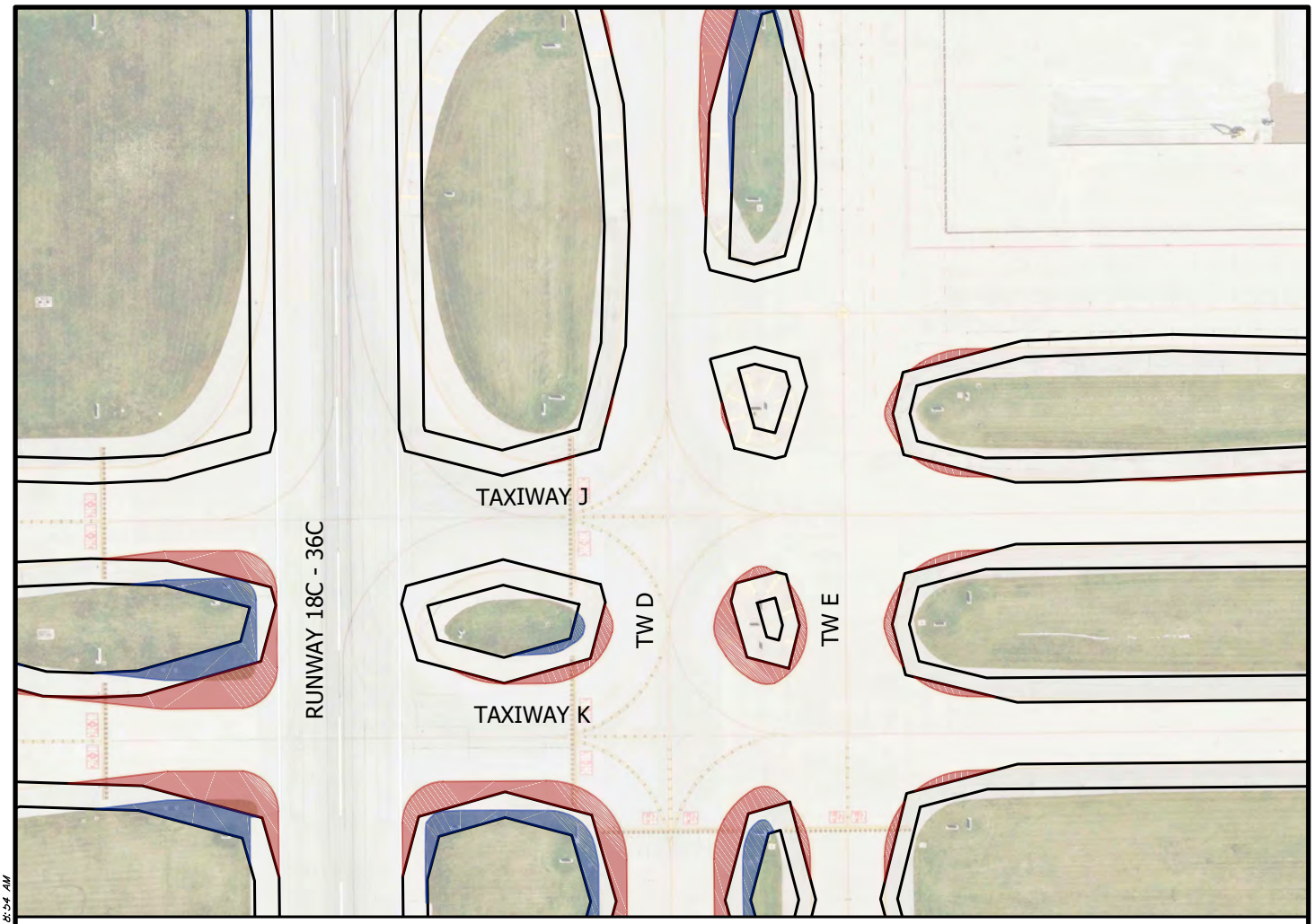

Taxiway Intersection Information		
TW J & TW D	TDG	4
Additional Pavement (SYD) 78	$Cost_{Pvmt}$	23,333
Additional Shoulder (SYD) 0	$Cost_{Shoulder}$	0
Additional Marking	$Cost_{Marking}$	4,000
Lighting	$Cost_{Lighting}$	158,000
	$Cost_{Total}$	185,333

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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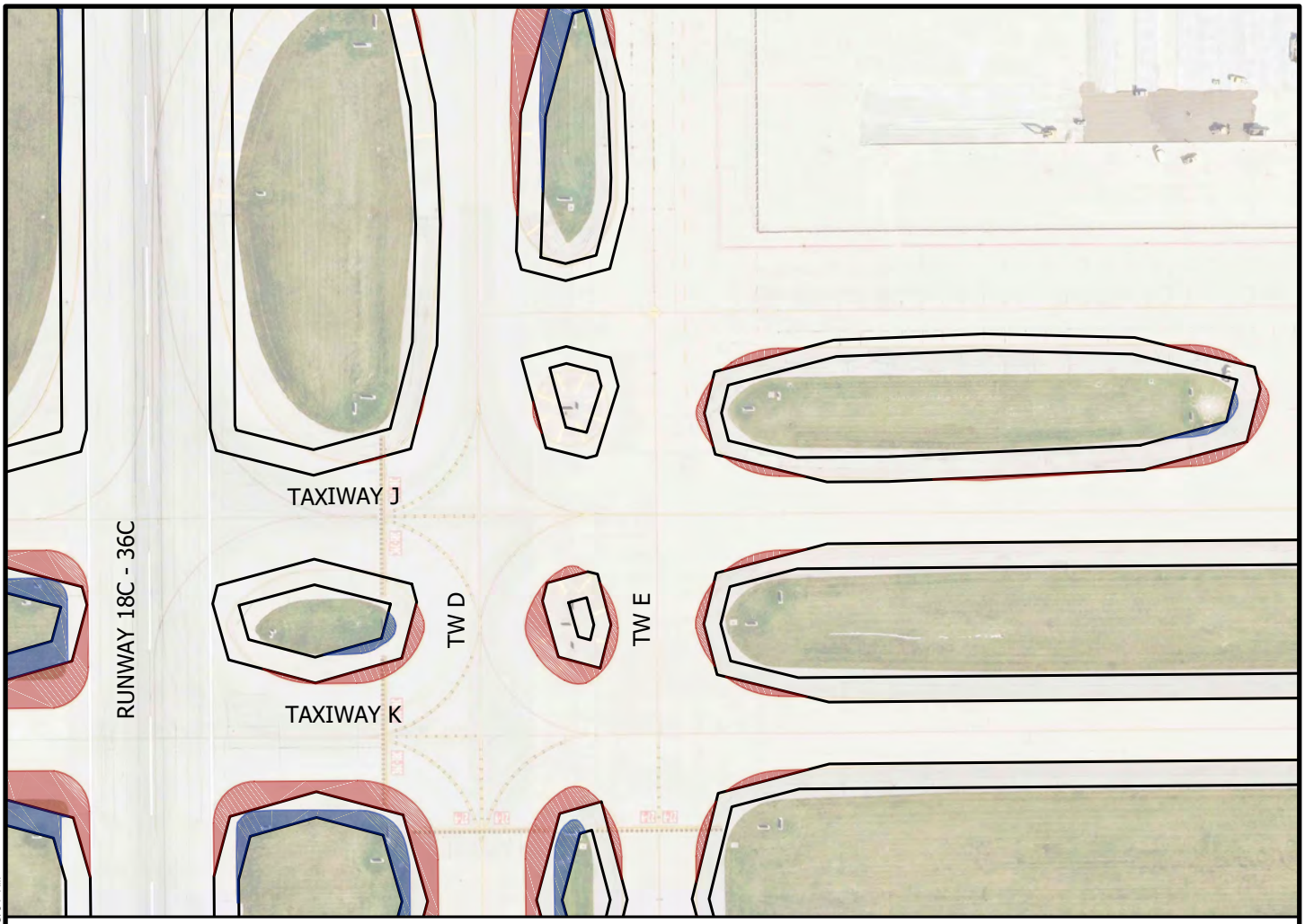

Taxiway Intersection Information		
TW J & TW E	TDG	4
Additional Pavement (SYD) 186	$Cost_{Pvmt}$	55,767
Additional Shoulder (SYD) 0	$Cost_{Shoulder}$	0
Additional Marking	$Cost_{Marking}$	5,700
Lighting	$Cost_{Lighting}$	26,000
	$Cost_{Total}$	87,467

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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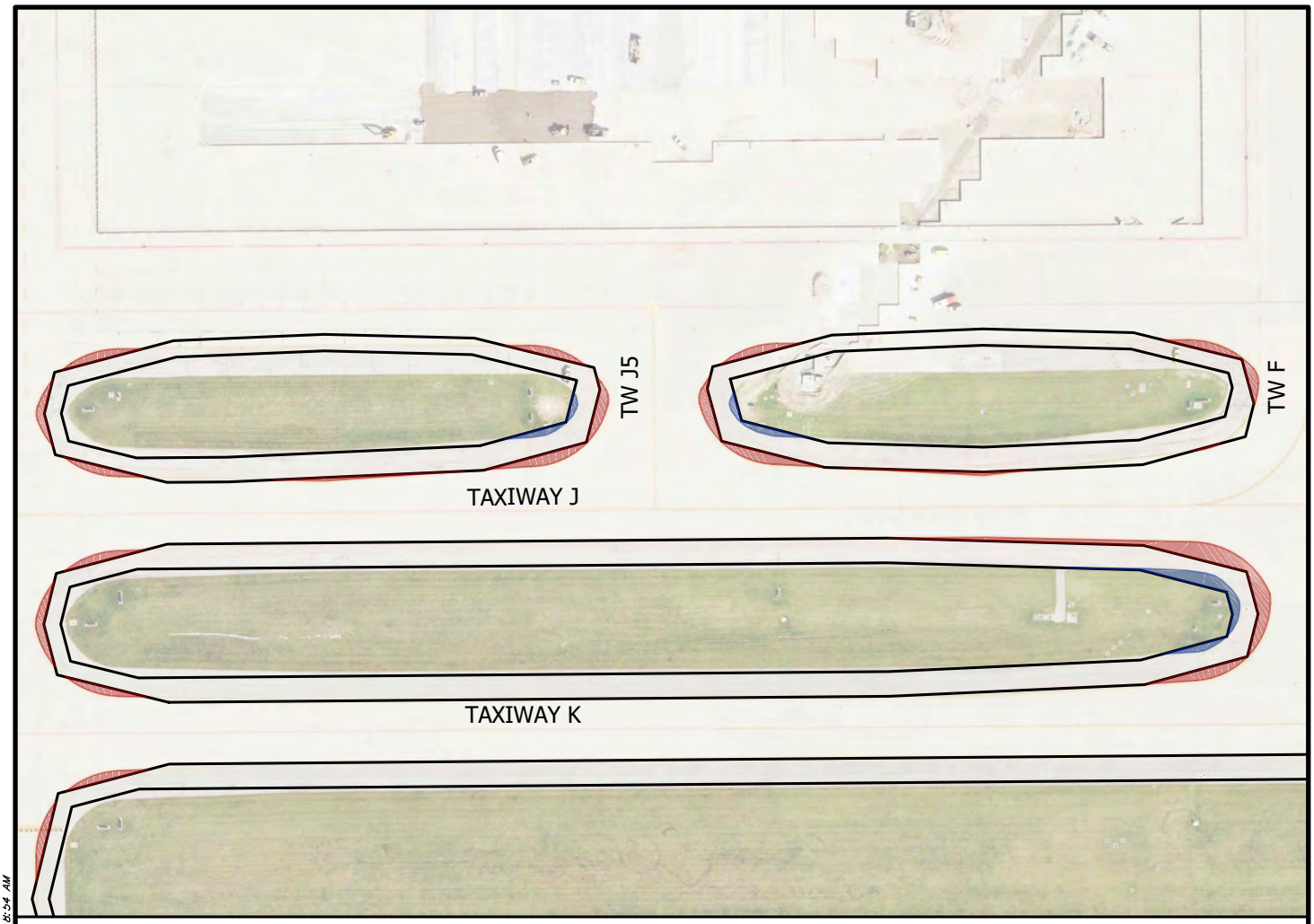

Taxiway Intersection Information		
TW J & TW J5	TDG	5
Additional Pavement (SYD) 458	$Cost_{Pvmt}$	137,433
Additional Shoulder (SYD) 146	$Cost_{Shoulder}$	6,137
Additional Marking	$Cost_{Marking}$	2,200
Lighting	$Cost_{Lighting}$	16,000
	$Cost_{Total}$	161,770

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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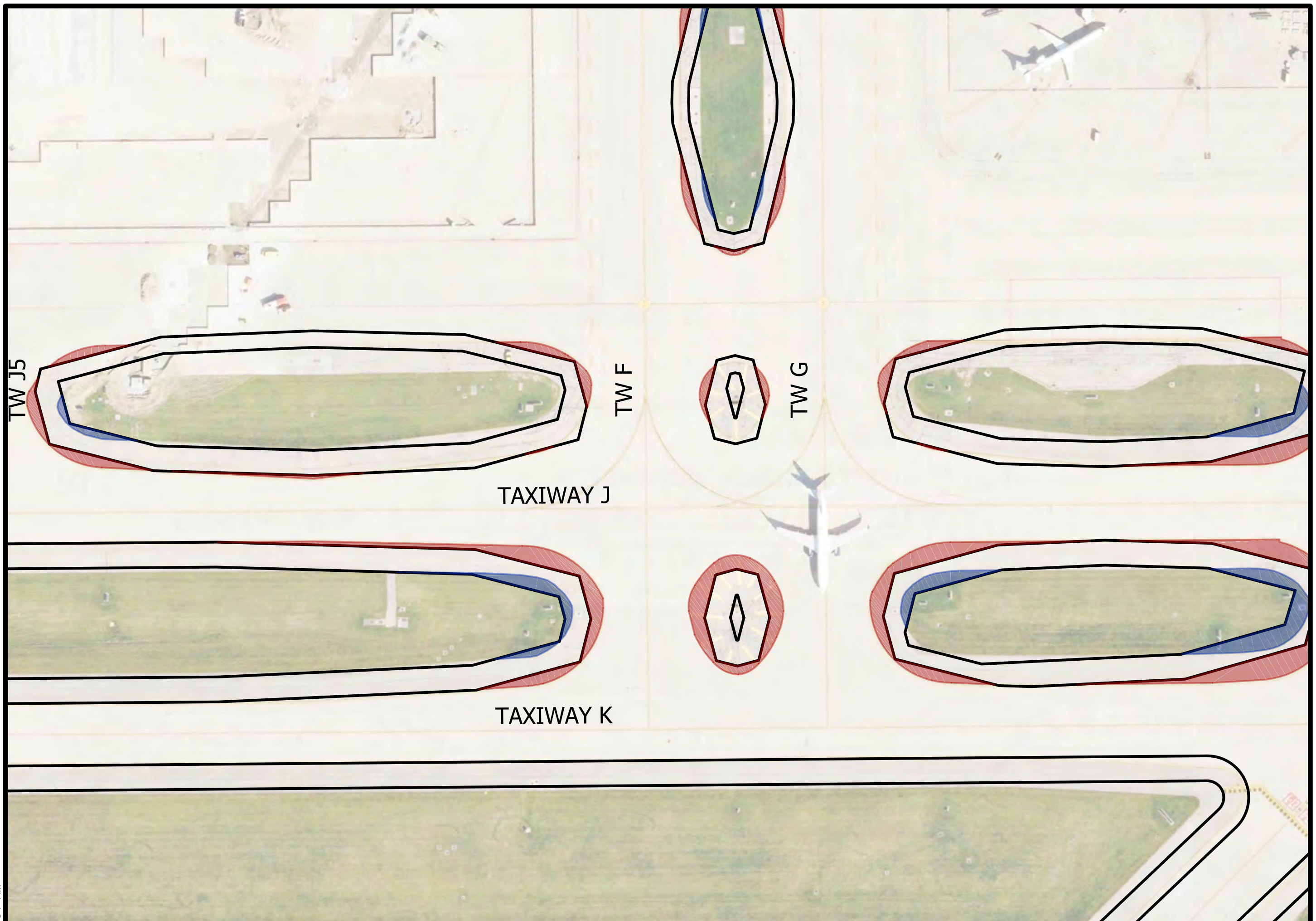

Taxiway Intersection Information			
TW J & TW F		TDG	5
Additional Pavement (SYD)	484	$Cost_{Pvmt}$	145,233
Additional Shoulder (SYD)	145	$Cost_{Shoulder}$	6,085
Additional Marking		$Cost_{Marking}$	3,500
Lighting		$Cost_{Lighting}$	34,000
		$Cost_{Total}$	188,819

LEGEND

- Additional Full Strength Pavement
- Additional Shoulder Pavement

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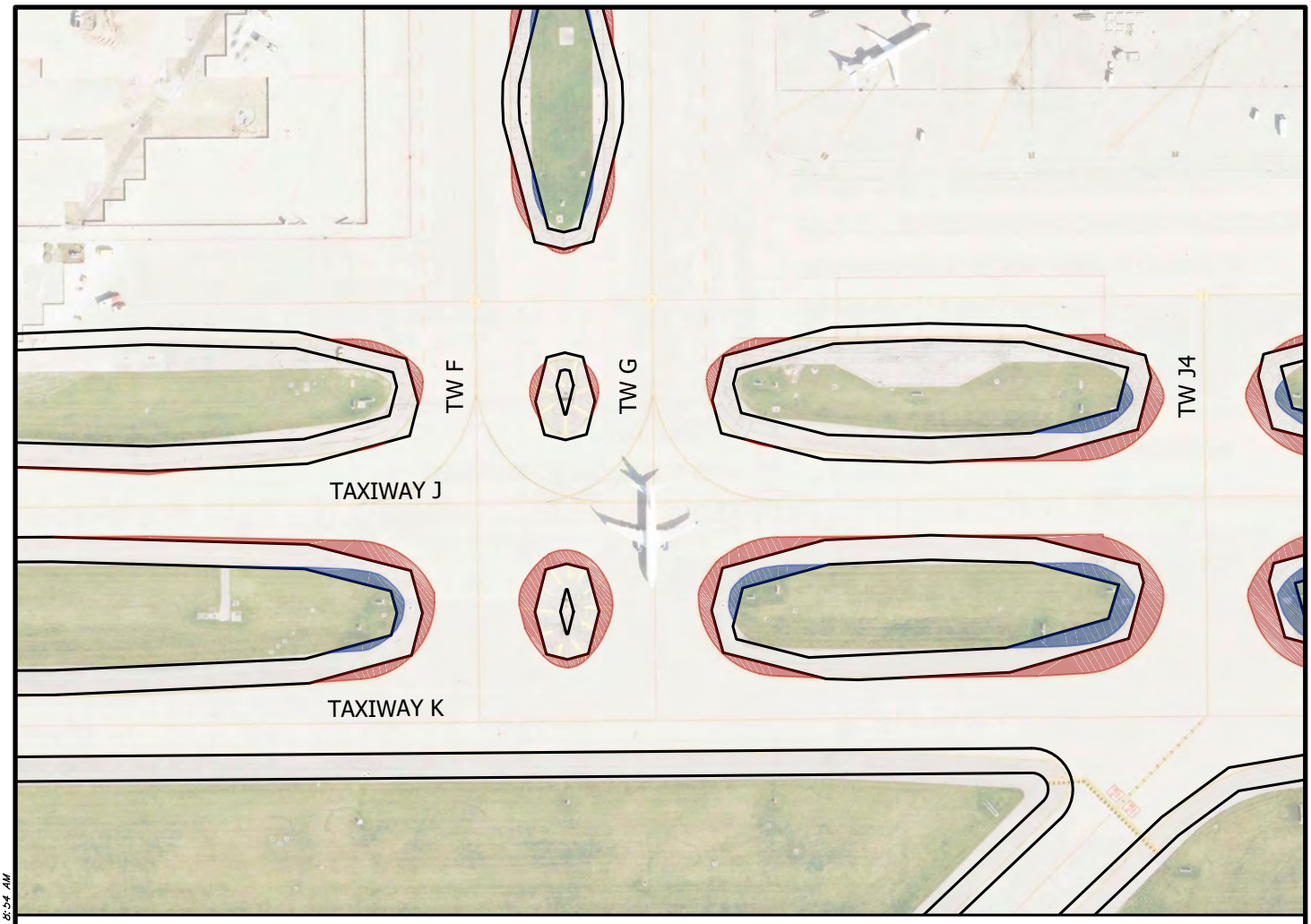


Taxiway Intersection Information		
TW J & TW G	TDG	5
Additional Pavement (SYD) 351	$Cost_{Pvmt}$	105,267
Additional Shoulder (SYD) 139	$Cost_{Shoulder}$	5,852
Additional Marking	$Cost_{Marking}$	3,500
Lighting	$Cost_{Lighting}$	34,000
	$Cost_{Total}$	148,619

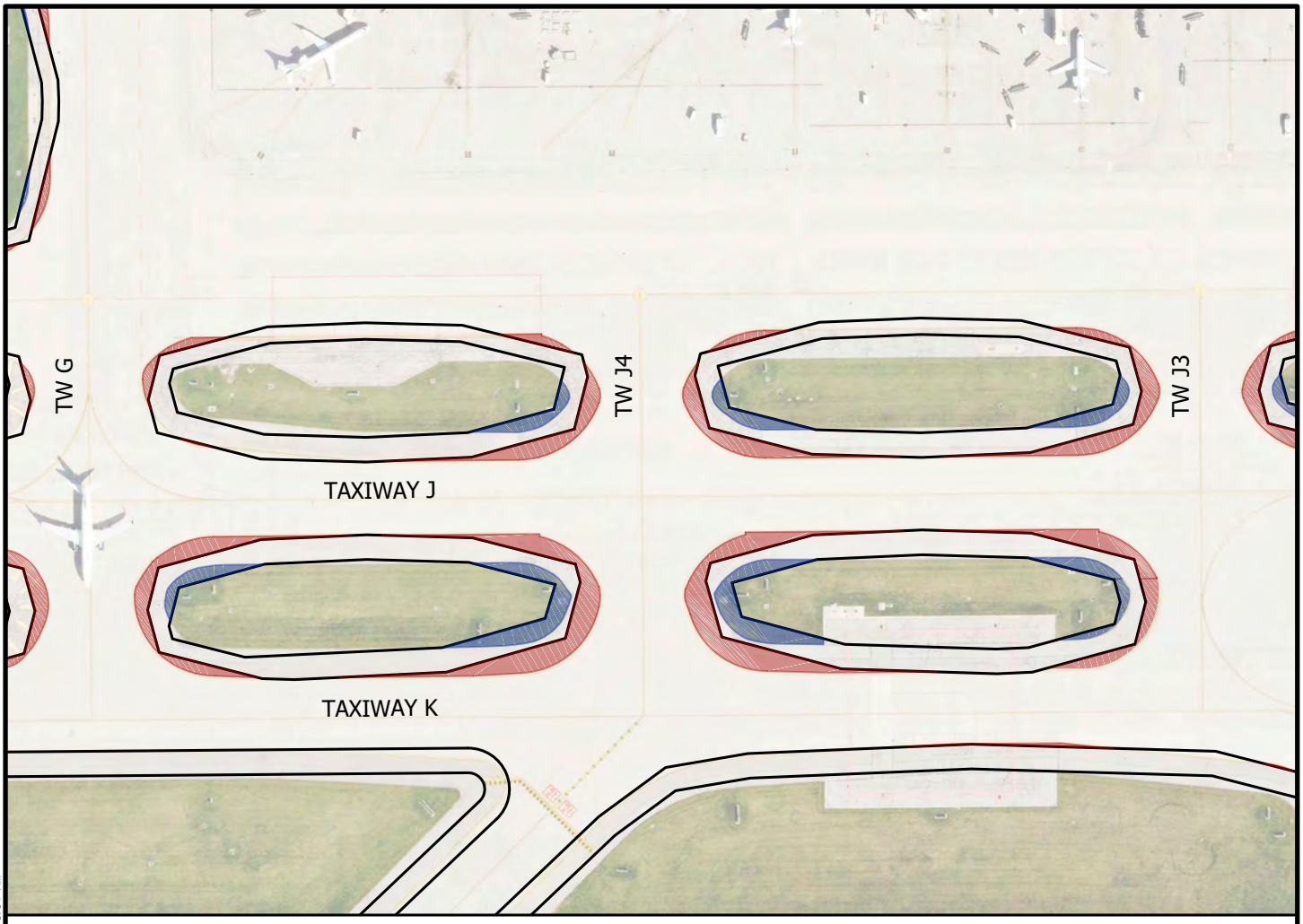
LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

Butler Fairman Seufert CIVIL ENGINEERS

CVG CINCINNATI/NORTHERN KENTUCKY INTERNATIONAL AIRPORT



Taxiway Intersection Information		
TW J & TW J4	TDG	6
Additional Pavement (SYD) 1390	$Cost_{Pvmt}$	417,000
Additional Shoulder (SYD) 639	$Cost_{Shoulder}$	26,829
Additional Marking	$Cost_{Marking}$	10,800
Lighting	$Cost_{Lighting}$	50,000
	$Cost_{Total}$	504,629

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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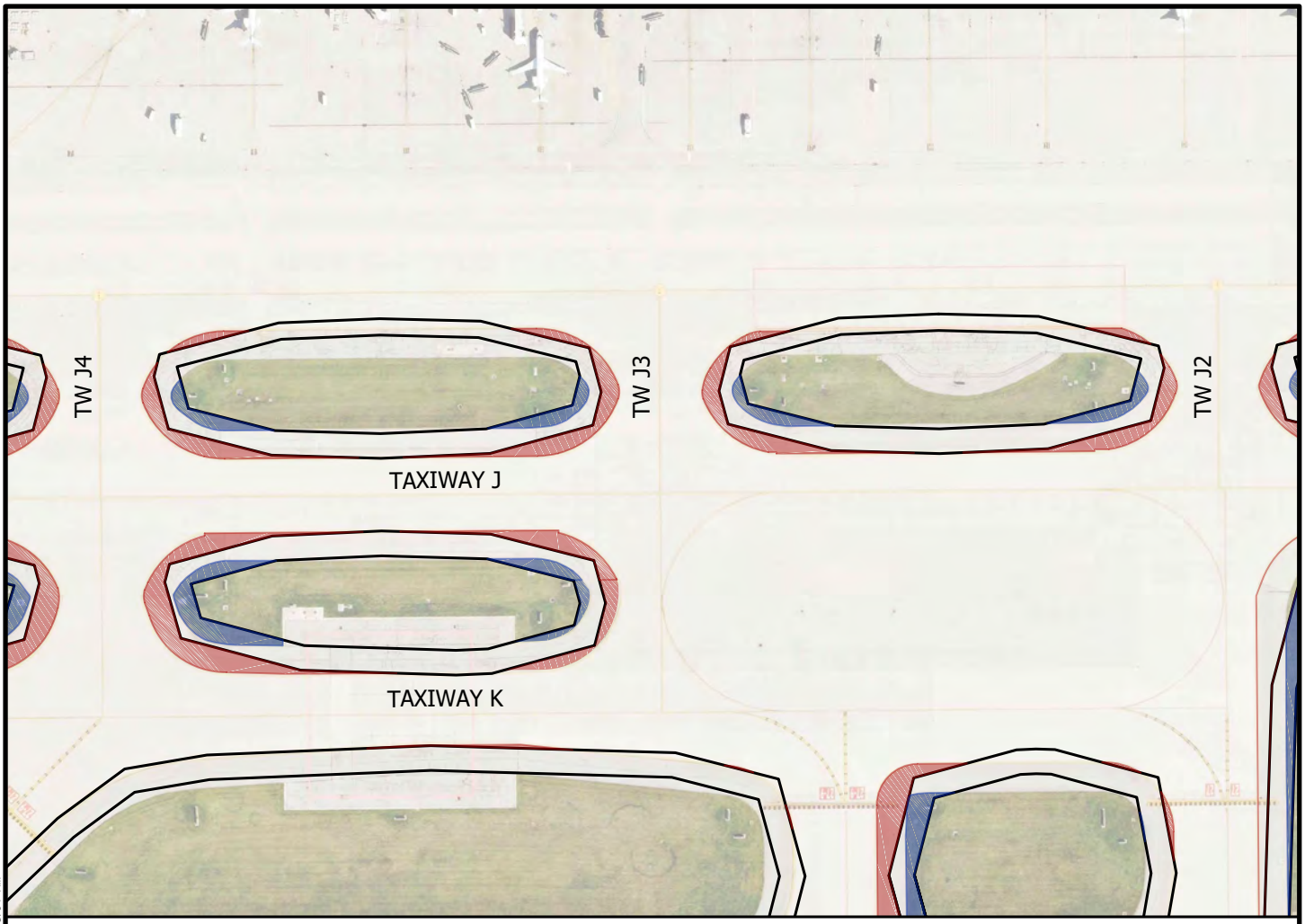

Taxiway Intersection Information		
TW J & TW J3	TDG	5
Additional Pavement (SYD) 1305	$Cost_{Pvmt}$	391,467
Additional Shoulder (SYD) 373	$Cost_{Shoulder}$	15,666
Additional Marking	$Cost_{Marking}$	6,800
Lighting	$Cost_{Lighting}$	30,000
	$Cost_{Total}$	443,933

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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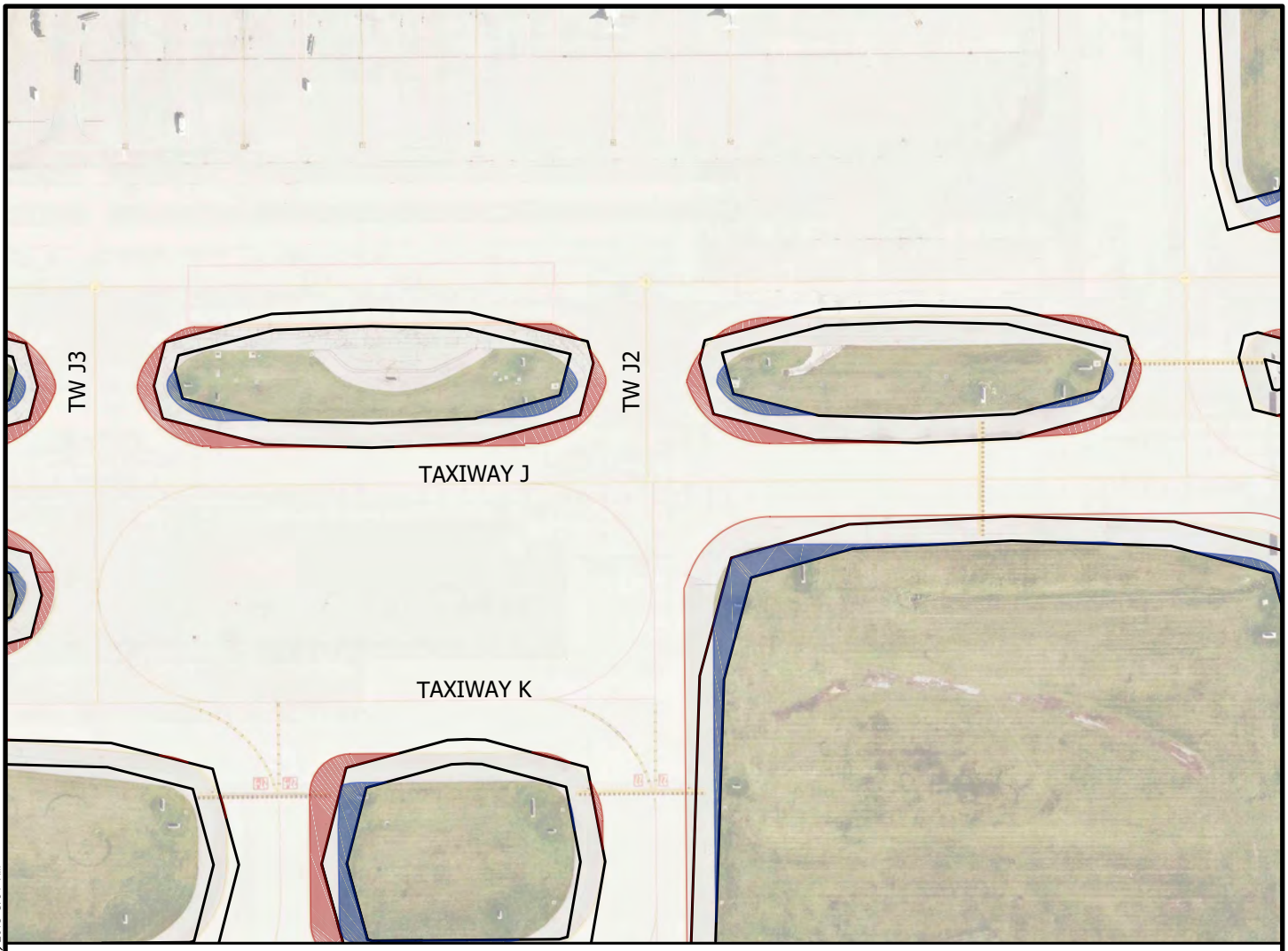

Taxiway Intersection Information		
TW J & TW J2	TDG	6
Additional Pavement (SYD) 2284	$Cost_{Pvmt}$	685,133
Additional Shoulder (SYD) 1295	$Cost_{Shoulder}$	54,376
Additional Marking	$Cost_{Marking}$	6,800
Lighting	$Cost_{Lighting}$	37,000
	$Cost_{Total}$	783,309

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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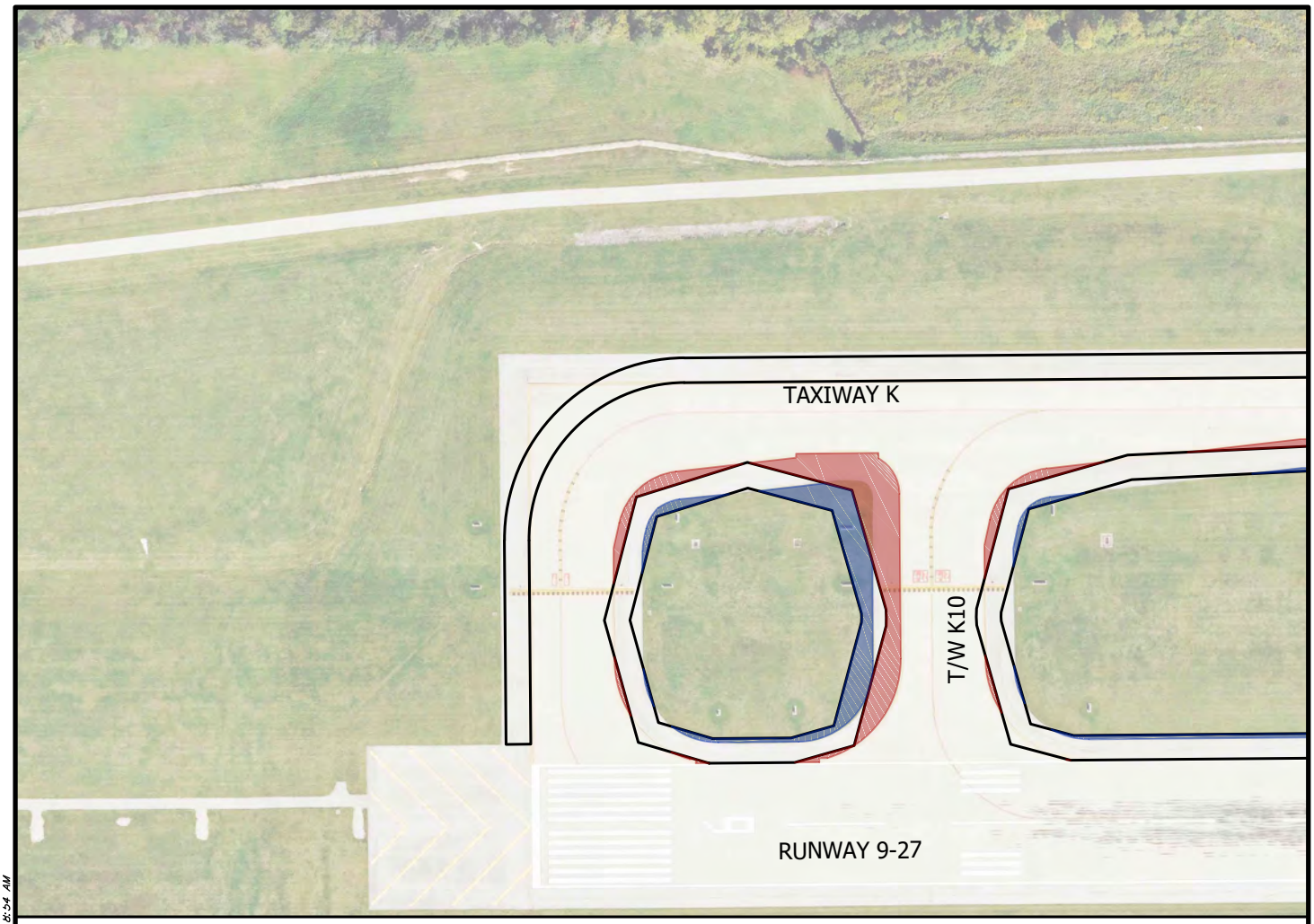

Taxiway Intersection Information		
TW K & TW K END CONN	TDG	6
Additional Pavement (SYD) 261	$Cost_{Pvmt}$	78,200
Additional Shoulder (SYD) 132	$Cost_{Shoulder}$	5,558
Additional Marking	$Cost_{Marking}$	2,550
Lighting	$Cost_{Lighting}$	22,000
	$Cost_{Total}$	108,308

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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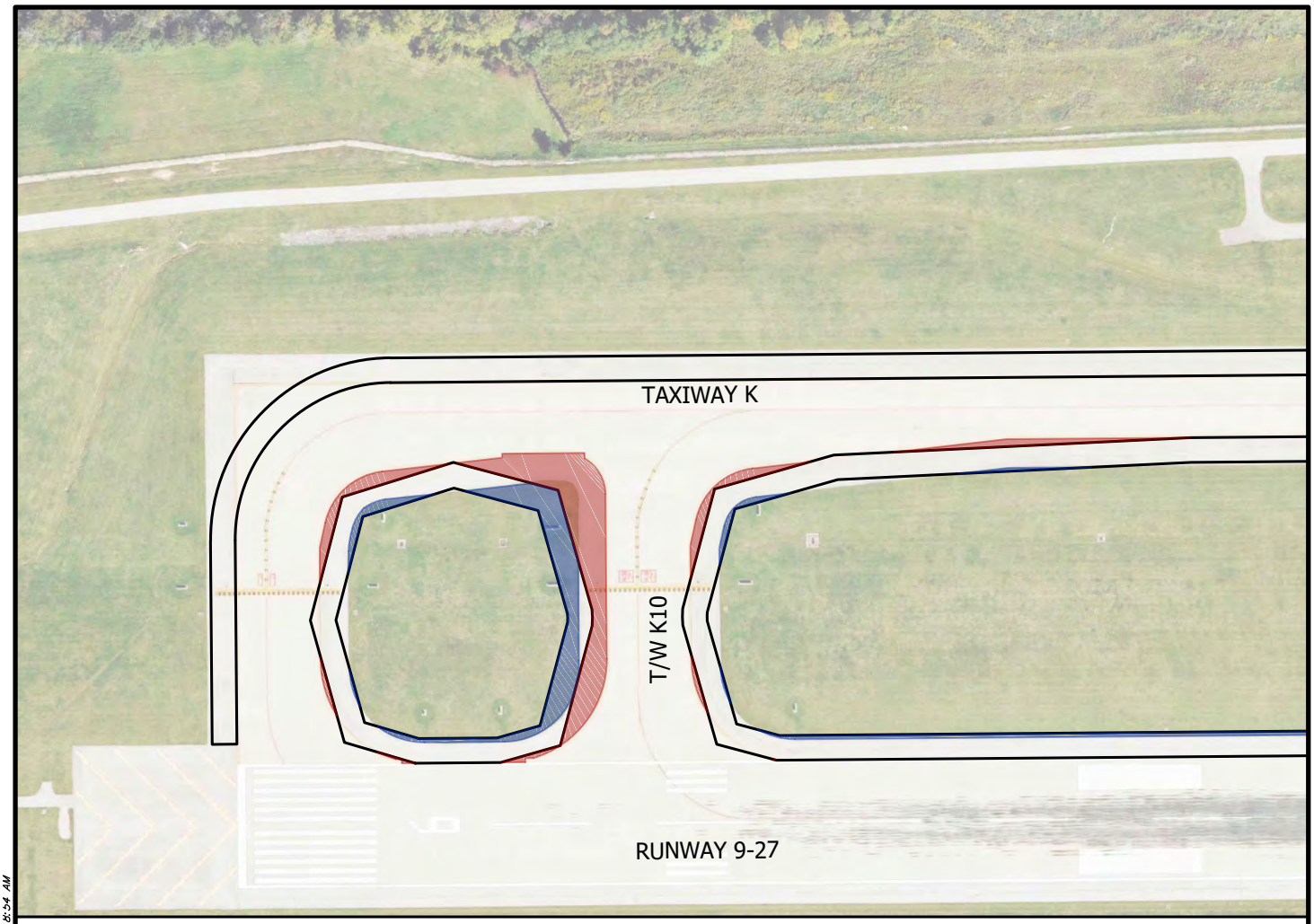
CVG CINCINNATI/NORTHERN KENTUCKY INTERNATIONAL AIRPORT



Taxiway Intersection Information		
TW K & TW K10	TDG	6
Additional Pavement (SYD) 1501	$Cost_{Pvmt}$	450,233
Additional Shoulder (SYD) 673	$Cost_{Shoulder}$	28,261
Additional Marking	$Cost_{Marking}$	5,000
Lighting	$Cost_{Lighting}$	54,000
	$Cost_{Total}$	537,495

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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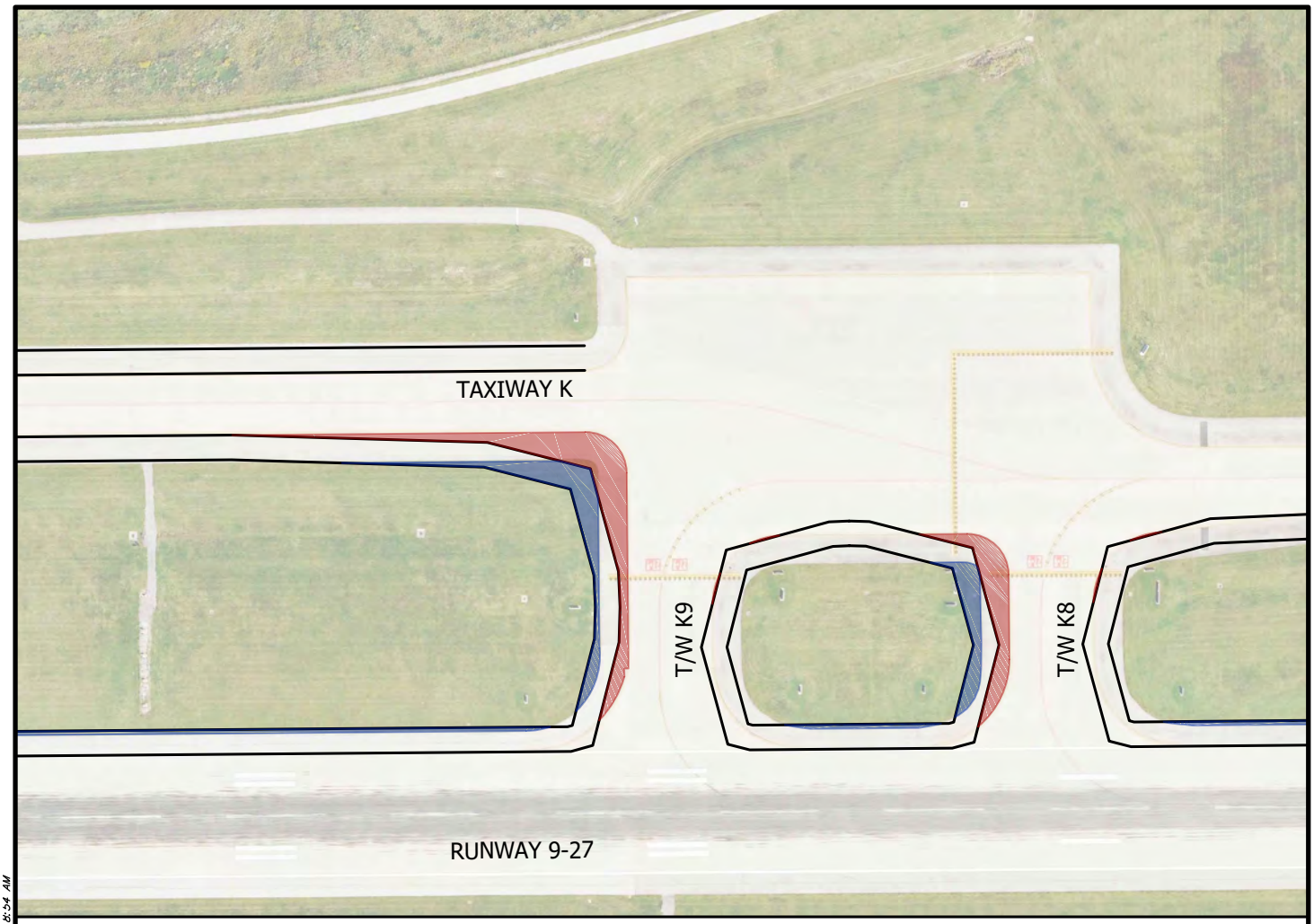

Taxiway Intersection Information		
TW K & TW K9	TDG	5
Additional Pavement (SYD) 1145	$Cost_{Pvmt}$	343,367
Additional Shoulder (SYD) 612	$Cost_{Shoulder}$	25,690
Additional Marking	$Cost_{Marking}$	3,000
Lighting	$Cost_{Lighting}$	28,000
	$Cost_{Total}$	400,057

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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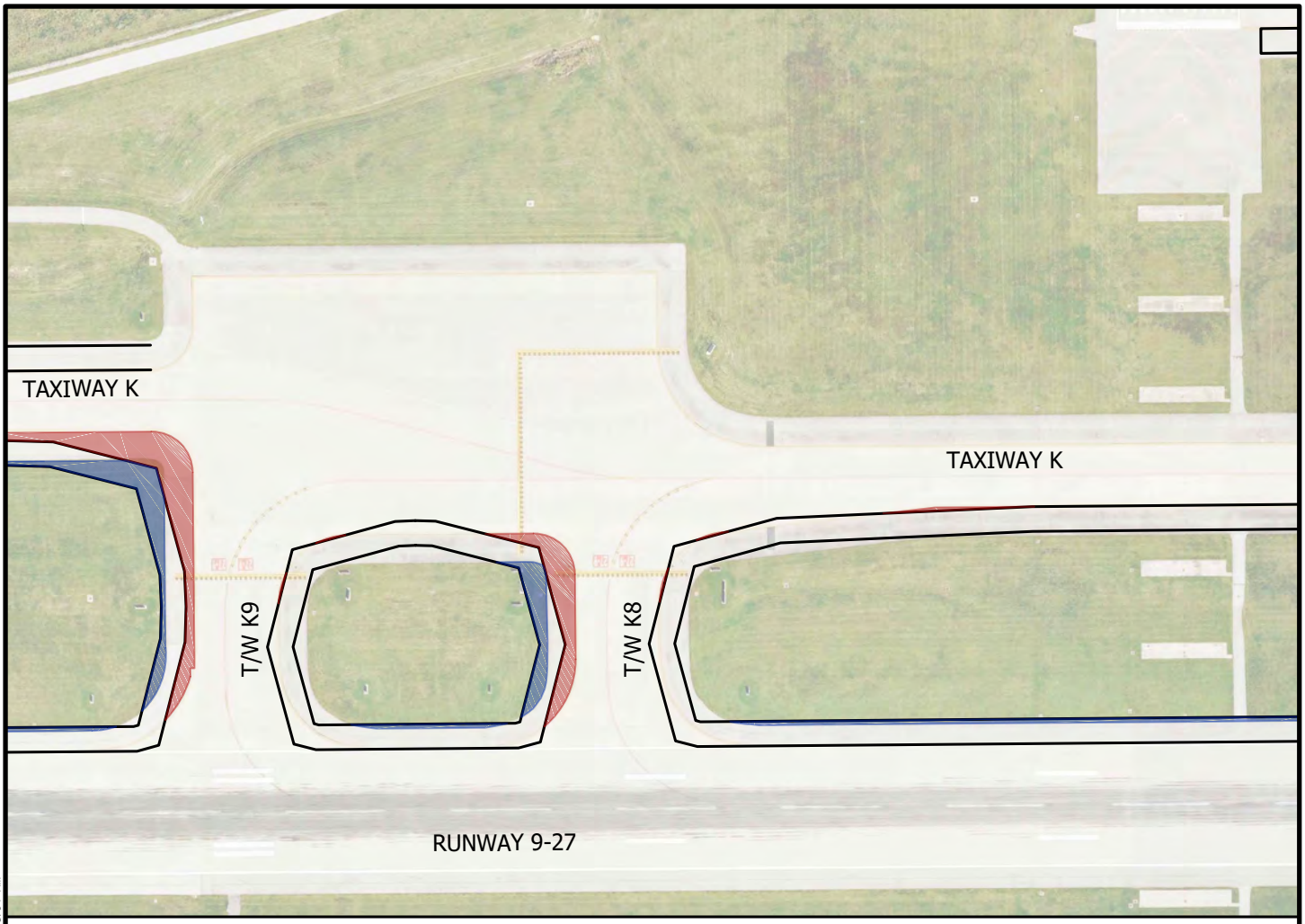

Taxiway Intersection Information		
TW K & TW K8	TDG	5
Additional Pavement (SYD) 288	$Cost_{Pvmt}$	86,433
Additional Shoulder (SYD) 52	$Cost_{Shoulder}$	2,175
Additional Marking	$Cost_{Marking}$	3,000
Lighting	$Cost_{Lighting}$	24,000
	$Cost_{Total}$	115,608

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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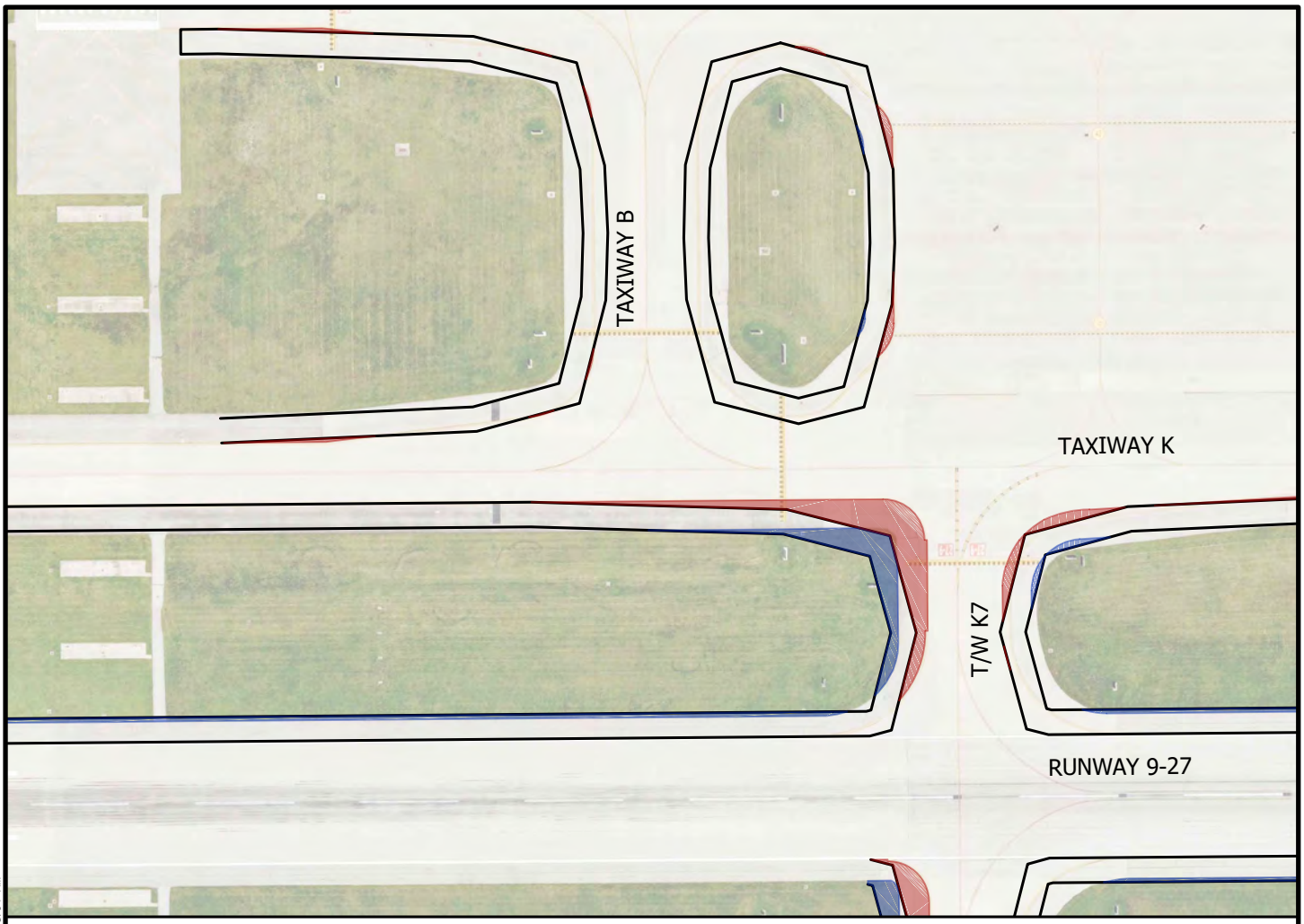
CVG CINCINNATI/NORTHERN KENTUCKY INTERNATIONAL AIRPORT



Taxiway Intersection Information		
TW K & TW B	TDG	5
Additional Pavement (SYD) 56	$Cost_{Pvmt}$	16,867
Additional Shoulder (SYD) 0	$Cost_{Shoulder}$	0
Additional Marking	$Cost_{Marking}$	7,600
Lighting	$Cost_{Lighting}$	36,000
	$Cost_{Total}$	60,467

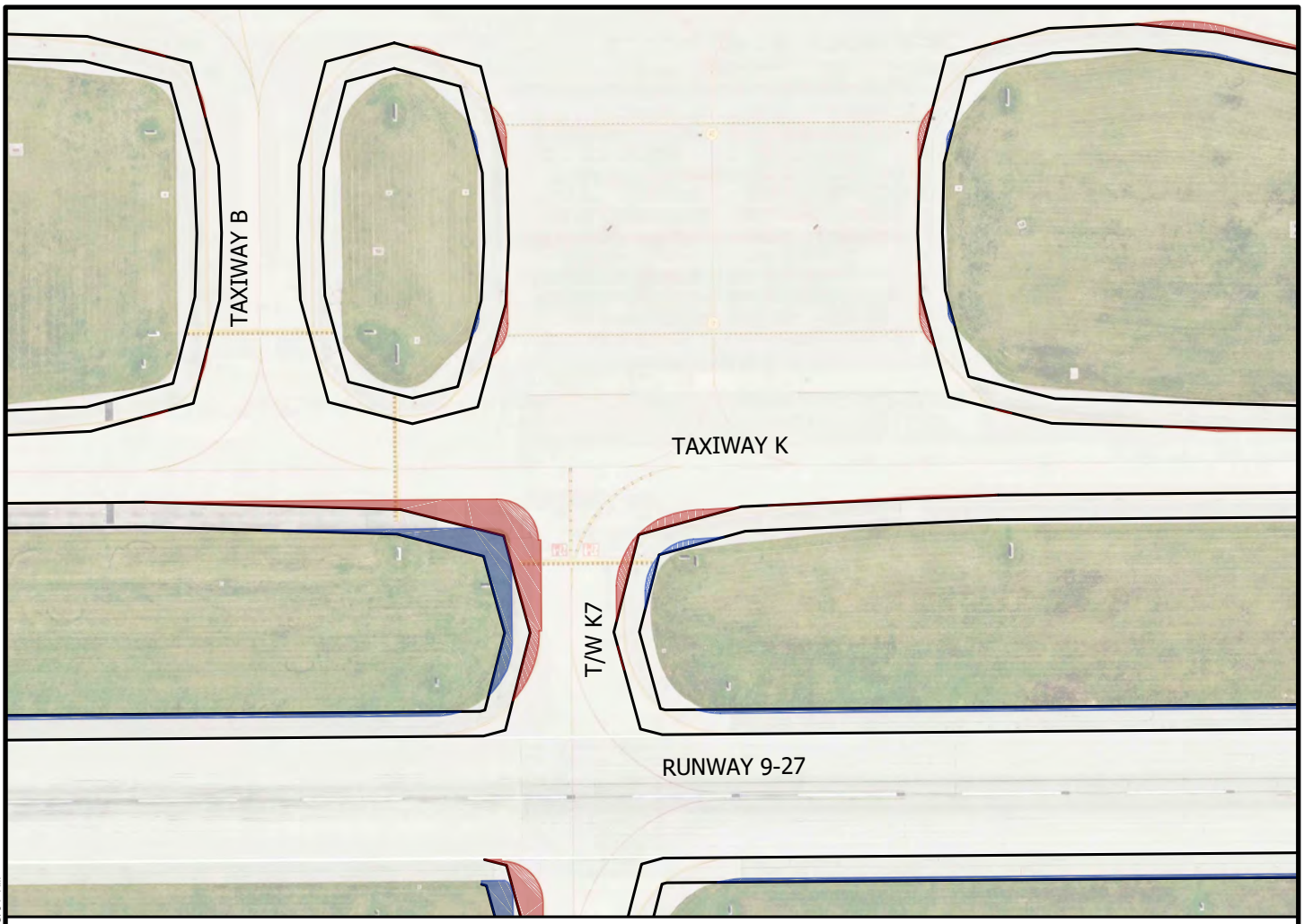
LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

Butler Fairman Seufert CIVIL ENGINEERS

CVG CINCINNATI/NORTHERN KENTUCKY INTERNATIONAL AIRPORT



Taxiway Intersection Information		
TW K & TW K7	TDG	5
Additional Pavement (SYD) 1069	$Cost_{Pvmt}$	320,633
Additional Shoulder (SYD) 440	$Cost_{Shoulder}$	18,461
Additional Marking	$Cost_{Marking}$	3,600
Lighting	$Cost_{Lighting}$	28,000
	$Cost_{Total}$	370,695

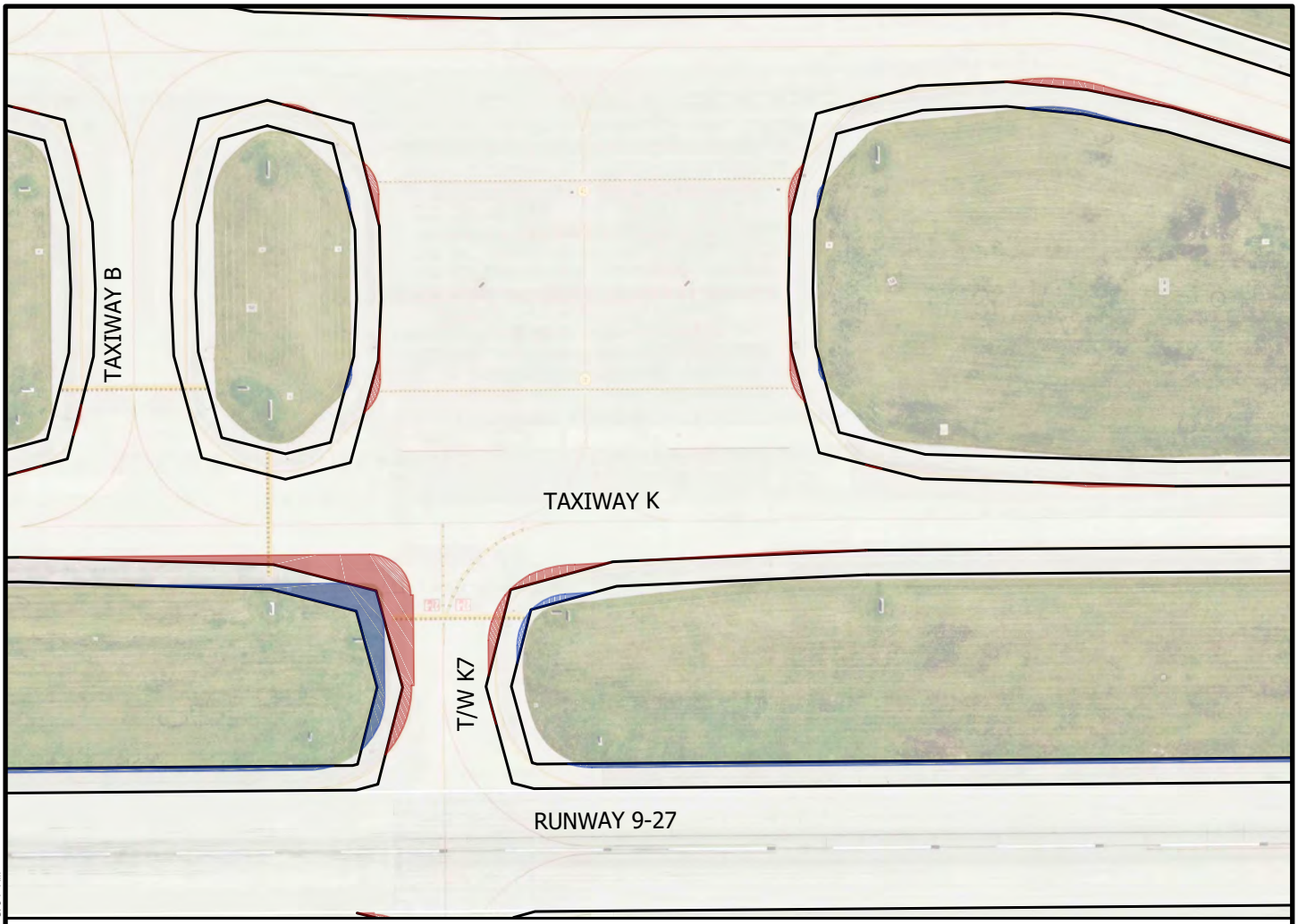
LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

Butler Fairman Seufert CIVIL ENGINEERS

CVG CINCINNATI/NORTHERN KENTUCKY INTERNATIONAL AIRPORT



Taxiway Intersection Information		
TW K & HOLD APRON	TDG	5
Additional Pavement (SYD) 143	$Cost_{Pvmt}$	42,833
Additional Shoulder (SYD) 17	$Cost_{Shoulder}$	714
Additional Marking	$Cost_{Marking}$	5,100
Lighting	$Cost_{Lighting}$	34,000
	$Cost_{Total}$	82,647

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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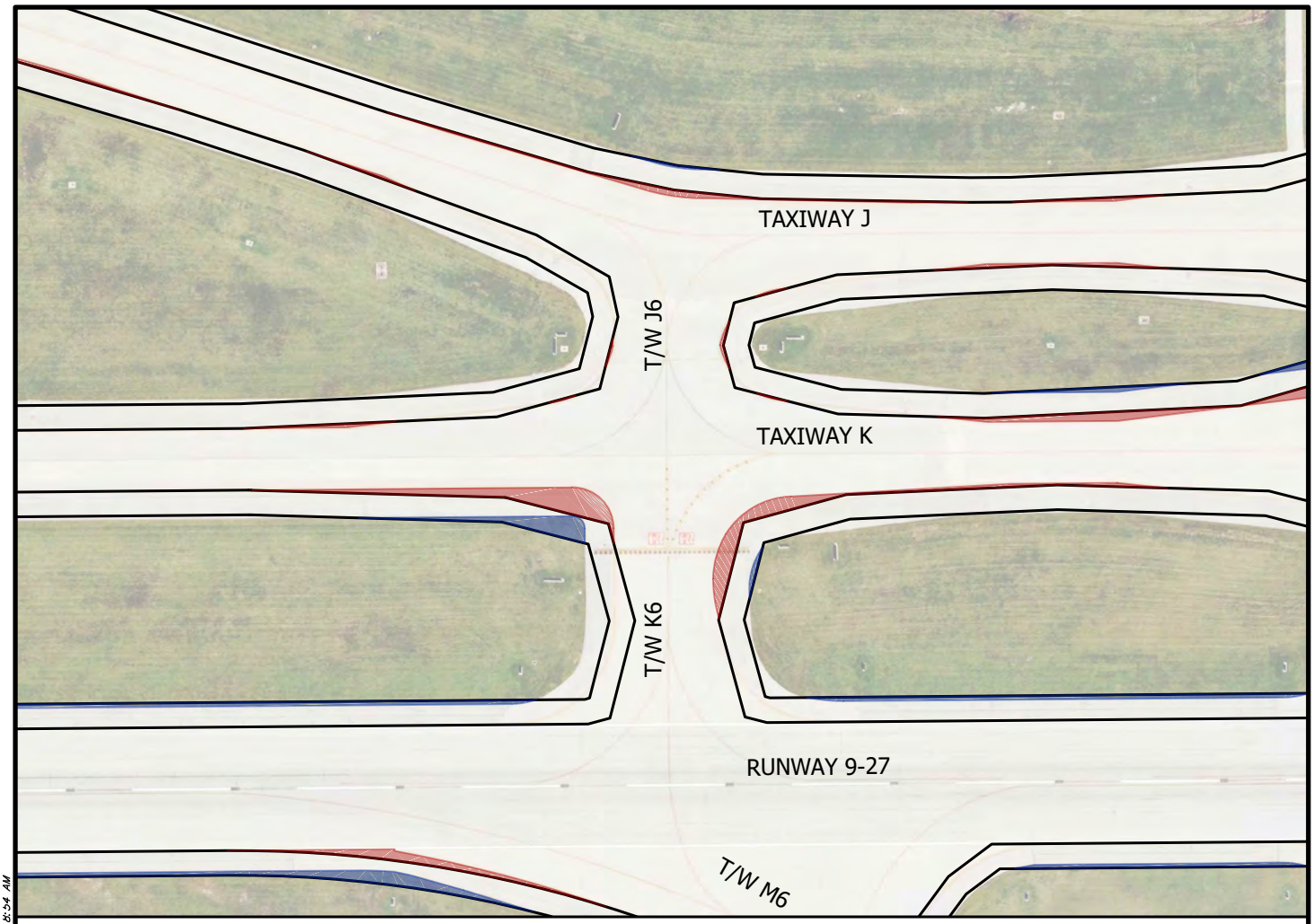

Taxiway Intersection Information		
TW K & TW K6	TDG	5
Additional Pavement (SYD) 936	$Cost_{Pvmt}$	280,833
Additional Shoulder (SYD) 278	$Cost_{Shoulder}$	11,695
Additional Marking	$Cost_{Marking}$	6,000
Lighting	$Cost_{Lighting}$	24,000
	$Cost_{Total}$	322,528

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

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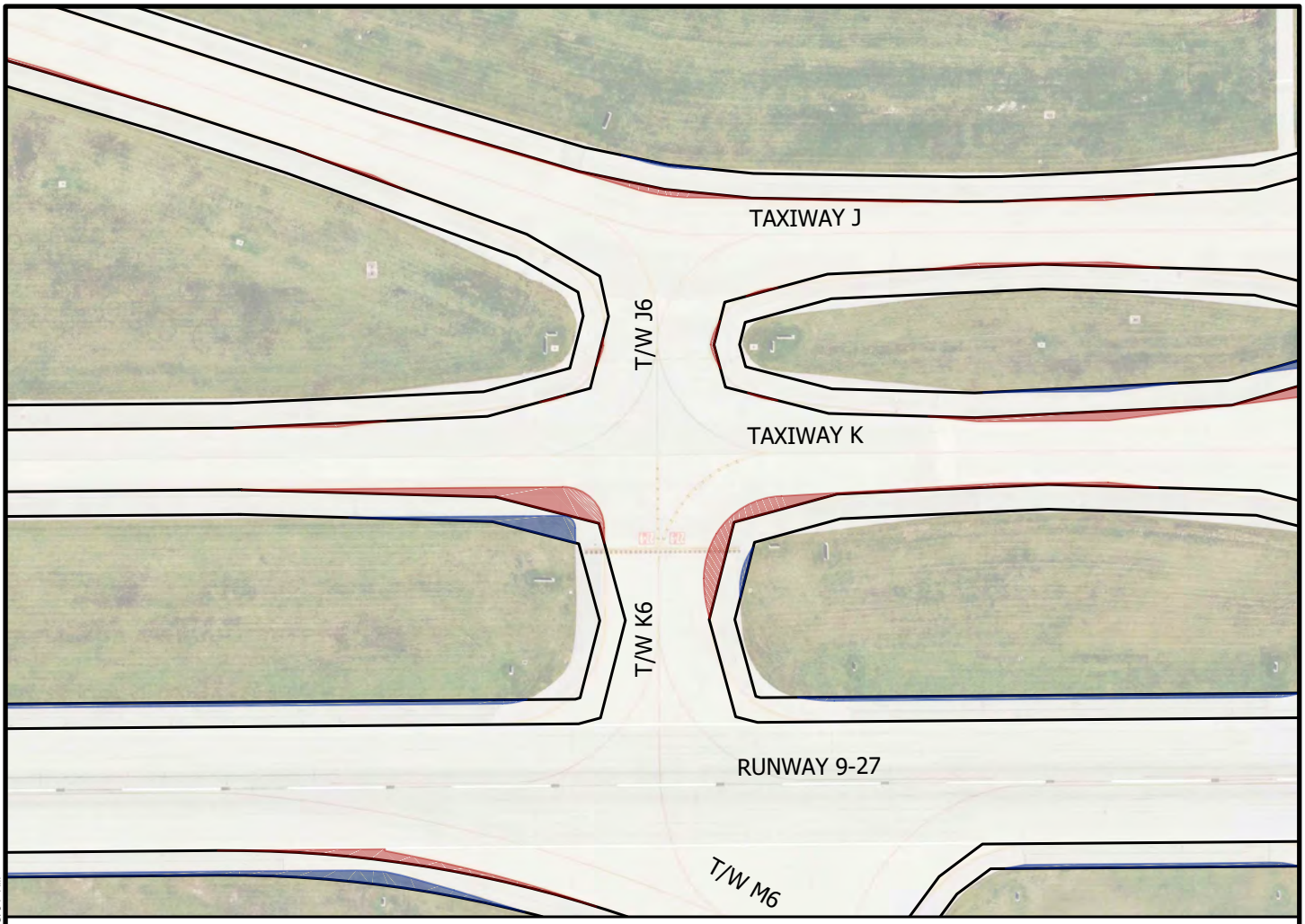


Taxiway Intersection Information		
TW K & TW J6	TDG	5
Additional Pavement (SYD) 73	$Cost_{Pvmt}$	21,867
Additional Shoulder (SYD) 0	$Cost_{Shoulder}$	0
Additional Marking	$Cost_{Marking}$	5,000
Lighting	$Cost_{Lighting}$	24,000
	$Cost_{Total}$	50,867

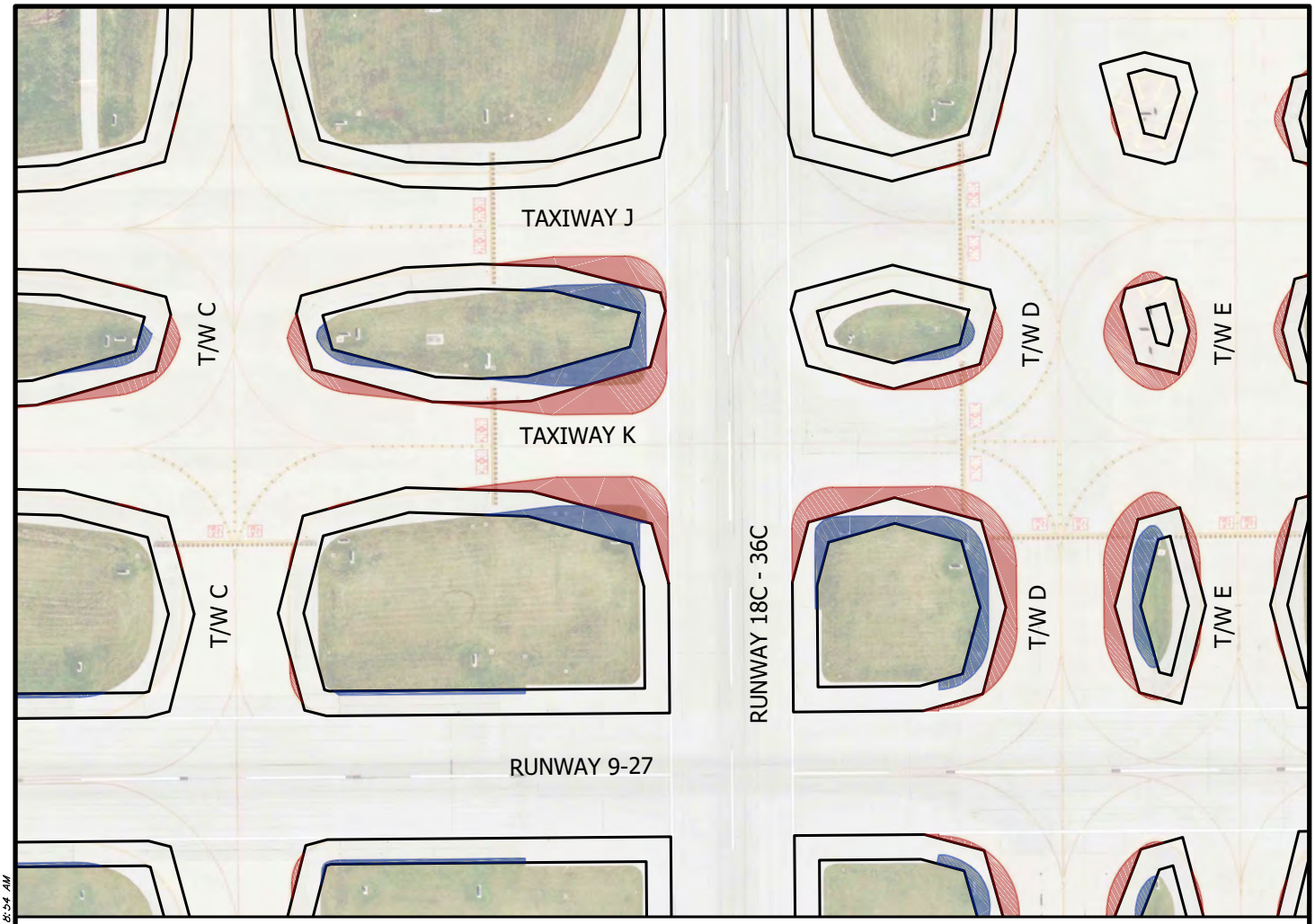
LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

Butler Fairman Seufert CIVIL ENGINEERS

CVG CINCINNATI/NORTHERN KENTUCKY INTERNATIONAL AIRPORT



Taxiway Intersection Information		
TW K & RW 18C	TDG	6
Additional Pavement (SYD) 2107	$Cost_{Pvmt}$	632,133
Additional Shoulder (SYD) 1210	$Cost_{Shoulder}$	50,811
Additional Marking	$Cost_{Marking}$	8,500
Lighting	$Cost_{Lighting}$	49,000
	$Cost_{Total}$	740,444

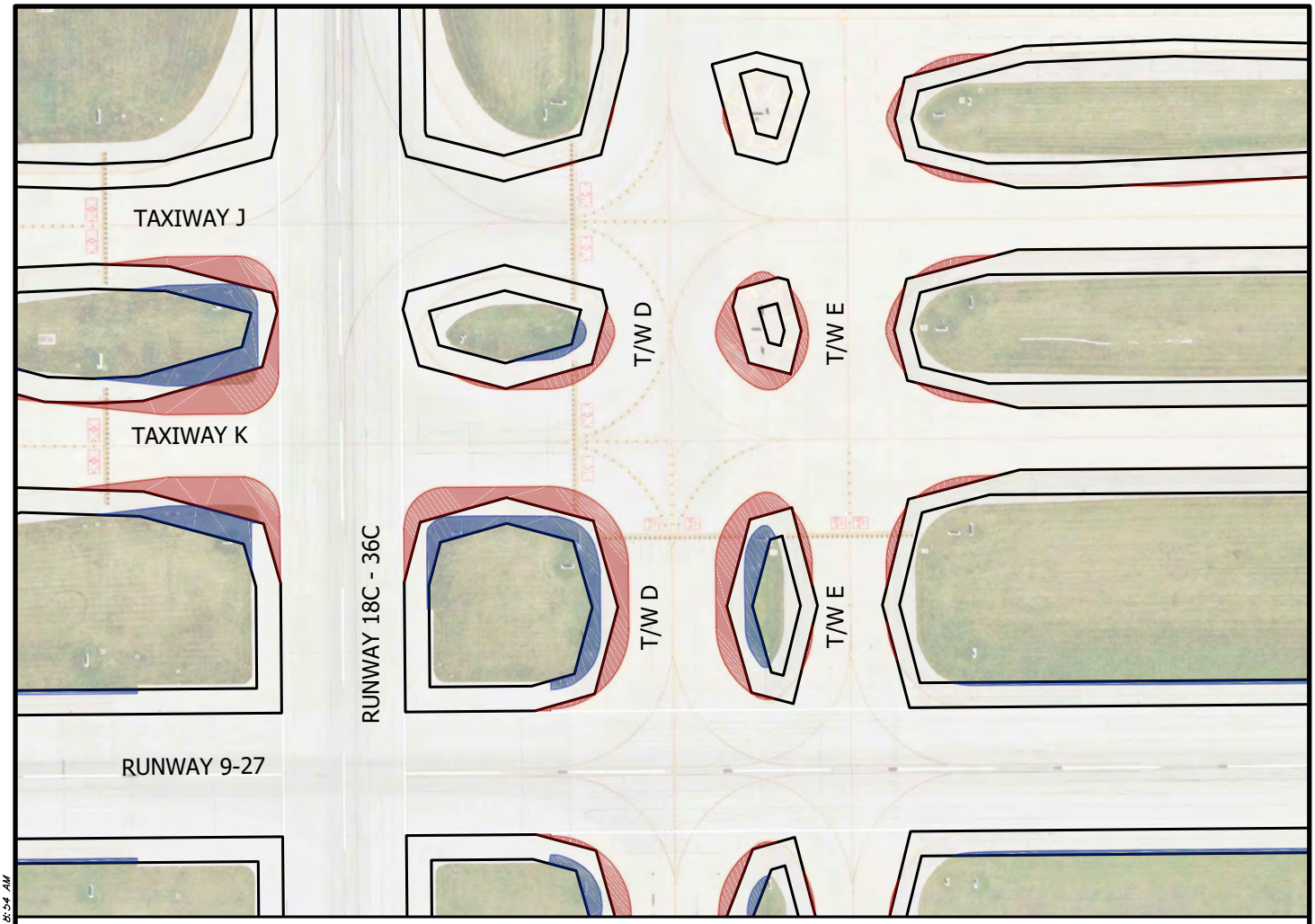
LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

BF&S Butler Fairman Seufert CIVIL ENGINEERS

CVG CINCINNATI/NORTHERN KENTUCKY INTERNATIONAL AIRPORT



Taxiway Intersection Information		
TW K & TW D	TDG	6
Additional Pavement (SYD) 1227	$Cost_{Pvmt}$	368,133
Additional Shoulder (SYD) 281	$Cost_{Shoulder}$	11,783
Additional Marking	$Cost_{Marking}$	6,800
Lighting	$Cost_{Lighting}$	44,000
	$Cost_{Total}$	430,717

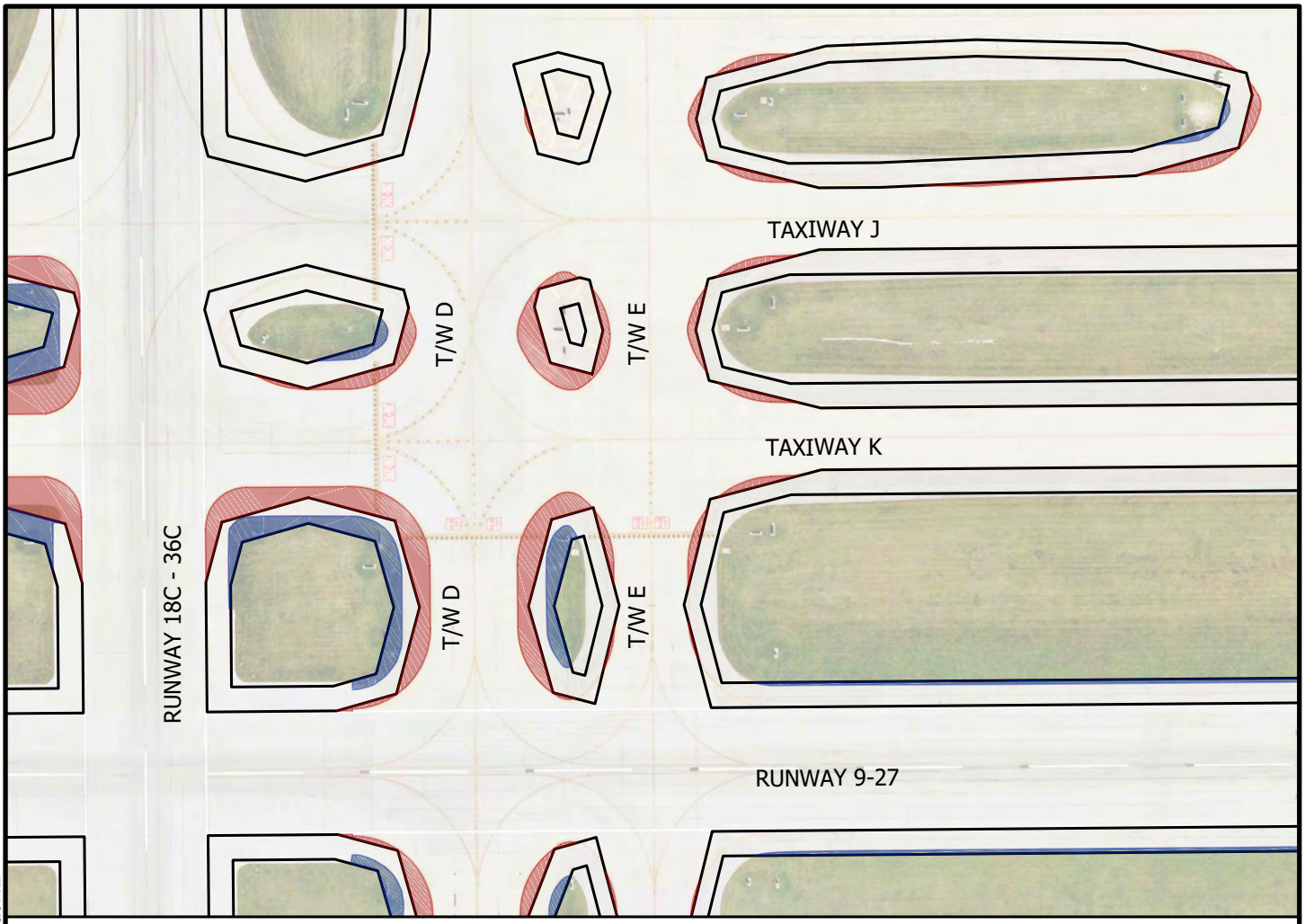
LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

Butler Fairman Seufert CIVIL ENGINEERS

CVG CINCINNATI/NORTHERN KENTUCKY INTERNATIONAL AIRPORT



Taxiway Intersection Information		
TW K & TW E	TDG	4
Additional Pavement (SYD) 397	$Cost_{Pvmt}$	119,167
Additional Shoulder (SYD) 0	$Cost_{Shoulder}$	0
Additional Marking	$Cost_{Marking}$	6,800
Lighting	$Cost_{Lighting}$	32,000
	$Cost_{Total}$	157,967

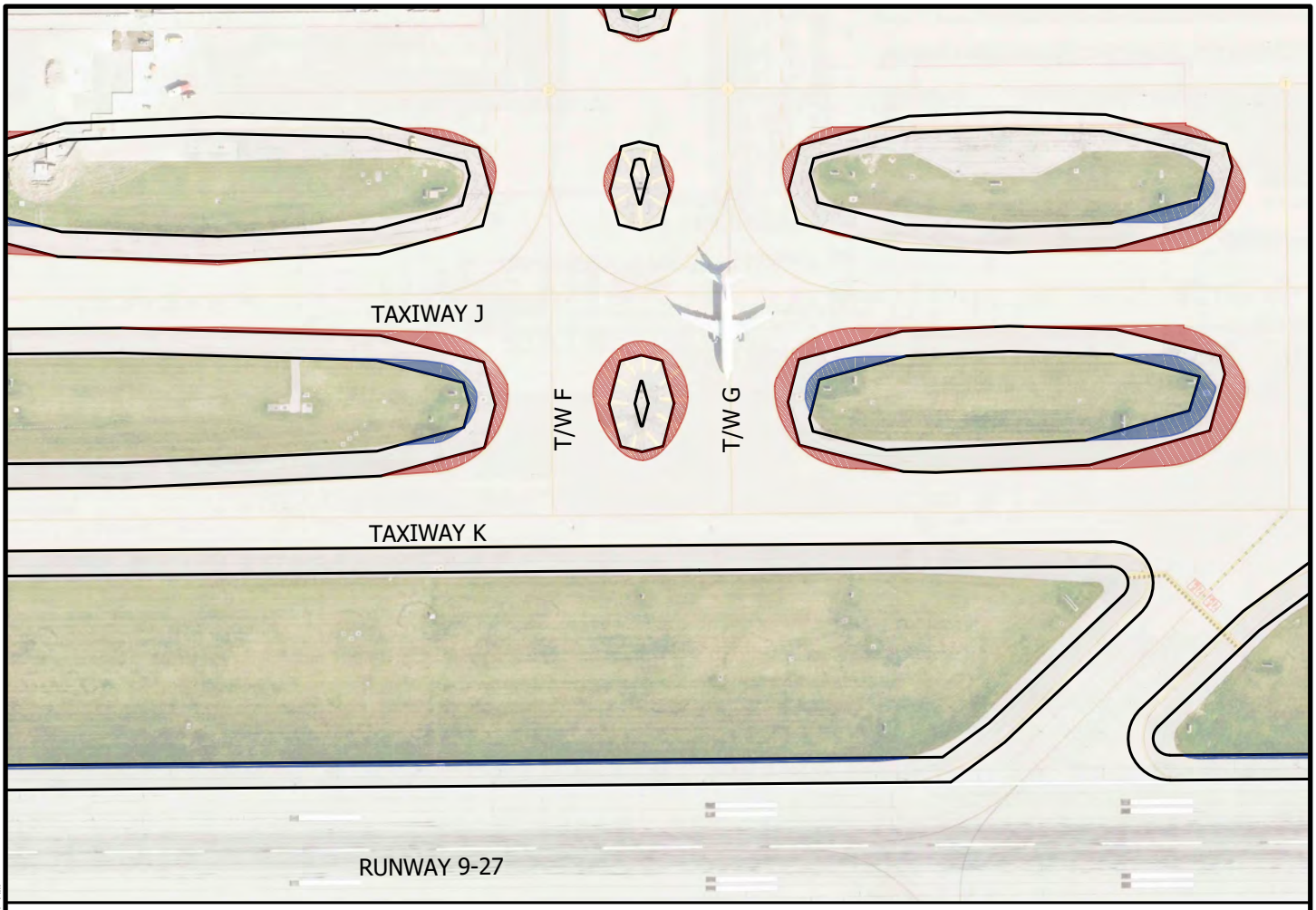
LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

Butler Fairman Seufert CIVIL ENGINEERS

CVG CINCINNATI/NORTHERN KENTUCKY INTERNATIONAL AIRPORT



Taxiway Intersection Information		
TW K & TW F	TDG	5
Additional Pavement (SYD) 536	$Cost_{Pvmt}$	160,733
Additional Shoulder (SYD) 97	$Cost_{Shoulder}$	4,088
Additional Marking	$Cost_{Marking}$	2,200
Lighting	$Cost_{Lighting}$	24,000
	$Cost_{Total}$	191,021

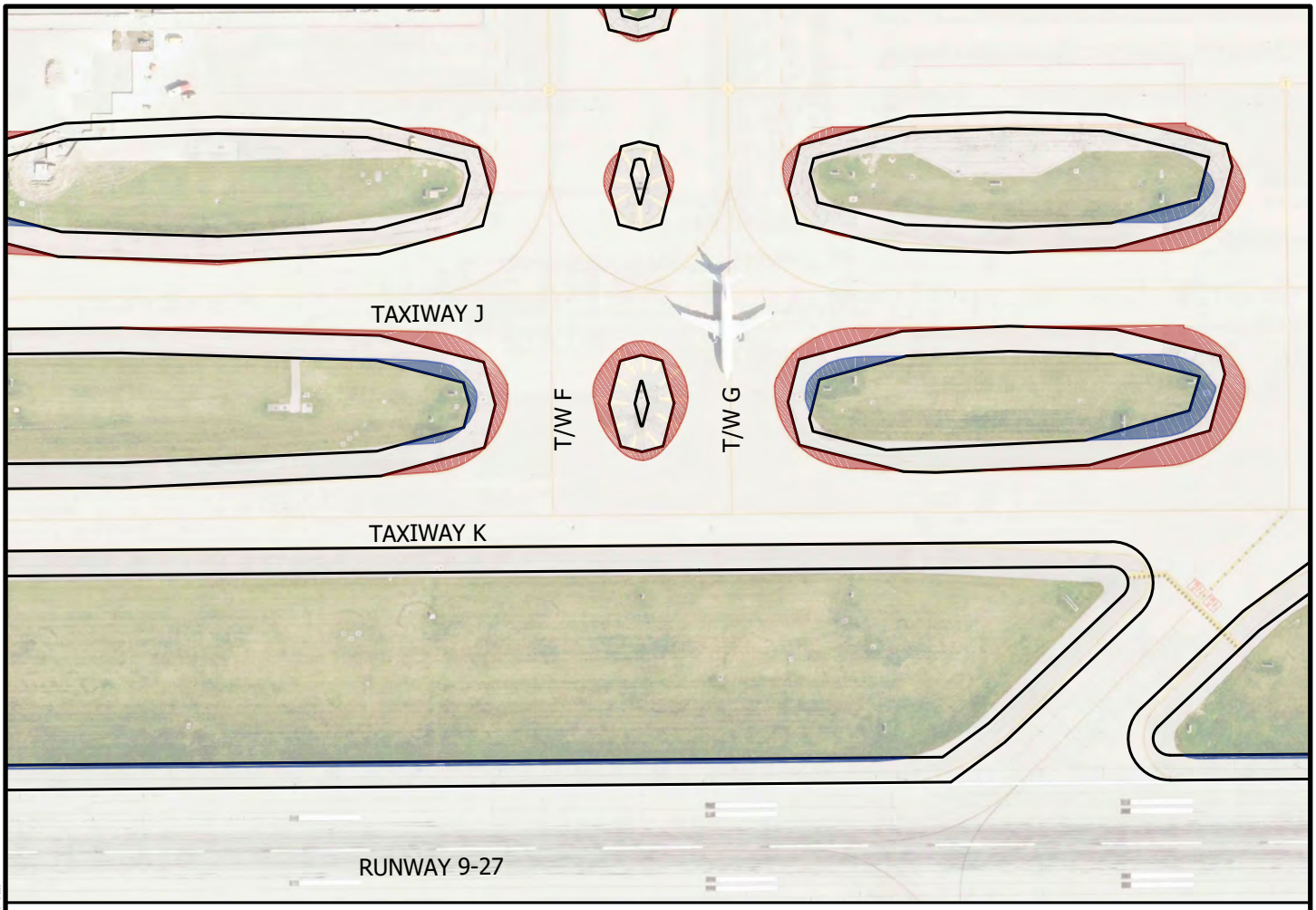
LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

BF&S Butler Fairman Seufert CIVIL ENGINEERS

CVG CINCINNATI/NORTHERN KENTUCKY INTERNATIONAL AIRPORT



Taxiway Intersection Information		
TW K & TW G	TDG	5
Additional Pavement (SYD) 544	$Cost_{Pvmt}$	163,333
Additional Shoulder (SYD) 45	$Cost_{Shoulder}$	1,904
Additional Marking	$Cost_{Marking}$	2,200
Lighting	$Cost_{Lighting}$	14,000
	$Cost_{Total}$	181,437

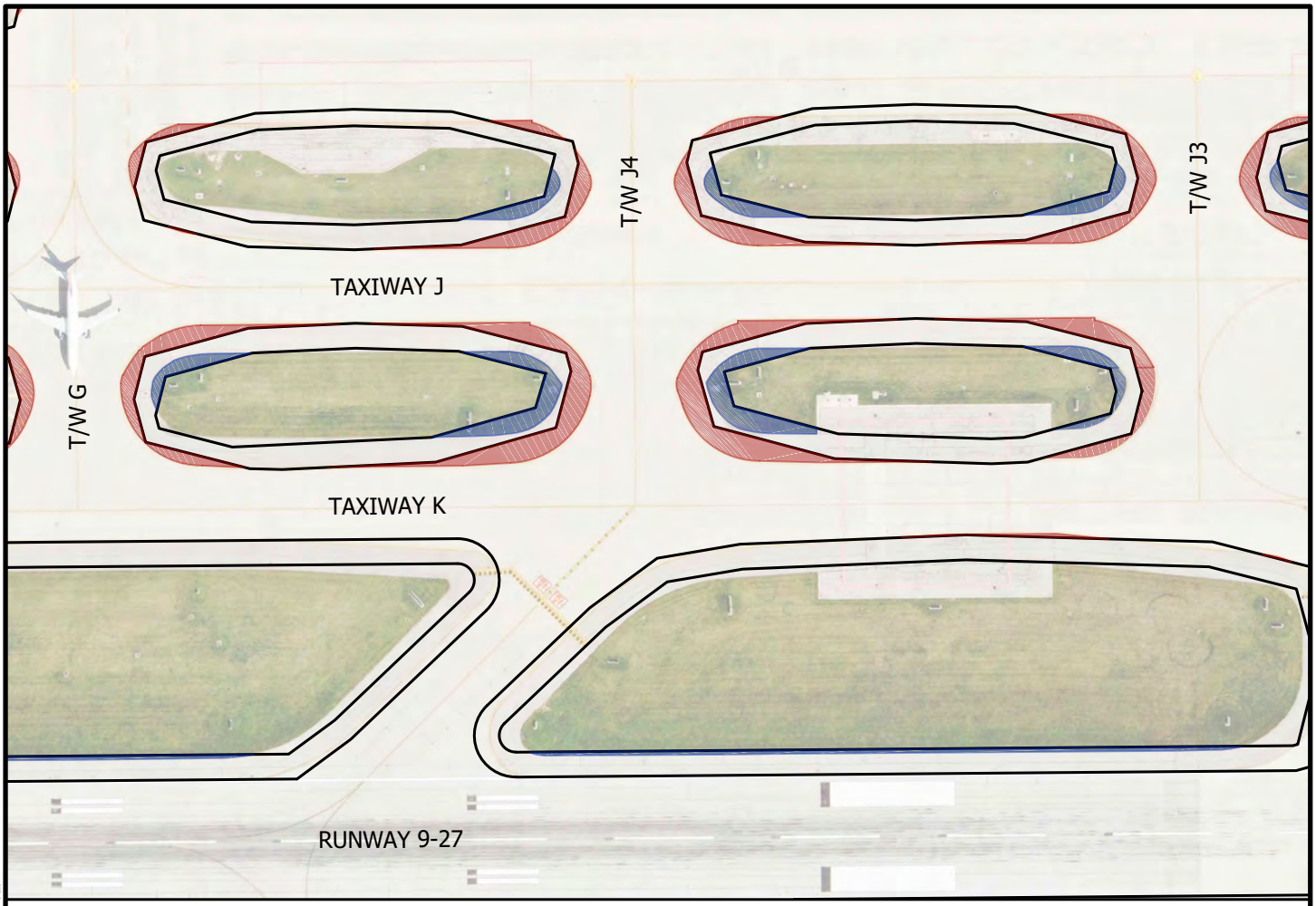
LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

BF&S Butler Fairman Seufert CIVIL ENGINEERS

CVG CINCINNATI/NORTHERN KENTUCKY INTERNATIONAL AIRPORT



Taxiway Intersection Information		
TW K & TW J4	TDG	6
Additional Pavement (SYD) 615	$Cost_{Pvmt}$	184,367
Additional Shoulder (SYD) 272	$Cost_{Shoulder}$	11,419
Additional Marking	$Cost_{Marking}$	4,400
Lighting	$Cost_{Lighting}$	37,000
	$Cost_{Total}$	237,186

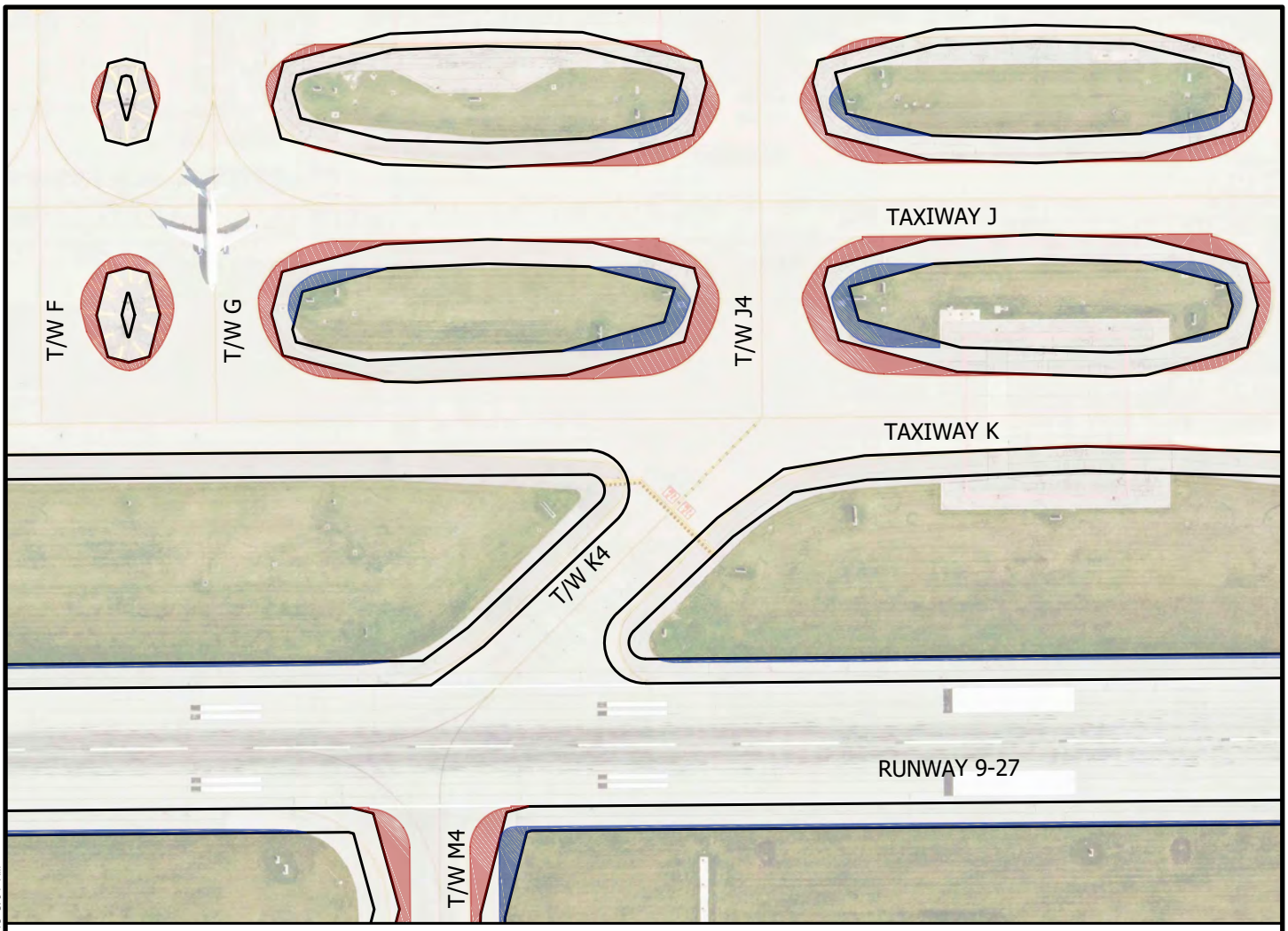
LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

Butler Fairman Seufert CIVIL ENGINEERS

CVG CINCINNATI/NORTHERN KENTUCKY INTERNATIONAL AIRPORT



Taxiway Intersection Information		
TW K & TW K4	TDG	5
Additional Pavement (SYD) 0	$Cost_{Pvmt}$	0
Additional Shoulder (SYD) 0	$Cost_{Shoulder}$	0
Additional Marking	$Cost_{Marking}$	4,300
Lighting	$Cost_{Lighting}$	28,000
	$Cost_{Total}$	32,300

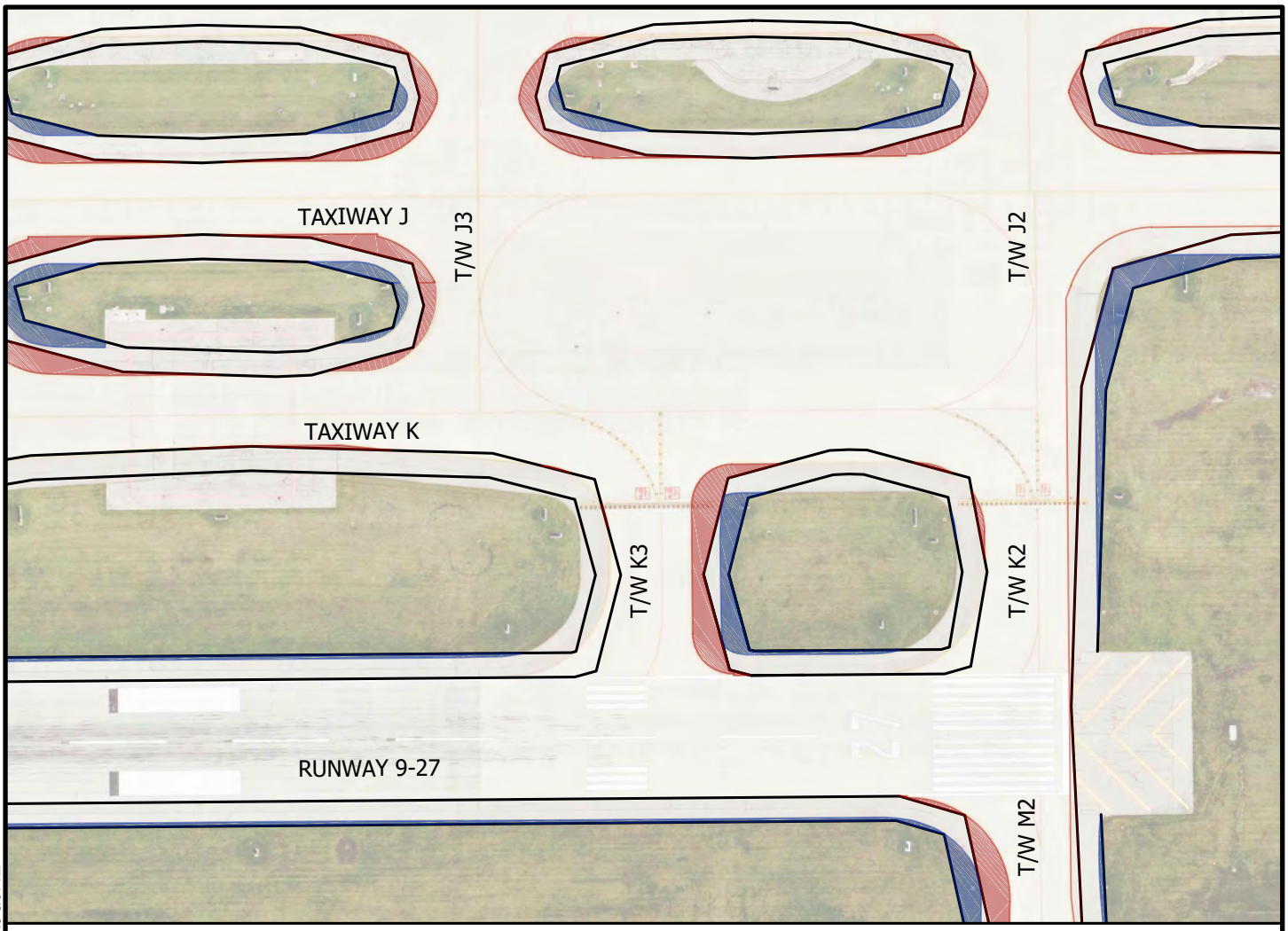
LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

BF&S Butler Fairman Seufert CIVIL ENGINEERS

CVG CINCINNATI/NORTHERN KENTUCKY INTERNATIONAL AIRPORT



Taxiway Intersection Information		
TW K & TW K3	TDG	5
Additional Pavement (SYD) 59	$Cost_{Pvmt}$	17,800
Additional Shoulder (SYD) 0	$Cost_{Shoulder}$	0
Additional Marking	$Cost_{Marking}$	1,850
Lighting	$Cost_{Lighting}$	20,000
	$Cost_{Total}$	39,650

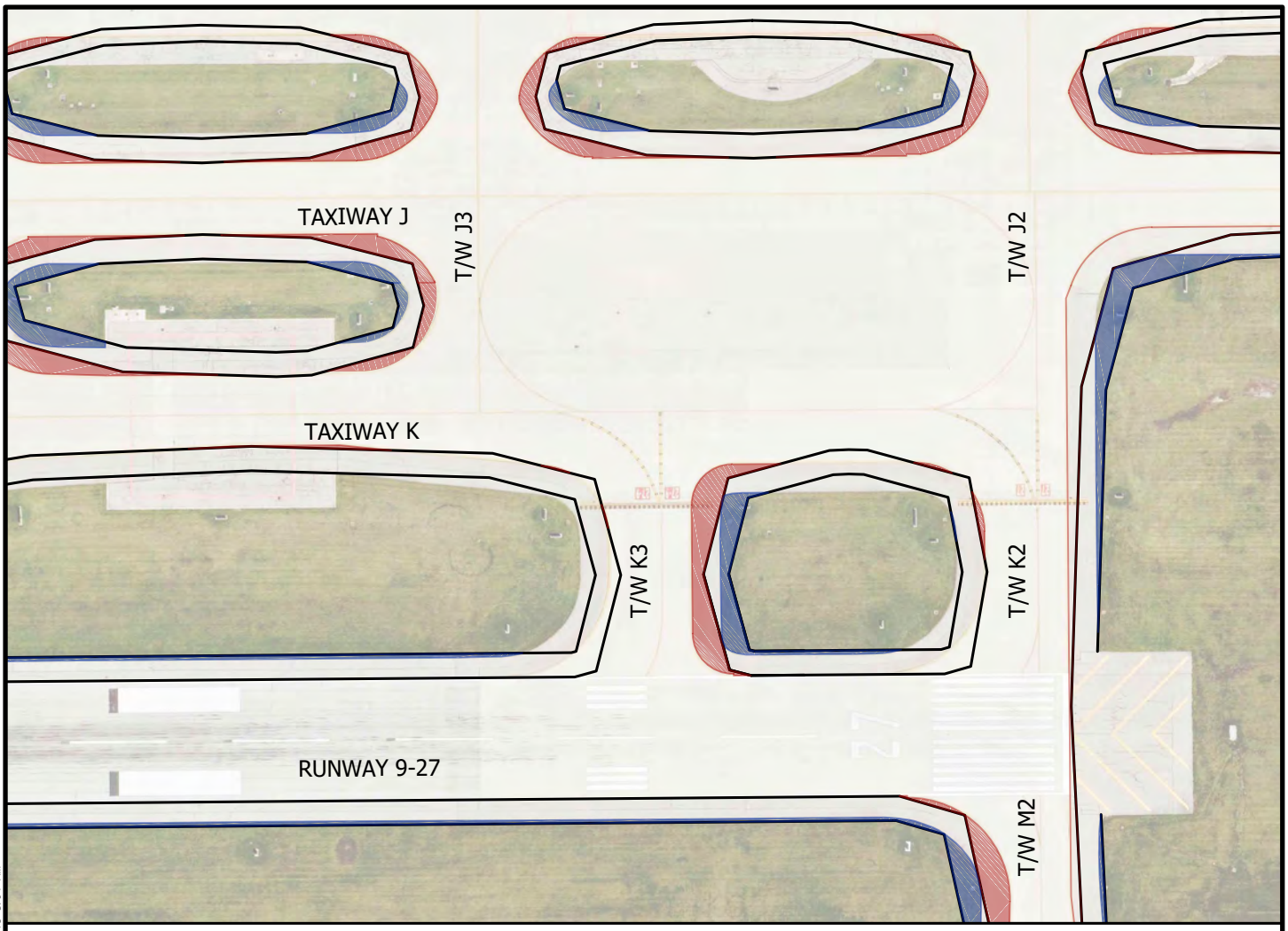
LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

BF&S Butler Fairman Seufert CIVIL ENGINEERS

CVG CINCINNATI/NORTHERN KENTUCKY INTERNATIONAL AIRPORT



Taxiway Intersection Information		
TW K & TW J3	TDG	5
Additional Pavement (SYD) 311	$Cost_{Pvmt}$	93,400
Additional Shoulder (SYD) 137	$Cost_{Shoulder}$	5,763
Additional Marking	$Cost_{Marking}$	1,650
Lighting	$Cost_{Lighting}$	8,000
	$Cost_{Total}$	108,813

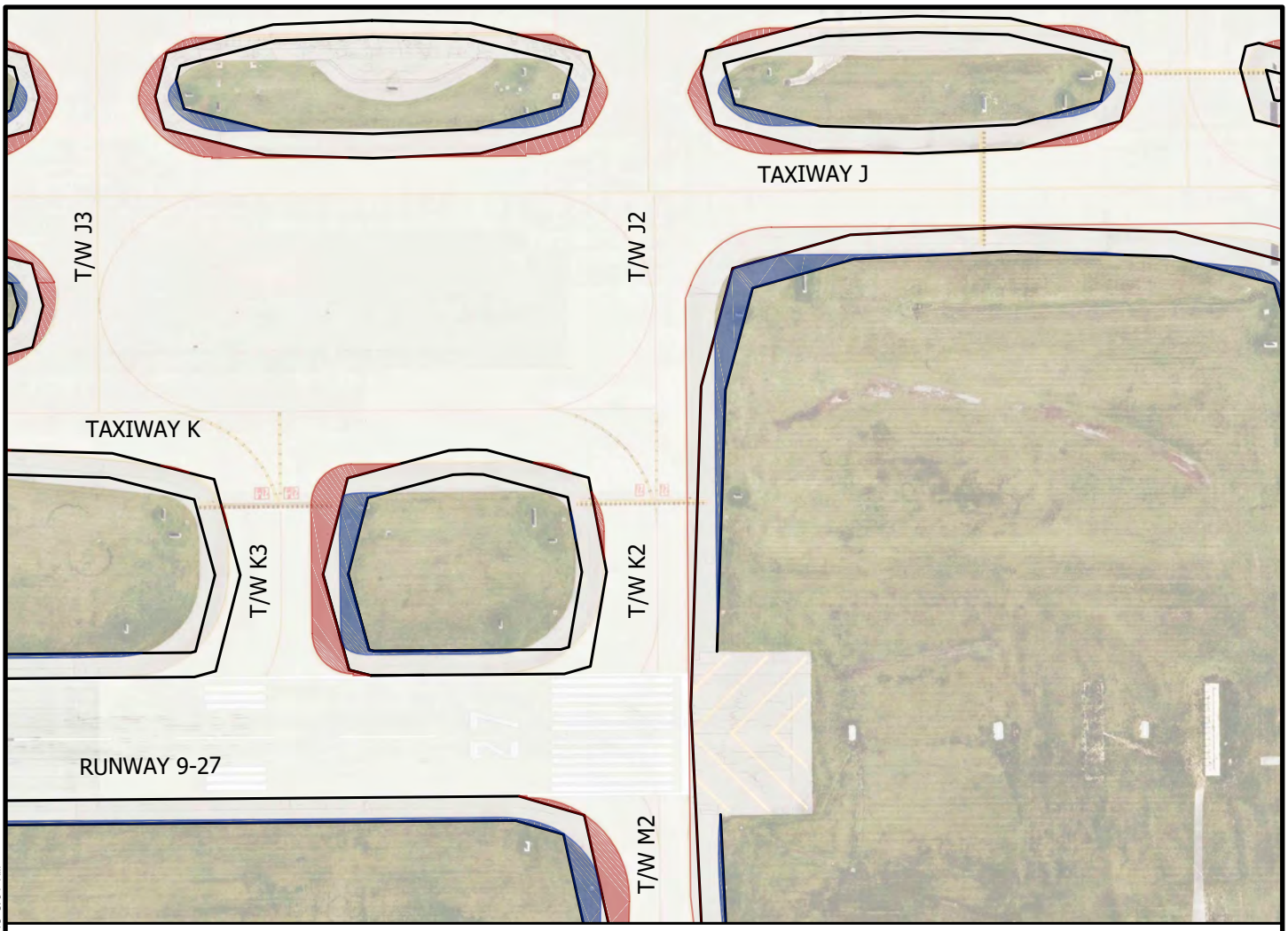
LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

Butler Fairman Seufert CIVIL ENGINEERS

CVG CINCINNATI/NORTHERN KENTUCKY INTERNATIONAL AIRPORT



Taxiway Intersection Information		
TW K & TW K2	TDG	6
Additional Pavement (SYD) 13	$Cost_{Pvmt}$	3,867
Additional Shoulder (SYD) 0	$Cost_{Shoulder}$	0
Additional Marking	$Cost_{Marking}$	2,900
Lighting	$Cost_{Lighting}$	22,000
	$Cost_{Total}$	28,767

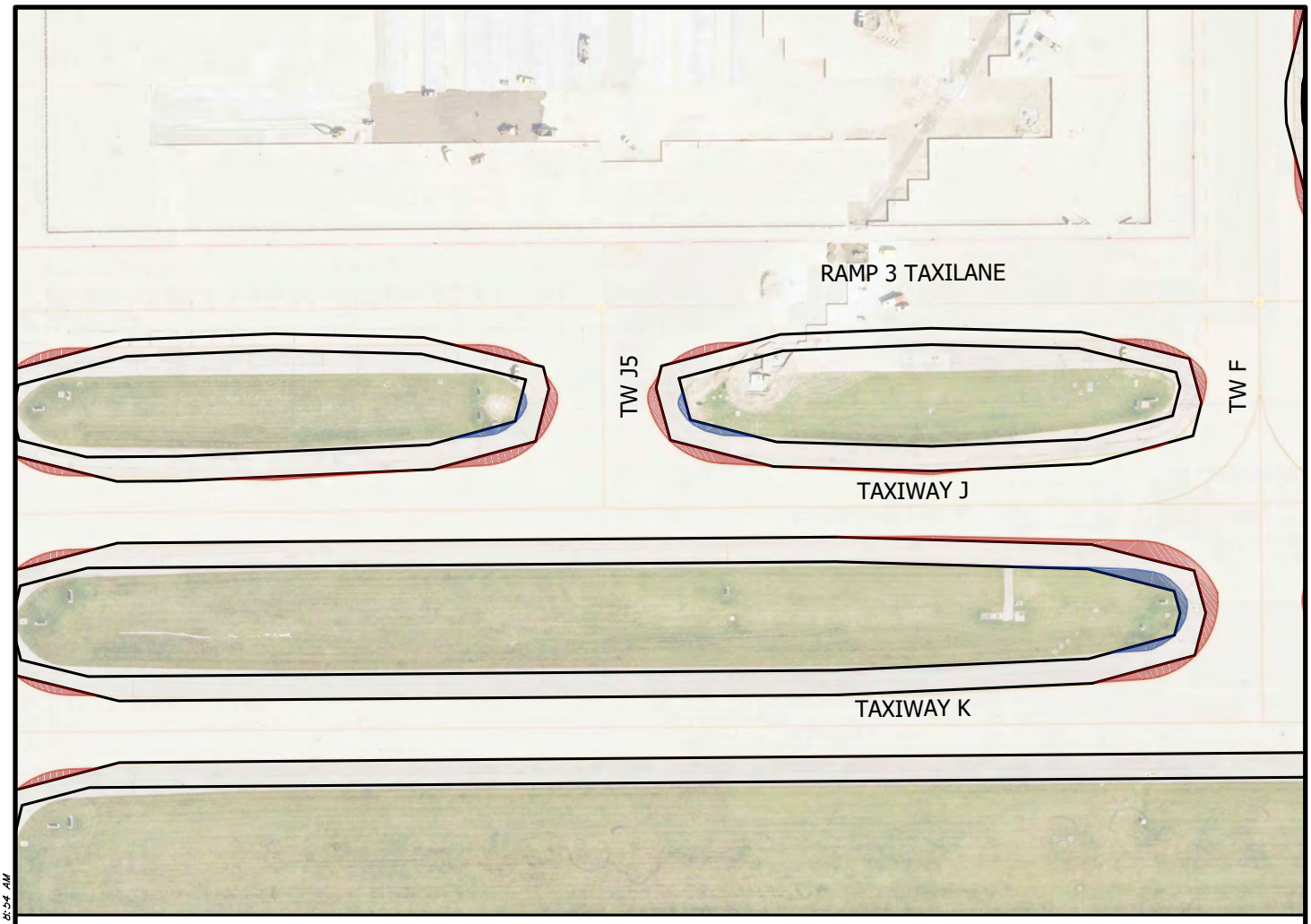
LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

Butler Fairman Seufert CIVIL ENGINEERS

CVG CINCINNATI/NORTHERN KENTUCKY INTERNATIONAL AIRPORT



Taxiway Intersection Information		
TAXILANE RAMP 3 & TW J5	TDG	5
Additional Pavement (SYD) 154	$Cost_{Pvmt}$	46,067
Additional Shoulder (SYD) 0	$Cost_{Shoulder}$	0
Additional Marking	$Cost_{Marking}$	3,500
Lighting	$Cost_{Lighting}$	16,000
	$Cost_{Total}$	65,567

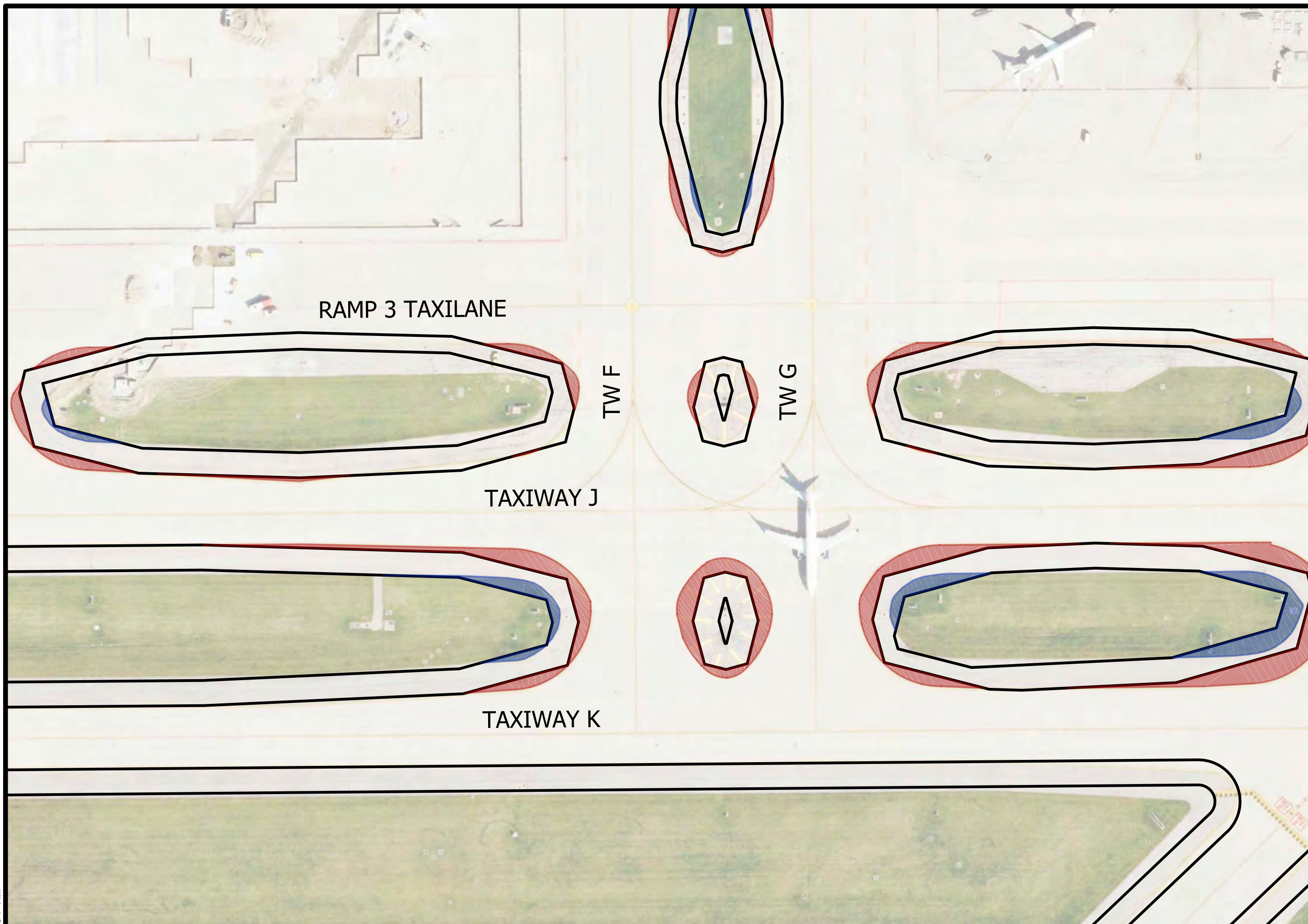
LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

BF&S Butler Fairman Seufert CIVIL ENGINEERS

CVG CINCINNATI/NORTHERN KENTUCKY INTERNATIONAL AIRPORT



Taxiway Intersection Information			
TAXILANE RAMP 3 & TW F		TDG	5
Additional Pavement (SYD)	130	$Cost_{Pvmt}$	39,133
Additional Shoulder (SYD)	0	$Cost_{Shoulder}$	0
Additional Marking		$Cost_{Marking}$	2,800
Lighting		$Cost_{Lighting}$	16,000
		$Cost_{Total}$	57,933

LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

Butler Fairman Seufert CIVIL ENGINEERS

CINCINNATI/NORTHERN KENTUCKY INTERNATIONAL AIRPORT

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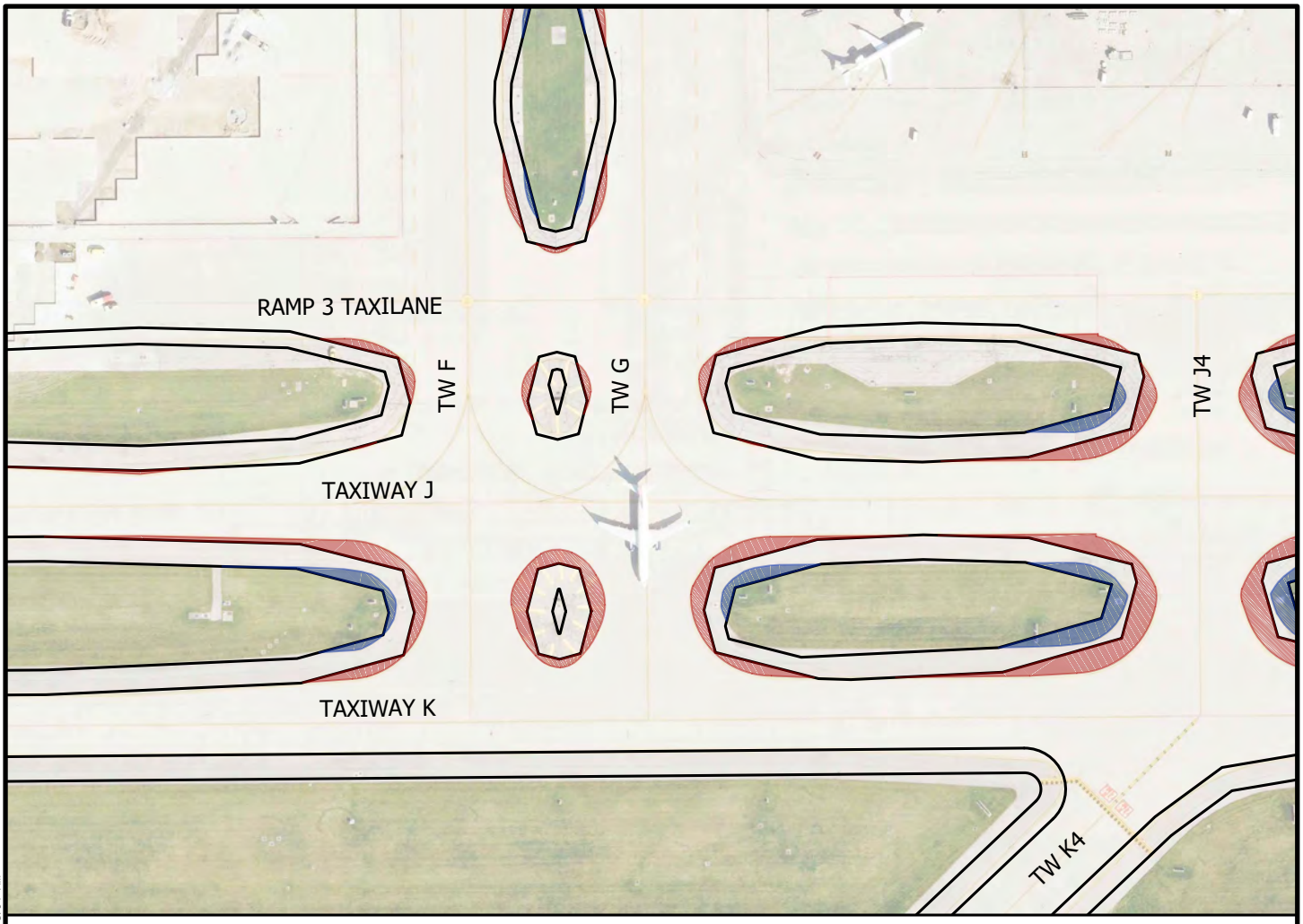


Taxiway Intersection Information		
TAXILANE RAMP 3 & TW G	TDG	5
Additional Pavement (SYD) 126	$Cost_{Pvmt}$	37,667
Additional Shoulder (SYD) 0	$Cost_{Shoulder}$	0
Additional Marking	$Cost_{Marking}$	2,550
Lighting	$Cost_{Lighting}$	18,000
	$Cost_{Total}$	58,217

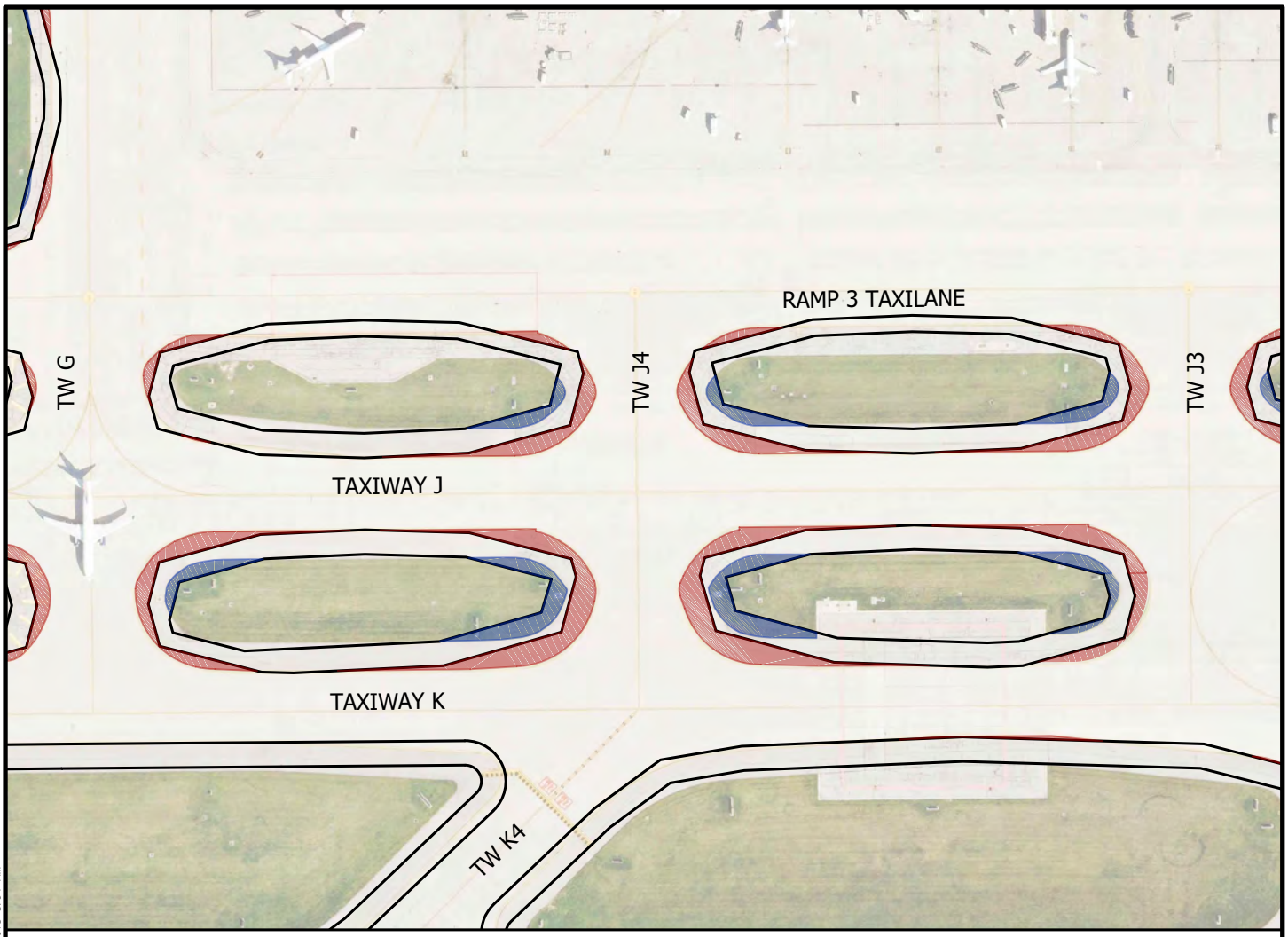
LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

BF&S Butler Fairman Seufert CIVIL ENGINEERS

CVG CINCINNATI/NORTHERN KENTUCKY INTERNATIONAL AIRPORT



Taxiway Intersection Information		
TAXILANE RAMP 3 & TW J4	TDG	6
Additional Pavement (SYD) 146	$Cost_{Pvmt}$	43,900
Additional Shoulder (SYD) 0	$Cost_{Shoulder}$	0
Additional Marking	$Cost_{Marking}$	3,250
Lighting	$Cost_{Lighting}$	20,000
	$Cost_{Total}$	67,150

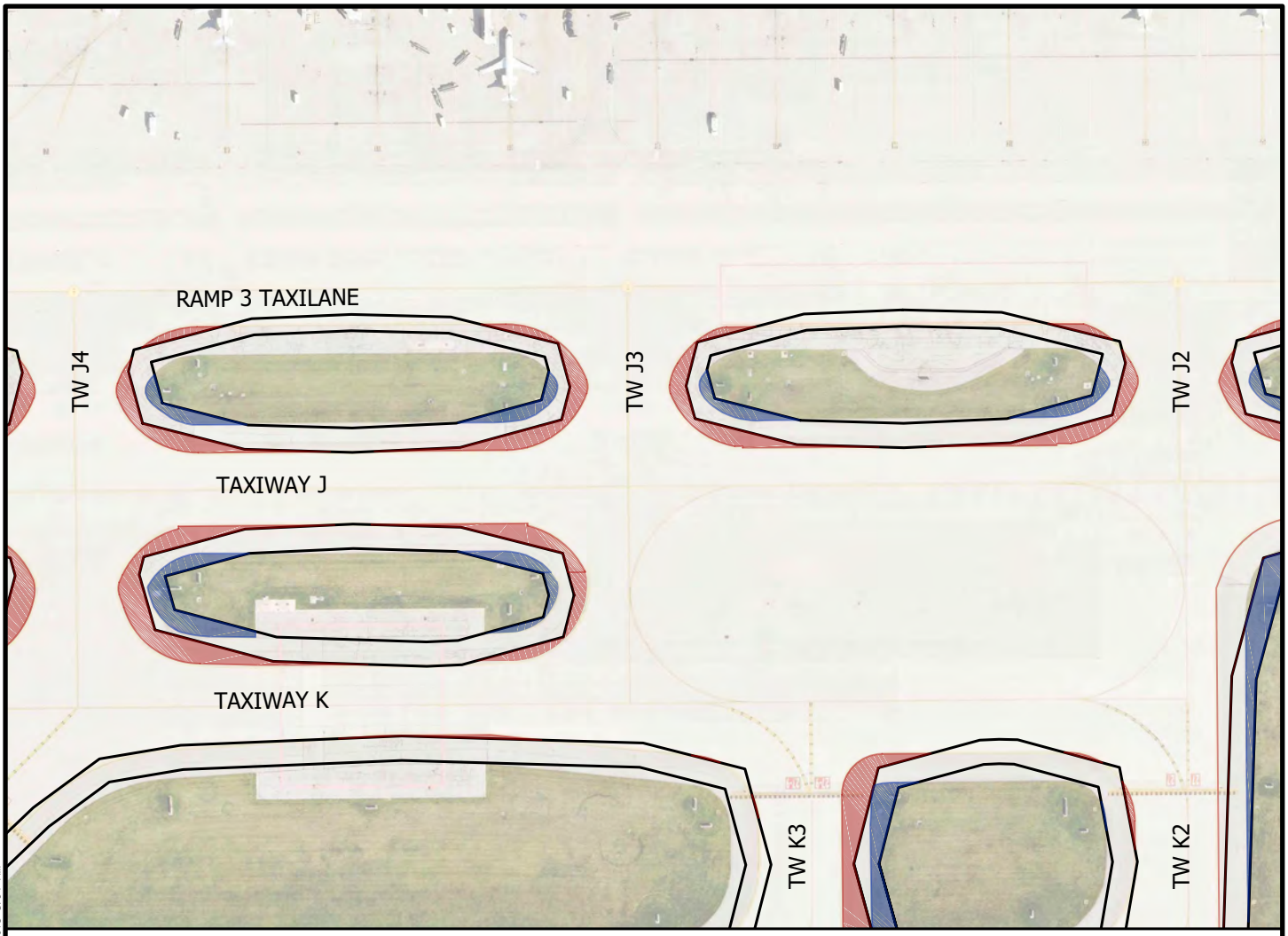
LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

Butler Fairman Seufert CIVIL ENGINEERS

CVG CINCINNATI/NORTHERN KENTUCKY INTERNATIONAL AIRPORT



Taxiway Intersection Information		
TAXILANE RAMP 3 & TW J3	TDG	5
Additional Pavement (SYD) 153	$Cost_{Pvmt}$	45,933
Additional Shoulder (SYD) 0	$Cost_{Shoulder}$	0
Additional Marking	$Cost_{Marking}$	3,500
Lighting	$Cost_{Lighting}$	20,000
	$Cost_{Total}$	69,433

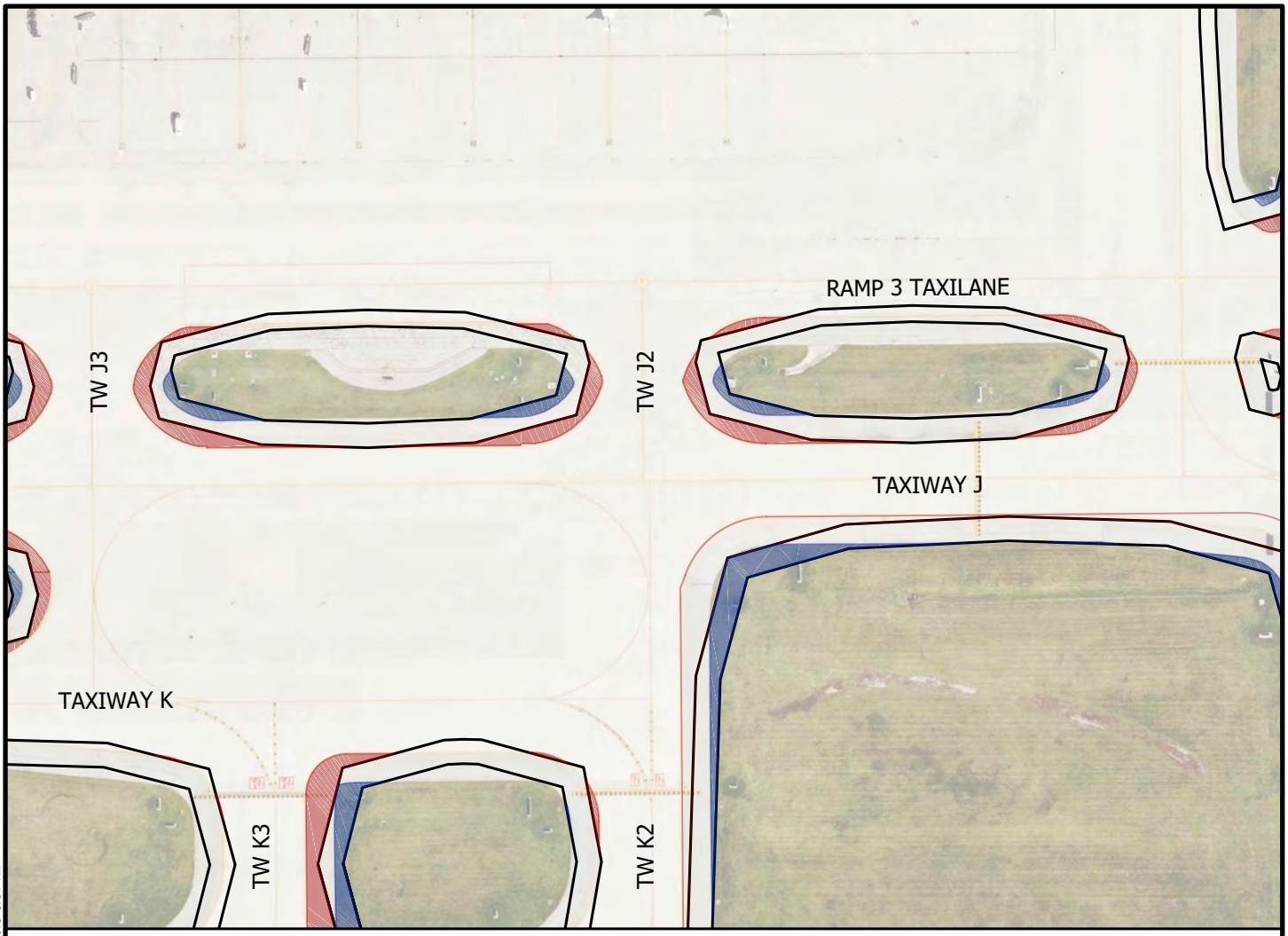
LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

Butler Fairman Seufert CIVIL ENGINEERS

CVG CINCINNATI/NORTHERN KENTUCKY INTERNATIONAL AIRPORT



Taxiway Intersection Information		
TAXILANE RAMP 3 & TW J2	TDG	5
Additional Pavement (SYD) 128	$Cost_{Pvmt}$	38,300
Additional Shoulder (SYD) 0	$Cost_{Shoulder}$	0
Additional Marking	$Cost_{Marking}$	3,500
Lighting	$Cost_{Lighting}$	20,000
	$Cost_{Total}$	61,800

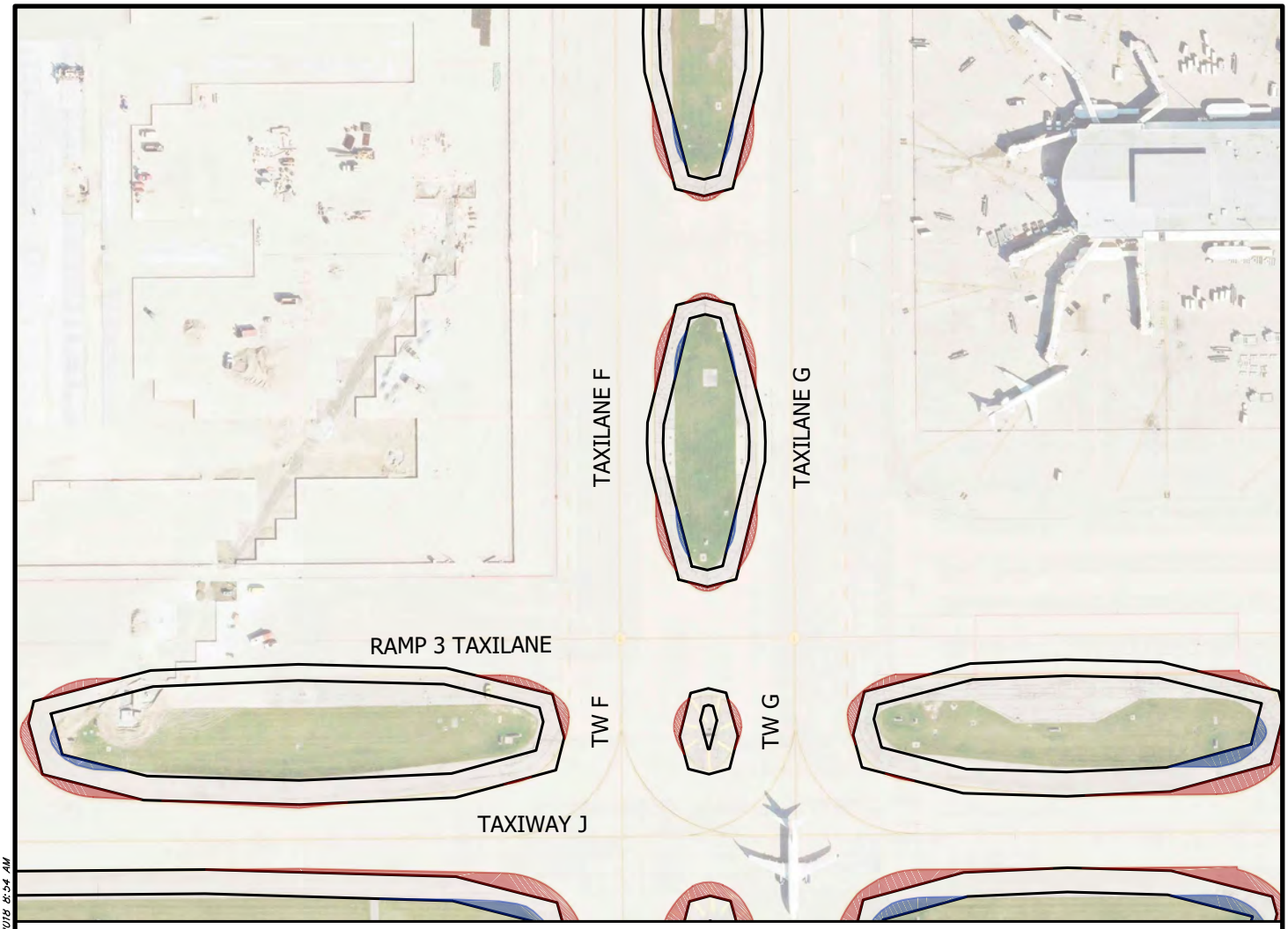
LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

Butler Fairman Seufert CIVIL ENGINEERS

CVG CINCINNATI/NORTHERN KENTUCKY INTERNATIONAL AIRPORT



Taxiway Intersection Information		
TAXILANE RAMP 3 & TAXILANE F & G	TDG	4
Additional Pavement (SYD) 323	$Cost_{Pvmt}$	96,867
Additional Shoulder (SYD) 83	$Cost_{Shoulder}$	3,500
Additional Marking	$Cost_{Marking}$	5,950
Lighting	$Cost_{Lighting}$	32,000
	$Cost_{Total}$	138,317

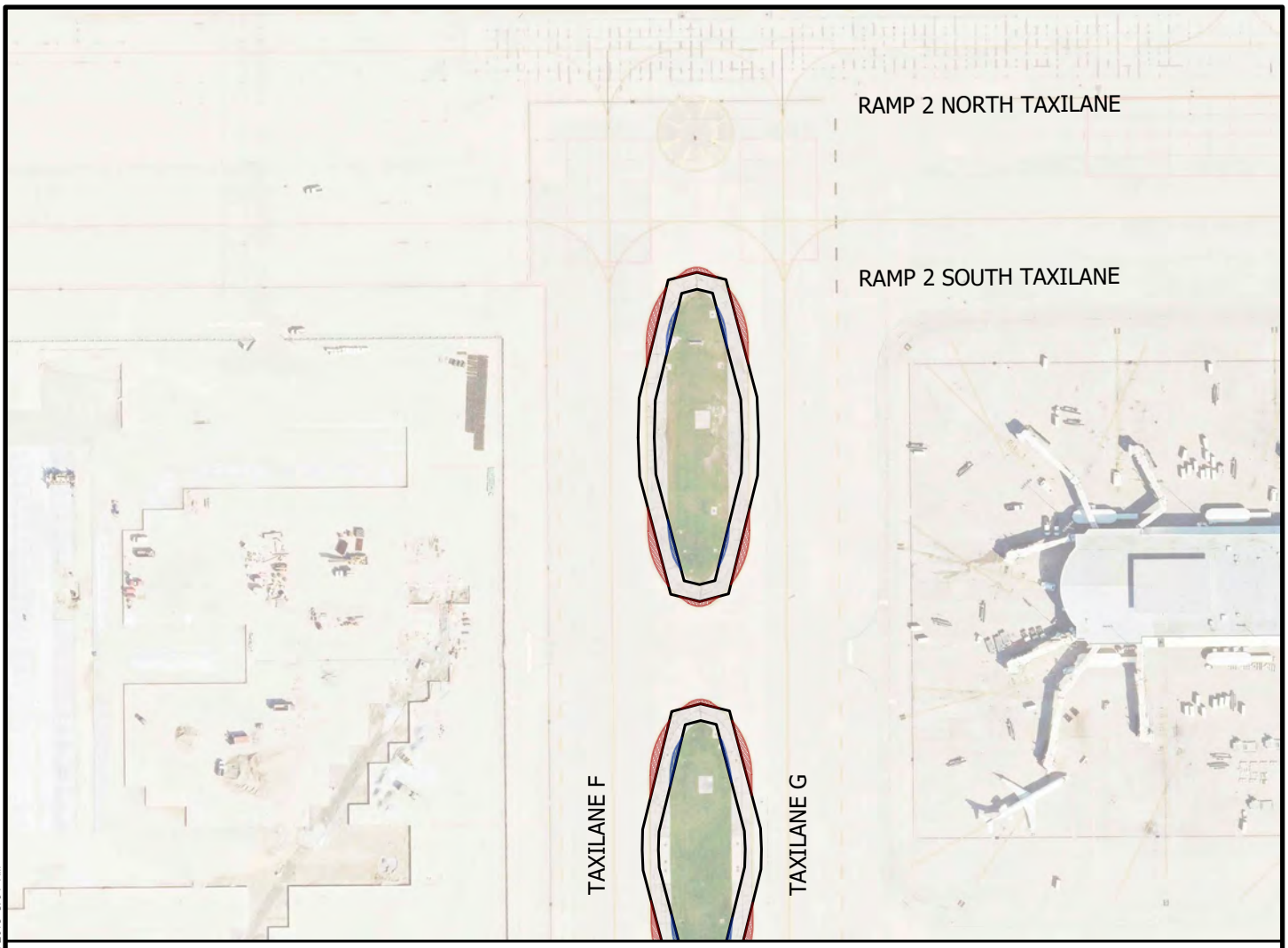
LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

Butler Fairman Seufert CIVIL ENGINEERS

CVG CINCINNATI/NORTHERN KENTUCKY INTERNATIONAL AIRPORT



Taxiway Intersection Information		
RAMP 2 S. TAXILANE & TAXILANE F & G	TDG	4
Additional Pavement (SYD) 340	$Cost_{Pvmt}$	102,067
Additional Shoulder (SYD) 85	$Cost_{Shoulder}$	3,556
Additional Marking	$Cost_{Marking}$	6,650
Lighting	$Cost_{Lighting}$	40,000
	$Cost_{Total}$	152,273

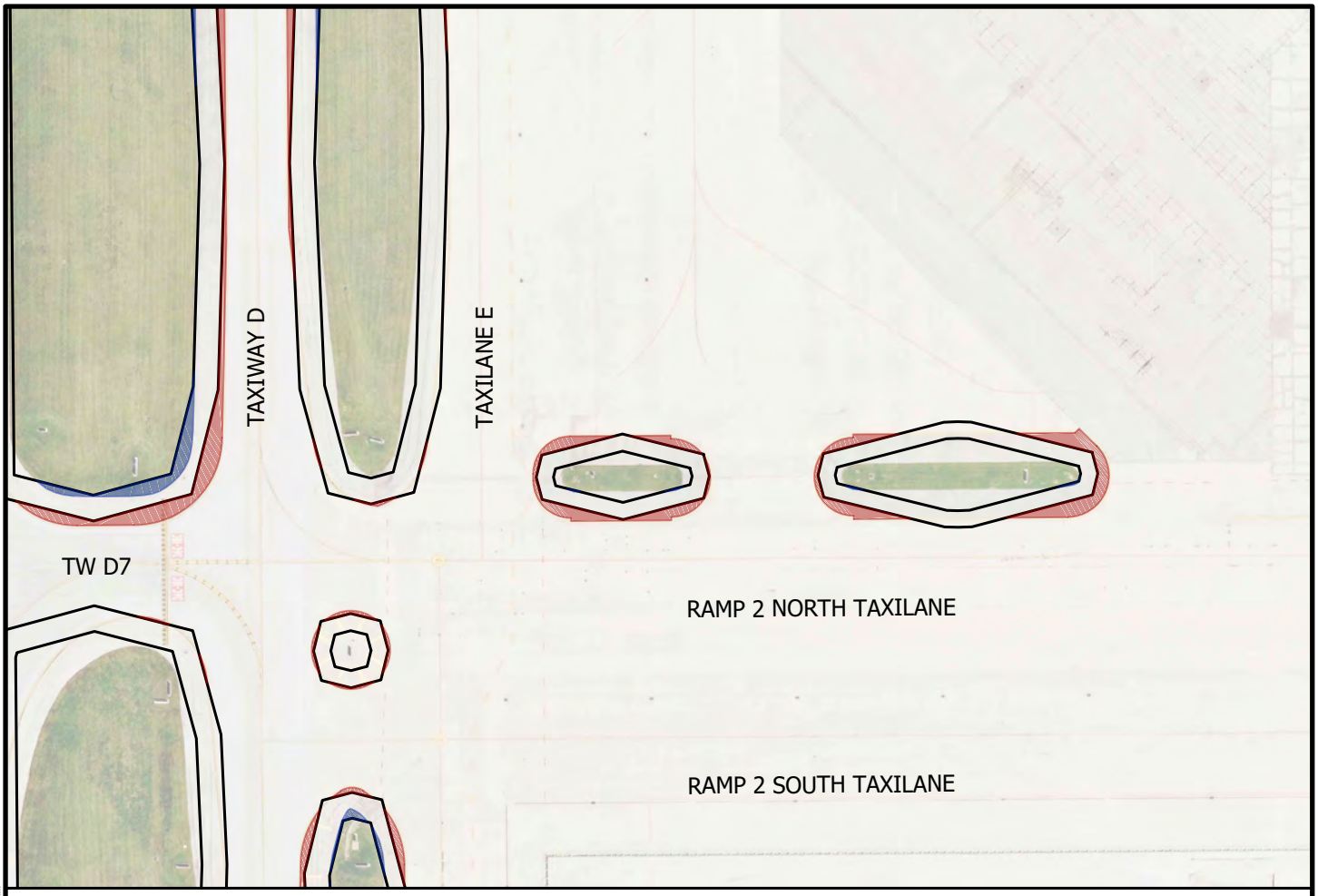
LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

BF&S Butler Fairman Seufert CIVIL ENGINEERS

CVG CINCINNATI/NORTHERN KENTUCKY INTERNATIONAL AIRPORT



Taxiway Intersection Information		
RAMP 2 N. TAXILANE & TAXILANE E	TDG	4
Additional Pavement (SYD) 429	$Cost_{Pvmt}$	128,733
Additional Shoulder (SYD) 4	$Cost_{Shoulder}$	182
Additional Marking	$Cost_{Marking}$	3,850
Lighting	$Cost_{Lighting}$	24,000
	$Cost_{Total}$	156,765

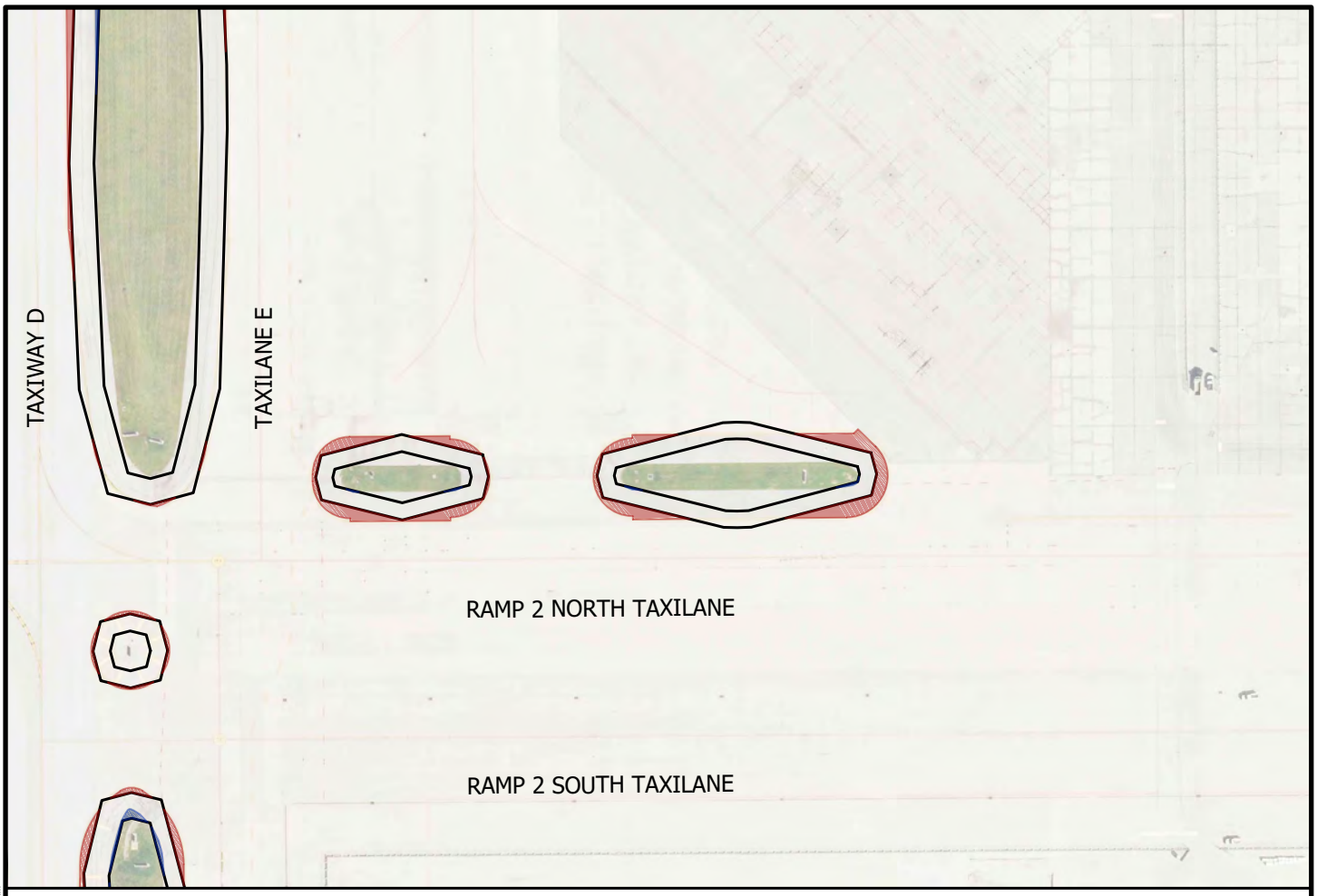
LEGEND

Additional Full Strength Pavement

Additional Shoulder Pavement

BF&S Butler Fairman Seufert CIVIL ENGINEERS

CVG CINCINNATI/NORTHERN KENTUCKY INTERNATIONAL AIRPORT



Taxiway Intersection Information		
RAMP 2 N. TAXILANE & TAXILANE	TDG	4
Additional Pavement (SYD) 595	$Cost_{Pvmt}$	178,433
Additional Shoulder (SYD) 8	$Cost_{Shoulder}$	345
Additional Marking	$Cost_{Marking}$	3,850
Lighting	$Cost_{Lighting}$	24,000
	$Cost_{Total}$	206,629

LEGEND

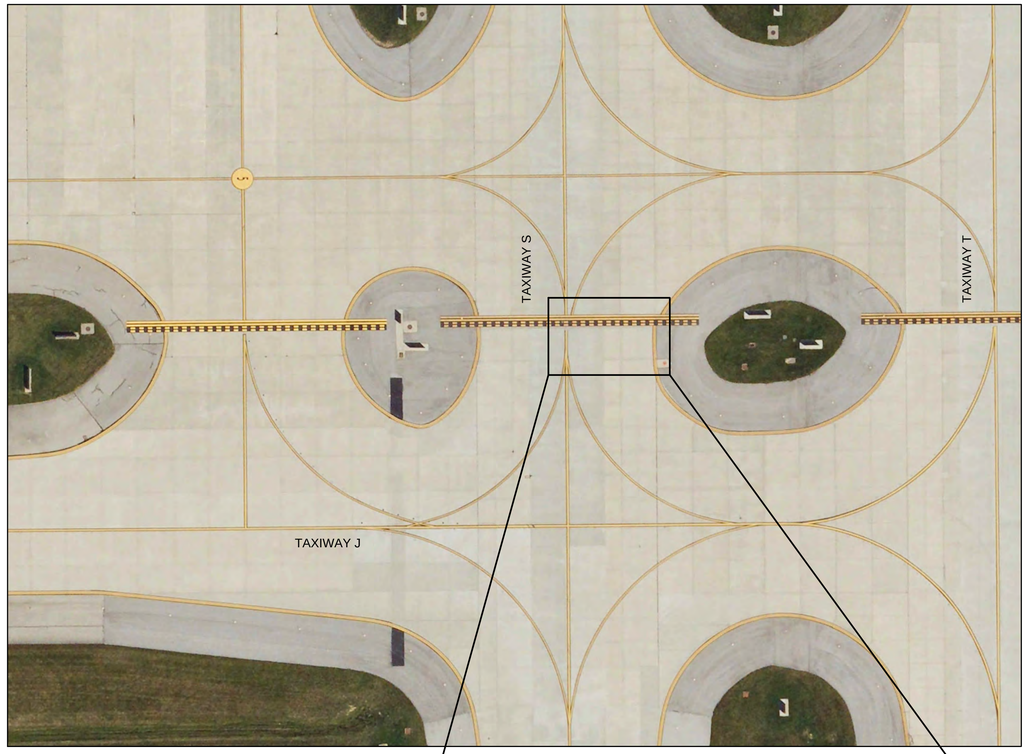
Additional Full Strength Pavement

Additional Shoulder Pavement

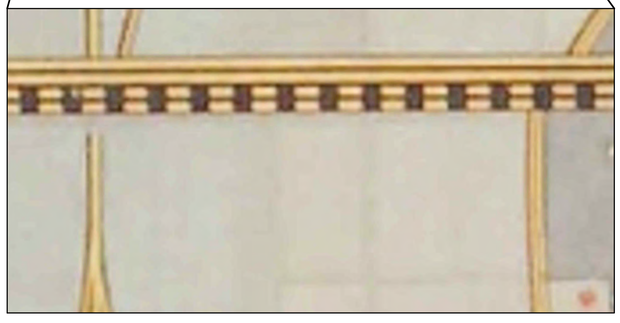
Butler Fairman Seufert CIVIL ENGINEERS

CVG CINCINNATI/NORTHERN KENTUCKY INTERNATIONAL AIRPORT

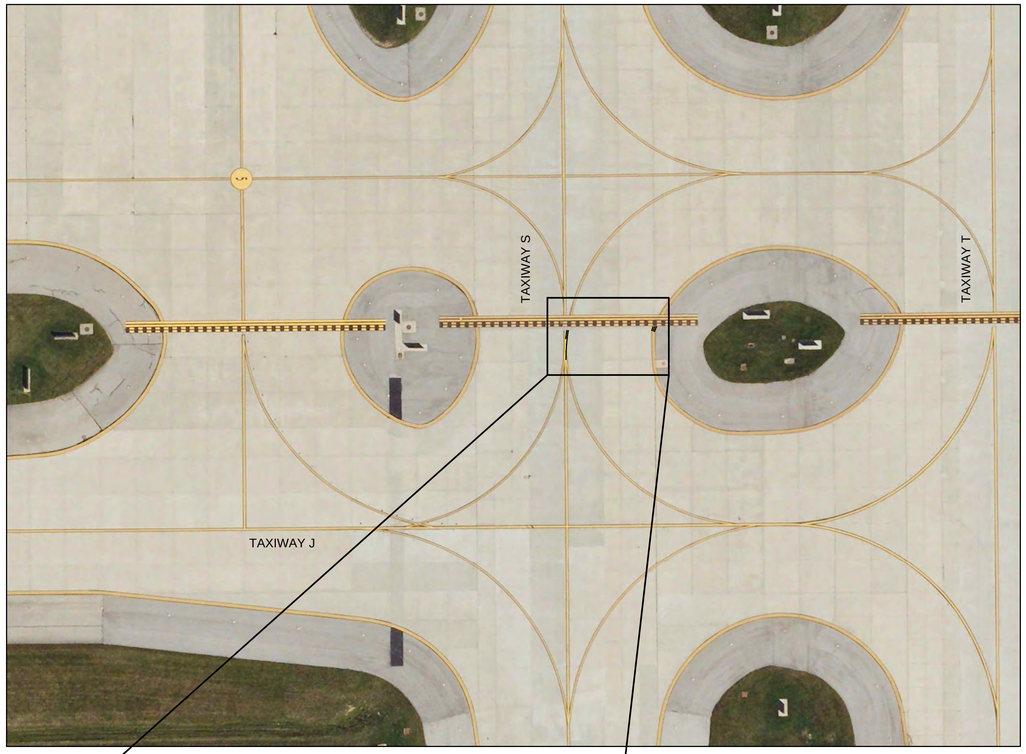
APPENDIX C



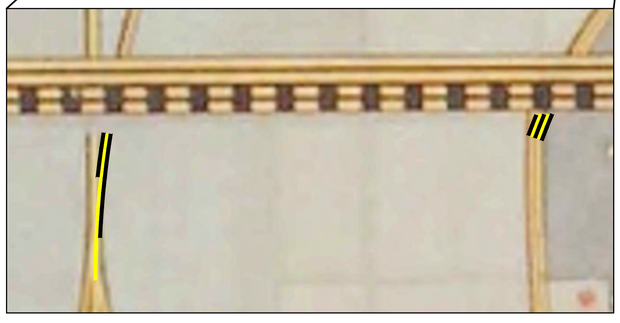
TAXIWAY S AND TAXIWAY J
EXISTING CONDITIONS
SCALE: 1" = 50'



TAXIWAY S AND TAXIWAY J
EXISTING CONDITIONS
SCALE: 1" = 10'



TAXIWAY S AND TAXIWAY J
RECOMMENDED MODIFICATIONS
SCALE: 1" = 50'



TAXIWAY S AND TAXIWAY J
RECOMMENDED MODIFICATIONS
SCALE: 1" = 10'

REVISIONS			
NO.	REMARK	DATE	BY

RECOMMENDED FOR APPROVAL: _____ 08/03/18
DESIGN ENGINEER DATE

DESIGNED: BSE DRAWN: BSE
CHECKED: JRC CHECKED: PAS

CININNATI/NORTHERN KENTUCKY INTERNATIONAL AIRPORT
APPENDIX C - EXHIBIT 1
BOONE COUNTY KENTUCKY

Headquarters
8450 WESTFIELD BLVD., SUITE 300
INDIANAPOLIS, IN. 46240-8302
TEL 317-713-4615
FAX 317-713-4616
www.BFSEngr.com

Butler, Fairman & Seufert ENGINEERS

Branch Locations
FORT WAYNE 260-459-1532
LOUISVILLE 502-583-1996
LAFAYETTE 765-423-5602
MERRILLVILLE 219-769-2333
PLAINFIELD 317-839-3242

HORIZONTAL SCALE	
AS SHOWN	
VERTICAL SCALE	
N/A	
SHEET	
01	OF 03
PROJECT	

BFS NO. 607400.0000

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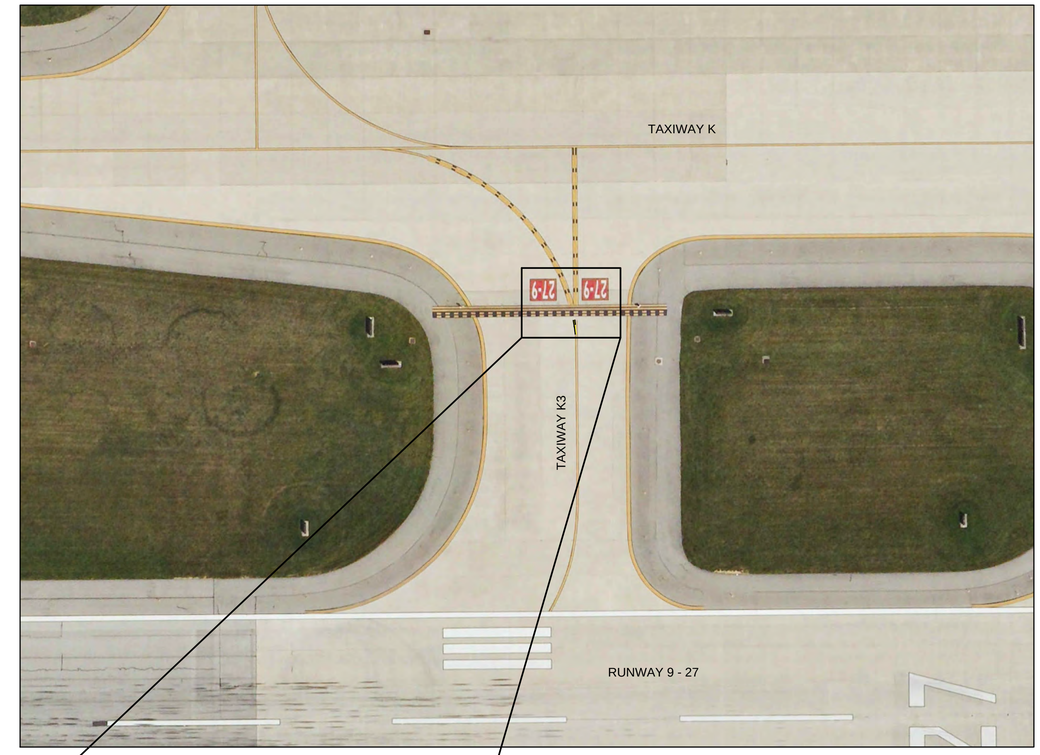
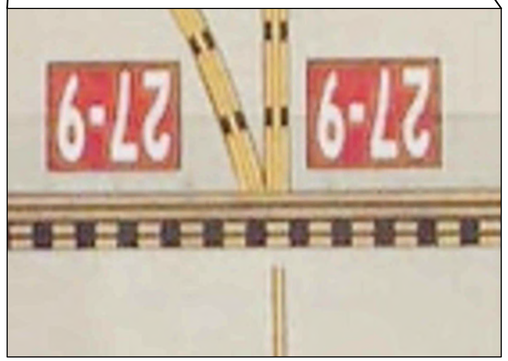
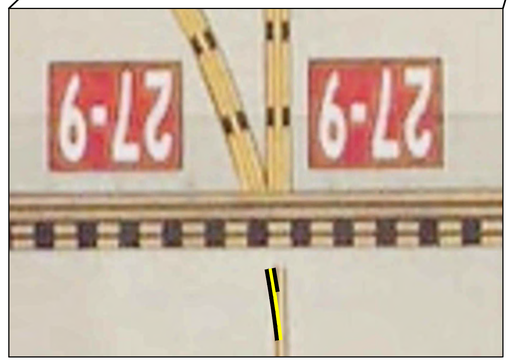
RUNWAY 18C - 36C AND TAXIWAY M
EXISTING CONDITIONS
SCALE: 1" = 50'



RUNWAY 18C - 36C AND TAXIWAY M
RECOMMENDED MODIFICATIONS
SCALE: 1" = 50'



RUNWAY 18C - 36C AND TAXIWAY M
EXISTING CONDITIONS
SCALE: 1" = 10'



RUNWAY 18C - 36C AND TAXIWAY M
RECOMMENDED MODIFICATIONS
SCALE: 1" = 10'

REVISIONS			
NO.	REMARK	DATE	BY

RECOMMENDED FOR APPROVAL: _____ 08/03/18
DESIGN ENGINEER DATE

DESIGNED: BSE DRAWN: BSE
CHECKED: JRC CHECKED: PAS

CININNATI/NORTHERN KENTUCKY INTERNATIONAL AIRPORT
APPENDIX C - EXHIBIT 2
BOONE COUNTY KENTUCKY

Headquarters
8450 WESTFIELD BLVD., SUITE 300
INDIANAPOLIS, IN. 46240-8302
TEL 317-713-4615
FAX 317-713-4616
www.BFSEngr.com

Butler Fairman Seufert ENGINEERS

Branch Locations
FORT WAYNE 260-459-1532
LOUISVILLE 502-593-1996
LAFAYETTE 765-423-5602
MERRILLVILLE 219-769-2333
PLAINFIELD 317-839-3242

HORIZONTAL SCALE
AS SHOWN
VERTICAL SCALE
N/A
SHEET
02 OF 03
PROJECT

BFS NO. 607400.0000

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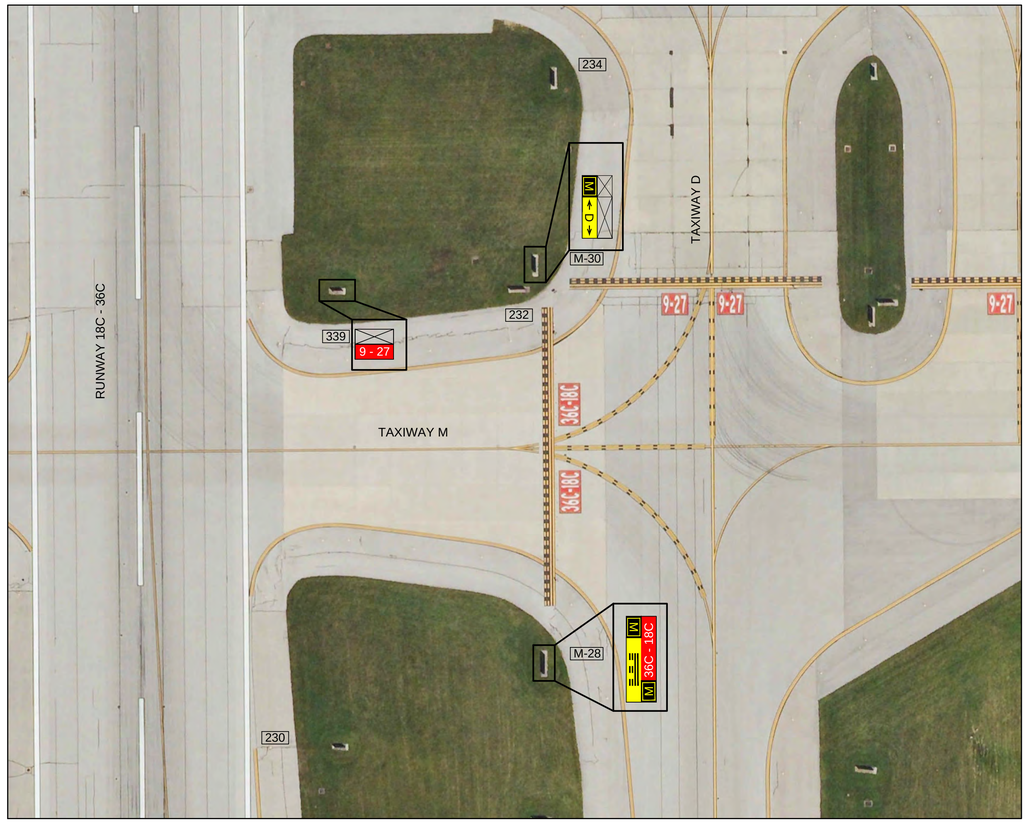

RUNWAY 18C - 36C AND TAXIWAY M
EXISTING CONDITIONS

RUNWAY 18C - 36C AND TAXIWAY M
RECOMMENDED MODIFICATIONS

0 50' 100'
SCALE: 1" = 50'

REVISIONS			
NO.	REMARK	DATE	BY

RECOMMENDED FOR APPROVAL: _____ 08/03/18
DESIGN ENGINEER DATE

DESIGNED: BSE DRAWN: BSE

CHECKED: JRC CHECKED: PAS

CININNATI/NORTHERN KENTUCKY INTERNATIONAL AIRPORT
APPENDIX C - EXHIBIT 3
BOONE COUNTY KENTUCKY

Headquarters
8450 WESTFIELD BLVD., SUITE 300
INDIANAPOLIS, IN. 46240-8302
TEL 317-713-4615
FAX 317-713-4616
www.BFSEngr.com

Butler Fairman & Seufert

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FORT WAYNE 260-459-1532
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HORIZONTAL SCALE	
AS SHOWN	
VERTICAL SCALE	
N/A	
SHEET	
03 OF 03	
PROJECT	
BFS NO.	607400.0000

APPENDIX D

Runway 18R and Parallel Taxiways

Primary Pavement	Intersecting Pavement	Total Cost	Additional Pavement	Additional Shoulder	Marking	Lighting
Runway 18R	Taxiway B End Connector	$ 18,125	NO	NO	YES	YES
Taxiway B	Taxiway B End Connector	$ 44,572	YES	YES	YES	YES
Runway 18R	Taxiway B6	$ 597,744	YES	YES	YES	YES
Taxiway B	Taxiway B6	$ 375,818	YES	YES	YES	YES
Runway 18R	Taxiway B5	$ 1,958,580	YES	YES	YES	YES
Taxiway B	Taxiway B5	$ 1,700,935	YES	YES	YES	YES
Runway 18R	Taxiway B4	$ 130,833	YES	NO	YES	YES
Taxiway B	Taxiway B4	$ 488,477	YES	YES	YES	YES
Runway 18R	Taxiway B3	$ 238,389	YES	YES	YES	YES
Taxiway B	Taxiway B3	$ 463,077	YES	YES	YES	YES
Runway 18R	Taxiway J	$ 57,097	YES	YES	YES	YES
Taxiway B	Taxiway J	$ 316,283	YES	YES	YES	YES

Runway 18C and Parallel Taxiways

Primary Pavement	Intersecting Pavement	Total Cost	Additional Pavement	Additional Shoulder	Marking	Lighting
Taxiway A	Taxiway B	$ 141,667	YES	NO	YES	YES
Taxiway A	Taxiway C	$ 207,298	YES	YES	YES	YES
Taxiway A	Runway 18C	$ 84,663	YES	YES	YES	YES
Taxiway C	Taxiway C11	$ 69,908	YES	NO	YES	YES
Taxiway C	Taxiway C9	$ 69,733	YES	NO	YES	YES
Taxiway C	Taxiway C8	$ 303,414	YES	YES	YES	YES
Taxiway C	Taxiway C7	$ 73,850	YES	NO	YES	YES
Taxiway C	Taxiway C6	$ 57,325	YES	NO	YES	YES
Taxiway C	Taxiway J	$ 165,150	YES	NO	YES	YES
Taxiway C	Taxiway K	$ 346,766	YES	YES	YES	YES
Taxiway C	Runway 9	$ 88,458	YES	NO	YES	YES
Taxiway C	Taxiway M	$ 67,333	YES	NO	YES	YES
Runway 18C	Taxiway C11	$ 48,669	YES	YES	YES	YES
Runway 18C	Taxiway C9	$ 1,135,271	YES	YES	YES	YES
Runway 18C	Taxiway C8	$ 1,286,323	YES	YES	YES	YES
Runway 18C	Taxiway C7	$ 42,250	NO	NO	YES	YES
Runway 18C	Taxiway C6	$ 157,988	YES	YES	YES	YES
Runway 18C	Taxiway D End Connector	$ 100,893	YES	YES	YES	YES
Taxiway D	Taxiway D End Connector	$ 114,885	YES	YES	YES	YES
Taxiway D End Conn.	Taxiway E End Connector	$ 25,438	NO	YES	YES	YES
Runway 18C	Taxiway D11	$ 278,475	YES	YES	YES	YES
Taxiway D	Taxiway D11	$ 158,584	YES	YES	YES	YES
Taxiway D	Taxiway E11	$ 104,553	YES	YES	YES	YES
Taxiway E	Taxiway E11	$ 101,977	YES	YES	YES	YES
Taxiway D	Taxiway E10	$ 589,766	YES	YES	YES	YES
Taxiway E	Taxiway E10	$ 234,114	YES	YES	YES	YES
Runway 18C	Taxiway D9	$ 82,117	YES	YES	YES	YES
Taxiway D	Taxiway D9	$ 84,692	YES	YES	YES	YES
Taxiway D	Taxiway E9	$ 170,094	YES	YES	YES	YES
Taxiway E	Taxiway E9	$ 185,127	YES	YES	YES	YES
Runway 18C	Taxiway D8	$ 466,695	YES	YES	YES	YES
Taxiway D	Taxiway D8	$ 429,134	YES	YES	YES	YES
Taxiway D	Taxiway E8	$ 428,305	YES	YES	YES	YES
Taxiway E	Taxiway E8	$ 112,746	YES	YES	YES	YES
Runway 18C	Taxiway D7	$ 258,306	YES	YES	YES	YES
Taxiway D	Taxiway D7	$ 174,825	YES	YES	YES	YES
Taxiway D	Ramp 2 North Taxilane	$ 43,458	YES	NO	YES	YES

Runway 18C and Parallel Taxiways

Primary Pavement	Intersecting Pavement	Total Cost	Additional Pavement	Additional Shoulder	Marking	Lighting
Taxiway E	Ramp 2 North Taxilane	$ 37,317	YES	NO	YES	YES
Taxiway D	Ramp 2 South Taxilane	$ 59,893	YES	YES	YES	YES
Taxiway E	Ramp 2 South Taxilane	$ 49,322	YES	YES	YES	YES
Runway 18C	Taxiway D6	$ 65,300	YES	NO	YES	YES
Taxiway D	Taxiway D6	$ 38,233	YES	NO	YES	YES
Taxiway D	Taxiway E6	$ 555,076	YES	YES	YES	YES
Taxiway E	Taxiway E6	$ 69,647	YES	YES	YES	YES
Taxiway D	Taxiway E5	$ 25,000	NO	NO	YES	YES
Taxiway E	Taxiway E5	$ 17,250	NO	NO	YES	YES
Taxiway E	Ramp 3 Taxilane	$ 64,867	YES	NO	YES	YES
Runway 18C	Taxiway D4	$ 94,382	YES	YES	YES	YES
Taxiway D	Taxiway D4	$ 101,556	YES	YES	YES	YES
Runway 18C	Taxiway D3	$ 132,088	YES	YES	YES	YES
Taxiway D	Taxiway D3	$ 239,943	YES	YES	YES	YES
Runway 18C	Taxiway D2	$ 533,619	YES	YES	YES	YES
Taxiway D	Taxiway D2	$ 408,701	YES	YES	YES	YES
Runway 18C	Taxiway D End Connector	$ 92,013	YES	YES	YES	YES
Taxiway D	Taxiway D End Connector	$ 103,745	YES	YES	YES	YES
Taxiway D	Taxiway N	$ 486,327	YES	YES	YES	YES
Taxiway N	Apron	$ 491,702	YES	YES	YES	YES

Runway 18L and Parallel Taxiways

Primary Pavement	Intersecting Pavement	Total Cost	Additional Pavement	Additional Shoulder	Marking	Lighting
Runway 18L	North End Connector	$ 54,125	NO	NO	YES	YES
Runway 18L	Taxiway T8	$ 168,397	YES	YES	YES	YES
Runway 18L	Taxiway T7	$ 64,500	NO	NO	YES	YES
Runway 18L	Taxiway T6	$ 2,344,196	YES	YES	YES	YES
Runway 18L	Taxiway T5	$ 1,432,639	YES	YES	YES	YES
Runway 18L	Taxiway T4	$ 1,482,472	YES	YES	YES	YES
Runway 18L	Taxiway T3	$ 163,728	YES	YES	YES	YES
Runway 18L	South End Connector	$ 27,425	YES	NO	YES	YES
Taxiway U	North End Connector	$ 14,000	NO	NO	YES	YES
Taxiway U	Taxiway T8	$ 170,885	YES	YES	YES	YES
Taxiway V	Taxiway T3	$ 64,129	YES	YES	YES	YES
Taxiway V	South End Connector	$ 46,879	YES	YES	YES	YES
Taxiway T	North End Connector	$ 189,687	YES	YES	YES	YES
Taxiway T	Taxiway S8	$ 326,777	YES	YES	YES	YES
Taxiway T	Ramp 2 North Taxilane	$ 246,620	YES	YES	YES	YES
Taxiway T	Ramp 2 South Taxilane	$ 183,232	YES	YES	YES	YES
Taxiway T	Taxiway T7	$ 161,250	NO	NO	YES	YES
Taxiway T	Ramp 3 Taxilane	$ 171,193	YES	YES	YES	YES
Taxiway T	Taxiway J	$ 332,119	YES	YES	YES	YES
Taxiway T	Taxiway T6	$ 2,010,995	YES	YES	YES	YES
Taxiway T	Taxiway M	$ 768,818	YES	YES	YES	YES
Taxiway T	Taxiway T5	$ 734,512	YES	YES	YES	YES
Taxiway T	Taxiway S5	$ 400,291	YES	YES	YES	YES
Taxiway S	Taxilane N	$ 8,750	NO	NO	YES	NO
Taxiway T	Taxiway T4	$ 1,462,713	YES	YES	YES	YES
Taxiway T	Taxiway S4	$ 223,536	YES	YES	YES	YES
Taxiway T	Taxiway T3	$ 156,481	YES	YES	YES	YES
Taxiway T	Taxiway S3	$ 411,525	YES	YES	YES	YES
Taxiway T	South End Connector	$ 185,463	YES	YES	YES	YES
Taxiway S	North End Connector	$ 193,280	YES	YES	YES	YES
Taxiway S	Taxiway S8	$ 335,058	YES	YES	YES	YES
Taxiway S	Ramp 2 North Taxilane	$ 259,061	YES	YES	YES	YES
Taxiway S	Ramp 2 South Taxilane	$ 208,648	YES	YES	YES	YES
Taxiway S	Ramp 3 Taxilane	$ 383,735	YES	YES	YES	YES
Taxiway S	Taxiway J	$ 689,825	YES	YES	YES	YES
Taxiway S	Taxiway M	$ 1,997,100	YES	YES	YES	YES
Taxiway S	Taxiway S5	$ 298,702	YES	YES	YES	YES

Runway 18L and Parallel Taxiways

Primary Pavement	Intersecting Pavement	Total Cost	Additional Pavement	Additional Shoulder	Marking	Lighting
Taxiway S	Taxiway S4	$ 182,459	YES	YES	YES	YES
Taxiway S	Taxiway S3	$ 345,949	YES	YES	YES	YES
Taxiway S	South End Connector	$ 314,094	YES	YES	YES	YES
Taxiway R	Ramp 1 North Taxilane	$ 66,060	YES	YES	YES	YES
Taxiway R	Taxiway S8	$ 20,125	NO	NO	YES	YES
Taxiway R	Ramp 2 North Taxilane	$ 29,000	NO	NO	YES	YES
Taxiway R	Ramp 2 South Taxilane	$ 28,750	NO	NO	YES	YES
Taxiway R	Ramp 3 Taxilane	$ 89,840	YES	YES	YES	YES
Taxiway R	Taxiway J	$ 241,485	YES	YES	YES	YES

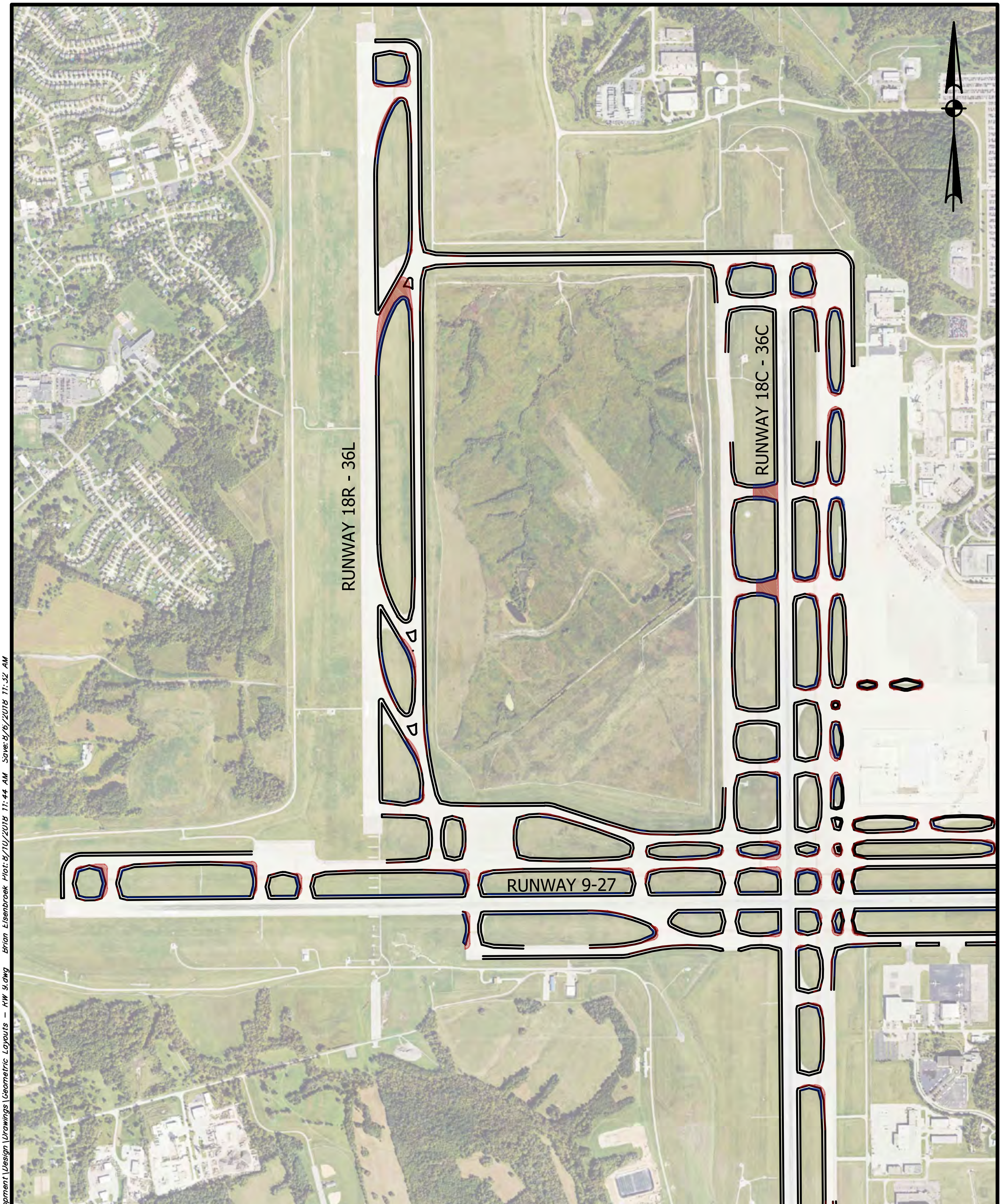
Runway 9 and Parallel Taxiways

Primary Pavement	Intersecting Pavement	Total Cost	Additional Pavement	Additional Shoulder	Marking	Lighting
Runway 9	Taxiway K End Connector	$ 26,845	YES	YES	YES	YES
Runway 9	Taxiway K10	$ 232,907	YES	YES	YES	YES
Runway 9	Taxiway K9	$ 124,525	YES	YES	YES	YES
Runway 9	Taxiway K8	$ 204,791	YES	YES	YES	YES
Runway 9	Taxiway K7	$ 195,381	YES	YES	YES	YES
Runway 9	Taxiway M7	$ 202,489	YES	YES	YES	YES
Runway 9	Taxiway K6	$ 112,403	YES	YES	YES	YES
Runway 9	Taxiway M6	$ 164,172	YES	YES	YES	YES
Runway 9	Runway 18C	$ -	NO	NO	NO	NO
Runway 9	Taxiway D	$ 567,511	YES	YES	YES	YES
Runway 9	Taxiway E	$ 137,047	YES	YES	YES	YES
Runway 9	Taxiway K4	$ 63,683	NO	YES	YES	YES
Runway 9	Taxiway M4	$ 407,797	YES	YES	YES	YES
Runway 9	Taxiway K3	$ 250,615	YES	YES	YES	YES
Runway 9	Taxiway K2	$ 111,727	YES	YES	YES	YES
Runway 9	Taxiway M2	$ 316,814	YES	YES	YES	YES
Taxiway M	Taxiway M2	$ 688,111	YES	YES	YES	YES
Taxiway M	Taxiway M4	$ 219,600	YES	NO	YES	YES
Taxiway M	Taxiway M	$ 27,167	YES	NO	YES	YES
Taxiway M	Taxiway E	$ 157,960	YES	YES	YES	YES
Taxiway M	Taxiway D	$ 249,537	YES	YES	YES	YES
Taxiway M	Runway 18C	$ 233,861	YES	YES	YES	YES
Taxiway M	Taxiway M6	$ 292,963	YES	YES	YES	YES
Taxiway M	Taxiway M7	$ 209,908	YES	YES	YES	YES
Taxiway J	Hold Apron	$ 66,777	YES	YES	YES	YES
Taxiway J	Taxiway J	$ 88,569	YES	YES	YES	YES
Taxiway J	Taxiway J6	$ 150,617	YES	YES	YES	YES
Taxiway J	Runway 18C	$ 211,777	YES	YES	YES	YES
Taxiway J	Taxiway D	$ 185,333	YES	NO	YES	YES
Taxiway J	Taxiway E	$ 87,467	YES	NO	YES	YES
Taxiway J	Taxiway J5	$ 161,770	YES	YES	YES	YES
Taxiway J	Taxiway F	$ 188,819	YES	YES	YES	YES
Taxiway J	Taxiway G	$ 148,619	YES	YES	YES	YES
Taxiway J	Taxiway J4	$ 504,629	YES	YES	YES	YES
Taxiway J	Taxiway J3	$ 443,933	YES	YES	YES	YES
Taxiway J	Taxiway J2	$ 783,309	YES	YES	YES	YES
Taxiway K	Taxiway K End Connector	$ 108,308	YES	YES	YES	YES

Runway 9 and Parallel Taxiways

Primary Pavement	Intersecting Pavement	Total Cost	Additional Pavement	Additional Shoulder	Marking	Lighting
Taxiway K	Taxiway K10	$ 537,495	YES	YES	YES	YES
Taxiway K	Taxiway K9	$ 400,057	YES	YES	YES	YES
Taxiway K	Taxiway K8	$ 115,608	YES	YES	YES	YES
Taxiway K	Taxiway B	$ 60,467	YES	NO	YES	YES
Taxiway K	Taxiway K7	$ 370,695	YES	YES	YES	YES
Taxiway K	Hold Apron	$ 82,647	YES	YES	YES	YES
Taxiway K	Taxiway K6	$ 322,528	YES	YES	YES	YES
Taxiway K	Taxiway J6	$ 50,867	YES	NO	YES	YES
Taxiway K	Runway 18C	$ 740,444	YES	YES	YES	YES
Taxiway K	Taxiway D	$ 430,717	YES	YES	YES	YES
Taxiway K	Taxiway E	$ 157,967	YES	NO	YES	YES
Taxiway K	Taxiway F	$ 191,021	YES	YES	YES	YES
Taxiway K	Taxiway G	$ 181,437	YES	YES	YES	YES
Taxiway K	Taxiway J4	$ 237,186	YES	YES	YES	YES
Taxiway K	Taxiway K4	$ 32,300	NO	NO	YES	YES
Taxiway K	Taxiway K3	$ 39,650	YES	NO	YES	YES
Taxiway K	Taxiway J3	$ 108,813	YES	YES	YES	YES
Taxiway K	Taxiway K2	$ 28,767	YES	NO	YES	YES
Ramp 3 Taxilane	Taxiway J5	$ 65,567	YES	NO	YES	YES
Ramp 3 Taxilane	Taxiway F	$ 57,933	YES	NO	YES	YES
Ramp 3 Taxilane	Taxiway G	$ 58,217	YES	NO	YES	YES
Ramp 3 Taxilane	Taxiway J4	$ 67,150	YES	NO	YES	YES
Ramp 3 Taxilane	Taxiway J3	$ 69,433	YES	NO	YES	YES
Ramp 3 Taxilane	Taxiway J2	$ 61,800	YES	NO	YES	YES
Ramp 3 Taxilane	Taxilanes F & G	$ 138,317	YES	YES	YES	YES
Ramp 2 South Taxilane	Taxilanes F & G	$ 152,273	YES	YES	YES	YES
Ramp 2 North Taxilane	Taxilane E	$ 156,765	YES	YES	YES	YES
Ramp 2 North Taxilane	Taxilane	$ 206,629	YES	YES	YES	YES

APPENDIX E



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MASTER PLAN 2050

Appendix 8-A | Noise Technical Report

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LEB TEAM

Contents

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List of Tables

List of Exhibits

1 Introduction

The purpose of this Noise Technical Report is to provide supporting documentation for the Master Plan being prepared for the Cincinnati/Northern Kentucky International Airport (CVG). A set of noise exposure contours was prepared for year 2037 Master Plan environmental overview. The noise contours represent conditions expected for the 20-year timeframe of this Master Plan.

2 Background on Characteristics of Noise

Sound is created by a vibrating source that induces vibrations in the air. The vibration produces alternating bands of relatively dense and sparse particles of air, spreading outward from the source like ripples on a pond. Sound waves dissipate with increasing distance from the source. Sound waves can also be reflected, diffracted, refracted, or scattered. When the source stops vibrating, the sound waves disappear almost instantly and the sound ceases.

Sound conveys information to listeners. It can be instructional, alarming, pleasant and relaxing, or annoying. Identical sounds can be characterized by different people, or even by the same person at different times, as desirable or unwanted. Unwanted sound is commonly referred to as “noise.”

Sound can be defined in terms of three components:

- Level (amplitude)
- Pitch (frequency)
- Duration (time pattern)

2.1 Sound Level

The level of sound is measured by the difference between atmospheric pressure (without the sound) and the total pressure (with the sound). Amplitude of sound is like the relative height of the ripples caused by the stone thrown into the water. Although physicists typically measure pressure using the linear Pascal scale, sound is measured using the logarithmic decibel (dB) scale. This is because the range of sound pressures detectable by the human ear can vary from *1 to 100 trillion units*. A logarithmic scale allows us to discuss and analyze noise using more manageable numbers. The range of audible sound ranges from approximately 1 to 140 dB, although everyday sounds rarely rise above about 120 dB. The human ear is extremely sensitive to sound pressure fluctuations. A sound of 140 dB, which is sharply painful to humans, contains *100 trillion (10^{14}) times more* sound pressure than the least audible sound.

By definition, a 10-dB increase in sound is equal to a tenfold (10^1) increase in the mean square sound pressure of the reference sound. A 20-dB increase is a 100-fold (10^2) increase in the mean square sound pressure of the reference sound. A 30-dB increase is a 1,000-fold (10^3) increase in mean square sound pressure.

A logarithmic scale requires different mathematics than what is used with linear scales. The sound pressures of two separate sounds, expressed in dB, are not arithmetically additive. For example, if a sound of 80 dB is added to another sound of 74 dB, the total is a 1-dB increase in the louder sound (81 dB), not the arithmetic sum of 154 dB. If two equally loud noise events occur simultaneously, the sound pressure level from the combined events is 3-dB higher than the level produced by either event alone.

Human perceptions of changes in sound pressure are less sensitive than a sound level meter. People typically perceive a tenfold increase in sound pressure, a 10-dB increase, as a doubling of loudness. Conversely, a 10-dB decrease in sound pressure is normally perceived as half as loud. In community settings, most people perceive a 3-dB increase in sound pressure (a doubling of the sound pressure or energy) as just noticeable. (In laboratory settings, people with good hearing are able to detect changes in sounds of as little as 1-dB.)

2.2 Sound Pitch

The pitch (or frequency) of sound can vary greatly from a low-pitched rumble to a shrill whistle. If we consider the analogy of ripples in a pond, high frequency sounds are vibrations with tightly spaced ripples, while low rumbles are vibrations with widely spaced ripples. The rate at which a source vibrates determines the frequency. The rate of vibration is measured in units called “Hertz” -- the number of cycles, or waves, per second. One’s ability to hear a sound depends greatly on the frequency composition. Humans hear sounds best at frequencies between 1,000 and 6,000 Hertz. Sound at frequencies above 10,000 Hertz (high-pitched hissing) and below 100 Hertz (low rumble) are much more difficult to hear.

If we are attempting to measure sound in a way that approximates what our ears hear, we must give more weight to sounds at the frequencies we hear well and less weight to sounds at frequencies we do not hear well. Acousticians have developed several weighting scales for measuring sound.
The A-weighted scale was developed to correlate with the judgments people make about the loudness of sounds. The A-weighted decibel scale (dBA) is used in studies where audible sound is the focus of inquiry. The U.S. Environmental Protection Agency (USEPA) has recommended the use of the A-weighted decibel scale in studies of environmental noise.[1] Its use is required by the Federal Aviation Administration (FAA) in airport noise studies.[2] For the purposes of this analysis, dBA was used as the noise metric and dB and dBA are used interchangeably.

[1] *Information on Levels of Environmental Noise Requisite to Protect Health and Welfare with an Adequate Margin of Safety*, USEPA, Office of Noise Abatement and Control, 1974, P. A-10.
[2] *Airport Noise Compatibility Planning,* 14 CFR Part 150, Sec. A150.3, September 24, 2004.

2.3 Duration of Sounds

The duration of sounds – their patterns of loudness and pitch over time – can vary greatly. Sounds can be classified as *continuous* like a waterfall, *impulsive* like a firecracker, or *intermittent* like aircraft overflights. Intermittent sounds are produced for relatively short periods, with the instantaneous sound level during the event roughly appearing as a bell-shaped curve. An aircraft event is characterized by the period during which it rises above the background sound level, reaches its peak, and then recedes below the background level.

3 Standard Noise Descriptors

Given the multiple dimensions of sound, a variety of descriptors, or metrics, have been developed for describing sound and noise. Some of the most commonly used metrics are discussed in this section. They include:

- Maximum Level (Lmax)
- Time Above Level (TA)
- Sound Exposure Level (SEL)
- Equivalent Sound Level (Leq)
- Day/Night Average Sound Level (DNL)

3.1 Maximum Level (LMAX)

Lmax is simply the highest sound level recorded during an event or over a given period of time. It provides a simple and understandable way to describe a sound event and compare it with other events. In addition to describing the peak sound level, Lmax can be reported on an appropriate weighted decibel scale (A-weighted, for example) so that it can disclose information about the frequency range of the sound event in addition to the loudness.

Lmax, however, fails to provide any information about the duration of the sound event. This can be a critical shortcoming when comparing different sounds. Even if they have identical Lmax values, sounds of greater duration contain more sound energy than sounds of shorter duration. Research has demonstrated that for many kinds of sound effects, the total sound energy, not just the peak sound level, is a critical consideration.

3.2 Time Above Level (TA)

The “time above,” or TA, metric indicates the amount of time that sound at a particular location exceeds a given sound level threshold. TA is often expressed in terms of the total time per day that the threshold is exceeded. The TA metric explicitly provides information about the duration of sound events, although it conveys no information about the peak levels during the period of observation.

3.3 Sound Exposure Level (SEL)

The sound exposure level, or SEL metric, provides a way of describing the total sound energy of a single event. In computing the SEL value, all sound energy occurring during the event, within 10 dB of the peak level (Lmax), is mathematically integrated over one second. (Very little information is lost by discarding the sound below the 10-dB cut-off, since the highest sound levels completely dominate the integration calculation.) Consequently, the SEL is always greater than the Lmax for events with a duration greater than one second. SELs for aircraft overflights typically range from five to 10 dB higher than the Lmax for the event.

3.4 Equivalent Sound Level (LEQ)

The equivalent sound level (Leq) metric may be used to define cumulative noise dosage, or noise exposure, over a period of time. In computing Leq, the total noise energy over a given period of time, during which numerous events may have occurred, is logarithmically averaged over the time period. The Leq represents the steady sound level that is equivalent to the varying sound levels actually occurring during the period of observation. For example, an 8-hour Leq of 67 dB indicates that the amount of sound energy in all the peaks and valleys that occurred in the 8-hour period is equivalent to the energy in a continuous sound level of 67 dB. Leq is typically computed for measurement periods of 1 hour, 8 hours, or 24 hours, although any time period can be specified.

Leq is a critical noise metric for many kinds of analysis where total noise dosage, or noise exposure, is under investigation. As already noted, noise dosage is important in understanding the effects of noise on both animals and people. Indeed, research has led to the formulation of the “equal energy rule.” This rule states that it is the total acoustical energy to which people are exposed that explains the effects the noise will have on them. That is, a very loud noise with a short duration will have the same effect as a lesser noise with a longer duration if they have the same total sound energy.

3.5 Day/Night Average Sound Level (DNL)

The DNL metric is really a variation of the 24-hour Leq metric. Like Leq, the DNL metric describes the total noise exposure during a given period. Unlike Leq, however, DNL, by definition, can only be applied to a 24-hour period. In computing DNL, an extra weight of 10 dB is assigned to any sound levels occurring between the hours of 10:00 p.m. and 6:59 a.m. This is intended to account for the greater annoyance that nighttime noise is presumed to cause for most people. Recalling the logarithmic nature of the dB scale, this extra weight treats one nighttime noise event as equivalent to 10 daytime events of the same magnitude.

As with Leq, DNL values are strongly influenced by the loud events. For example, 30 seconds of sound of 100 dB, followed by 23 hours, 59 minutes, and 30 seconds of silence would compute to a DNL value of 65 dB. If the 30 seconds occurred at night, it would yield a DNL of 75 dB.

This example can be roughly equated to an airport noise environment. Recall that an SEL is the mathematical compression of a noise event into one second. Thus, 30 SELs of 100 dB during a 24-hour period would equal DNL 65 dB, or DNL 75 dB if they occurred at night. This situation could actually occur in places around a real airport. If the area experienced 30 overflights during the day, each of which produced an SEL of 100 dB, it would be exposed to DNL 65 dB. Recalling the relationship of SEL to the peak noise level (Lmax) of an aircraft overflight, the Lmax recorded for each of those overflights (the peak level a person would actually hear) would typically range from 90 to 95 dB.

4 Regulatory Setting

This section presents information regarding noise and land use criteria that may be useful in the evaluation of noise impacts.

4.1 Federal Regulations

The FAA has a long history of publishing noise and use assessment criteria. A summary of some of the more pertinent regulations and guidelines is presented in the following paragraphs.

4.1.1 Noise Control Act

Congress passed the Noise Control Act (42 U.S.C. §4901 et seq.) in 1972, which established a national policy to promote an environment for all Americans free from noise that jeopardizes their health and welfare. The act set forth the foundation for conducting research and setting guidelines to restrict noise pollution.

4.1.2 Federal Aviation Noise Abatement Policy

On November 18, 1976, the U.S. Department of Transportation and FAA jointly issued the Federal Aviation Noise Abatement Policy. This policy recognized aircraft noise as a major constraint on the further development of the commercial aviation and established key responsibilities for addressing aircraft noise. The policy stated that the federal government has the authority and responsibility to regulate noise at the source by designing and managing flight procedures to limit the impact of aircraft noise on local communities; and by providing funding to airports for noise abatement planning.

4.1.3 Aviation Safety and Noise Abatement Act of 1979

The Aviation Safety and Noise Abatement Act of 1979 (ASNA), which is codified as 49 U.S.C. 47501-47510, set forth the foundation for the airport noise compatibility planning program outlined in 14 Code of Federal Regulations (CFR) Part 150. The act established the requirements for conducting noise compatibility planning and provided assistance to, and funding for which airport operators could apply to undertake such planning.

4.1.4 Airport Noise and Capacity Act of 1990

The Airport Noise and Capacity Act (ANCA) of 1990 established two broad directives for the FAA: 1) to establish a method by which to review airport noise and access/use restrictions imposed by airport proprietors, and 2) to institute a program to phase out Stage 2 aircraft over 75,000 pounds by December 31, 1999.[3] To implement ANCA, the FAA amended 14 CFR Part 91 and issued 14 CFR Part 161 which sets forth noise levels that are permitted for aircraft of various weights, engine number.

[3] Title 14, Part 36 of the CFR sets forth noise levels that are permitted for aircraft of various weights, engine number, and date of certification. Aircraft were divided into three classes according to noise level, Stage 1, Stage 2, and Stage 3, with Stage three being the quietest. Per 14 CFR Part 36, to be designated as Stage 3, aircraft must meet noise levels defined by the FAA at takeoff, sideline, and approach measurement locations.

4.1.5 Federal Requirements to Use DNL in Environmental Noise Studies

DNL is the standard metric used for environmental noise analysis in the U.S. This practice originated with the USEPA's effort to comply with the Noise Control Act of 1972. The USEPA designated a task group to "consider the characterization of the impact of airport community noise and develop a community noise exposure measure."[4] The task group recommended using the DNL metric. The USEPA accepted the recommendation in 1974, based on the following considerations:

- The measure is applicable to the evaluation of pervasive, long-term noise in various defined areas and under various conditions over long periods of time.
- The measure correlates well with known effects of the noise environment on individuals and the public.
- The measure is simple, practical, and accurate.
- Measurement equipment is commercially available.
- The metric at a given location is predictable, within an acceptable tolerance, from knowledge of the physical events producing the noise.[5]

Soon thereafter, the Department of Housing and Urban Development (HUD), Department of Defense, and the Veterans Administration adopted the use of DNL.

At about the same time, the Acoustical Society of America developed a standard (ANSI S3.23-1980) which established DNL as the preferred metric for outdoor environments. This standard was reevaluated in 1990 and they reached the same conclusions regarding the use of DNL (ANSI S12.40-1990).

In 1980, the Federal Interagency Committee on Urban Noise (FICUN) met to consolidate federal guidance on incorporating noise considerations in local land use planning. The committee selected DNL as the best noise metric for the purpose, thus endorsing the USEPA's earlier work and making it applicable to all federal agencies.[6]

In response to the requirements of the ASNA Act of 1979 and the recommendations of FICUN and USEPA, the FAA established DNL in 1981 as the single metric for use in airport noise and land use compatibility planning. This decision was incorporated into the final rule implementing ASNA, 14 CFR Part 150, in 1985. Part 150 established the DNL as the noise metric for determining the exposure of individuals to aircraft noise and identified residential land uses as being normally compatible with noise levels below DNL 65 dB.

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4 *Information on Levels of Environmental Noise Requisite to Protect Health and Welfare with an Adequate Margin of Safety*, USEPA, Office of Noise Abatement and Control. 1974, P. A-10.

5 *Information on Levels of Environmental Noise Requisite to Protect Health and Welfare with an Adequate Margin of Safety*, USEPA, Office of Noise Abatement and Control. 1974, Pp. A-1–A-23.

6 *Guidelines for Considering Noise in Land Use Planning and Control*. Federal Interagency Committee on Urban Noise (FICUN), 1980.

5 Modeling Methodology

The analysis of noise exposure around CVG was prepared using the FAA's Aviation Environmental Design Tool (AEDT) Version 3b. Inputs to the AEDT include runway definition, number of aircraft operations during the time period evaluated, the types of aircraft flown, the time of day when they are flown, how frequently each runway is used for arriving and departing aircraft, the routes of flight used when arriving to and departing from the runways, and departure profiles. The AEDT calculates noise exposure for the area around an airport and outputs contours of noise exposure using the Day/Night Average Sound Level (DNL) metric. Noise exposure contours for the levels of 65, 70, and 75 DNL were calculated and represent average-annual day conditions for the 2037 Master Plan scenario.

5.1 Future (2037) Master Plan Noise Exposure Contour Input Data

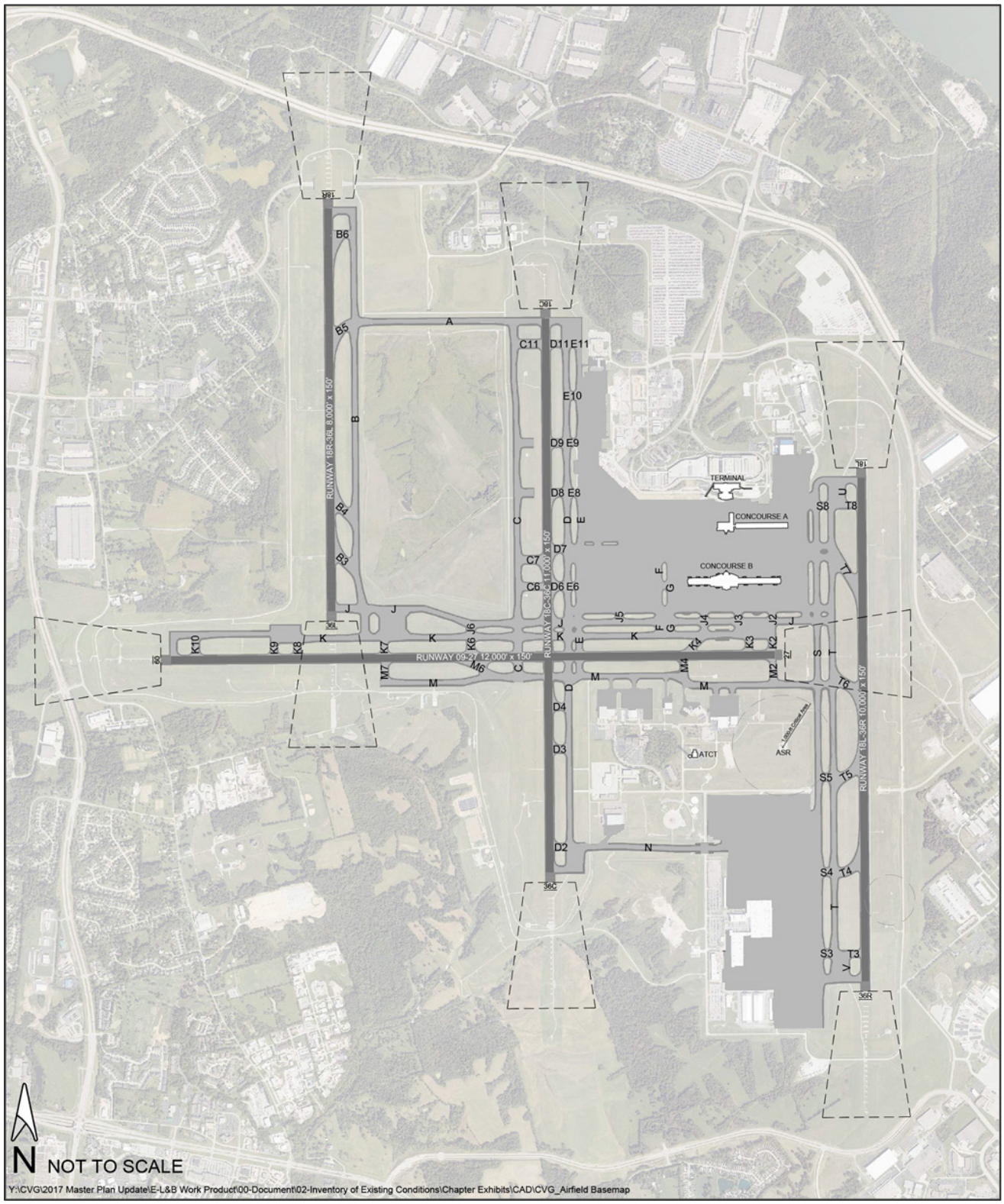
Runway Definition: CVG currently has four runways. Three parallel north/south runways (18L/36R, 18C/36C, and 18R/36L) and one east/west runway (09/27). This analysis assumes no change to runway layout would occur by 2037. The current airfield layout at CVG is shown on **Exhibit 5-1, *Current Airfield Layout***. The runways and lengths at CVG are listed below:

Runway	Length (feet)
09/27	12,000
18L/36R	10,000
18C/36C	11,000
18R/36L	8,000

Number of Operations and Fleet Mix: The number of annual operations modeled for the Future (2037) Master Plan Noise Exposure Contour was based on the CVG Master Plan 2050 aviation activity forecast (Forecast) which can be found in Chapter 3, *Aviation Activity Forecast*. That Forecast projects a total of 303,323 operations in the year 2037 at CVG, which results in 831 average-annual day operations. Specific aircraft types and times of operation for commercial and non-commercial aircraft was based on data provided in the Forecast. **Table 5-1, *Future (2037) Distribution of Average Daily Operations by Aircraft Category***, provides a summary of the average daily operations and fleet mix forecast at CVG in 2037, organized by aircraft type, operation type, and time of day.

Runway End Utilization: Average-annual day runway end utilization for 2037 was derived primarily from analysis of radar data and a review of previous noise analysis at CVG. For this analysis, no change to runway use patterns is anticipated. **Table 5-2, *Future (2037) Runway End Utilization***, summarizes the percentage of use by each aircraft category on each of the runways at CVG during the daytime (7:00 a.m. – 9:59 p.m.) and nighttime (10:00 p.m. – 6:59 a.m.).

EXHIBIT 5-1 CURRENT AIRFIELD LAYOUT



Sources: FAA CVG Airport Diagram October 12, 2017; KCAB; Woolpert Photography dated September 23, 2017

TABLE 5-1 FUTURE (2037) DISTRIBUTION OF AVERAGE DAILY OPERATIONS BY AIRCRAFT CATEGORY

Aircraft Type	Engine Model ID	Arrivals		Departures		Total
		Day	Night	Day	Night	
Large Passenger Jets						
Airbus A319-100 Series	2CM019	2.0	0.4	2.1	0.2	4.7
Airbus A319-100 Series	3IA006	1.9	0.4	2.1	0.2	4.6
Airbus A319-100 Series	4CM036	1.9	0.4	2.1	0.2	4.6
Airbus A319-NEO	15PW105	1.0	0.2	1.0	0.1	2.3
Airbus A319-NEO	17CM082	1.0	0.2	1.0	0.1	2.3
Airbus A320-200 Series	1CM009	3.3	0.6	3.5	0.4	7.8
Airbus A320-200 Series	1IA003	3.2	0.6	3.4	0.4	7.6
Airbus A320-200 Series	2CM014	3.2	0.6	3.4	0.4	7.6
Airbus A320-NEO	17CM082	4.6	0.8	5.0	0.5	10.9
Airbus A320-NEO	18PW122	4.6	0.8	5.0	0.5	10.9
Airbus A321-200 Series	3CM025	10.0	1.8	10.7	1.1	23.5
Airbus A321-200 Series	3IA008	9.7	1.8	10.4	1.1	22.9
Airbus A321-200 Series	8CM054	9.7	1.8	10.4	1.1	22.9
Boeing 737 MAX 7	18CM087	3.4	0.6	3.7	0.4	8.1
Boeing 737 MAX 8	18CM084	8.6	1.6	9.2	0.9	20.4
Boeing 737 MAX 9	18CM084	0.2	0.0	0.2	0.0	0.5
Boeing 737-700 Series	3CM031	10.1	1.8	10.8	1.1	23.8
Boeing 737-700 Series	3CM032	10.1	1.8	10.8	1.1	23.8
Boeing 737-800 Series	3CM032	7.1	1.3	7.6	0.8	16.8
Boeing 737-800 Series	3CM033	6.9	1.3	7.4	0.8	16.3
Boeing 737-800 Series	3CM034	6.9	1.3	7.4	0.8	16.3
Boeing 737-900 Series	3CM032	0.6	0.1	0.6	0.1	1.3
Boeing 737-900 Series	3CM033	0.6	0.1	0.6	0.1	1.3
Boeing MD-88	4PW071	0.6	0.1	0.7	0.1	1.5
Bombardier CRJ-700	5GE084	13.2	2.4	14.1	1.5	31.2
Bombardier CRJ-700-LR	5GE084	13.2	2.4	14.1	1.5	31.2
Bombardier CRJ-900	6GE092	38.5	7.0	41.3	4.2	91.0
Bombardier CS100	16PW111	2.4	0.4	2.6	0.3	5.7
Embraer ERJ170	6GE093	2.9	0.5	3.2	0.3	7.0
Embraer ERJ170-LR	6GE093	2.9	0.5	3.2	0.3	7.0

Aircraft Type	Engine Model ID	Arrivals		Departures		Total
		Day	Night	Day	Night	
Embraer ERJ175	6GE094	20.9	3.8	22.4	2.3	49.4
Embraer ERJ190	6GE094	3.1	0.6	3.3	0.3	7.2
Embraer ERJ190	6GE095	3.1	0.6	3.3	0.3	7.2
Subtotal		**211.1**	**38.5**	**226.4**	**23.3**	**499.3**
Heavy Jets						
Boeing 747-800 Freighter	2GE045	0.8	2.5	1.1	2.1	6.5
A300F4-600 Series	1PW056	1.0	3.1	1.4	2.7	8.3
Airbus A300B4-200 Series	3GE074	0.0	0.0	0.0	0.0	0.1
Airbus A330-300 Series	1GE033	6.2	19.3	8.8	16.6	50.9
Airbus A330-900N Series (Neo)	19RR098	0.2	0.6	0.3	0.5	1.7
Boeing 747-400 Series Freighter	1GE024	0.4	1.3	0.6	1.1	3.3
Boeing 747-400 Series Freighter	3GE057	0.9	2.9	1.3	2.5	7.7
Boeing 767-200 Series Freighter	1GE010	5.7	17.7	8.1	15.2	46.6
Boeing 767-300 ER Freighter	1GE029	9.6	30.1	13.8	23.1	76.6
Boeing 767-300 ER Freighter					2.9	2.9
Boeing 777 Freighter	7GE099	1.7	5.3	2.4	4.6	14.1
Boeing 787-8 Dreamliner	12RR067	0.2	0.5	0.2	0.5	1.4
Boeing 787-8 Dreamliner	7GENX1	0.3	0.9	0.4	0.8	2.3
Subtotal		**26.9**	**84.2**	**38.6**	**72.6**	**222.3**
Large Cargo Jets						
Boeing 727-200 Series	1PW009	0.2	0.6	0.3	0.5	1.5
Boeing 737-400 Series Freighter	1CM007	1.0	27.4	5.5	22.9	56.9
Subtotal		**1.2**	**28.0**	**5.8**	**23.4**	**58.4**
Air Taxi / General Aviation						
Bombardier Challenger 600	5GE084	0.9	0.1	0.9	0.1	2.0
Bombardier Challenger 601	1GE034	0.1	0.0	0.1	0.0	0.2
Bombardier CRJ-200-ER	5GE084	3.5	0.4	3.5	0.4	7.8
Bombardier Learjet 35	1AS001	1.8	0.2	1.8	0.2	4.0
Cessna 172 Skyhawk	IO360	0.1	0.1	0.1	0.1	0.3
Cessna 182	IO360	0.0	0.0	0.0	0.0	0.1
Cessna 206	TIO540	0.0	0.0	0.0	0.0	0.1
Cessna 208 Caravan	PT6A14	0.2	0.1	0.2	0.1	0.6
Cessna 441 Conquest II	TPE8	0.1	0.0	0.1	0.0	0.3

Aircraft Type	Engine Model ID	Arrivals		Departures		Total
		Day	Night	Day	Night	
Cessna 500 Citation I	1PW035	2.0	1.3	2.1	1.2	6.6
Cessna 525 CitationJet	10PW099	0.9	0.6	1.0	0.5	3.0
Cessna 550 Citation II	PW530	1.5	0.2	1.5	0.1	3.2
Cessna 560 Citation Excel	1PW037	1.4	0.2	1.4	0.1	3.0
Cessna 560 Citation V	PW530	0.3	0.0	0.3	0.0	0.7
Cessna 650 Citation III	1AS002	0.1	0.0	0.1	0.0	0.3
Cessna 680 Citation Sovereign	7PW078	0.2	0.0	0.2	0.0	0.4
Cessna 750 Citation X	13AL027	0.2	0.0	0.2	0.0	0.4
CESSNA CITATION 510	PW615F	0.1	0.0	0.1	0.0	0.2
DeHavilland DHC-6-300 Twin Otter	PT6A27	0.1	0.0	0.1	0.0	0.1
Dornier 228-200 Series	TPE5A	0.0	0.0	0.0	0.0	0.0
Eclipse 500 / PW610F	PW610F	0.1	0.0	0.1	0.0	0.2
Embraer EMB120 Brasilia	PW118	0.3	0.2	0.4	0.2	1.1
Embraer ERJ145	6AL012	0.9	0.1	0.9	0.1	2.0
Fairchild SA-227-AC Metro III	TPE11U	0.7	0.5	0.8	0.4	2.4
Fokker F100	1RR020	0.1	0.0	0.1	0.0	0.2
Gulfstream G400	6RR042	0.5	0.1	0.5	0.0	1.0
Gulfstream V-SP	3BR001	0.1	0.0	0.1	0.0	0.3
Hawker Beechcraft Corp Beechjet 400	1PW037	0.8	0.6	0.9	0.5	2.8
Israel IAI-1125 Astra	1AS002	0.3	0.0	0.3	0.0	0.7
Mitsubishi MU-300 Diamond	1PW037	0.5	0.1	0.5	0.1	1.1
Piper PA-28 Cherokee Series	IO320	0.0	0.0	0.0	0.0	0.1
Piper PA-32 Cherokee Six	TIO540	0.2	0.1	0.2	0.1	0.5
Raytheon Beech 1900-D	PT67D	1.4	0.2	1.5	0.1	3.2
Raytheon Beech Baron 58	TIO540	0.1	0.0	0.1	0.0	0.3
Shorts 330-200 Series	PT6A4R	0.5	0.3	0.5	0.3	1.5
Subtotal		**20.1**	**5.4**	**20.6**	**4.9**	**51.0**
Grand Total		**259.4**	**156.1**	**291.3**	**124.2**	**831.0**

Notes: Day = 7:00 a.m. to 9:59 p.m, Night = 10:00 p.m. to 6:59 a.m.
Totals may not equal sum due to rounding.
Source: Landrum & Brown analysis

TABLE 5-2 FUTURE (2037) RUNWAY END UTILIZATION

Daytime Arrivals								
	09	18C	18L	18R	27	36C	36L	36R
Large Cargo Jets	0.8%	36.2%	38.5%	0.0%	3.1%	10.8%	0.0%	10.8%
Heavy Jets	0.9%	22.8%	54.5%	0.5%	2.5%	6.5%	0.0%	12.4%
Passenger Jets	0.5%	31.3%	40.8%	0.3%	3.8%	10.4%	0.0%	12.9%
Air Taxi / GA Props	0.5%	33.8%	39.1%	1.0%	4.2%	11.5%	0.1%	9.9%
Air Taxi / GA Jets	0.4%	33.1%	37.5%	0.3%	4.1%	12.9%	0.0%	11.8%
Nighttime Arrivals								
	09	18C	18L	18R	27	36C	36L	36R
Large Cargo Jets	18.1%	3.4%	7.8%	0.4%	27.7%	4.6%	0.1%	38.0%
Heavy Jets	60.5%	4.1%	0.0%	0.0%	32.2%	2.2%	0.0%	0.9%
Passenger Jets	56.9%	4.3%	0.1%	0.0%	34.3%	2.7%	0.0%	1.8%
Air Taxi / GA Props	43.9%	4.7%	3.1%	0.2%	27.3%	3.1%	0.0%	17.7%
Air Taxi / GA Jets	17.0%	7.5%	17.6%	7.7%	18.9%	3.4%	0.0%	28.0%
Daytime Departures								
	09	18C	18L	18R	27	36C	36L	36R
Large Cargo Jets	0.1%	2.2%	17.3%	0.6%	67.6%	1.9%	0.0%	10.3%
Heavy Jets	0.0%	5.1%	4.3%	0.0%	84.0%	2.8%	0.0%	3.8%
Passenger Jets	0.0%	3.5%	18.5%	0.0%	68.4%	2.2%	0.0%	7.3%
Air Taxi / GA Props	0.0%	2.5%	24.3%	0.1%	62.6%	1.7%	0.0%	8.8%
Air Taxi / GA Jets	0.0%	2.2%	16.7%	0.8%	69.5%	2.2%	0.5%	8.1%
Nighttime Departures								
	09	18C	18L	18R	27	36C	36L	36R
Large Cargo Jets	0.2%	1.0%	3.7%	0.3%	78.8%	6.0%	0.0%	10.0%
Heavy Jets	0.0%	1.3%	0.4%	0.0%	88.9%	4.6%	0.0%	4.9%
Passenger Jets	0.0%	1.6%	1.6%	0.0%	80.2%	8.4%	0.0%	8.1%
Air Taxi / GA Props	0.0%	1.2%	5.2%	0.1%	80.9%	8.4%	0.2%	4.1%
Air Taxi / GA Jets	0.2%	1.0%	12.5%	0.1%	30.2%	8.5%	1.3%	46.3%

Notes: Daytime = 7:00 a.m. – 9:59 p.m., Nighttime = 10:00 p.m. – 6:59 a.m.
Source: Landrum & Brown analysis

Flight Tracks: Flight tracks locations and percent distribution for the Future (2037) Master Plan Noise Exposure Contour was derived primarily from analysis of previous radar data and noise modeling at CVG. For this analysis no change to flight tracks is anticipated.

Aircraft Weight and Trip Length: Aircraft weight upon departure is a factor in the dispersion of noise because it impacts the rate at which an aircraft is able to climb. Generally, heavier aircraft have a slower rate of climb and a wider dispersion of noise along the flight route. Where specific aircraft weights are unknown, the AEDT uses the distance flown to the first stop as a surrogate for the weight, by assuming that the weight has a direct relationship with the fuel load necessary to reach the first destination. The AEDT groups trip lengths into nine stage categories and assigns standard aircraft weights to each stage category. These categories are:

Stage Category	Stage Length
1	0-500 nautical miles
2	501-1000 nautical miles
3	1001-1500 nautical miles
4	1501-2500 nautical miles
5	2501-3500 nautical miles
6	3501-4500 nautical miles
7	4501-5500 nautical miles
8	5501-6500 nautical miles
9	6500+ nautical miles

The stage lengths modeled for the Future (2037) Master Plan Noise Exposure Contour are based upon a review of existing schedules and typical destinations for current conditions at CVG. In general, the destinations are not expected to substantially change from current conditions. Some minor changes in schedules may occur, but overall the percentage of operations that fall within each of the nine stage lengths will remain relatively the same. Therefore, no major changes to stage length are expected to occur. **Table 5-3, *Future (2037) Stage Lengths***, indicates the proportion of the operations that would fall within each of the nine stage length categories for Future (2037) Master Plan Noise Exposure Contour.

TABLE 5-3 FUTURE (2037) STAGE LENGTHS

Stage Length Category	Air Carrier Jets	Heavy Jets	Large Cargo Jets	Air Taxi / General Aviation
1	47.8%	16.6%	47.2%	99.5%
2	43.0%	26.9%	42.5%	0.5%
3	5.0%	18.5%	4.4%	0.0%
4	3.9%	16.6%	5.3%	0.0%
5	0.0%	6.9%	0.6%	0.0%
6	0.3%	7.0%	0.0%	0.0%
7	0.0%	7.5%	0.0%	0.0%
8	0.0%	0.0%	0.0%	0.0%
9	0.0%	0.0%	0.0%	0.0%
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**

Source: Landrum & Brown analysis, *Future (2037) Master Plan Noise Exposure Contour*

The Future (2037) Master Plan Noise Exposure Contour, showing levels of 65, 70, and 75 DNL, is presented on **Exhibit 5-2**, ***Future (2037) Master Plan Noise Exposure Contour***. The 65+ DNL of the Future (2037) Master Plan Noise Exposure Contour encompasses approximately 16.2 square miles. **Table 5-4, *Future (2037) Master Plan Noise Exposure Contour – Area (in Square Miles) Within Noise Contour Bands*** shows the area of the 65, 70, and 75 DNL contours, as well as their combined total area.

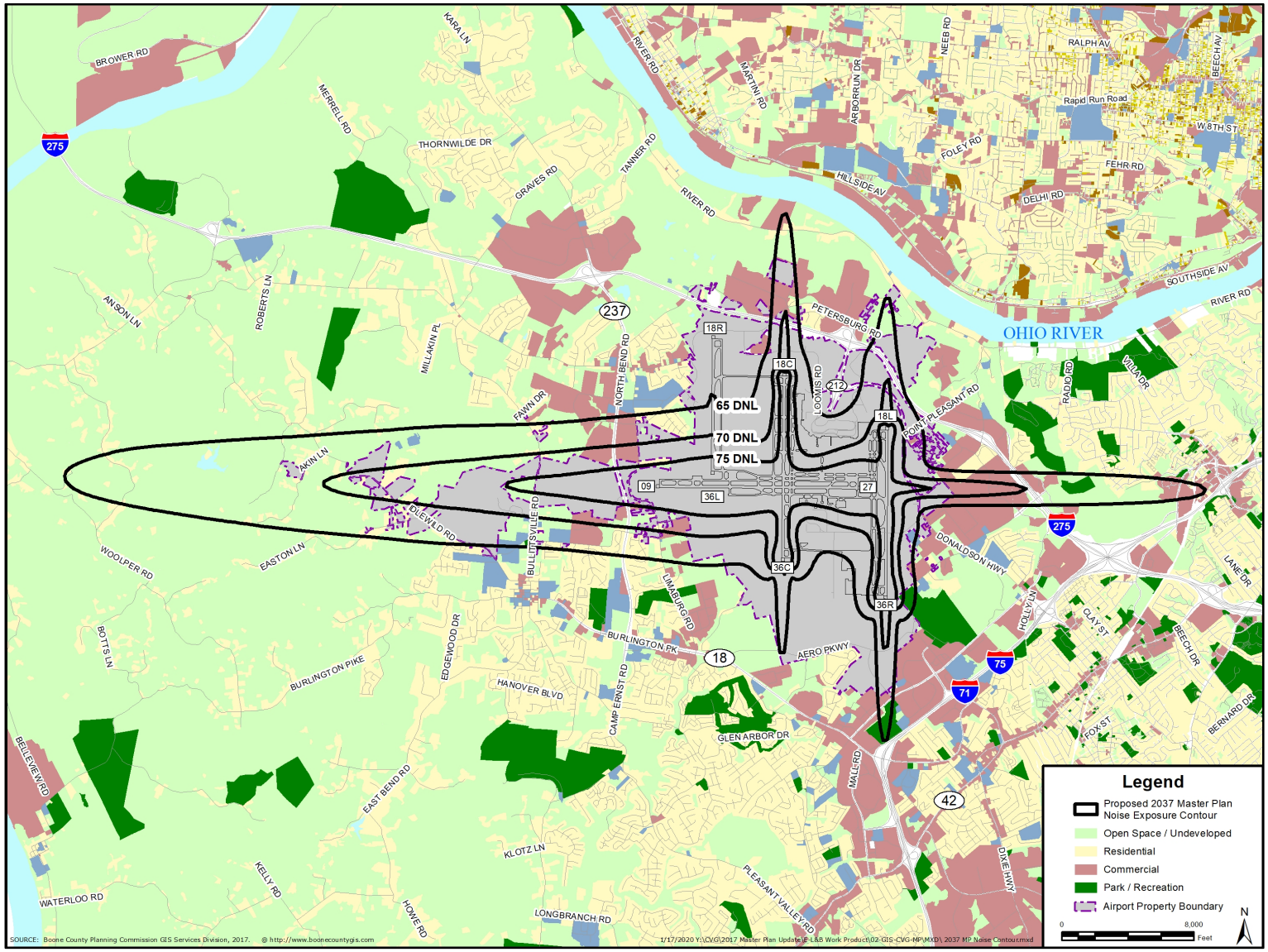
TABLE 5-4 FUTURE (2037) MASTER PLAN NOISE EXPOSURE CONTOUR – AREA (IN SQUARE MILES) WITHIN NOISE CONTOUR BANDS

Contour Range (DNL)	2037 Master Plan Noise Exposure Contour Area (Square Miles)
65-70	9.8
70-75	3.8
75+	2.6
65+	**16.2**

Note: Figures are rounded to the nearest tenth of a square mile.
Source: Landrum & Brown analysis

The Future (2037) Master Plan Noise Exposure Contour reflects the runway use patterns in use at CVG. The contour is widest and longest to the west of Runway 27 because this is the primary departure runway during single runway operations and the nighttime period. The Future (2037) Master Plan Noise Exposure Contour extends north and south of Runways 18L/36R and 18C/36C due to the use of these runways for arrivals and departures during dual runway operations during the daytime. The Future (2037) Master Plan Noise Exposure Contour surrounding Runway 18R/36L is minimal due to the limited use of this runway. The extension of the Future (2037) Master Plan Noise Exposure Contour east of Runway 09/27 reflects the usage of Runway 27 for arrivals when wind and operational conditions dictate.

EXHIBIT 5-2 FUTURE (2037) MASTER PLAN NOISE EXPOSURE CONTOUR



Source: Landrum & Brown analysis

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