Executive Summary

Actuarial & Underwriting Committee Meeting, September 21, 2021
Board of Governors Meeting, September 22, 2021

Catastrophe Modeling Software – 20-0030

Topic

Citizens is requesting approval to contract with AIR Worldwide Corporation for Catastrophe Modeling Software. This software is used to estimate Citizens' exposure to hurricane losses, in order to ensure actuarial sound rating, improve risk management, enhance risk transfer decision-making, and assist in catastrophe reserving and real-time hurricane event response. Approval is requested for a five (5) year base term with a three (3) year renewal option, for an amount not to exceed $4,849,039 for the life of the contract. The contract price is variable, based upon policy count, therefore the cost provided is the highest possible amount. However, the cost could be lower as outlined below.

Background

Citizens must use catastrophe modeling software to estimate how much it is likely to pay for repairing the structures it insures that are damaged by hurricanes. These estimates are needed for seven of Citizens' most important business functions:

1. **Determining Policyholder Premiums**: Florida law requires that policyholders' hurricane premiums be calculated using catastrophe modeling software that has been approved by a state-created review board called the Florida Commission on Hurricane Loss Projection Methodology.
2. **Preparing for an Approaching Hurricane:** When a hurricane is approaching Florida, it is important to estimate the cost of the damage that it might cause several days before it actually makes landfall. Catastrophe models can be used to estimate these costs. Catastrophe modeling firms also often offer additional services to help prepare for an approaching storm.
3. **Required Reporting After a Hurricane**: After a hurricane has made landfall in Florida, the Florida Office of Insurance Regulation requires Citizens to file several reports. One of these reports includes an estimate made using a catastrophe model of the total cost of the damage caused by the hurricane.
4. **Understand Reinsurance and Risk Transfer**: Citizens pays upfront for its reinsurance premium. Citizens is then reimbursed from the reinsurance company only after a large storm affects its policies. A catastrophe model is required to estimate the probable size of these reimbursements, which is required for Citizens to decide the kind of reinsurance it should buy. This is also true for the catastrophe bonds issued by Citizens, which are technically not reinsurance but effectively work the same way by transferring risk out of Citizens.
5. **Estimate Claims Paying Resources After a Hurricane**: Citizens uses a catastrophe model to make sure it has enough money to pay the immediate costs of repairing homes and buildings after a large hurricane. If Citizens does not have enough money to pay all the

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costs, then it must assess all Floridians for whatever it cannot pay. In this scenario, catastrophe models are used to estimate this difference between the money it has, and the money it must eventually pay, to determine the correct amount to assess Floridians.

6. **Respond to Requests by the Board of Governors, the Legislature, and Other Stakeholders:** The Board of Governors, the Florida legislature, and other stakeholder will often ask Citizens for the effect of legislative or other changes on how much Citizens is likely to pay after a large hurricane. These effects must be estimated using a catastrophe model. For example, in 2021 the legislature asked Citizens how much less it might have to pay for hurricanes if policyholders replaced their roofs.
7. **Understand Effects of Citizens' Changing Insured Policy Count:** In the current state of the insurance market, the number of policies insured by Citizens has been steadily growing. These additional policies mean Citizens will pay more losses after a large hurricane. This increases the probability that Citizens will run out of money, requiring it to assess all Floridians. The catastrophe model allows Citizens to estimate the increase in this probability due to the extra policies.

To estimate probable hurricane losses, the catastrophe model begins with input about each individual building insured by Citizens. This includes the building's specific location or address, the construction type such as masonry or frame, the roof shape, and features that protect the building against wind damage such as storm shutters. The hurricane produces two main estimates of the hurricane risk. The average annual loss, or AAL, is the expected cost of hurricane damage paid by Citizens over the next year. The probable maximum losses, or PMLs, describes the probability of different large losses. If needed the catastrophe model can produce the AAL or PMLs for an individual building, for groups of buildings, or for all of Citizens' policies together. The model also provides a large list of simulated hurricanes which represent hypothetical storms that could hit Florida. For example, it has a list of possible category 4 storms making landfall in Miami-Dade, with their losses. These can be used to better understand the kinds of hurricanes that might cause severe losses for Citizens and its policyholders.

In practice, the catastrophe model results will depend on the judgment of the catastrophe modeler running the software. The modeler must decide how to massage policy data into the model's required format. And they must configure the model in other ways to match how Citizens pays losses after a storm, for example that Citizens never pays for flood losses. This means that, in practice, the model results will vary somewhat according to the judgment exercised by the modeler even though, technically, the model will always produce identical results for identical input data and configuration.

In summary, a catastrophe model mitigates hurricane risk by allowing Citizens to charge policyholders a fair premium for insuring against hurricane damage, to buy appropriate reinsurance, and to provide required information immediately before and after a hurricane makes landfall in Florida. It also allows Citizens to fulfill several reporting requirements related

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to setting policyholder premiums, reporting potential losses to regulators after a hurricane, and responding to questions by its Board of Governors, the legislature, and other stakeholders.

Citizens currently has a catastrophe model license with AIR Worldwide under a contract with a 5-year initial term and an optional 3-year renewal that began on December 17, 2013 and will expire on December 16, 2021. The total cost of that contract, including the 3-year renewals, is $2,078,622. Staff was pleased and satisfied with the level of service provided throughout the contract period.

The requested contract was negotiated on the best value to Citizens pursuant to Invitation to Negotiate No. 20-0030 for Catastrophe Modeling Software System. The ITN was issued on October 9, 2020. Citizens received responses from three (3) vendors: AIR Worldwide Corporation, Eqecat, Inc (dba CoreLogic) and Risk Management Solutions, Inc. After review and scoring, the Evaluation Team recommended advancing all three (3) vendors to negotiations. Citizens' negotiation team recommended AIR Worldwide Corporation for award on April 13, 2021, after conducting negotiations with all three (3) vendors.

Awarded Vendor

Staff selected AIR through an Invitation-to-Negotiate. AIR is heavily focused on hurricane modeling. It created one of the first, if not the first, hurricane catastrophe model, and its model is still state-of-the-art. The board of experts created by Florida in 1994 to evaluate hurricane models, called the Florida Commission on Hurricane Loss Methodology, has approved the AIR model for the last 25 years. AIR holds annual conferences on hurricane catastrophe modeling, and offers a program to educate and certify catastrophe risk modelers. It also provides robust services to estimate losses immediately before and after a hurricane makes landfall. It is not surprising that, among the vendors who responded to the ITN, AIR is the most widely used by Florida insurers; it is licensed by 18 Florida-based P&C insurance companies, 11 of which are in the top 20 of Florida insurers by direct written premium. It is also licensed by almost 75 reinsurers and reinsurance brokers.

The contract is for a five (5) year base term with one (1) three (3) year renewal option. Approval is requested for an amount to not exceed $4,849,039 including renewals.

The actual costs would vary with Citizens' insured policy count. The requested authorization provides the maximum amount necessary. This is an annual fee of $539,299 per year over the first five years, and assumes Citizens' is always insuring more than 1.5M policies over that time. However, the annual fee would be only $487,140 during any of those five years in which Citizens insured fewer than 750,000 policies. Similarly, during the optional final three years of the contract, Citizens would pay $717,515 during years it insured over 1.5M policies, down to $645,767 in years it insured fewer than 750,000 policies. If Citizens' policy count is between 750,000 and 1.5M policies, then the actual cost would be in between these two extremes.

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Software-as-a-Service (SaaS)

The contract also requires AIR to own and maintain the computers that run the AIR software. Citizens employees and computers would connect to this software over the internet. This is called a "Software-as-a-Service", or SaaS, arrangement. Citizens' corporate strategy is to use SaaS whenever possible to allow Citizens to better meet its changing computing needs. This is because under SaaS, a constant monthly fee replaces the large initial cost and effort that is required to set up a new computer or application under more traditional approaches.

SaaS is a particularly good choice for catastrophe modeling software, which is very complicated to install and annually update. For example, the AIR software must run on 12 different computers which talk to each other in complicated ways, and it must be installed on a second set of 12 computers for emergency backup purposes. There is always the risk that it will not work effectively and predictably within Citizens' computer environment. As an example, in 2020 this interaction with Citizens' computing system caused our AIR software installation to break for reasons still not understood. Over 3 months, 10 staff members spent around 330 hours troubleshooting with AIR support, who were very helpful. Unfortunately, the software ultimately had to be re-installed. Luckily there was no hurricane during this time; it would have been difficult or impossible for staff to respond to the hurricane while also continuing to fix the catastrophe modeling installation. Even still, these delays caused staff to miss several deadlines.

None of the issues stated in the example reflect a failure of either the AIR software, or of Citizens' computing environment. Rather, it is an inevitable risk of engineering these two complex systems under traditional installation methods. SaaS mitigates this risk because the AIR software is installed in AIR's computing environment instead of Citizens'. If the AIR software somehow stopped working, under the current contract, AIR would have to restore access within 2 hours. And every night, AIR must back up any Citizens' data on its computers, and restore it within several days if lost; staff chose not to pay extra to guarantee Citizens' data would be restored within 24 hours, partly because the most important elements of that data would also be stored on Citizens' own computers. This small remaining risk of losing access to the AIR software under the SaaS contract does not threaten Citizens' effective use of catastrophe modeling.

More generally, the SaaS arrangement allows the experts at AIR to install and update the AIR software, while Citizens' staff focuses on using it. The SaaS component of the costs, which are included in the total costs quoted earlier, are $697,075 over the first five years, and $501,894 in the optional final three years. This averages $139,415 per year over the first five years of the contract. If Citizens were to install AIR on its own computers, then the cost of only the computers would be approximately $41,000 per year. This leaves a difference of $98,000 per year Citizens would pay over the first five years for the guaranteed access to the AIR software provided under the SaaS arrangement and allow staff to focus on Citizens' core business concerns.

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Comparison to Current Contract

Citizens currently has a catastrophe model license with AIR Worldwide under a contract for $2,078,622 over 8 years. A meaningful comparison of the current and the proposed contract requires addressing two important differences:

1. During the current contract, Citizens insured 551,000 policies on average. Recall that the proposed contract's licensing costs depend on Citizens' insured policy count; the lowest price applies if Citizens insures fewer than 750,000 policies. This is the price that will be compared to Citizens' current contract, which is less than the amount requested for approval.

2. Under the current contract, Citizens installed and maintained the AIR software on its own computers. AIR has stated that this option would only be supported for another four years; after that, SaaS would be required. To reflect this, the separate SaaS costs for the proposed contract, previously discussed, will be removed from the total costs for this comparison.

The comparison also uses the first five years of the proposed contract, since the last three years are optional for Citizens, and reflect some uncertainty in the future state of SaaS and computing technology.

The table below compares the cost of the current and proposed contract. The new contract costs an additional $88,000 per year. Given the six-year difference in the average contract date, this is an increase of 5.0% per year. Compared to an inflation rate of 2.4% from the six-year period from 2015 through 2021, this is about 2.6% above inflation, or about an additional $48,000 per year.

	Contract Years	Average Insured Policy Count	Licensing Cost	
			Total	Per Year
Current Contract	2014-2021	551,000	$2,078,622	$259,828
New Contract	2022-2026	Less than 750,000	$1,738,625	$347,725

Annual Cost Difference New Contract – Current Contract	$87,897
Time Passed	6 years
Increase Per Year	5.0%

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The inflation-adjusted difference in the annual costs of $48,000 is reasonable, for the following reasons.

1. Throughout out the prior 8-year contract AIR added capabilities to its software which provide additional value, and presumably will do the same during the period of this next contract. For example, it is now much easier for staff to view and understand the impact of specific (hypothetical) hurricanes that it was at the beginning of the last contract, which is a feature staff uses to better understand the potential damage of approaching hurricanes.
2. Citizens' average size of 551,000 policies over the prior contract was much lower than even the 750,000 contemplated in the lowest tier price of the new contract.
3. AIR Worldwide's costs were comparable to the other vendors responding to the ITN where one vendor was slightly less; and the other vendor was more expensive while offering similar services and features.

Recommendation

Staff proposes that the Actuarial and Underwriting Committee review, and if approved recommend the Board of Governors:

a) Authorize Citizens to contract with AIR Worldwide Corporation for an initial term of (5) years, and for a three (3) year optional renewal term, for an amount not to exceed $4,849,039 for the life of the contract, as set forth in this Action Item; and

b) Authorize staff to take any appropriate or necessary action consistent with this Action Item.

☒ ACTION ITEM	☐ CONSENT ITEM
☒ New Contract	☐ Contract Amendment
☐ Contract Amendment	☐ Existing Contract Extension
☐ Other_____	☐ Existing Contract Additional Spend
	☐ Previous Board Approval_____
	☐ Other_____

Action Items: Items requiring detailed explanation to the Board. When a requested action item is a day-to-day operational item or unanimously passed through committee it may be moved forward to the board on the Consent Index.

☐ **Move forward as Consent**: This Action item is a day-to-day operational item, unanimously passed through committee or qualifies to be moved forward on the Consent Index.

Consent Items: Items not requiring detailed explanation to the Board of Governors. Consent items are contract extensions, amendments or additional spending authorities for items previously approved by the Board.

Item Description	**Catastrophe Modeling Software**
Purpose/Scope	This Action Item seeks Board approval to contract with AIR Worldwide Corporation for Catastrophe Modeling Software. This software is used to estimate Citizens' exposure to hurricane losses, in order to ensure actuarial sound rating, improve risk management, enhance risk transfer decision-making, and assist in catastrophe reserving and real-time hurricane event response. The contract price is variable, based upon policy count, therefore the cost provided is the highest possible amount. The contract requires AIR to own and maintain the computers that run the software.
Contract ID	Catastrophe Modeling Software Contract number: 20-0030 Recommended vendor: AIR Worldwide Corporation
Budgeted Item	☒Yes ☐No Funding included in 2021 Operation Budget and annually for each respective contract year.
Procurement Method	This contract was procured pursuant to Invitation to Negotiate.: 20-0030. The ITN was issued on October 9, 2020. Three (3) vendors were advanced to the negotiation phase. Citizens' negotiation team recommended AIR Worldwide

	Corporation for award on April 13, 2021, after conducting negotiations with all three vendors.
Contract Amount	Not to exceed $4,849,039 for the life of the contract (including the renewal term)
Contract Terms	Five (5) year base term with one optional three (3) year renewal term.
Committee Recommendation	Staff proposes that the Actuarial and Underwriting Committee review, and if approved recommend the Board of Governors: a) Authorize Citizens to contract with AIR Worldwide Corporation for an initial term of five (5) years, and for one (1) three (3) year optional renewal term, for an amount not to exceed $4,849,039 for the life of the contract, as set forth in this Action Item; and b) Authorize staff to take any appropriate or necessary action consistent with this Action Item.
Board Recommendation from Committee	If approved at its September 21, 2021, meeting, the Actuarial & Underwriting Committee recommends that the Board of Governors: a) Authorize Citizens to contract with AIR Worldwide Corporation for an initial term of five (5) years, and for one (1) three (3) year optional renewal term, for an amount not to exceed $4,849,039 for the life of the contract, as set forth in this Action Item; and b) Authorize staff to take any appropriate or necessary action consistent with this Action Item.
Contacts	Jennifer Montero, Chief Financial Officer