

**CORPUS CHRISTI FIRE FIGHTERS'
RETIREMENT SYSTEM**

ACTUARIAL AUDIT
OF DECEMBER 31, 2020 VALUATION



FOSTER & FOSTER
ACTUARIES AND CONSULTANTS

February 6, 2024

Corpus Christi Fire Fighters' Retirement System
Corpus Christi, TX

Re: Actuarial Audit of December 31, 2020 Valuation

To whom it may concern:

We are pleased to present to the City of Corpus Christi (City) this report of the actuarial audit of the Corpus Christi Fire Fighters' Retirement System (System). Foster & Foster was retained by the City to perform a limited-scope actuarial audit of the December 31, 2020 actuarial valuation report produced by Rudd and Wisdom, Inc. (Actuary). Accordingly, we have performed the following tasks:

- A review of the actuarial assumptions and methods used in the System's valuation;
- An examination of the current actuary's data collection and calculation processes and its interpretation of plan provisions and benefits;
- Review detailed liability calculations for ten active and ten inactive members used in the valuation report;
- An assessment of the results of the Actuary's most recent valuation report and experience study;
- An opinion on the System's current actuarial funding policies and practices; and
- Any additional advice, comments, or concerns deemed appropriate.

This report was prepared at the request of the City and is intended for use by the City and those designated or approved by the City. This report may be provided to other parties only in its entirety and only with the permission of the City. Foster & Foster will not accept any liability for any misuse of this report.

In conducting the valuation, we have relied on liability information supplied by the System's actuary and various personnel, report and asset information supplied by System staff. While we cannot verify the accuracy of all this information, the supplied information was reviewed for consistency and reasonableness. As a result of this review, we have no reason to doubt the substantial accuracy of the information and believe that it has produced appropriate results.

In performing the analysis, we used third-party software to model (calculate) the underlying liabilities and costs. These results are reviewed in the aggregate and for individual sample lives. The output from the software is either used directly or input into internally developed models to generate the costs. All internally developed models are reviewed as part of the process. As a result of this review, we believe that the models have produced reasonable results. We do not believe there are any material inconsistencies among assumptions or unreasonable output produced due to the aggregation of assumptions.

The undersigned are familiar with the immediate and long-term aspects of pension valuations and meet the Qualification Standards of the American Academy of Actuaries necessary to render the actuarial opinions

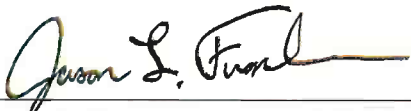
contained herein. All sections of this report are considered an integral part of the actuarial opinions.

To our knowledge, no associate of Foster & Foster, Inc. working on valuations of the program has any direct financial interest or indirect material interest in the Corpus Christi Fire Fighters' Retirement System, nor does anyone at Foster & Foster, Inc. act as a member of the Board of Trustees of the System. Thus, there is no relationship existing that might affect our capacity to prepare and certify this actuarial report.

If there are any questions, concerns, or comments about any of the items contained in this report, please contact us at 630-320-0200.

Respectfully Submitted,

Foster & Foster, Inc.

By: 
Jason L. Franken, FSA, EA, MAAA



Paul M. Baugher, FSA, EA, MAAA

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EXECUTIVE SUMMARY

An actuarial valuation provides a best estimate of a plan's liabilities, assets, funded status and annual contribution requirements at a particular point in time. This estimate helps ensure that current assets and future contribution requirements will be sufficient to fund the benefits as they are earned by working members and provide benefits promised to members throughout retirement. Future liabilities are determined by projecting future benefit payments for each member based on individual census data, the plan's provisions, and a set of actuarial assumptions regarding future salary increases and future member behavior. The extent to which an actuarial valuation accurately measures a plan's liabilities, funded status and contribution levels depends on a variety of factors including:

- The accuracy and completeness of the underlying census and financial information;
- Accurate incorporation of the plan's provisions into the actuarial model;
- The extent to which actuarial assumptions predict future participant behavior and future economic outcomes; and
- The appropriateness of the actuarial methods being used.

A thorough actuarial audit will include review of the above factors to ensure the actuary's valuation provides the best estimates possible. In addition, there are several other items an actuary must take into consideration when performing an actuarial valuation. An actuary must consider the Actuarial Standards of Practice, which provide guidelines in assessing the underlying data, setting appropriate actuarial assumptions/methods, and disclosing results. State and federal laws related to maintaining and funding pension systems is another important consideration. Accordingly, a thorough actuarial audit will include review of these factors in conjunction with the ones mentioned previously.

The remainder of this report focuses on the audit of the December 31, 2020 actuarial valuation report for the Corpus Christi Fire Fighters' Retirement System prepared by your Actuary. We have organized this audit report into the following key categories which correspond to the objectives outlined above:

- Member Data Review;
- Asset Data and Asset Method Review;
- Liability Review;
- Funding Calculation and Actuarial Methods Review;
- Assumption Review;
- Plan Provisions Review, and
- Report Review.

For each of the above categories, we have provided details regarding the review we performed along with key observations and recommendations. In general, we believe the valuation results are reasonable and we found no major deficiencies. More specifically, we find that:

- The approach to develop the actuarially determined contribution is sufficient and consistent with the long-term objective of funding the plan over time and paying benefits as they become due;
- Underlying member and asset information used is reasonable, consistent, and free of any material discrepancies;
- Actuarial assumptions and methods are reasonable;
- The valuation report generally complies with the Actuarial Standards of Practice that apply specifically to valuing pensions and is sufficient in communicating actuarial results; and
- The valuation has been completed in accordance with State and Federal requirements.

In completing our review, we also made several observations and recommendations for the City's consideration. The most notable of these observations / recommendations are summarized below:

- Assumption Review
 - The underlying mortality table for inactives is tied to retiree experience, while tables for survivors and disabled lives also were included with the Pub-2010 release. We would recommend using the appropriate table for each inactive group to provide the best estimate of their liabilities.
 - The mortality projection is currently based on the MP-2018 table. Since these projection scales are updated annually, it might be worth including the annual projection scale update as part of the underlying mortality assumption, so that the most current information is being used each year.
- Report Review
 - The valuation report does not include any risk disclosure as required by Actuarial Standard of Practice Number 51. At a minimum, all future reports should include this disclosure.

MEMBER DATA REVIEW

An actuarial valuation determines liabilities based on current and projected benefits to be paid to each member of the plan. As such, one of the key items provided for the actuarial valuation is data on each of the current members. Member data includes the status of the member (active, terminated, disabled, retired, beneficiary), key dates (birth, hire, retirement, termination), gender, pensionable pay, benefit amounts, and forms of payment.

There are typically two levels of data review:

- Review unprocessed data that was provided to the actuary to perform the valuation. The goal here is to determine if the audit would arrive at substantially the same final data as the plan's actuary after processing was complete.
- Review the final data that was provided by the plan's staff against plan provision requirements and the member data summaries provided in the valuation report.

The scope of our audit only included the second level of data review. We found the data provided to be sufficient to measure the benefits provided by the System. The form of payment for inactive members was not included, but this was easily determined based on other fields. Further, we found no material differences between the data and report summaries. As such, the actuarial valuation appropriately reflected the member data provided by the System.

OBSERVATIONS / RECOMMENDATIONS

None.

ASSET DATA AND ASSET METHOD REVIEW

An actuarial valuation compares the plan's liabilities to the assets to determine the plan's funded status and the resulting need for additional contributions. We confirmed that the valuation used assets consistent with those shown in the December 31, 2020 Independent Auditor's Report and Financial Statements for the System.

While assets are measured on a market-value basis, an actuarial value of assets is used to measure the funded status of the plan and determine contribution requirements. The actuarial value of assets is based on a method that recognizes asset gains and losses over a period of time. This produces an asset value that is less volatile than the market value, resulting in less volatile contribution requirements. An acceptable smoothing method will dampen volatility and will meet the following three requirements:

1. Will not produce an actuarial value of assets that is unreasonably higher or lower than the market value of assets. To achieve this, an appropriate market value corridor is applied to the actuarial value of assets;
2. Will not be biased (systematically higher or lower than the market value); and
3. Will not spread asset gains and losses over an unreasonable length of time.

The System's actuarial value of assets is based on a commonly accepted and widely used method that smooths market value gains and losses over a five-year period. Since the method recognizes market value gains and losses over a five-year period, the actuarial value of assets will converge with the market value absent future gains and losses on assets. Therefore, the method is unbiased. Further, the 20% corridor is acceptable, keeping the actuarial value of assets from deviating too far from the market value of assets. We find this portion of the method used to be reasonable and consistent with actuarial standards of practice. Finally, we reviewed the calculation of the actuarial value of assets and determined that the method has been utilized appropriately.

OBSERVATIONS / RECOMMENDATIONS

None.

LIABILITY REVIEW

In order to confirm the accuracy of the liability calculations provided in the actuarial valuation report, we developed an independent actuarial model. The model used the same plan provisions, member data, actuarial assumptions, and methods that were used by the Actuary to independently verify the liabilities calculated for representative sample members.

The actuarial valuation process, while sophisticated in its calculation methodology, is an estimate of the financial value of benefits payable on contingent events, most of which occur many years into the future. This means that the estimates contain a considerable amount of uncertainty and variability. As actuaries, we recognize that small differences in the results do not change the overall financial results portrayed in the valuation. Furthermore, the actuarial software used by different firms has implicit differences that create variances in valuation numbers. For these reasons, we consider the comparison of key valuation results in terms of both value and percentage differences. As a general rule, results that are within 2% of the plan actuary's calculation of present value of future benefits and within 5% for the plan actuary's calculation of actuarial accrued liability and normal cost are deemed acceptable. Further analysis may be needed to determine if any calculation issues exist when results fall outside those margins.

For the System, full member data was provided, so we were able to look at the results from a high-level in total and for representative sample members. Our present value of future benefits and actuarial accrued liability calculations are within 0.1% of what the Actuary prepared, which is very promising. Our normal cost calculation was lower than what the Actuary prepared, but we believe this is tied to the valuing of the DROP benefits and its immediate impact on older members, as shown in the individual results below. We did not dig into various liability breakouts in total, since it was beyond the scope of this project.

Below is a summary of the results of the verification process, which involved the review of liabilities for ten active members and ten inactive members (two retirees, two disableds, two deferreds, two survivors, and two alternate payees). Given the information available, we are not able to definitely determine the reasons that certain members fall outside of the thresholds outlined above, but we have listed a few observations below that may be worth further consideration.

Based on these combined results, it is our professional assessment that the Actuary has provided a reasonable valuation of the liabilities.

KEY LIABILITY RESULTS – ACTIVES
 (% Difference from Actuary Results)

<u>Member</u>	<u>Present Value of Benefits (%)</u>	<u>Actuarial Accrued Liability</u>	<u>Normal Cost</u>
Active #1	(0.31%)	(0.39%)	2.22%
Active #2	(0.37%)	(0.52%)	2.12%
Active #3	(0.51%)	(0.68%)	7.29%
Active #4	(0.32%)	(0.33%)	(0.29%)
Active #5	(0.62%)	0.32%	(1.78%)
Active #6	(0.62%)	(0.54%)	(1.31%)
Active #7	(1.09%)	(1.02%)	(2.03%)
Active #8	(0.68%)	(0.16%)	(1.97%)
Active #9	(0.45%)	(0.33%)	(1.14%)
Active #10	(0.56%)	1.98%	(0.67%)
All Samples	(0.51%)	(0.48%)	0.28%

KEY LIABILITY RESULTS – INACTIVES
 (% Difference from Actuary Results)

<u>Member</u>	<u>Actuarial Accrued Liability</u>	<u>Member</u>	<u>Actuarial Accrued Liability</u>
InPay #1	0.00%	Deferred #1	(0.43%)
InPay #2	0.00%	Deferred #2	(0.06%)
InPay #3	0.00%		
InPay #4	0.00%		
InPay #5	0.27%		
InPay #6	0.00%		
InPay #7	0.00%		
InPay #8	0.00%		

OBSERVATIONS / RECOMMENDATIONS

- During the liability review process, we noticed that the Actuary uses a 98% retirement rate from age 65 to 69 and 100% retirement rate at age 70, while the valuation report discloses the 100% retirement rate at age 65. We were able to discuss and resolve the discrepancy with the Actuary. This item is anticipated to have an immaterial impact on results.
- The active results were slightly less than the Actuary prepared for all liabilities in almost all cases. Each active member's results were well within the thresholds that we were targeting. The one exception was Active #3, whose normal cost measurement was outside of the deemed acceptable range. This is simply due to his age being beyond normal retirement age. In such cases, any difference in liability immediately

becomes part of the normal cost, resulting in a significant difference. We have no concerns with this one member's results.

- The inactive in-payment results are strong, with seven members matching exactly to the Actuary's results. The one in-payment member where we did not match exactly is deceased with two beneficiaries. Our calculations were higher than the Actuary for one of the beneficiaries and lower for the other, resulting in a net difference that is very reasonable.
- The inactive deferred results were strong as well, with all of our results being within 0.5% of the Actuary's results.

FUNDING CALCULATION AND ACTUARIAL METHODS REVIEW

Review of the calculation of the recommended contributions consists of review of several components as follows:

- Review of the accuracy of the calculations used to determine the contribution requirements.
- Review of the appropriateness of the underlying actuarial funding method used to calculate the normal cost (the annual amount needed to fund the benefits as they are earned by members).
- Review of planned contribution rates.

Below is an analysis of each of these items:

Review of the Accuracy of the Calculations Used

We reviewed the calculation of the required contribution based on the underlying assumptions and methods and found the calculations to be accurate. We were able to match the contribution as a percentage of payroll in each year to the dollar based on the liability information provided in the report. We were able to replicate the actuarial value of assets based on the asset detail provided in the report.

Review of the Appropriateness of the Underlying Actuarial Funding Method

The Entry Age Normal funding method is the method used by most public sector funds. This method spreads costs evenly over the member's career in relation to their annual salary, which is consistent with how many public funds base their contributions. Entry Age Normal is also required for use with Governmental Accounting Standards. The Conference of Consulting Actuaries (CCA) Public Plans Community in their October 2014 white paper entitled "Actuarial Funding Policies and Practices for Public Pension Plans" recommend use of the "Entry Age cost method with level percentage of pay" as a model practice. As such, we find the funding method used to be appropriate.

Review of Planned Contribution Rates

The Texas Pension Board Pension Funding Guidelines, effective June 30, 2017, state that plans with amortization periods that exceed 30 years as of June 30, 2017 should seek to reduce their amortization period to 30 years or less as soon as practicable, but not later than June 30, 2025. The 2020 valuation report shows that the employer is phasing into higher annual contribution rates. These rates exceed the rate that would be required to amortize the unfunded liability over 30 years starting in 2020. This is in full compliance with the state requirements. With the rates phasing into higher amounts and the short-term projections provided by the Actuary to monitor the expected amortization period in the future, we feel comfortable that the approach used is appropriate.

OBSERVATIONS / RECOMMENDATIONS

None.

ASSUMPTION REVIEW

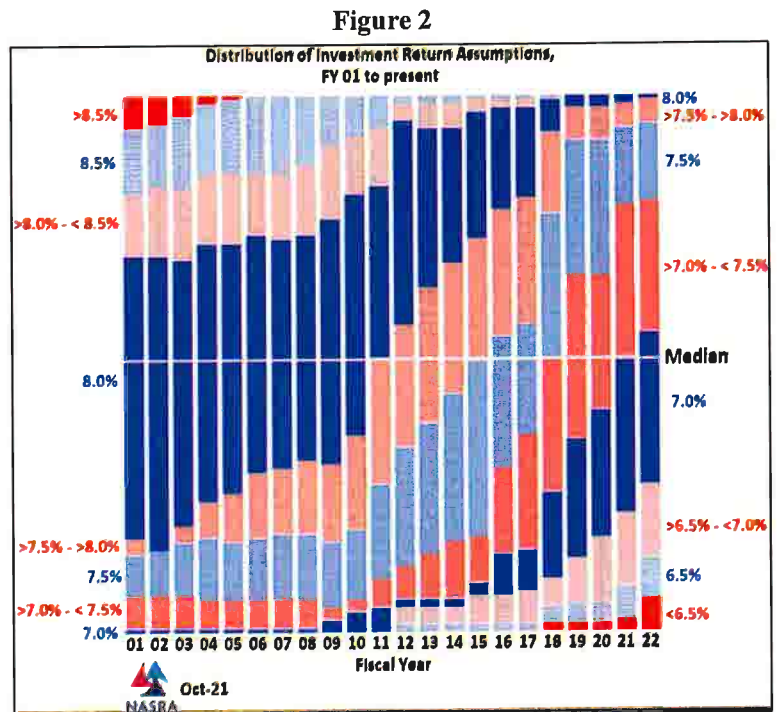
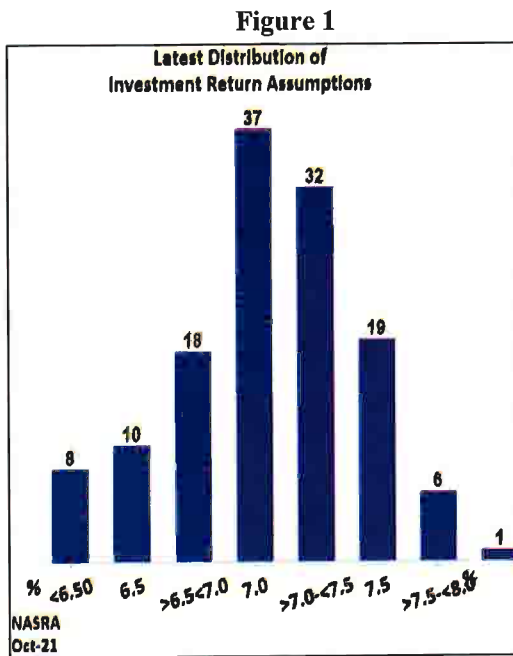
Actuarial assumptions are used within a valuation to measure the future benefits to be paid from a plan by considering economic and demographic factors that will impact the plan. Economic assumptions include investment rates of return/discount rates, inflation rates, and salary scales. Demographic assumptions include rates for mortality, retirement, termination, and disability.

As part of any audit, assumptions are to be reviewed in terms of their reasonableness and appropriateness as well as their compliance with applicable Actuarial Standards of Practice. Our review has considered all the assumptions, both individually and collectively, and we find them to be reasonable and appropriate. Further, we believe the assumptions and methods are in compliance with Actuarial Standards of Practice, most notably Standards 4, 27, and 35. It should be noted however, that a detailed review of the assumptions based on past and anticipated future experience or prior gains and losses is beyond the scope of this report.

OBSERVATIONS / RECOMMENDATIONS

- The last detailed study of System experience was completed in 2021 and reflected in the December 31, 2020 valuation report. Having a regularly scheduled review of experience is a best practice and puts you squarely in compliance with Texas Government Code. We would recommend noting the date of the latest experience review in the assumption section of the valuation report.
- The mortality assumption is based on the latest tables produced for public sector plans, Pub-2010. The tables used for inactive members appear to be the same for all groups, even though group-specific tables (retiree, survivor, disabled) are available with the Pub-2010 results. We would recommend utilizing these group-specific tables to provide the best estimate of inactive liabilities.
- We noticed that the mortality generational projection makes use of MP-2018, which was not the most recent scale available when the experience study and valuation reports were completed. Since these projection scales are generally updated annually, it might be worth considering including the annual projection scale update as part of the underlying mortality assumption, so that the most current information is being used each year.
- A detailed analysis of the interest rate assumption is beyond the scope of this audit. We were able to consider the 7.25% assumption, though, from two perspectives to give our thoughts on the selected rate. This review, summarized below, gives us no reason to doubt the reasonability of the assumption.
 - One approach is to review the model the long-term rate of return using the Horizon Actuarial Services (HAS) survey. Using the 2021 survey results and the asset allocation information included in the December 31, 2020 Independent Auditor's Report and Financial Statements for the System, a reasonable range for the long-term rate of return assumption would be 5.56% to 6.85%. The range is based on the 40th and 60th percentile of the 20-year returns using the capital market assumptions of the 24 survey respondents who provided long-term assumptions to the HAS survey. The percentiles generally mean that there would be a 60% probability that the average return over the 20-year period would exceed 5.56% and a 40% probability that the average return over the 20-year period would exceed 6.85%. The 50% probability is 6.20%.

- A second approach is to consider return assumptions used by other public funds, as found in national assumption surveys. The National Association of State Retirement Administrators (NASRA) released updated information in October 2021 to their ongoing summary of investment return assumptions used by public employers. Figure 1 below, taken from NASRA's website, shows that an assumption of 7.00% to 7.50% is most common among respondents. Figure 2 shows how discount rates are trending down over the last 22 years, with a current median of 7.00%.



- The inflation assumption of 2.75% is reasonable with that found in the Horizon Actuarial Services (HAS) survey published in 2021. Among the 24 investment firms who provided long-term data, this survey shows an average long-term expectation of inflation of 2.23%. The decrease in this assumption from 3.10% to 2.75% was appropriate.
- The payroll growth assumption (currently 2.75%) was considered as part of the 2021 experience study and kept consistent with the inflation rate. We would recommend that actual System experience be included in future studies. A review of payroll information included in the 2020 financial statement shows that the assumption is supported over all available periods, although that was helped by a significant increase in payroll during 2020, as shown in the table below. If 2020 experience was excluded, longer-term averages are below the current assumption. It would be worthwhile for the City to opine on future expectations.

Period	Rate (2014 – 2020)	Rate (2015 – 2019)
1 year	16.1%	7.6%
2 years	11.8%	3.3%
4 years	5.5%	2.4%
6 years	5.2%	N/A

PLAN SUMMARY REVIEW

The benefits available to System membership are outlined in the plan document. The "Summary of Present Plan" section of the valuation report provides a brief summary of the relevant provisions of the plan document which impact the benefits paid by the System. Our audit compared this summary to the plan document, considering both the content as well as the clarity of the provisions shown. We found the summary to be complete and understandable.

OBSERVATIONS / RECOMMENDATIONS

- The plan document and Summary Plan Description documents we were provided both had effective dates after the valuation. As such, the contribution rates in the plan document were for years after the valuation, so we could not confirm the rates used in the valuation. We would recommend confirming that the contribution rates used in the valuation are consistent with the plan document at that time. It may also be worthwhile to include a brief history of contribution rates in the plan document for such purposes.
- While not relevant to the audit itself, in our review of the plan document we observed that the actuarial equivalence basis includes a mortality basis that is 30 years old at this point and an interest rate that is higher than the current investment return assumption of the valuation. We would recommend that the City consider the appropriateness of these assumptions.

REPORT REVIEW

VALUATION REPORT

The valuation report summarizes the work completed as part of the valuation process. In doing so, the report should meet certain requirements and objectives. Below is a summary of the key requirements and objectives:

- The report should clearly and concisely relay the results of the valuation;
- The report should include a summary of the data, assumptions, methods and plan provisions used to develop the results;
- The report should provide discussion of the key risks that should be considered by the reader in reviewing the results and a discussion of the impact on plan maturity (including measures of maturity where appropriate) when reviewing these risks;
- The report should provide certain disclosures that clarify and supplement the results as required by the Actuarial Standards of Practice (ASOP); and
- The report should provide information sufficient to allow another actuary to reasonably verify the results.

OBSERVATIONS / RECOMMENDATIONS

ASOP Number 51, *Assessment and Disclosure of Risk Associated with Measuring Pension Obligations and Determining Pension Plan Contributions*, was issued in September 2017. The purpose of this ASOP was to assist actuary's in identifying and disclosing risks that, in the actuary's professional judgment, may reasonably be anticipated to significantly affect the plan's future financial condition. The Standard was effective for any actuarial work product with a measurement date on or after November 1, 2018. In the 2020 valuation report, we would have expected to see a new risk section or reference to an external risk document to be in compliance with this Standard, but none was found. This additional information should be added for all future reports.

RESPONSE FROM SYSTEM ACTUARY

Mitchell L. Bilbe, F.S.A.
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January 19, 2024

Mr. Jason L. Franken
Foster & Foster, Inc.
184 Sherman Blvd., Suite 305
Naperville, IL 60563

Re: Response to the Preliminary Report of the
Actuarial Audit of the December 31, 2020
Actuarial Valuation of the CCFFRS

Dear Mr. Franken:

The City of Corpus Christi engaged your firm, Foster & Foster, Inc., to conduct an actuarial audit of the December 31, 2020 actuarial valuation we performed for the Corpus Christi Fire Fighters' Retirement System (CCFFRS or System). We received your December 11, 2023 preliminary report of the actuarial audit. The state law requiring actuarial audits of public employee pension plans gives the CCFFRS Board of Trustees the opportunity to make written comments in response to your preliminary audit report. The Board has asked us to prepare the comments below on their behalf for inclusion in your final report to the city.

We are pleased with the results of your actuarial audit. For the City of Corpus Christi and the CCFFRS Board of Trustees, the key section in your preliminary report is in the Executive Summary on the top of page 2. That portion of the report is summarized in the second sentence, "we believe the valuation results are reasonable." This means that both the city and the board can rely on the results of that actuarial valuation.

You made three observations/recommendations in the Executive Summary which are repeated below. Our response follows each one.

Base Mortality Assumption

"The underlying mortality table for inactives is tied to retiree experience, while tables for survivors and disabled lives also were included in the Pub-2010 release. We would recommend using the appropriate table for each inactive group to provide the best estimate of their liabilities."

While we agree in theory with this recommendation, the change to separate base mortality tables for surviving spouses and for disabled retirees would result in a relatively small reduction in the key metrics of the actuarial valuation. The difference would be immaterial in our opinion. We prefer to use the same base mortality assumption for all inactives, simplifying the assumption set and being very slightly conservative in the results. We believe that is a reasonable assumption for a relatively small number of participants.

Mortality Improvement Projection

“The mortality projection is currently based on the MP-2018 table. Since these projection scales are updated annually, it might be worth including the annual projection scale update as part of the underlying mortality assumption, so that the most current information is being used each year.”

The changes of the MP series of projection scales from year-to-year have been very small. In addition, no update was provided in 2022 and 2023 due to the distorting effects of COVID on the national mortality experience. We prefer waiting until an appropriate projection scale has been developed with some post-COVID experience or some adjustments for the COVID distortions. We believe that the MP-2018 projection scale used for generational projection is a reasonable component of the mortality assumption. Reviewing demographic assumptions every five years or so is appropriate.

Risk Disclosure

“The valuation report does not include any risk disclosure as required by Actuarial Standard of Practice Number 51. At a minimum, all future reports should include this disclosure.”

We believe that we have included significant information on risk in all of our actuarial valuation reports for the last 20 years. The key risk for the System is investment performance being less than the long-term assumption. In our December 31, 2020 actuarial valuation report, pages 1-3 contain projected amortization periods for the next two biennial actuarial valuations under six different scenarios to show the projected amortization periods under the different scenarios. These projections would fall under the category of scenario tests as described in sections 2.16 and 3.4 of Actuarial Standard of Practice Number 51. In our professional judgment, we believe that this information is more useful than disclosure on plan maturity as suggested on page 12 of the preliminary actuarial audit report. And we believe that we are complying with Actuarial Standard of Practice Number 51.

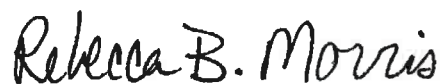
Please let us know if you have any questions about these responses.

We appreciate the professional manner in which you have conducted this actuarial audit and your communications with Rudd and Wisdom.

Sincerely,



Mark R. Fenlaw, F.S.A.



Rebecca B. Morris, A.S.A.

MRF/RBM:nlg

cc: Board of Trustees, Corpus Christi Fire Fighters' Retirement System

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