Highway Patrol Retirement System

Comprehensive Annual Financial Report

A Component Unit of the State of Ohio
Year ended December 31, 2018

Mark Atkeson, Executive Director
1900 Polaris Parkway, Suite 201
Columbus, Ohio 43240-4037

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Disclaimer

This audit report is subject to review and acceptance by the Auditor of State's office, and the requirements of Ohio Revised Code § 117.25 are not met until the Auditor of State certifies this report. This process takes approximately two weeks and reports are subject to change if the Auditor of State determines that modification of a report is necessary to comply with required accounting or auditing standards or OMB Circular A-133.

Introductory Section

Awards

Government Finance Officers Association

Certificate of Achievement for Excellence in Financial Reporting

Presented to

Highway Patrol Retirement System

Ohio

For its Comprehensive Annual Financial Report for the Fiscal Year Ended

December 31, 2017

Christopher P. Morrill

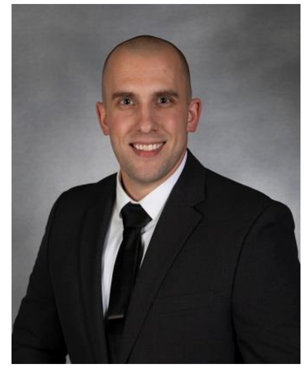
Executive Director/CEO

Board of Trustees and Senior Staff


Captain Cory D. Davies
Employee Trustee / Chair


Lieutenant Andre T. Swinerton
Employee Trustee / Vice-Chair


Sergeant Jeremy B. Mendenhall
Employee Trustee


Trooper Brice A. Nihiser
Employee Trustee


Staff Lieutenant Matthew L. Them
Employee Trustee


Colonel Paul A. Pride
Statutory Member


Major (ret.) Darryl L. Anderson
Retiree Trustee


Captain (ret.) Lester R. Reel
Retiree Trustee


Major (ret.) JP Allen
Governor's Investment Expert Appointee


Kenneth C. Boyer
Treasurer of State's Investment Designee

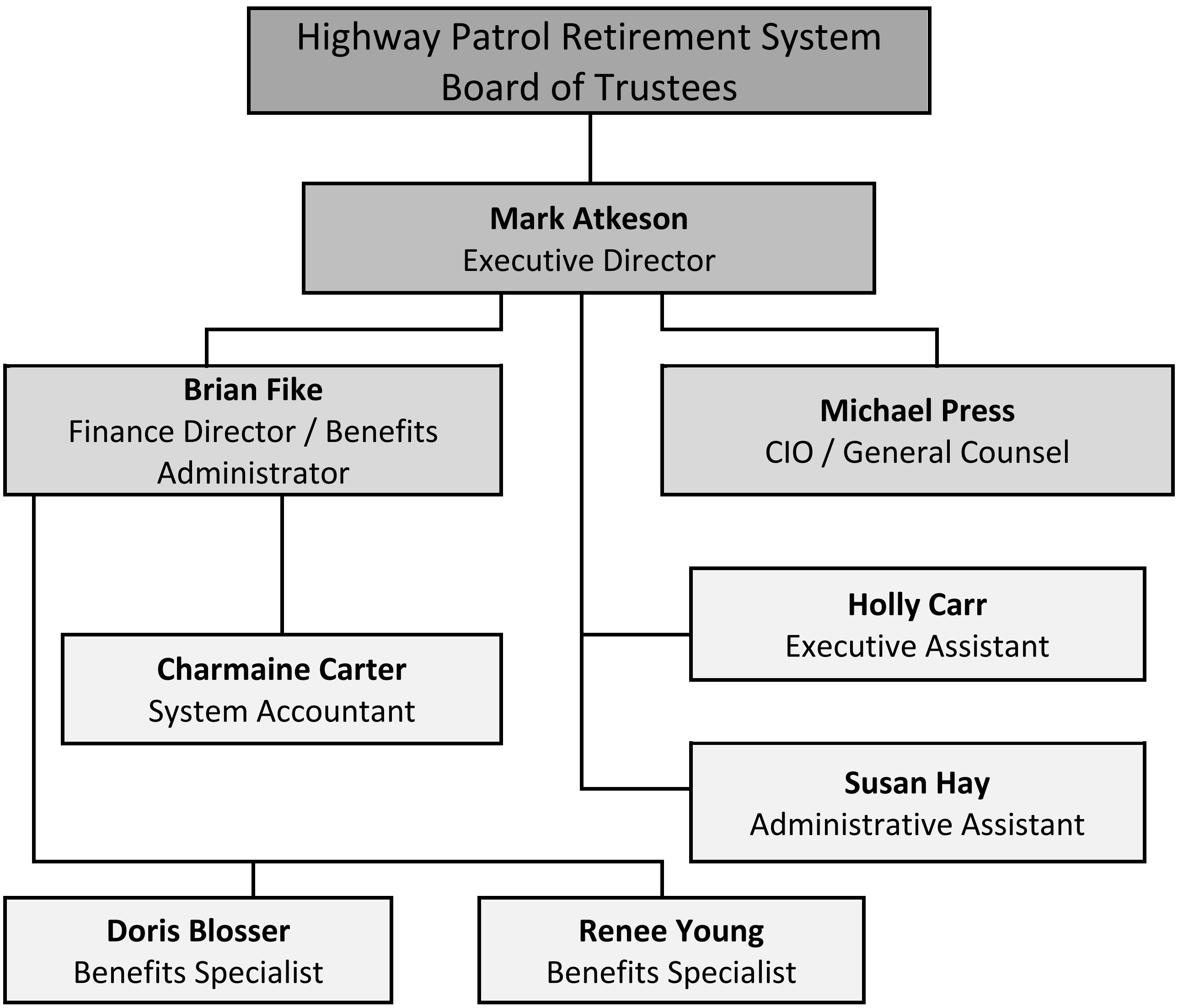

Joseph H. Thomas
General Assembly's Investment Expert Appointee


Maj. (ret.) Mark R. Atkeson
Executive Director


Michael D. Press
Chief Investment Officer / General Counsel


Brian C. Fike
Finance Director / Benefits Administrator

Highway Patrol Retirement System Organizational Chart



See Page 9 for a list of consultants and investment managers.

Consultants

Medical Advisor
David A. Tanner, DO
Columbus, Ohio

Actuary
Gabriel, Roeder, Smith, & Co.
Southfield, Michigan

Investment Consultant
Clearstead
Cleveland, Ohio

Investment Managers

Ancora Advisors
Cleveland, Ohio
Micro Cap Equity

AQR Capital Management
Greenwich, Connecticut
Domestic Equity

Blue Point Capital Partners
Cleveland, Ohio
Private Equity

Credit Suisse Asset Management
New York, New York
High Yield Fixed Income

Diamond Hill Funds
Columbus, Ohio
Domestic Equity

Dimensional Fund Advisors
Austin, Texas
Small Cap Blend / International Equity

Driehaus Capital Management
Chicago, Illinois
International Small Cap Growth Equity

Evanston Capital Management
Evanston, Illinois
Fund of Hedge Funds

Forest Investment Associates
Atlanta, Georgia
Timber

GCM Grosvenor
Chicago, Illinois
Private Equity

HarbourVest Partners
Boston, Massachusetts
Private Equity

Harrison Street
Chicago, Illinois
Real Estate

H.I.G. Whitehorse
Miami, Florida
Fixed Income & Private Equity

Jennison Associates
New York, New York
Domestic Equity

Johnson Institutional Management
Cincinnati, Ohio
Core Fixed Income

J.P. Morgan Asset Management
New York, New York
Intermediate-Term Fixed Income

Kayne Anderson Capital Advisors
Los Angeles, California
Energy/Mezzanine & Private Equity

Lazard Asset Management
New York, New York
International Equity

Long Wharf Real Estate Partners
Boston, Massachusetts
High Yield Fixed Income

LSV Asset Management
Chicago, Illinois
Large Cap Value Equity

Marathon Asset Management
New York, New York
Real Estate

Oaktree Capital Management
New York, New York
Real Estate

OFI Trust Company
New York, New York
Emerging Markets

Pacific Investment Management Co.
Newport Beach, California
Real Estate

Pantheon Ventures
San Francisco, California
Private Equity

Partners Group (USA)
New York, New York
Direct Infrastructure

Quantum Energy Partners
Houston, Texas
Private Equity

Silver Point Specialty Credit Fund
Greenwich, Connecticut
Fixed Income

Standard Life Investments
Boston, Massachusetts
Tactical Asset Allocation

The Carlyle Group
Washington, D.C.
Private Equity

The Vanguard Group
Wayne, Pennsylvania
Domestic Equity

Thompson, Siegel & Walmsley LLC
Richmond, Virginia
International Equity

Wellington Management Co.
Boston, Massachusetts
Large Cap Growth Equity

Westfield Capital Management
Boston, Massachusetts
Small Cap Growth Equity

William Blair & Company
Chicago, Illinois
International Equity

See the Investment Section, Pages 76-77 for payments to investment managers and brokers.

Legislative Summary

The Ohio Legislature passed House Bill 362 in early 2018 with an effective date of May 11, 2018. This bill made the following changes:

- Restore the minimum retirement age to 52 (as it was prior to 1989) for new hires after January 1, 2020;
- Calculate pension benefits for off-duty disabilities based on a minimum 12-year service benefit instead of a minimum 20-year service benefit;
- Survivor benefits were also amended. These changes do not affect those already retired or in DROP before May 11, 2018:
    - Eliminate the automatic 50% unfunded survivor benefit for survivors and establish a set amount for survivor benefits while increasing that amount annually as the board determines; and
    - Provide no survivor benefits for those who marry after retirement.

June 26, 2019

Letter of Transmittal

Members of the Board of Trustees:

We are pleased to present to you the *Comprehensive Annual Financial Report* for the Highway Patrol Retirement System (HPRS) for the period ended December 31, 2018. This report is intended to provide financial, investment, actuarial, and statistical information in a single publication. Working with each HPRS staff member and various consultants employed by HPRS, HPRS management takes full responsibility for the accuracy and completeness of this report. The data presented in this report demonstrates the careful stewardship of the system's assets to enable the Board to provide excellent pension and health care benefits to our members.

HPRS was created by the Ohio Legislature in 1941 to provide pension benefits to the sworn officers and communications personnel of the Ohio State Highway Patrol (OSHP). Prior to this action of the Legislature, active duty members of the OSHP contributed to the Ohio Public Employees Retirement System. Currently, only sworn officers, cadets in training to become sworn officers, and communications personnel hired prior to November 2, 1989 are permitted to be contributing members of HPRS. In 1974, the Legislature authorized HPRS to offer health care benefits to retired members, if excess funds are available.

In addition to pension benefits, HPRS provides disability benefits to active duty members, disabled both on- and off-duty. Survivor and death benefits and health care coverage are provided for benefit recipients and eligible dependents. A full description of benefits provided by HPRS can be found in the *Summary of Plan Provisions* portion of the Actuarial Section.

Major Plan Initiatives and Changes in 2018

In 2018, as in prior years, the Board made modifications to HPRS' health care plan. The Board continued to implement recommendations made by its health care consultant that was hired in 2016, including changes to eligibility for dependent spouses and children. Health care is the most difficult challenge facing the System, and the Board is continuously monitoring the status of the health care fund, as well as weighing options to extend the solvency of the fund.

House Bill 362 was passed by the Ohio Legislature early in the year and went into effect on May 11, 2018. This legislation raised the minimum retirement age from 48 to 52 for all Highway Patrol new hires after January 1, 2020. The bill also made amendments to the calculation of off-duty disabilities as well as changes to survivor benefits.

For 2018, the employee contribution rate remained at 12.5% of payroll. COLA for eligible beneficiaries was set at 1.25%.

Investments

The primary objective of the Highway Patrol Retirement System is to provide eligible members and beneficiaries with scheduled pension benefits. It is very important that the Board develops and implements an investment strategy that provides the funds necessary to maintain the security and safety of the plan. With benefit recipients living longer, health care costs rising at a rate of many times the actual rate of inflation and financial downturns, such as the recession of 2008, the investment strategy must be monitored and adjusted constantly.

Consistent with prudent standards for preservation of capital and maintenance of liquidity, the goal of the fund is to earn the highest possible rate of return consistent with HPRS's tolerance for risk as determined periodically by the Board in its role as a fiduciary. This objective should ensure adequate funds to meet scheduled benefits. Diversification of assets will ensure that adverse or unexpected results from a security class will not have a detrimental impact on the entire portfolio.

2018 proved to be a very difficult year in the equity markets, most specifically during the fourth quarter. Most major asset classes ended the year in the red, and the S&P 500 entered official correction territory in the fourth quarter after spending most of the year in a positive position. Fixed income markets however did provide some downside protection, and they were spared the end of year sell-off.

The Federal Reserve (Fed) continued its push to raise interest rates from the historically low levels that have been in place in the decade since the financial crisis. The federal funds rate was raised four times in 2018 and the Fed signaled more increases for 2019. Some positive economic outcomes included 2.9% GDP growth for the full year, the highest rate since 2015, with Q4 growth of 2.6%, beating expectations of 2.2% amid the difficult capital markets.

HPRS' investment portfolio, while well diversified, was impacted by the broad sell-off across asset classes and ended the year with a -5.23% net rate of return vs. the benchmark of -3.5% and actuarial assumed rate of return of 7.75%. The ending fair value of the portfolio for 2018 was $809.3 million.

A more detailed report on investment operations and performance can be found in the *Management's Discussion and Analysis* section, beginning on page 19, and the Investment Section, beginning on page 65.

Internal Controls

The management of HPRS has implemented and is responsible for a system of internal accounting controls, designed to provide reasonable assurance of the safeguarding of assets and the reliability of financial records. Once again in 2018, the Summit County Internal Audit Department (SCIAD) was retained to perform internal auditing services, specifically an audit of health care premium, single life annuity, and cost of living adjustment (COLA) calculations. Summit County also audited the System's purchasing/expenditures, and corporate card controls. Although one minor recommendation for improvement was given, no material weaknesses were identified. In 2019, SCIAD will again provide internal audit services for HPRS.

Because the cost of a control should not exceed the benefits to be derived, the objective is to provide reasonable, rather than absolute assurance, that the financial statements are free of any material misstatements. The internal accounting controls in place are adequate to meet the purpose for which they were intended and are reviewed annually by an external auditor. Please see the Independent Auditors' Report on Internal Control Over Financial Reporting and on Compliance and Other Matters Based on an Audit of Financial Statements Performed in Accordance with Government Auditing Standards on Page 62. The financial statements, supporting schedules, and statistical tables are presented fairly in all material respects.

Funding

The funding of pension and health care benefits of HPRS comes from a combination of employer and employee contributions and investment returns. Ohio law requires public pension plans to be able to amortize pension obligations within a 30-year period. At the close of 2009, HPRS was not able to amortize pension liabilities in 30 years or less. The funding status percentage dropped from 80.9% at the end of 2007 to 59.5% at the end of 2011. Due to changes that were enacted by the Board in 2013 and 2014, the amortization period no longer exceeds the 30-year limit. The funding status for the period ended December 31, 2017, as reflected in the annual actuarial valuation, was 67.2%, and the amortization period was 27 years. On the healthcare side, under intermediate actuarial assumptions regarding future healthcare cost trends, the fund is expected to be solvent until 2029, according to the December 31, 2017 actuarial report. The System's actuary will complete their valuation as of December 31, 2018 which will be issued around mid-year 2019.

Awards

The Government Finance Officers Association of the United States and Canada (GFOA) awarded a Certificate of Achievement for Excellence in Financial Reporting to the Highway Patrol Retirement System for its comprehensive annual financial report for the fiscal year ended December 31, 2017. In order to be awarded a Certificate of Achievement, a government must publish an easily readable and efficiently organized comprehensive annual financial report. This report must satisfy both generally accepted accounting principles and applicable legal requirements.

A Certificate of Achievement is valid for a period of one year only. We believe that our current comprehensive annual financial report continues to meet the Certificate of Achievement program's requirements, and we are submitting it to the GFOA to determine its eligibility for another certificate.

Professional Services

To aid in efficient and effective management, professional services are provided to the HPRS by consultants appointed by the Board. Gabriel, Roeder, Smith & Company of Southfield, Michigan, provides actuarial services. The investment advisor to the Board is Clearstead of Cleveland, Ohio. Under contract with the Auditor of State of Ohio, Schneider Downs & Co., Inc., of Columbus, Ohio, audited the financial records of the system. The Summit County Internal Audit Department of Akron, Ohio, was retained to perform internal auditing services.

Acknowledgements

The preparation of this report is only possible through the combined efforts of the system's staff under the direction of the Board of Trustees. It is intended to provide complete and reliable information as a basis for making management decisions, a means for determining compliance with legal provisions, and a means for determining responsible stewardship over the assets contributed by the members and their employer, the State of Ohio.

Upon publication of this report at www.ohprs.org, HPRS will notify interested parties of its availability, including all State Highway Patrol facilities, professional consultants, investment managers, ranking members of the appropriate Ohio House and Senate committees, the Ohio Retirement Study Council, and the Office of Budget and Management.

Submitted for your review,

Mark R. Atkeson
Executive Director

Brian C. Fike, CPA
Finance Director

Financial Section

SCHNEIDER DOWNS

Big Thinking. Personal Focus.

INDEPENDENT AUDITORS' REPORT

Board of Trustees
Ohio State Highway Patrol Retirement System
Columbus, Ohio

Report on the Financial Statements

We have audited the accompanying financial statements of The Ohio State Highway Patrol Retirement System (HPRS), a component unit of the State of Ohio (State), which comprise the statement of fiduciary net position as of December 31, 2018, and the related statement of changes in fiduciary net position for the year ended December 31, 2018, and related notes to the financial statements as listed in the table of contents.

Management's Responsibility for the Financial Statements

Management is responsible for the preparation and fair presentation of these financial statements in accordance with accounting principles generally accepted in the United States of America; this includes the design, implementation and maintenance of internal control relevant to the preparation and fair presentation of financial statements that are free from material misstatement, whether due to fraud or error.

Auditors' Responsibility

Our responsibility is to express an opinion on these financial statements based on our audit. We conducted our audit in accordance with auditing standards generally accepted in the United States of America and the standards applicable to financial audits contained in *Government Auditing Standards*, issued by the Comptroller General of the United States. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditors' judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the entity's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal control. Accordingly, we express no such opinion. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of significant accounting estimates made by management, as well as evaluating the overall presentation of the financial statements.

Schneider Downs & Co., Inc.
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PrimeGlobal
An Association of Independent Accounting Firms

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Pittsburgh, PA 15222
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We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

Opinion

In our opinion, the financial statements referred to above present fairly, in all material respects, the fiduciary net position of the Ohio State Highway Patrol Retirement System as of December 31, 2018, and the change in fiduciary net position for the year then ended in conformity with accounting principles generally accepted in the United States of America.

Other Matters

Required Supplementary Information

Accounting principles generally accepted in the United States of America require this presentation to include management's discussion and analysis and required supplementary schedules, as listed in the table of contents, to supplement the basic financial statements. Such information, although not a part of the basic financial statements, is required by the Governmental Accounting Standards Board, who considers it to be an essential part of financial reporting for placing the basic financial statements in an appropriate operational, economic, or historical context. We have applied certain limited procedures to the required supplementary information in accordance with auditing standards generally accepted in the United States of America, which consisted of inquiries of management about the methods of preparing the information and comparing the information for consistency with management's responses to our inquiries, the basic financial statements, and other knowledge we obtained during our audit of the basic financial statements. We do not express an opinion or provide any assurance on the information because the limited procedures do not provide us with sufficient evidence to express an opinion or provide any other assurance.

Supplementary and Other Information

Our audit was conducted for the purpose of forming an opinion on the basic financial statements taken as a whole. The supplementary information, including the schedules of administrative expenses, investment expenses, and payments to consultants, as listed in the table of contents, are presented for the purposes of additional analysis and are not a required part of the basic financial statements. The supplementary information is the responsibility of management and was derived from and relates directly to the underlying accounting and other records used to prepare the basic financial statements. Such information has been subjected to the auditing procedures applied in the audit of the basic financial statements and certain additional procedures, including comparing and reconciling such information directly to the underlying accounting and other records used to prepare the basic financial statements or the basic financial statements themselves, and other additional procedures in accordance with auditing standards generally accepted in the United States of America. In our opinion, the supplementary information is fairly stated, in all material respects, in relation to the basic financial statements as a whole.

The introductory, investments, actuarial and statistical sections, as listed in the table of contents have not been subjected to the auditing procedures applied in the audit of the basic financial statements, and accordingly, we do not express an opinion or provide any assurance on them.

Other Reporting Required by Government Auditing Standards

In accordance with *Government Auditing Standards*, we have also issued our report dated June 26, 2019, on our consideration of the HPRS's internal control over financial reporting and on our tests of its compliance with certain provisions of laws, regulations, contracts, and grant agreements and other matters. The purpose of that report is to describe the scope of our testing of internal control over financial reporting and compliance and the results of that testing, and not to provide an opinion on internal control over financial reporting or on compliance. That report is an integral part of an audit performed in accordance with *Government Auditing Standards* in considering the HPRS's internal control over financial reporting and compliance.

Schneider Downs & Co., Inc.

Columbus, Ohio
June 26, 2019

Financial Highlights

- At December 31, 2018, HPRS had net assets of $817,308,534. All of the assets are held in trust for pension and health care benefits and are available to meet HPRS's ongoing obligations to plan participants and their beneficiaries.
- During 2018, HPRS's fiduciary net position decreased by $80,361,151, or 9.0%.
- HPRS's funding objective is to meet long-term benefit obligations through contributions and investment income. At December 31, 2017, the date of the most recent actuarial valuation, HPRS assets equaled 67.2% of the present value of pension obligations.
- Additions to fiduciary net position for the year were $9,550,057, which includes member and employer contributions of $45,089,164 and an investment loss of $43,173,319.
- Deductions from fiduciary net position decreased 4.1% over the prior year. Of this amount, pension benefits decreased by 5.1%, health care expenses increased by 2.0% and administrative expenses decreased by 0.1%.

Overview of the Financial Statements

The financial statements consist of the following components:

1. Statement of Fiduciary Net Position
2. Statement of Changes in Fiduciary Net Position
3. Notes to the Financial Statements

This report also contains other supplementary information in addition to the basic financial statements themselves.

The Statement of Fiduciary Net Position provides a snapshot of account balances at year-end, indicating the assets available for future payments to benefit recipients, less any current liabilities of the system. The Statement of Changes in Fiduciary Net Position provides a summary of current-year additions and deductions to the plan.

The Statement of Fiduciary Net Position and the Statement of Changes in Fiduciary Net Position report information about HPRS's activities and financial position. These statements reflect the full accrual basis of accounting, which is similar to the accounting method used by most private sector companies. All of the current year's revenues and expenses are taken into account regardless of when cash is received or paid. All investment gains and losses are shown at trade date rather than settlement date. Investments are shown at fair value, reflecting both realized and unrealized gains and losses. Each capital asset is depreciated over its expected useful life.

The difference between HPRS assets and liabilities is reported on these statements as the Net Position – Restricted for Pension and Post-Employment Health Care Benefits. Over time, increases and decreases in HPRS's net position are one indicator of whether the fund's financial health is improving or deteriorating. Other factors, such as market conditions, should be considered in measuring HPRS's overall health (see HPRS's financial statements on pages 23-24 of this report).

The Notes to the Financial Statements provide additional information that is essential to a full understanding of the data provided in the financial statements (see the *Notes to the Financial Statements* on pages 25-52 of this report).

Other Information

In addition to the financial statements and accompanying notes, this report presents certain required supplementary information concerning HPRS's progress in funding its obligations to provide pension benefits to members (see the *Required Supplementary Schedules* on pages 53-59 of this report).

The schedules of administrative expenses, investment expenses, and payments to consultants are presented immediately following the required supplementary information.

HPRS Activities

Additions to Fiduciary Net Position

Employer and member contributions, as well as income from investments, provide reserves needed to finance retirement benefits and health care. In 2018, total contributions and investment returns resulted in additions of $9.6 million. Employer contributions decreased by 0.4% and member contributions also decreased by 0.4%.

Additions to Fiduciary Net Position
(in thousands)

	2018	2017	$ Change	% Change
Net appreciation in fair value of investments	($53,005)	$105,056	($158,061)	(150.5)
Interest and dividend income	17,705	17,284	421	2.4
Real estate operating income (loss), net	1	1	-	-
Investment expenses	(7,875)	(6,389)	(1,486)	23.3
Employer contributions	30,638	30,750	(112)	(0.4)
Member contributions	14,452	14,505	(53)	(0.4)
Transfers from other Ohio systems	410	619	(209)	(33.8)
Health care premiums	4,063	3,886	177	4.6
Retiree drug subsidy	1,808	1,418	390	27.5
Prescription drug rebates	1,353	720	633	87.9
Total additions	$9,550	$167,850	($158,300)	(94.3)

The *Investment Section* of this report summarizes the result of investment activity for the year ended December 31, 2018.

Deductions from Fiduciary Net Position

HPRS was created to provide retirement, disability, and survivor benefits to qualified members and their beneficiaries. The costs of these programs include benefit payments by the plan, refunded contributions, and the administrative costs of the system. In 2018, total deductions from the fiduciary net position decreased 4.1%, health care expenses increased by 2.0%, and administrative expenses decreased by 0.1%. Refunds of member contributions decreased by 33.3%, and transfers of contributions to other Ohio retirement systems increased by 49.6%.

Deductions from Fiduciary Net Position
(in thousands)

	2018	2017	$ Change	% Change
Pension benefits	$64,622	$69,515	($4,893)	(7.0)
DROP benefits	6,959	5,881	1,078	18.3
Refunds of member contributions	717	1,075	(358)	(33.3)
Health care expenses	15,762	15,457	305	2.0
Administrative expenses	1,640	1,641	(1)	(0.1)
Transfers to other Ohio systems	211	141	70	49.6
Total deductions	$89,911	$93,710	($3,799)	(4.1)

Changes in Fiduciary Net Position

In 2018, the Net Position – Restricted for Pension and Post-Employment Health Care Benefits decreased by $80,361,151, or 9.0%. Investment income attributable to the decrease in fair values of investments equaled $53,005,010. All of the assets are available to meet HPRS's ongoing obligations to plan participants and their beneficiaries.

Changes in Fiduciary Net Position
(in thousands)

	2018	2017 (Restated)[1]
Beginning balance	$897,670	$824,015
Ending balance	817,309	897,670
Total change	($80,361)	$73,655
% change	(9.0%)	8.9%

[1]Restated as a result of GASB 75 implementation

Capital Assets

As of December 31, 2018, HPRS's investment in capital assets totaled $35,484 (net of accumulated depreciation), a decrease of $27,063, or 43.3% from December 31, 2017. This investment in capital assets includes office equipment, software, and furniture for administrative use.

Total Assets

In 2018, total assets decreased by $80,507,438, or 8.9%. The change in total assets was largely attributable to decreases in the fair value of investments.

Assets
(in thousands)

	2018	2017	$ Change	% Change
Cash and short-term investments	$10,480	$14,498	($4,018)	(27.7)
Receivables	4,714	10,042	(5,328)	(53.1)
Investments, at fair value	809,317	880,462	(71,145)	(8.1)
Other assets	52	69	(17)	(24.6)
Total assets	$824,563	$905,071	($80,508)	(8.9)

Total Liabilities

In 2018, total liabilities decreased by $46,227, or 0.6%.

Liabilities
(in thousands)

	2018	2017	$ Change	% Change
Total liabilities	$7,262	$7,308	($46)	(0.6)

Requests for Information

This financial report is designed to provide retirees, members, trustees, investment managers, and the public with a general overview of HPRS's finances and to show accountability for the money it receives. Questions concerning any of the information provided in this report or requests for additional financial information can be directed to:

Brian Fike, *Finance Director*
State Highway Patrol Retirement System
1900 Polaris Parkway, Suite 201, Columbus, OH 43240-4037
Phone: 614.431.0781
Email: b.fike@ohprs.org

Statement of Fiduciary Net Position
December 31, 2018

	Pension	Post-Employment Health Care	Total
Assets			
Cash and short-term investments	$9,177,509	$1,302,689	$10,480,198
Receivables			
Employer contributions receivable	1,386,418	246,391	1,632,809
Member contributions receivable	1,294,239	-	1,294,239
Accrued investment income	1,565,189	222,168	1,787,357
Total receivables	4,245,846	468,559	4,714,405
Investments, at fair value			
Domestic equity	230,836,042	33,175,927	264,011,969
International equity	143,238,117	20,523,994	163,762,111
Fixed income	126,353,186	18,104,606	144,457,792
Real estate	41,129,569	5,893,279	47,022,848
Private equity	102,169,159	14,639,381	116,808,540
Hedge funds	45,936,993	6,582,115	52,519,108
Tactical Asset Allocation	13,598,955	1,948,536	15,547,491
Direct Infrastructure	4,536,656	650,038	5,186,694
Total investments	707,798,677	101,517,876	809,316,553
Other Assets			
Prepaid expenses	-	-	-
Property and equipment, net	31,073	4,411	35,484
Net Pension Asset	16,190	-	16,190
Total other assets	47,263	4,411	51,674
Total assets	721,269,295	103,293,535	824,562,830
Deferred Outflows of Resources			
Deferred Outflows – Pension	198,850	38,430	237,280
Liabilities			
Accounts payable	497,145	70,567	567,712
Accrued payroll liabilities	244,270	34,673	278,943
Accrued pension liabilities	4,304,458	-	4,304,458
Accrued health care liabilities	-	838,025	838,025
Net Pension Liability	750,831	-	750,831
Net OPEB Liability	-	522,224	522,224
Total liabilities	5,796,704	1,465,489	7,262,193
Deferred Inflows of Resources			
Deferred Inflows – Pension	190,481	38,902	229,383
Net position – restricted for pension and post-employment health care benefits	$715,480,960	$101,827,574	$817,308,534

See the accompanying Notes to the Financial Statements, pages 25-52.

Statement of Changes in Fiduciary Net Position
Year ended December 31, 2018

	Pension	Post-Employment Health Care	Total
Additions			
Contributions			
Employer	$26,014,314	$4,623,201	$30,637,515
Member	14,451,649	-	14,451,649
Transfers from other systems	410,250	-	410,250
Other income			
Health care premiums	-	4,062,903	4,062,903
Retiree drug subsidy	-	1,808,082	1,808,082
Prescription drug rebates	-	1,352,977	1,352,977
Total contributions	40,876,213	11,847,163	52,723,376
Investment activity			
Net appreciation (depreciation) in fair value of investments	(46,416,484)	(6,588,526)	(53,005,010)
Interest and dividend income	15,504,207	2,200,723	17,704,930
Real estate operating income (loss), net	1,306	185	1,491
	(30,910,971)	(4,387,618)	(35,298,589)
Less: investment expenses	(6,895,901)	(978,829)	(7,874,730)
Net income from investment activity	(37,806,872)	(5,366,447)	(43,173,319)
Total additions	3,069,341	6,480,716	9,550,057
Deductions			
Pension benefits	64,622,145	-	64,622,145
DROP benefits	6,959,275	-	6,959,275
Refunds of member contributions	716,739	-	716,739
Health care expenses	-	15,762,478	15,762,478
Administrative expenses	1,435,864	203,812	1,639,676
Transfers to other systems	210,895	-	210,895
Total deductions	73,944,918	15,966,290	89,911,208
Change in fiduciary net position	(70,875,577)	(9,485,574)	(80,361,151)
Net position – restricted for pension and post-employment health care benefits			
Balance, December 31, 2017	786,356,537	111,798,876	898,155,413
Prior period adjustment, GASB 75	-	(485,728)	(485,728)
Balance, December 31, 2017, restated	786,356,537	111,313,148	897,669,685
Balance, December 31, 2018	$715,480,960	$101,827,574	$817,308,534

See the accompanying Notes to the Financial Statements, pages 25-52.

Note 1 Summary of Significant Accounting Policies

Basis of Accounting

HPRS' financial statements are prepared using the accrual basis of accounting, under which expenses are recorded when incurred and revenues are recorded when earned and measurable. Member and employer contributions are recognized in the period in which the contributions are due. Benefits and refunds are recognized when due and payable in accordance with the terms of the plan. Investment purchases and sales are recorded at the trade date. Administrative expenses are financed by investment income.

The accounting and reporting policies of HPRS conform to generally accepted accounting principles in the United States of America (GAAP). The preparation of financial statements in conformity with GAAP requires management to make estimates and assumptions that affect the reported assets and liabilities, disclosure of contingent assets and liabilities, and the reported revenues and expenses during the accounting period. Actual results could differ from these estimates.

The Governmental Accounting Standards Board (GASB) requires that plan assets be split between pension benefits and health care. To meet this requirement, plan assets and liabilities not specifically identifiable to a plan were proportionately allocated to the pension and post-employment health care plans. Additionally, a portion of the investment activity and administrative expenses are allocated to the health care fund. The amounts are derived from the health care projected allocation rate calculation. This calculation is the proportion of projected post-employment health care net assets compared to the projected total net assets.

Investment Accounting

Income on all investments is recognized on the accrual basis. Gains and losses on sales and exchanges, recognized at the trade date, are determined using the average cost of equity securities sold, and for all other investments, the specific cost of securities sold.

All investments are reported at fair value, which is the amount that the plan could reasonably expect to receive in a current sale between a willing buyer and a willing seller, other than in a forced or liquidation sale.

Securities traded on a national exchange are valued at the last reported sales price at the current exchange rate. Fair values of real estate and private equity investments are based on information provided by the fund's managers or by independent appraisals.

Net appreciation (or depreciation) in fair value of investments is determined by calculating the change in the fair value between the beginning of the year and the end of the year, less purchases at cost, plus sales at fair value.

Investment expenses consist of expenses directly related to HPRS investment operations, as well as an allocation of certain administrative expenses.

Use of Estimates

In preparing financial statements in conformity with GAAP, the management of HPRS makes estimates and assumptions that affect: (1) the reported amounts of assets and liabilities; (2) disclosures of contingent assets and liabilities; and (3) the amount of revenues and expenses during the reporting period. Actual results could differ from those estimates and assumptions. Certain investment assets, including private equity and real estate, use estimates in reporting fair value in the financial statements. These estimates are subject to uncertainty in the near term, which could result in changes in the values reported for those assets in the Statement of Fiduciary Net Position.

Capital Assets

When acquired, an item of property or equipment in excess of $5,000 is capitalized at cost. An improvement in excess of $5,000 that extends the useful life of an asset is capitalized as well. An expenditure for maintenance or repair of an asset is expensed as incurred. Depreciation is computed using the straight-line method over the useful life of each asset (typically, between three and ten years).

Accrued Health Care Liabilities

Accrued health care liabilities are based upon estimates furnished by the claims administrators. These estimates have been developed from prior claims experience.

In general, costs of member health care benefits are recognized as claims are incurred and premiums are paid. Health care expenses of $15,762,478 for 2018 are shown on the accompanying Statement of Changes in Fiduciary Net Position.

Contributions and Benefits

Based on statutory requirements, employer and employee contributions are recognized when due. In accordance with the terms of the plan, benefits and refunds are recognized when due and payable.

Federal Income Tax Status

HPRS is a qualified entity under Section 501(a) of the Internal Revenue Code and is, therefore, exempt from federal income taxes.

Recently Issued Accounting Pronouncements

HPRS implemented GASB Statement No. 75, *Accounting and Financial Reporting for Postemployment Benefits Other Than Pensions*, which provides guidance on reporting OPEB liabilities similar to how pension liabilities are reported under Statement 68. HPRS is required to record its proportionate share of the Ohio Public Employees Retirement System's (OPERS) net OPEB liability and disclose additional information in the footnotes and required supplementary information sections of this report.

The implementation of GASB 75 resulted in a restatement of the beginning Net Position – Restricted for Pension and Post-Employment Health Care Benefits of -$485,728.

Note 2 Plan Description

Organization
HPRS is a single-employer retirement system for employees of the Ohio State Highway Patrol, including officers with arrest authority, cadets in training at the Highway Patrol Training Academy, and members of the radio division who were hired prior to November 2, 1989. HPRS was created by Ohio Revised Code Chapter 5505 and is administered by a Board of Trustees consisting of five active members, two retired members, three appointed members, and one ex-officio member. The Board appoints an executive director, chief investment officer, actuary, investment consultant, medical advisor, and internal auditor.

HPRS administers both a defined benefit pension plan and a post-employment health care plan, which is considered to be an "other post-employment benefit," or OPEB. Financial information for pensions and OPEB are presented separately in the financial statements. HPRS, a separate financial reporting entity in accordance with criteria established by GASB Statement No. 39 (an amendment to No. 14), is a component unit of the State of Ohio. HPRS does not have financial accountability over any other entities.

Membership
HPRS membership consisted of the following at the end of 2017 and 2018:

Membership Data
Year ended December 31

	2018	2017
Pension & OPEB Benefits		
Retirees & other benefit recipients	1,671	1,637
Deferred retirees	13	11
Active members		
15 or more years of service	766	773
Less than 15 years of service	902	877

Benefits

Members are eligible for pension and health care benefits upon reaching both an age and a service requirement with the Ohio State Highway Patrol. The pension benefit is a percentage of the member's final average salary, which is defined as the average of the member's five highest salaried years. For 20 or more years of service, the percentage is determined by multiplying 2.5% times the first 20 years of service, plus 2.25% for the next 5 years of service, plus 2.0% for each year in excess of 25 years of service. A member's pension may not exceed 79.25% of the final average salary. Retirement with reduced benefits is available upon reaching age 48 with 20 years of service credit. Retirement with full benefits is available upon reaching age 48 with 25 years of service credit, or age 52 with 20 years of service credit. Beginning in 2020, new hires of the Ohio State Highway Patrol will be eligible for retirement with full benefits upon reaching age 52 with 20 years of service credit. All members must retire upon attaining age 60. Ohio law permits, but does not require, HPRS to offer health care to its membership. HPRS currently offers medical, hospitalization and prescription drug coverage for its members and their dependents. In addition to pension and health care benefits, HPRS also provides for disability and survivor benefits.

In 2006, HPRS implemented the Deferred Retirement Option Plan (DROP). In general, a member who is eligible to retire with an unreduced pension benefit may enter the DROP. The member will continue to work for the Ohio State Highway Patrol. A DROP member does not accumulate additional pension service credit; however, instead of receiving a monthly pension benefit, the member accrues that benefit in a tax-deferred account until employment with the Ohio State Highway Patrol is terminated. The 2018 DROP activity is discussed in Note 11.

Former members with at least 15 years of service but less than 20 years of service are eligible for a pension upon reaching age 55. The percentage of final average salary is determined by multiplying 1.5% by the number of years of service credit. These members, though eligible to receive a pension, are not eligible for health care benefits.

Contributions

The Ohio Revised Code requires contributions by both active members and the Ohio State Highway Patrol. The employer contribution rate is established by the Ohio General Assembly. The HPRS Board sets the employee contribution rate between 10.0%-14.0% of payroll.

In 2018, the member contribution rate was 12.5% of payroll, and the employer contribution rate was 26.5%.

Based on the December 31, 2016 actuarial valuation, the Board allocated the employer contribution rate to pension benefits effective January 1, 2017 and OPEB as follows:

Pension	OPEB	Total
22.50%	4.00%	26.50%

Based on the December 31, 2017 actuarial valuation, the Board allocated the employer contribution rate to pension benefits effective January 1, 2018 and OPEB as follows:

Pension	OPEB	Total
23.00%	3.50%	26.50%

Upon request of a member who terminates employment with the Ohio State Highway Patrol, member contributions are refunded. If a member dies while active in the service of the Ohio State Highway Patrol, member contributions are refunded to the member's beneficiary, provided that no survivor benefits are payable.

A member with credited service in OPERS, School Employees Retirement System (SERS), State Teachers Retirement System (STRS), Ohio Police & Fire Pension Fund (OP&F), or Cincinnati Retirement System (CRS) may transfer that service credit to HPRS. Similarly, a member with credited service in HPRS may transfer that service to OPERS, SERS, STRS, OP&F, or CRS.

Note 3 Net Position

Chapter 5505 of the Revised Code requires that various funds be established to account for contributions, reserves, income, and expenses.

The Employees' Savings Fund was created to accumulate the contributions deducted from the salaries of members, less any refunds of member contributions. Upon retirement, a member's contributions are transferred to the Pension Reserve Fund.

The Employer's Accumulation Fund is the fund in which the state's contributions to HPRS are accumulated. Included in this fund are the reserves allocated to the payment of OPEB.

The Pension Reserve Fund is the fund from which all pensions are paid to members who retire on or after January 1, 1966.

The Survivors' Benefit Fund is the fund from which survivor benefits are paid to qualifying beneficiaries.

The Income Fund is used to accumulate all interest, dividends, distributions, and other income from deposits and investments. Gifts, bequests to the system, transfers, and any other income are also credited to the Income Fund.

The Expense Fund provides for the payment of administrative expenses with the necessary money allocated to it from the Income Fund.

At December 31, 2018, the fiduciary net position was allocated to the various funds as follows:

Fiduciary Net Position December 31, 2018	
Employees' Savings Fund	$93,867,195
Employer's Accumulation Fund	101,827,574
Pension Reserve fund	621,613,765
Survivors' Benefit Fund	-
Income Fund	-
Expense Fund	-
Total	$817,308,534

Note 4 Property and Equipment

The following is a summary of equipment, at cost, less accumulated depreciation, at December 31, 2018:

Capital Assets - Equipment December 31, 2018	
Cost, 12/31/2017	$147,039
(+) Additions	-
(-) Retirements	-
Cost, 12/31/2018	$147,039
Accumulated depreciation, 12/31/2017	$115,845
(+) Additions	11,531
(-) Retirements	-
Accumulated depreciation, 12/31/2018	$127,376
Book value, 12/31/2018	$19,663

The following is a summary of furniture, at cost, less accumulated depreciation, at December 31, 2018:

Capital Assets - Furniture December 31, 2018	
Cost, 12/31/2017	$82,710
(+) Additions	-
(-) Retirements	-
Cost, 12/31/2018	$82,710
Accumulated depreciation, 12/31/2017	$51,357
(+) Additions	15,532
(-) Retirements	-
Accumulated depreciation, 12/31/2018	$66,889
Book value, 12/31/2018	$15,821

Note 5 Fair Value Measurement

HPRS's investments measured and reported at fair value are classified according to the following hierarchy:
Level 1 – Investments reflect prices quoted in active markets.
Level 2 – Investments reflect prices that are based on a similar observable asset either directly or indirectly, which may include inputs in markets that are not considered to be active.
Level 3 – Investments reflect prices based upon unobservable sources.

The categorization of investments within the hierarchy is based upon the pricing transparency of the instrument and should not be perceived as the particular investment's risk.

Debt and equities classified in Level 1 of the fair value hierarchy are valued by an external pricing vendor. Assets classified in Level 2 are subject to pricing by an alternative pricing source, due to lack of information available by the primary vendor.

Investments and Short-Term Holdings Measured at Fair Value

Investments by Fair Value Level	12/31/2018	Fair Value Measurements Using: Quoted Prices in Active Markets for Identical Assets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
Debt Securities				
Bond Mutual Funds	$20,012,370	$20,012,370	-	-
Marketable Certificates of Deposit	239,347	-	239,347	-
Municipal Bonds	2,675,120	-	2,675,120	-
U.S. Agency Bonds	7,531,962	-	7,531,962	-
U.S. Corporate Bonds	16,060,033	-	16,060,033	-
U.S. Government	6,998,216	6,988,216	-	-
Total Debt Securities	53,517,048	27,010,586	26,506,462	-
Equity Securities				
Domestic Equity Mutual Funds	153,238,602	153,238,602	-	-
Foreign Equity Mutual Funds	19,110,170	19,110,170	-	-
Foreign Stocks	4,263,623	4,263,624	-	-
U.S. Common and Preferred Stock	65,574,648	65,574,648	-	-
Total Equity Securities	242,187,043	242,187,044	-	-
Total Investments by Fair Value Level	$295,704,092	$269,197,630	$26,506,462	-

Investments Measured at the Net Asset Value (NAV)	
Commingled Bond Funds	$61,712,028
Commingled Domestic Equity Funds	45,432,746
Commingled International Equity Funds	140,388,317
Direct Infrastructure	5,186,694
Direct Lending	29,228,715
Hedge Funds	52,519,108
Private Equity	116,808,540
Private Real Estate Funds	46,788,824
Tactical Asset Allocation	15,547,491
Total Investments Measured at the NAV	513,612,461
Total Investments	$809,316,553

The valuation method for investments measured at the net asset value (NAV) per share, or equivalent, is presented in the table below.

Investments Measured at the Net Asset Value

	12/31/2018	Unfunded Commitments	Redemption Frequency (If Currently Eligible)	Redemption Notice Period
Commingled Bond Funds [1]	$61,712,028		Daily, Monthly	1-20 Days
Commingled Domestic Equity Funds [1]	45,432,746		Monthly	10 Days
Commingled International Equity Funds [1]	140,388,317		Daily	1-3 Days
Direct Infrastructure [2]	5,186,694	19,833,141		
Direct Lending [3]	29,228,715	9,926,628		
Hedge Funds [4]	52,519,108		Quarterly, Annually	65 days
Private Equity [5]	116,808,540	66,579,371		
Private Real Estate Funds [5]	46,788,824	39,204,999	Monthly	30 days
Tactical Asset Allocation [6]	15,547,491		Monthly	5 Days
Total Investments Measured at the NAV	$513,612,461			

(1) **Commingled Bond Funds and Equity Funds**: One bond fund and five equity funds are considered to be commingled in nature. Each are valued at the net asset value of units held at the end of the period based upon the fair value of the underlying investments.

(2) **Direct Infrastructure**: HPRS has committed to two global infrastructure limited partnerships. Infrastructure offers strong return potential, consistent cash flow yield and defensive characteristics. The fair values of these funds are determined using net assets valued one quarter in arrears plus current quarter cash flows. These funds are not eligible for redemption. Distributions are received as underlying investments within the funds are liquidated, which on average can occur over the span of 5 to 10 years.

(3) **Direct Lending**: HPRS has committed to two direct lending limited partnerships. Direct lending funds generate strong cash flow, have variable interest rates, and are well protected through debt covenants. The fair values of these funds have been determined using net assets valued one quarter in arrears plus current quarter cash flows. These funds are not eligible for redemption. Distributions are received as underlying investments within the funds are liquidated, which on average can occur over the span of 5 to 10 years.

(4) **Hedge Fund**: One multi-manager, multi-strategy “fund-of funds” investing predominantly in limited partnerships and similar pooled investment vehicles managed by independent portfolio managers that employ diverse alternative investment strategies across a variety of asset classes. HPRS also has one small position with managers that are liquidating.

(5) **Private Equity and Real Estate Funds**: HPRS currently has seven private real estate investments and sixteen private equity investments in its portfolio. These strategies have exposure to several categories of investments, including real estate equity and debt, buyout, mezzanine debt, co-investment, and energy related private investments. The fair values of these funds have been determined using net assets valued one quarter in arrears plus current quarter cash flows. These funds are not eligible for redemption. Distributions are received as underlying investments within the funds are liquidated, which on average can occur over the span of 5 to 10 years.

(6) **Tactical Asset Allocation**: Tactical asset allocation (TAA) strategies are intended to reduce portfolio volatility and improve risk-adjusted returns by having low equity market beta and low correlations to traditional long equity and fixed income strategies. HPRS had one TAA strategy with monthly liquidity at year end, and it is valued at NAV per share on a monthly basis.

Note 6 Deposits and Investment Risk

Investments

Ohio Revised Code Section 5505.06 grants “full power” to the Retirement Board to invest the system’s assets pursuant to a prudent person standard. This standard provides that “the board and other fiduciaries shall discharge their duties with respect to the funds solely in the interest of the participants and beneficiaries; for the exclusive purpose of providing benefits to participants and their beneficiaries and defraying reasonable expenses of administering the system; with care, skill, prudence, and diligence under the circumstances then prevailing that a prudent person acting in a like capacity and familiar with these matters would use in the conduct of an enterprise of a like character and with like aims; and by diversifying the investments of the system so as to minimize the risk of large losses, unless under the circumstances it is clearly prudent not to do so.”

All investments, both domestic and international, are registered in the name of HPRS.

Deposits

HPRS cash balances consist of an operating cash account held at PNC Bank, cash on deposit with the State Highway Patrol Federal Credit Union, and excess investment cash held by the custodian, PNC Bank. Cash balances are either interest-bearing or invested in highly liquid debt instruments with an original maturity of three months or less. At December 31, 2018, the carrying value of all deposits was $10,480,198 (including money market funds of $8,136,727), as compared to bank balances of $10,511,043. The difference in the carrying amount and the bank balances is caused by outstanding warrants and deposits in transit.

Concentration of Credit Risk

Concentration of credit risk is the risk of inability to recover the value of deposits, investments, or collateral securities in the possession of an outside party.

Investment managers are expected to maintain diversified portfolios by sector and issuer. Pursuant to its investment policy, and excluding U.S. government securities, HPRS has no more than 10% of the fixed income portfolio invested in the securities of any one issuer, and no more than 5% in any one issue, with the exception of U.S. government securities.

Credit Risk

Credit risk is the risk that an issuer or counterparty to an investment will be unable to fulfill its obligations. HPRS does not have a policy to limit credit risk.

HPRS exposure to credit risk on fixed income securities, based on S&P Quality Ratings, is as follows:

S&P Quality Ratings December 31, 2018	
AAA	$25,312,479
AA	7,528,735
A	15,592,176
BBB	19,406,364
BB	8,153,458
B	18,148,982
CCC	3,354,749
C	18,394
D	108,376
Unrated	17,605,363
Total Investments	$115,229,076

Foreign Currency Risk

Foreign currency risk is the risk that changes in exchange rates between the U.S. dollar and foreign currencies could adversely affect an investment's fair value. HPRS does not have a policy to limit foreign currency risk. HPRS's exposure to foreign currency risk derives from its positions in foreign currency-denominated investments. At December 31, 2018, HPRS had zero exposure to foreign currency risk.

Interest Rate Risk

Interest rate risk is the risk that an interest rate change could adversely affect an investment's fair value. HPRS does not have a policy to limit interest rate risk.

The reporting of effective duration in the table below quantifies, to the fullest extent possible, the interest rate risk of the system's fixed income assets.

Investment Maturities December 31, 2018	
Less than 1 year	$16,506,585
1 - 5 years	50,933,013
Greater than 5, up to 10 years	27,643,407
Greater than 10 years	20,146,071
Total	$115,229,076

Custodial Credit Risk

Custodial credit risk is the risk that, in the event of a failure of a depository institution or counterparty to a transaction, HPRS will be unable to recover the value of deposits, investments, or collateral securities in the possession of an outside party.

At December 31, 2018, the carrying amounts of HPRS's operating and investment cash deposits totaled $10,480,198, and the corresponding bank balances totaled $10,511,043. Of the bank balances, the Federal Deposit Insurance Corporation insured $250,000. In accordance with state law, bank balances of $2,093,459 were collateralized at 112% with securities held in the name of HPRS's pledging financial institution.

Investment Concentrations

The following is a list of investments in any one organization that represents 5% or more of the pension plan's net assets held in trust for pension benefits:

Vanguard Mutual Funds
Evanston Capital Management, LLC
LSV Asset Management
Jennison Associates LLC

Money-Weighted Rate of Return

The money-weighted rate of return expresses investment performance, net of investment expense, adjusted for the changing amounts actually invested. For the fiscal year ended December 31, 2018, the annual money-weighted rate of return on pension plan investments, net of investment expense was -5.23%.

Commitments

As of December 31, 2018, unfunded commitments related to the real estate, private equity, direct infrastructure, and direct lending investment portfolios totaled $135,544,139.

Note 7 Derivatives

A derivative is an investment vehicle that derives its value from another instrument or index. Derivatives are primarily used to maximize yields and offset volatility caused by interest rate and currency fluctuations. These instruments leave investors exposed to various credit, market, and legal risks.

At December 31, 2018, HPRS did not have any direct investments in derivatives; however, it held shares in commingled funds that had incidental exposure to derivatives.

Note 8 Net Pension Liability and Actuarial Information

The components of the net pension liability as of December 31, 2018:

Schedule of Net Pension Liability
Year ended December 31

Year	Total Pension Liability	Fiduciary Net Position	Net Pension Liability	Plan Net Position as a % of Total Pension Liability	Covered Payroll[1]	Net Pension Liability as a % of Covered Payroll
2014	$1,044,345,838	$740,661,880	$303,683,958	70.92%	$99,211,756	306.10%
2015	1,111,064,399	704,225,034	406,839,365	63.38%	99,983,224	406.91%
2016	1,137,269,498	721,685,656	415,583,842	63.46%	108,788,871	382.01%
2017	1,178,545,088	786,354,140	392,188,948	66.72%	112,705,188	347.98%
2018	1,472,338,067	715,480,960	756,857,107	48.59%	116,009,622	652.41%

Source: GRS

[1]Includes members of DROP

The total pension liability was determined by an actuarial valuation as of December 31, 2017, and update procedures were used to roll forward the total pension liability to December 31, 2018. The following actuarial assumptions were used, applied to all periods included in the measurement:

Actuarial Assumptions

Valuation Date	December 31, 2017
Inflation	3.5% wage inflation; 2.50% price inflation
Salary Increases	3.8% to 13.5% including inflation
Investment Rate of Return	7.25%

Long-Term Expected Return on Plan Assets

The long-term expected rate of return on pension plan investments was determined using a building-block method in which best-estimate ranges of expected future real rates of return (expected returns, net of pension plan investment expense and inflation) are developed for each major asset class. These ranges are combined to produce the long-term expected rate of return by weighting the expected future real rates of return by the target asset allocation percentage and by adding expected inflation. The target allocations as of December 31, 2017 were provided by the system's investment consultant. Best estimates of arithmetic real rates of return were approximated using expected returns from twelve investment consultants. For each major asset class that is included in the system's target asset allocation as of December 31, 2017, best estimates of the arithmetic rates of return are summarized in the following table:

Asset Allocation
December 31, 2017

Asset Class	Target Allocations	Long-Term Expected Real Rate of Return
Cash	1.00%	0.05%
Domestic Equity - Large Cap	25.00	4.78
Domestic Equity - Small Cap	5.00	5.77
International Equity	15.00	5.94
Emerging Markets	5.00	8.01
Domestic Corporate Fixed Income	10.00	1.03
Domestic Government Fixed Income	3.00	0.70
Treasury Inflation Protected Securities	0.00	0.83
High-Yield Bonds	6.00	2.66
Real Estate	5.00	4.30
Private Equity	13.00	8.02
Hedge Funds	5.00	3.87
Other Alternatives	7.00	3.70
Total	100.00%	

Source: GRS

Single Discount Rate

A single discount rate of 5.84% was used to measure the total pension liability. This single discount rate was based on the expected rate of return on pension plan investments of 7.25% and the municipal bond rate of 3.71%. The projection of cash flows used to determine this single discount rate assumed that:

(1) plan member contributions will be 12.5% of payroll each calendar year, and
(2) the employer contribution rate allocated to the pension program will be 26.50% of payroll.

Based on these assumptions, the pension plan's fiduciary net position and future contributions were sufficient to finance benefit payments through the year 2052. Therefore, the long-term expected rate of return on pension plan investments was applied to projected benefit payments through the year 2052, and the municipal bond rate was applied to all benefit payments after that date.

Regarding the sensitivity of the net pension liability to changes in the Single Discount Rate, the following presents the plan's net pension liability, calculated using a Single Discount Rate of 5.84%, as well as what the plan's net pension liability would be if it were calculated using a Single Discount Rate that is 1% lower or 1% higher:

NPL Sensitivity

	1% Decrease 4.84%	Current Single Discount Rate Assumption 5.84%	1% Increase 6.84%
Net Pension Liability	$951,721,158	$756,857,107	$608,007,373

Source: GRS

Mortality Rates for Pension

The pre-retirement mortality tables, for post-retirement mortality, used in evaluating allowances to be paid were the RP-2014 employees mortality table for males and females, adjusted for mortality improvement back to the observation period base year of 2006. The base year for females was then established to be 2012. Mortality rates for a particular calendar year are determined by applying the MP-2018 mortality improvement scale to the above described tables. This assumption is effective with the December 31, 2018 valuation.

The healthy retiree mortality tables, for post-retirement mortality, used in evaluating allowances to be paid were the RP-2014 Healthy Annuitant mortality table for males and females, adjusted for mortality improvement back to the observation period base year of 2006. The base year for females was then established to be 2012. Mortality rates for a particular calendar year are determined by applying the MP-2018 mortality improvement scale to the above described tables. This assumption is effective with the December 31, 2018 valuation.

The disabled retiree mortality tables, for post-retirement mortality, used in evaluating allowances to be paid were the RP-2014 disabled mortality table for males and females, adjusted for mortality improvement back to the observation period base year of 2006. The base year for females was then established to be 2012. Mortality rates for a particular calendar year are determined by applying the MP-2018 mortality improvement scale to the above described tables. This assumption is effective with the December 31, 2018 valuation.

Experience Study

The actuarial assumptions used in this report were last reviewed and updated as part of the five-year experience study for the period January 1, 2010 through December 31, 2014.

Note 9 Net Other Postemployment Benefits (OPEB) Liability and Actuarial Information

The components of the net OPEB liability as of December 31, 2018:

Schedule of Net OPEB Liability
Year ended December 31

Year	Total OPEB Liability	Fiduciary Net Position	Net OPEB Liability	Plan Net Position as a % of Total OPEB Liability	Covered Payroll[1]	Net OPEB Liability as a % of Covered Payroll
2017	$566,130,019	$111,798,820	$454,331,199	19.75%	$112,705,188	403.11%
2018	459,600,937	101,827,574	357,773,363	22.16%	116,009,622	308.40%

Source: GRS

The total OPEB liability was determined by an actuarial valuation as of December 31, 2017, and update procedures were used to roll forward the total OPEB liability to December 31, 2018. The following actuarial assumptions were used, applied to all periods included in the measurement:

Actuarial Assumptions

Valuation Date	December 31, 2017
Inflation	3.5% wage inflation; 2.50% price inflation
Salary Increases	3.8% to 13.5% including inflation
Investment Rate of Return	7.25%
Health Care Cost Trend	4.5% to 8.25%, with ultimate rate of 3.5%

Long-Term Expected Return on Plan Assets

The long-term expected rate of return on pension plan investments was determined using a building-block method in which best-estimate ranges of expected future real rates of return (expected returns, net of pension plan investment expense and inflation) are developed for each major asset class. These ranges are combined to produce the long-term expected rate of return by weighting the expected future real rates of return by the target asset allocation percentage and by adding expected inflation. The target allocations as of December 31, 2017 were provided by the system's investment consultant. Best estimates of arithmetic real rates of return were approximated using expected returns from twelve investment consultants. For each major asset class that is included in the system's target asset allocation as of December 31, 2017, best estimates of the arithmetic rates of return are summarized in the following table:

Asset Allocation December 31, 2017		
Asset Class	Target Allocations	Long-Term Expected Real Rate of Return
Cash	1.00%	0.05%
Domestic Equity - Large Cap	25.00	4.78
Domestic Equity - Small Cap	5.00	5.77
International Equity	15.00	5.94
Emerging Markets	5.00	8.01
Domestic Corporate Fixed Income	10.00	1.03
Domestic Government Fixed Income	3.00	0.70
Treasury Inflation Protected Securities	0.00	0.83
High-Yield Bonds	6.00	2.66
Real Estate	5.00	4.30
Private Equity	13.00	8.02
Hedge Funds	5.00	3.87
Other Alternatives	7.00	3.70
Total	100.00%	

Source: GRS

Single Discount Rate

A single discount rate of 3.82% was used to measure the total OPEB liability. This Single Discount Rate was based on an expected rate of return on OPEB plan investments of 7.25% and a municipal bond rate of 3.71%. The projection of cash flows used to determine this Single Discount Rate assumed that employer contributions will be made at rates equal to the actuarially determined contribution rate. Based on these assumptions, the OPEB plan's fiduciary net position and future contributions were sufficient to finance the benefit payments through the year 2028. As a result, the long-term expected rate of return on OPEB plan investments was applied to projected benefit payments through the year 2028, and the municipal bond rate was applied to all benefit payments after that date.

Regarding the sensitivity of the net OPEB liability to changes in the single discount rate, the following presents the plan's net OPEB liability, calculated using a single discount rate of 3.82%, as well as what the plan's net OPEB liability would be if it were calculated using a single discount rate that is 1% lower or 1% higher:

Net OPEB Liability Sensitivity			
	1% Decrease 2.82%	Current Single Discount Rate Assumption 3.82%	1% Increase 4.82%
Net OPEB Liability	$445,587,346	$357,773,363	$289,071,928

Source: GRS

Regarding the sensitivity of the net OPEB liability to changes in the healthcare cost trend rates, the following presents the plan's net OPEB liability, calculated using the assumed trend rates as well as what the plan's net OPEB liability would be if it were calculated using a trend rate that is 1% lower or 1% higher:

Net OPEB Liability Sensitivity

	1% Decrease	Current Healthcare Cost Trend Rate Assumption	1% Increase
Net OPEB Liability	$291,827,804	$357,773,363	$434,945,566

Source: GRS

Mortality Rates for OPEB

The pre-retirement mortality tables, for post-retirement mortality, used in evaluating allowances to be paid were the RP-2014 employees mortality table for males and females, adjusted for mortality improvement back to the observation period base year of 2006. The base year for females was then established to be 2012. Mortality rates for a particular calendar year are determined by applying the MP-2018 mortality improvement scale to the above described tables. This assumption is effective with the December 31, 2018 valuation.

The healthy retiree mortality tables, for post-retirement mortality, used in evaluating allowances to be paid were the RP-2014 Healthy Annuitant mortality table for males and females, adjusted for mortality improvement back to the observation period base year of 2006. The base year for females was then established to be 2012. Mortality rates for a particular calendar year are determined by applying the MP-2018 mortality improvement scale to the above described tables. This assumption is effective with the December 31, 2018 valuation.

The disabled retiree mortality tables, for post-retirement mortality, used in evaluating allowances to be paid were the RP-2014 disabled mortality table for males and females, adjusted for mortality improvement back to the observation period base year of 2006. The base year for females was then established to be 2012. Mortality rates for a particular calendar year are determined by applying the MP-2018 mortality improvement scale to the above described tables. This assumption is effective with the December 31, 2018 valuation.

Experience Study

The actuarial assumptions used in this report were last reviewed and updated as part of the five-year experience study for the period January 1, 2010 through December 31, 2014.

Note 10 Pension and OPEB Benefits for Employees

Plan Description – Ohio Public Employees Retirement System (OPERS)
The employees of HPRS are members of OPERS. OPERS administers three separate pension plans: The Traditional Pension Plan – a cost-sharing, multiple employer defined benefit pension plan; the Member-Directed Plan – a defined contribution plan; and the Combined Plan – a cost-sharing, multiple employer defined benefit pension plan that has elements of both a defined benefit and defined contribution plan.

OPERS maintains a cost-sharing, multiple-employer defined benefit post-employment health care trust, which funds multiple health care plans including medical coverage, prescription drug coverage and deposits to a Health Reimbursement Arrangement to qualifying benefit recipients of both the Traditional Pension and the Combined plans. This trust is also used to fund health care for Member-Directed Plan participants, in the form of a Retiree Medical Account (RMA). At retirement or refund, Member-Directed Plan participants may be eligible for reimbursement of qualified medical expenses from their vested RMA balance.

In order to qualify for health care coverage, age-and-service retirees under the Traditional Pension and Combined plans must have 20 or more years of qualifying Ohio service credit. Health care coverage for disability benefit recipients and qualified survivor benefit recipients is available. The health care coverage provided by OPERS meets the definition of an Other Post Employment Benefit (OPEB) as described in GASB Statement 45. Please see the Plan Statement in the OPERS 2017 CAFR for details.

The Ohio Revised Code permits, but does not require, OPERS to provide health care to its eligible benefit recipients. Authority to establish and amend health care coverage is provided to the OPERS Board of Trustees (OPERS Board) in Chapter 145 of the Ohio Revised Code.

OPERS issues a stand-alone financial report. Interested parties may obtain a copy by visiting https://www.opers.org/financial/reports.shtml#CAFR, by writing to OPERS, 277 East Town Street, Columbus, OH 43215-4642, or by calling 614-222-5601 or 800-222-7377.

Funding Policy
The Ohio Revised Code provides the statutory authority requiring public employers to fund health care through their contributions to OPERS. A portion of each employer's contribution to OPERS is set aside to fund OPERS health care plans.

Employer contribution rates are expressed as a percentage of the earnable salary of active members. In 2018, State and Local employers contributed at a rate of 14.0% of earnable salary and Public Safety and Law Enforcement employers contributed at 18.1%. These are the maximum employer contribution rates permitted by the Ohio Revised Code. Active member contributions do not fund health care.

HPRS employer contributions to OPERS for the years ended December 31, 2018, 2017, and 2016, were $88,854, $95,054, and $91,371, respectively, which were equal to the required contributions for each year.

Each year, the OPERS Board determines the portion of the employer contribution rate that will be set aside to fund health care plans. As recommended by OPERS' actuary, the portion of employer contributions allocated to health care beginning January 1, 2018 decreased to 0.0% for both the Traditional and Combined plans. The OPERS Board is also authorized to establish rules for the retiree or their surviving beneficiaries to pay a portion of the health care provided. Payment amounts vary depending on the number of covered dependents and the coverage selected. The employer contribution as a percentage of covered payroll deposited for Member-Directed Plan for 2018 was 4.0%.

Pension Assets, Pension Liabilities, Pension Expense, and Deferred Outflows of Resources and Deferred Inflows of Resources Related to Pensions

At December 31, 2018, HPRS reported a liability of $750,831 for its proportionate share of the Traditional Plan's net pension liability and $16,190 for its proportionate share of the Combined Plan's net pension asset. The net pension liability and asset were measured as of December 31, 2017, and the total pension liability used to calculate the net pension liability and asset was determined by an actuarial valuation as of that date. HPRS's proportion of the net pension liability was based on a projection of the system's long-term share of contributions to the pension plan relative to the projected contributions of all participating employers, actuarially determined. At December 31, 2017, HPRS's proportions were as follows:

	HPRS
Traditional Plan	0.004786%
Combined Plan	0.011893%

For the year ended December 31, 2018, HPRS recognized pension expense of $148,101.

At December 31, 2018, HPRS reported deferred outflows of resources and deferred inflows of resources related to pensions from the following sources:

Deferred Outflows and Inflows of Resources

	Deferred *Outflows* of Resources	Deferred *Inflows* of Resources
Difference between expected and actual experience	$767	$19,620
Net difference between projected and actual earnings on pension plan investments	-	163,748
Assumption changes	91,144	-
Changes in proportion	11,242	7,112
Contributions subsequent to the measurement date	95,696*	-
Total	$198,849	$190,480

*$95,696 reported as deferred outflows of resources related to pensions resulting from HPRS' contributions subsequent to the measurement date will be recognized as a reduction of net pension liability in the year ending December 31, 2019.

Amounts reported as deferred outflows of resources and deferred inflows of resources related to pensions will be recognized in pension expense as follows:

Year ended December 31:	
2019	$69,902
2020	(12,679)
2021	(73,589)
2022	(68,574)
2023	(539)
2024	(440)
2025	(271)
2026	(242)
2027	(80)

Actuarial Assumptions – OPERS Pension

The total pension liability in the December 31, 2017 actuarial valuation was determined using the following actuarial assumptions, applied to all periods included in the measurement:

Actuarial Assumption - OPERS December 31, 2017 Valuation Date		
	Traditional Pension Plan	Combined Plan
Investment Rate of Return	7.50%	7.50%
Wage Inflation	3.25%	3.25%
Projected Salary Increases	3.25% - 10.75% (includes wage inflation at 3.25%)	3.25% - 8.25% (includes wage inflation at 3.25%)
Cost-of-Living Adjustments	Pre 1/7/2013 Retirees: 3.00% Simple; Post 1/7/2013 Retirees: 3.00% Simple through 2018, then 2.15% Simple.	Pre 1/7/2013 Retirees: 3.00% Simple; Post 1/7/2013 Retirees: 3.00% Simple through 2018, then 2.15% Simple.

Pre-retirement mortality rates are based on the RP-2014 Employees mortality table for males and females, adjusted for mortality improvement back to the observation period base year of 2006. The base year for males and females was then established to be 2015 and 2010, respectively. Post-retirement mortality rates are based on the RP-2014 Healthy Annuitant mortality table for males and females, adjusted for mortality improvement back to the observation period base year of 2006. The base year for males and females was then established to be 2015 and 2010, respectively. Post-retirement mortality rates for disabled retirees are based on the RP-2014 Disabled mortality table for males and females, adjusted for mortality improvement back to the observation period base year of 2006. The base year for males and females was then established to be 2015 and 2010, respectively. Mortality rates for a particular calendar year are determined by applying the MP-2015 mortality improvement scale to all of the above described tables.

The discount rate used to measure the total pension liability was 7.50% for the Traditional Pension Plan, Combined Plan and Member-Directed Plan. The projection of cash flows used to determine the discount rate assumed that contributions from plan members and those of the contributing employers are made at the contractually required rates, as actuarially determined. Based on those assumptions, the pension plan’s fiduciary net position was projected to be available to make all projected future benefit payments of current plan members. Therefore, the long-term expected rate of return on pension plan investments for the Traditional Pension Plan, Combined Plan and Member-Directed Plan was applied to all periods of projected benefit payments to determine the total pension liability.

The following table presents HPRS's proportionate share of the net pension liability or asset calculated using the discount rate of 7.50%, as well as what HPRS's proportionate share of the net pension liability would be if it were calculated using a discount rate that is one percentage point lower or one percentage point higher than the current rate:

Sensitivity of HPRS' proportionate share of the Net Pension Liability (Asset)			
	1% Decrease – 6.5%	Current Rate – 7.5%	1% Increase – 8.5%
Traditional Plan HPRS	$1,333,284	$750,831	$265,240
Combined Plan HPRS	($8,801)	($16,190)	($21,288)

The allocation of investment assets within the Defined Benefit portfolio is approved by the Board as outlined in the annual investment plan. Plan assets are managed on a total return basis with a long-term objective of achieving and maintaining a fully funded status for the benefits provided through the defined benefit pension plans. The following table displays the Board-approved asset allocation policy for 2017 and the long-term expected real rates of return.

OPERS Asset Allocation December 31, 2017		
Asset Class	Target Allocation	Weighted Average Long-Term Expected Real Rate of Return
Fixed Income	23.00%	2.20%
Domestic Equities	19.00%	6.37%
Real Estate	10.00%	5.26%
Private Equity	10.00%	8.97%
International Equities	20.00%	7.88%
Other Investments	18.00%	5.26%
Total	100.00%	5.66%

The long-term expected rate of return on defined benefit investment assets was determined using a building-block method in which best estimate ranges of expected future real rates of return are developed for each major asset class. These ranges are combined to produce the long-term expected real rate of return by weighting the expected future real rates of return by the target asset allocation percentage, adjusted for inflation.

OPEB Liabilities, OPEB Expense, and Deferred Outflows of Resources and Deferred Inflows of Resources Related to OPEB

At December 31, 2018, HPRS reported a liability of $522,224 for its proportionate share of OPERS net OPEB liability. The net OPEB liability was measured as of December 31, 2017, and the total OPEB liability used to calculate the net OPEB liability was determined by an actuarial valuation as of that date. HPRS's proportion of the net OPEB liability was based on a projection of the system's long-term share of contributions to the OPEB plan relative to the projected contributions of all participating employers, actuarially determined. At December 31, 2017, HPRS's proportion was as follows:

	HPRS
OPEB	0.004809%

For the year ended December 31, 2018, HPRS recognized OPEB expense of $36,969.

At December 31, 2018, HPRS reported deferred outflows of resources and deferred inflows of resources related to OPEB from the following sources:

Deferred Outflows and Inflows of Resources	Deferred *Outflows* of Resources	Deferred *Inflows* of Resources
Difference between expected and actual experience	$407	$-
Net difference between projected and actual earnings on pension plan investments	-	38,902
Assumption changes	38,023	-
Changes in proportion	-	-
Contributions subsequent to the measurement date	-	-
Total	$38,430	$38,902

Amounts reported as deferred outflows of resources and deferred inflows of resources related to OPEB will be recognized in pension expense as follows:

Year ended December 31:	
2019	$8,648
2020	8,648
2021	(8,043)
2022	(9,726)

Actuarial Assumptions – OPERS OPEB

The total OPEB liability was determined by an actuarial valuation as of December 31, 2016, rolled forward to the measurement date of December 31, 2017. The actuarial valuation used the following actuarial assumptions applied to all prior periods included in the measurement in accordance with the requirements of GASB 74:

Actuarial Assumption - OPERS December 31, 2016 Valuation Date (rolled forward to December 31, 2017)	
	OPEB
Single Discount Rate	3.85%
Investment Rate of Return	6.50%
Municipal Bond Rate	3.31%
Wage Inflation	3.25%
Projected Salary Increases	3.25% - 10.75% (includes wage inflation at 3.25%)
Health Care Cost Trend Rate	7.50% Initial 3.25% Ultimate in 2028

Pre-retirement mortality rates are based on the RP-2014 Employees mortality table for males and females, adjusted for mortality improvement back to the observation period base year of 2006. The base year for males and females was then established to be 2015 and 2010, respectively. Post-retirement mortality rates are based on the RP-2014 Healthy Annuitant mortality table for males and females, adjusted for mortality improvement back to the observation period base year of 2006. The base year for males and females was then established to be 2015 and 2010, respectively. Post-retirement mortality rates for disabled retirees are based on the RP-2014 Disabled mortality table for males and females, adjusted for mortality improvement back to the observation period base year of 2006. The base year for males and females was then established to be 2015 and 2010, respectively. Mortality rates for a particular calendar year are determined by applying the MP-2015 mortality improvement scale to all of the above described tables.

A single discount rate of 3.85% was used to measure the OPEB liability on the measurement date of December 31, 2017. Projected benefit payments are required to be discounted to their actuarial present value using a single discount rate that reflects (1) a long-term expected rate of return on OPEB plan investments (to the extent that the health care fiduciary net position is projected to be sufficient to pay benefits), and (2) tax-exempt municipal bond rate based on an index of 20-year general obligation bonds with an average AA credit rating as of the measurement date (to the extent that the contributions for use with the long-term expected rate are not met). This single discount rate was based on an expected rate of return on the health care investment portfolio of 6.50% and a municipal bond rate of 3.31%. The projection of cash flows used to determine this single discount rate assumed that employer contributions will be made at rates equal to the actuarially determined contribution rate. Based on these assumptions, the health care fiduciary net position and future contributions were sufficient to finance health care costs through 2034. As a result, the long-term expected rate of return on health care investments was applied to projected costs through the year 2034, and the municipal bond rate was applied to all health care costs after that date.

The following table presents HPRS's proportionate share of the net OPEB liability calculated using the discount rate of 3.85%, as well as what HPRS's proportionate share of the net OPEB liability would be if it were calculated using a discount rate that is one percentage point lower or one percentage point higher than the current rate:

Sensitivity of HPRS' proportionate share of the Net OPEB Liability			
	1% Decrease – 2.85%	**Current Rate – 3.85%**	**1% Increase – 4.85%**
Net OPEB Liability	$693,794	$522,224	$383,422

Retiree health care valuations use a health care cost-trend assumption that changes over several years built into the assumption. The near-term rates reflect increases in the current cost of health care; the trend starting in 2018 is 7.50%. If this trend continues for future years, the projection indicates that years from now virtually all expenditures will be for health care. A more reasonable alternative is that in the not-too-distant future, the health plan cost trend will decrease to a level at, or near, wage inflation. On this basis, the actuaries project premium rate increases will continue to exceed wage inflation for approximately the next decade, but by less each year, until leveling off at an ultimate rate, assumed to be 3.25% in the most recent valuation.

Changes in the health care cost trend rate may also have a significant impact on the net OPEB liability. The following table presents HPRS's proportionate share of the net OPEB liability calculated using the assumed trend rates, as well as what HPRS's proportionate share of the net OPEB liability would be if it were calculated using a health care cost trend rate that is one percentage point lower or one percentage point higher than the current rate:

Sensitivity of HPRS' proportionate share of the Net OPEB Liability			
	1% Decrease	**Current Rate**	**1% Increase**
Net OPEB Liability	$499,655	$522,224	$545,533

The allocation of investment assets within the Health Care portfolio is approved by the Board as outlined in the annual investment plan. Assets are managed on a total return basis with a long-term objective of continuing to offer a sustainable health care program for current and future retirees. The System's primary goal is to achieve and maintain a fully funded status for benefits provided through the defined pension plans. Health care is a discretionary benefit. The table below displays the Board-approved asset allocation policy for 2017 and the long-term expected real rates of return:

OPERS OPEB Asset Allocation
December 31, 2017

Asset Class	Target Allocation	Weighted Average Long-Term Expected Real Rate of Return
Fixed Income	34.00%	1.88%
Domestic Equities	21.00%	6.37%
Real Estate	6.00%	5.91%
International Equities	22.00%	7.88%
Other Investments	17.00%	5.39%
Total	100.00%	4.98%

The long-term expected rate of return on health care investment assets was determined using a building-block method in which best-estimate ranges of expected future real rates of return are developed for each major asset class. These ranges are combined to produce the long-term expected real rate of return by weighting the expected future real rates of return by the target asset allocation percentage, adjusted for inflation.

During 2017, OPERS managed investments in three investment portfolios: the Defined Benefit portfolio, the Health Care portfolio and the Defined Contribution portfolio. The Health Care portfolio includes the assets for health care expenses for the Traditional Pension Plan, Combined Plan and Member-Directed Plan eligible members. Within the Health Care portfolio, contributions into the plans are assumed to be received continuously throughout the year based on the actual payroll payable at the time contributions are made, and health care-related payments are assumed to occur mid-year. Accordingly, the money-weighted rate of return is considered to be the same for all plans within the portfolio. The annual money-weighted rate of return expressing investment performance, net of investment expenses and adjusted for the changing amounts actually invested, for the Health Care portfolio is 15.2% for 2017.

Note 11 DROP Activity

DROP Activity Year ended December 31, 2018	
Beginning Balance	$21,563,609
Contributions	6,959,275
Distributions	(4,688,079)
Net Adjustments	1,781,833
Ending Balance	$25,616,638

Note 12 Risk Management

HPRS purchases insurance coverage for general liability, property damage, cyber, and employee and public official liability with varying policy limits. In the past three years, no settlements have exceeded insurance coverage, and coverage has not been significantly reduced.

Note 13 Contingent Liabilities

At any given time, HPRS is a party to various litigation actions. While the final outcome of any action cannot be determined, management does not expect that the liability, if any, for these legal actions will have a material adverse effect on the financial position of HPRS.

Schedule of Changes in Net Pension Liability and Related Ratios[1]
Years ended December 31, 2014-2018

	2018	2017	2016	2015	2014
Total Pension Liability					
Service Cost	$19,678,759	$19,634,876	$18,094,205	$17,805,023	$17,656,943
Interest on the Total Pension Liability	89,298,391	85,936,111	84,194,909	81,577,033	79,175,488
Benefit Changes	-	(5,681,779)	-	-	-
Difference between Expected & Actual Experience	537,872	17,854,158	(8,632,852)	(6,365,985)	-
Assumption Changes	256,572,285	-	-	40,773,369	-
Benefit Payments	(71,577,589)	(75,392,803)	(65,720,438)	(66,213,253)	(64,525,978)
Refunds	(716,739)	(1,074,973)	(1,730,725)	(857,626)	(2,177,476)
Net Change in Total Pension Liability	293,792,979	41,275,590	26,205,099	66,718,561	30,128,977
Total Pension Liability – Beginning	**1,178,545,088**	**1,137,269,498**	**1,111,064,399**	**1,044,345,838**	**1,014,216,861**
Total Pension Liability – Ending (a)	**1,472,338,067**	**1,178,545,088**	**1,137,269,498**	**1,111,064,399**	**1,044,345,383**
Plan Fiduciary Net Position					
Employer Contributions	26,014,314	26,109,836	25,383,684	22,895,242	22,325,421
Employee Contributions	14,451,649	14,504,919	14,101,171	13,686,292	11,577,268
Pension Plan Net Investment Income	(37,810,306)	101,482,224	46,423,125	(5,701,922)	45,104,959
Benefit Payments	(71,577,589)	(75,392,803)	(65,720,438)	(66,213,253)	(64,525,978)
Refunds	(716,739)	(1,074,973)	(1,730,725)	(857,626)	(2,177,476)
Pension Plan Administrative Expense	(1,435,864)	(1,437,267)	(1,352,722)	(1,084,161)	(1,031,473)
Other	199,355	478,548	356,527	838,582	420,984
Net Change in Plan Fiduciary Net Position	**(70,875,180)**	**64,670,484**	**17,460,622**	**(36,436,846)**	**11,693,705**
Plan Fiduciary Net Position – Beginning	**786,356,140**	**721,685,656**	**704,225,034**	**740,661,880**	**728,968,175**
Plan Fiduciary Net Position – Ending (b)	**715,480,960**	**786,356,140**	**721,685,656**	**704,225,034**	**740,661,880**
Net Pension Liability – Ending (a) – (b)	**$756,857,107**	**$392,188,948**	**$415,583,842**	**$406,839,365**	**$303,683,958**
Plan Fiduciary Net Position as a Percentage of Total Pension Liability	48.59%	66.72%	63.46%	63.38%	70.92%
Covered Payroll[2]	$116,009,622	$112,705,188	$108,788,871	$99,983,221	$99,211,756
Net Pension Liability as a Percentage of Covered Payroll	652.41%	347.98%	382.01%	406.91%	306.10%
Notes to Schedule:	N/A	N/A	N/A	N/A	N/A

Source: GRS

[1]The effort and cost to recreate financial statement information for the previous five years was not practical. Additional years will be displayed as they become available.
[2]Includes members of the DROP

Required Supplementary Schedules

Schedule of Employer Contributions - Pension
Years ended December 31, 2009 - 2018

Year	Actuarially Calculated Employer Contribution	Actual Contributions	Annual Contribution Deficiency	Covered Payroll	Annual Contributions as a % of Covered Payroll	% Contributed
2009	$19,978,427	$20,453,914	$475,487	$94,824,789	21.57	102
2010	22,872,487	21,211,944	(1,660,543)	94,767,852	22.38	93
2011	26,956,449	22,966,338	(3,990,111)	93,126,449	24.66	85
2012	30,488,160	23,766,361	(6,721,799)	98,117,403	24.22	78
2013	35,429,985	22,908,182	(12,521,803)	98,519,844	23.25	65
2014	29,767,228	22,325,421	(7,441,807)	99,211,756	22.50	75
2015	22,446,316	22,895,242	448,926	99,983,224	22.90	102
2016	24,407,389	25,383,684	976,295	108,788,871	23.33	104
2017	25,349,355	26,109,836	760,481	112,705,188	23.17	103
2018	26,014,314	26,014,314	0	116,009,622	22.42	100

Source: GRS

Schedule of Investment Returns[1]
Year ended December 31

	Annual Return[2]
2018	-5.23%
2017	14.15%
2016	6.60%
2015	-0.61%
2014	5.99%

Source: Clearstead

[1]The effort and cost to recreate financial statement information for the previous five years was not practical. Additional years will be displayed as they become available.
[2]Annual money-weighted rate of return, net of investment expenses

Notes to the Trend Data - Pension

Valuation Date	December 31, 2017
Actuarial Cost Method	Entry Age
Amortization Method	Level-Percentage Closed
Remaining Amortization Period	27 years
Asset Valuation Method	Four-year smoothed market
Inflation	3.5% wage inflation; 2.75% price inflation
Salary Increases	3.8% to 13.5% including inflation
Investment Rate of Return	7.75%
Retirement Age	Experience-based table of rates that are specific to the type of eligibility condition
Mortality	RP-2014 Mortality Tables for males and females, adjusted for mortality improvement back to the observation period base year of 2006. The base year for females was then established to be 2012. Mortality rates for a particular calendar year are determined by applying the MP-2015 mortality improvement scale to the above described tables.
Notes	There were no assumption changes during the year. There were benefit changes beginning with the December 31, 2017 annual actuarial valuation, which include changes to age and service pension eligibility, off-duty disability, and survivor benefits.

Schedule of Changes in Net OPEB Liability and Related Ratios[1]
Years ended December 31, 2017-2018

	2018	2017
Total OPEB Liability		
Service Cost	$26,136,968	$23,656,819
Interest on the Total OPEB liability	19,662,580	19,242,920
Changes of benefit terms	-	709,187
Difference between Expected and Actual Experience	(74,912,273)	(1,203,916)
Assumption Changes	(68,877,841)	46,862,079
Benefit payments, including refunds of employee contributions	(8,538,516)	(9,433,745)
Net Change in Total OPEB Liability	(106,529,082)	79,833,344
Total OPEB Liability - Beginning	**566,130,019**	**486,296,675**
Total Pension Liability - Ending (a)	**459,600,937**	**566,130,019**
Plan Fiduciary Net Position		
Employer Contributions	4,623,201	4,640,177
Nonemployer contributing entities Contributions	-	-
Employee Contributions	-	-
Net investment income	(5,852,119)	14,467,179
Benefit payments, including refunds of employee contributions	(8,538,516)	(9,433,745)
OPEB plan administrative expense	(203,812)	(204,198)
Other	-	-
Net Change in Plan Fiduciary Net Position	**(9,971,246)**	**9,469,413**
Plan Fiduciary Net Position - Beginning	**111,798,820**	**102,329,407**
Plan Fiduciary Net Position - Ending (b)	**101,827,574**	**111,798,820**
Net OPEB Liability - Ending (a) - (b)	**$357,773,363**	**$454,331,199**
Plan Fiduciary Net Position as a Percentage of Total OPEB Liability	22.16%	19.75%
Covered Payroll[2]	$116,009,622	$112,705,188
Net OPEB Liability as a Percentage of Covered Payroll	308.40%	403.11%
Notes to Schedule:	N/A	N/A

Source: GRS

[1]The effort and cost to recreate financial statement information for the previous eight years was not practical. Additional years will be displayed as they become available.
[2]Includes members of the DROP

Schedule of Employer Contributions - OPEB[1]

Years ended December 31, 2018

Year	Actuarially Calculated Employer Contribution	Actual Contributions	Annual Contribution Deficiency (Excess)	Covered Payroll	Annual Contributions as a % of Covered Payroll	% Contributed
2017	30,774,152	4,640,177	26,133,975	112,705,188	4.12%	15.08%
2018	22,105,633	4,623,201	17,482,432	116,009,622	3.99%	20.91%

Source: GRS

[1] Additional years will be added as they become available

Schedule of Investment Returns[1]

Year ended December 31

	Annual Return[2]
2018	-5.23%
2017	14.15%
2016	6.60%
2015	-0.61%
2014	5.99%

Source: Clearstead

[1]The effort and cost to recreate financial statement information for the previous seven years was not practical. Additional years will be displayed as they become available.
[2]Annual money-weighted rate of return, net of investment expenses

Notes to the Trend Data - OPEB

Valuation Date	December 31, 2016 and December 31, 2017
Actuarial Cost Method	Individual Entry Age
Amortization Method	Level percent of pay - open
Equivalent Single Amortization Period	30 years
Asset Valuation Method	Four-year smoothed market
Inflation	3.5% wage inflation; 2.75% price inflation
Salary Increases	3.8% to 13.5% including inflation
Investment Rate of Return	7.75%, net to OPEB plan investment expense, including inflation
Retirement Age	Experience-based table of rates that are specific to the type of eligibility condition.

Schedule of HPRS' Proportionate Share of the Net Pension Liability – Last 10 Years*

Ohio Public Employees Retirement System – Traditional Pension Plan	2018	2017	2016	2015
HPRS' proportion of the net pension liability (asset)	0.004786%	0.004728%	0.004710%	0.005055%
HPRS' proportionate share of the net pension liability (asset)	$750,831	$1,073,648	$815,831	$609,690
HPRS' covered-employee payroll	632,469	611,150	586,187	619,711
HPRS' proportionate share of the net pension liability (asset) as a % of its covered payroll	119%	176%	139%	98%
Plan fiduciary net position as a % of the total pension liability	84.66%	77.25%	81.08%	86.45%

Ohio Public Employees Retirement System – Combined Pension Plan	2018	2017	2016	2015
HPRS' proportion of the net pension liability (asset)	0.011893%	0.011169%	0.010530%	0.010396%
HPRS' proportionate share of the net pension liability (asset)	(16,190)	(6,216)	(5,124)	(4,003)
HPRS' covered-employee payroll	48,708	43,475	38,320	36,600
HPRS' proportionate share of the net pension liability (asset) as a % of its covered payroll	33%	14%	13%	11%
Plan fiduciary net position as a % of the total pension liability	137.28%	116.55%	116.90%	114.83%

Schedule of Contributions – Last 10 Years*

Ohio Public Employees Retirement System – Traditional Pension Plan	2018	2017	2016	2015
Contractually required contribution	$82,221	$73,338	$70,343	$74,365
Contributions in relation to the contractually required contribution	82,221	73,338	70,343	74,365
Contribution deficiency (excess)	-	-	-	-
HPRS' covered payroll	632,469	611,150	586,187	619,711
Contributions as a % of covered-employee payroll	13%	12%	12%	12%

Ohio Public Employees Retirement System – Combined Pension Plan	2018	2017	2016	2015
Contractually required contribution	6,332	5,217	4,598	4,560
Contributions in relation to the contractually required contribution	6,332	5,217	4,598	4,560
Contribution deficiency (excess)	-	-	-	-
HPRS' covered payroll	48,708	43,475	38,320	36,600
Contributions as a % of covered-employee payroll	13%	12%	12%	12%

*Additional years will be added as they become available

Notes to Required Supplementary Schedules

Schedule of Changes in Net Pension Liability and Net OPEB Liability
The total pension liability and total OPEB liability contained in these schedules were provided by HPRS's actuary, Gabriel, Roeder, Smith & Company. The net pension liability is measured as the total pension liability, less the amount of the fiduciary net position of the Retirement System related to Pension. The net OPEB liability is measured as the total OPEB liability, less the amount of the fiduciary net position of the Retirement System related to OPEB.

Schedule of Administrative Expenses
Year ended December 31, 2018

Personnel	$1,090,702
Professional and technical services	
Computer services	61,769
Actuary	96,625
Education	16,024
Medical consulting	14,525
Audit	41,642
Legal	42,639
Miscellaneous services	13,551
Medical services	4,480
Total professional and technical services	291,255
Communications	
Printing	1,524
Postage	6,447
Telephone	4,399
Internet	7,930
Total communications	20,300
Other expenses	
Office rent	115,241
Depreciation	27,064
Insurance	38,195
Supplies	3,977
Miscellaneous	12,254
Loss on disposal of equipment	-
Ohio Retirement Study Council	2,944
Travel	19,556
Memberships and subscriptions	7,852
New equipment	6,609
Computer Service – Offsite server	3,600
Cable	1,588
Retiree Healthcare Consultant	-
Write Offs	(1,461)
Total other expenses	237,419
Total administrative expenses	$ 1,639,676

Above amounts do not include investment-related administrative expenses.

Schedule of Investment Expenses
Year ended December 31, 2018

Personnel	$47,340
Professional services	
Investment services	7,531,445
Monitoring services	283,795
Total professional services	7,815,240
Other expenses	
Due diligence	2,852
Computer services	6,863
Memberships and subscriptions	2,266
Printing and supplies	169
Total other expenses	12,150
Total investment expenses	$7,874,730

Payments to Consultants
Year ended December 31, 2018

Consultant	Fee	Service
Aon Consulting Inc.	$12,500	Medical
Attorney General's Office	16,378	Legal
Bricker & Eckler	1,750	Legal
Clearstead	283,795	Investment
County Of Summit Ohio	16,360	Auditing
David Tanner, MD	1,752	Medical
Gabriel, Roeder, Smith & Company	96,625	Actuarial
Ice Miller LLC	24,511	Legal
Ohio Auditor of State	782	Auditing
Schneider Downs	24,500	Auditing
Total	$478,953	

See the Investment Section, pages 76-77 for payments to investment managers and brokers.

SCHNEIDER DOWNS

Big Thinking. Personal Focus.

INDEPENDENT AUDITORS' REPORT ON INTERNAL CONTROL OVER FINANCIAL REPORTING AND ON COMPLIANCE AND OTHER MATTERS BASED ON AN AUDIT OF FINANCIAL STATEMENTS PERFORMED IN ACCORDANCE WITH *GOVERNMENT AUDITING STANDARDS*

Board of Trustees
Ohio State Highway Patrol Retirement System
Columbus, Ohio

We have audited, in accordance with the auditing standards generally accepted in the United States of America and the standards applicable to financial audits contained in *Government Auditing Standards* issued by the Comptroller General of the United Statements, the financial statements of The Ohio State Highway Patrol Retirement System (HPRS), which comprise the statement of fiduciary net position as of December 31, 2018, and the related statement of changes in fiduciary net position for the year then ended, and the related notes to the financial statements, and have issued our report thereon dated June 26, 2019.

Internal Control Over Financial Reporting

In planning and performing our audit of the financial statements, we considered the HPRS's internal control over financial reporting (internal control) to determine the audit procedures that are appropriate in the circumstances for the purpose of expressing our opinions on the financial statements, but not for the purpose of expressing an opinion on the effectiveness of the HPRS's internal control. Accordingly, we do not express an opinion on the effectiveness of the HPRS's internal control.

A *deficiency in internal control* exists when the design or operation of a control does not allow management or employees, in the normal course of performing their assigned functions, to prevent, or detect and correct, misstatements on a timely basis. A *material weakness* is a deficiency, or a combination of deficiencies, in internal control, such that there is a reasonable possibility that a material misstatement of the HPRS's financial statements will not be prevented, or detected and corrected on a timely basis. A *significant deficiency* is a deficiency, or a combination of deficiencies, in internal control that is less severe than a material weakness, yet important enough to merit attention by those charged with governance.

Our consideration of internal control was for the limited purpose described in the first paragraph of this section and was not designed to identify all deficiencies in internal control that might be material weaknesses or, significant deficiencies. Given these limitations, during our audit we did not identify any deficiencies in internal control that we consider to be material weaknesses. However, material weaknesses may exist that have not been identified.

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Compliance and Other Matters

As part of obtaining reasonable assurance about whether the HPRS's financial statements are free from material misstatement, we performed tests of its compliance with certain provisions of laws, regulations, contracts and grant agreements, noncompliance with which could have a direct and material effect on the determination of financial statement amounts. However, providing an opinion on compliance with those provisions was not an objective of our audit, and accordingly, we do not express such an opinion. The results of our tests disclosed no instances of noncompliance or other matters that are required to be reported under *Government Auditing Standards*.

Purpose of This Report

The purpose of this report is solely to describe the scope of our testing of internal control and compliance and the results of that testing, and not to provide an opinion on the effectiveness of the HPRS's internal control or on compliance. This report is an integral part of an audit performed in accordance with *Government Auditing Standards* in considering the entity's internal control and compliance. Accordingly, this communication is not suitable for any other purpose.

Schneider Downs & Co., Inc.

Columbus, Ohio
June 26, 2019

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Investment Section

Investment Overview

Introduction

Chapter 5505 of the Ohio Revised Code and the Board-adopted *Investment Policy* govern investment activity at HPRS. In accordance with Ohio Revised Code 5505.06, "The Board shall have full power to invest the funds. The Board and other fiduciaries shall discharge their duties with respect to the funds solely in the interest of the participants and beneficiaries; for the exclusive purpose of providing benefits to participants and their beneficiaries and defraying reasonable expenses of administering the system; with care, skill, prudence, and diligence under the circumstances then prevailing that a prudent person acting in a like capacity and familiar with these matters would use in the conduct of an enterprise of a like character and with like aims; and by diversifying the investments of the system so as to minimize the risk of large losses, unless under the circumstances it is clearly prudent not to do so."

HPRS's total investment portfolio, as reflected in the *Statement of Fiduciary Net Position* (page 23), is comprised of the Pension (Defined Benefit) and Post-Employment Health Care portfolios' assets. Defined Benefit portfolio assets originate from member and employer contributions to the system. The management of these assets is the responsibility of the HPRS Investment Committee, under the direction of the Board of Trustees, and HPRS's Investment Consultant, Clearstead. Clearstead assists the Board with the construction and diversification of HPRS's investment portfolio and manager selection. Additionally, Clearstead assists with matters of investment policy and asset allocation recommendations and provides monthly and quarterly performance reviews.

Investment Policy

The Board-adopted *Investment Policy* (pages 78-88) provides information on HPRS's investment policies and performance objectives. The policy establishes asset allocation targets, risk tolerances, return objectives, and other guidelines, such as defining the responsibilities of the fiduciaries who implement the strategies and manage HPRS's investment portfolio.

Investment Summary

HPRS's *Investment Summary* (page 68) includes the total fund assets of the Pension and Post-Employment Health Care portfolios. All investments are reported at fair value, which is the amount that the plan could reasonably expect to receive in a current sale between a willing buyer and a willing seller, other than in a forced or liquidation sale.

A complete listing of assets held at December 31, 2018 is available from HPRS upon request.

Investment Performance

As shown in the *Schedule of Investment Results* (page 72), performance information is reported gross-of-fees (net-of-fees for alternative investments) versus benchmark for the total fund and each asset class over selected periods. All returns are calculated in U.S. Dollars using a time-weighted rate of return. Net-of-fees returns are available from HPRS upon request.

Source: HPRS Investment Staff

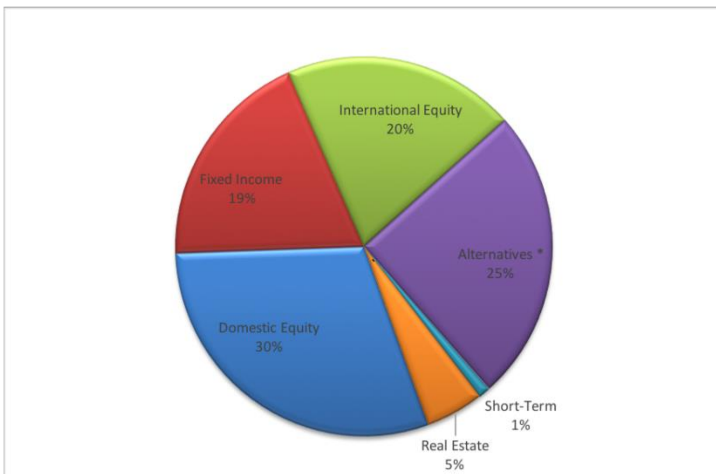
Investment Summary
December 31, 2018

	Fair Value	Actual	Target	Range
Domestic equity	$264,011,969	32.2%	30.0%	20 - 40%
Fixed income	144,457,792	17.6	19.0	10 - 30
Alternatives *	190,061,833	23.2	25.0	15 - 35
International equity	163,762,111	20.0	20.0	10 - 30
Short-term	10,480,198	1.3	1.0	0 - 6
Real estate	47,022,848	5.7	5.0	0 - 10
Net portfolio value	$819,796,751	100.0%	100.0%	

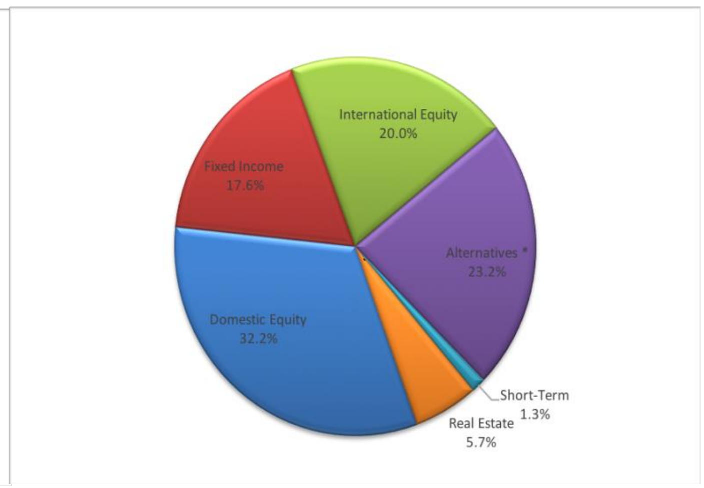
* Alternatives include private equity, fund of hedge funds, direct infrastructure and global tactical asset allocation investments.

Asset Allocation – Total Fund
December 31, 2018

Policy Allocation

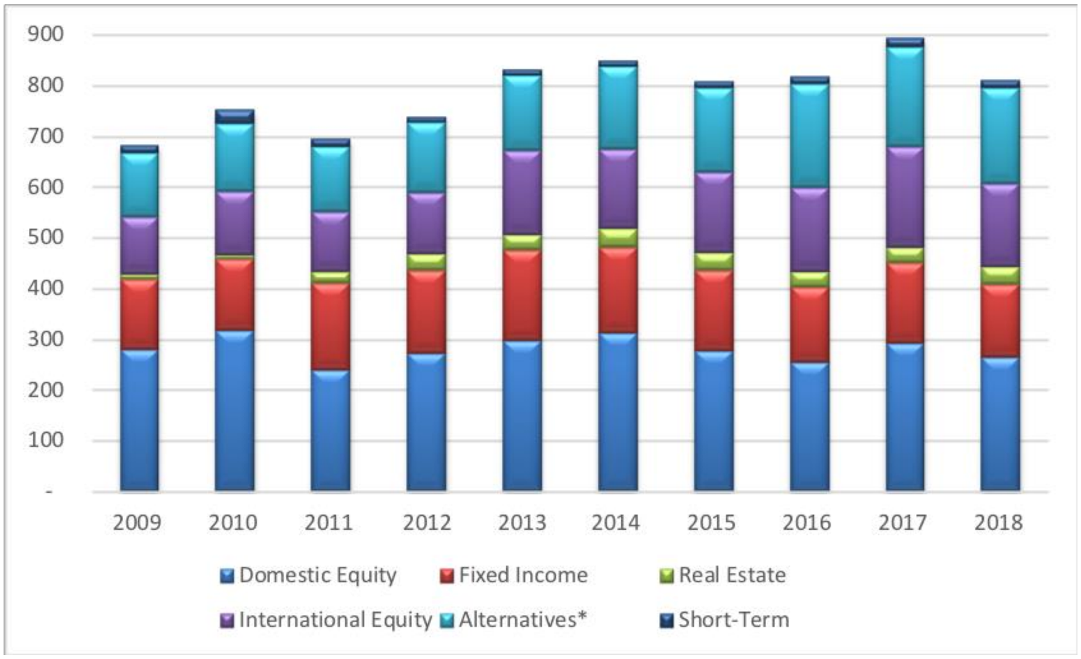


Actual Allocation



* Alternatives include private equity, fund of hedge funds, direct infrastructure and global tactical asset allocation investments.

Ten-Year Investment Comparison
(in millions)



* Alternatives include private equity, fund of hedge funds, direct infrastructure and global tactical asset allocation investments.

Economic & Market Review – 2018

2017 was a great year with accelerating and synchronized global growth which led to exceptional returns for investors across most asset classes amidst a backdrop of low volatility. 2018 was the opposite, with few areas of the capital markets in positive territory for the year with an accompanying return of volatility. We can point to three main drivers of volatility: economic growth divergence, Federal Reserve policy, and political risks including trade.

The synchronized global growth of 2017 became more divergent in 2018 with U.S. growth leading the way versus other developed economies. U.S. GDP growth accelerated being aided by 2017 tax cuts, whereas China slowed. China was hampered by the trade spat with the U.S. and a government clampdown on credit. Growth in the Eurozone also eased amidst a backdrop of various political concerns, particularly in Italy and Brexit. The global growth divergence led to increased volatility and slowing growth overseas accompanied by weaker currencies, which led to poor international equity returns.

The shift from quantitative easing to quantitative tightening is well underway in the U.S. When the Federal Reserve dropped their funds rate to zero during the global financial crisis, they also implemented an asset purchase program that swelled the Fed's balance sheet from $870 billion to $4.5 trillion[1]. Lower interest rates encouraged investors to move into riskier asset classes to generate yield and return. Savers and those depending on fixed income yields were forced out on the risk spectrum to generate income even if they did not necessarily want the associated risk. Volatility fell for several years after the global financial crisis amidst a relatively benign economic environment and remained low as investors took the Fed's main cue that they would remain supportive of economic growth.

However, the story is changing with the opposite dynamic now developing. The Federal Reserve hiked interest rates for its ninth time in December and has begun shrinking its balance sheet. As of December, the Fed's balance sheet is near $4.1 trillion and forecast to gradually shrink over many years. The Fed's balance sheet normalization program began in October 2017 and is now at the stated maximum quarterly reduction rate of $50 billion of securities[2]. The uncertainty regarding Federal Reserve policy and its near-term impact on economic growth is likely to result in volatility.

The third driver of volatility was a variety of political risks, with the two largest stories being the trade war with China and Brexit. China trade negotiations will impact several industries and many companies in both countries. The outcome of the negotiations will have a meaningful impact on the markets and global economy. Brexit also poses a challenge to global markets due to the uncertainty that would arise from a hard Brexit from the EU.

[1] www.federalreserve.gov

[2] www.federalreserve.gov

For the year, global equities produced negative returns, with much of the poor performance occurring in the 4th quarter. The Russell 3000 Index (measuring U.S. equities) returned -5.2% while the MSCI ACWI ex USA (international equities) returned -14.2% in 2018. Hedge funds did not fare much better, returning -4.1% (HFRI Fund of Funds), and fixed income was flat to negative depending on the amount of credit risk. Private investments were additive for many investors as they are not required to mark to market based purely on investor sentiment. As measured by NCREIF, private real estate investments returned 7.2% in 2018.

Source: Clearstead

Schedule of Investment Results
Year ended December 31, 2018

	2018	2017	3-Year	5-Year
Domestic Equity	**-7.97%**	**21.53%**	**8.37%**	**7.38%**
Russell 3000	-5.24	21.13	8.97	7.91
International Equity	**-14.90**	**28.72**	**3.67**	**0.63**
MSCI ACWI ex US IMI	-14.80	27.81	4.39	0.80
Fixed Income	**2.45**	**5.23**	**4.69**	**3.71**
Barclays Capital Aggregate/Opp. Blend	0.68	3.43	2.45	2.76
Real Estate	**15.73**	**10.3**	**11.21**	**12.33**
NCREIF	14.0	6.9	10.0	10.94
Alternatives ▲	**-1.49**	**4.86**	**2.77**	**3.56**
HFRI Fund of Funds Composite Blend	0.72	6.56	4.50	5.15
Total Fund	**-4.73**	**14.83**	**5.58**	**4.71**
Absolute Objective	7.75	7.75	7.75	7.75
Relative/Composite Benchmark ►	-3.50	14.41	5.88	4.94

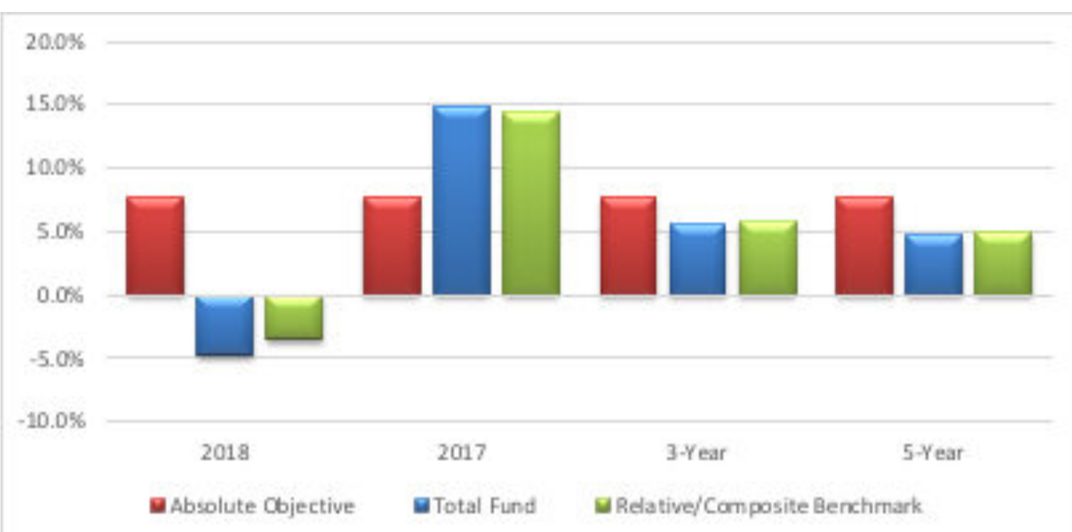
▲ Includes private equity, GTAA, direct infrastructure and fund of hedge funds. Performance results for private equity classes are typically reported on a quarter lag basis, adjusted for cash flow activity during the fourth quarter.

► Relative Composite Benchmark: Russell 3000, 31%; MSCI ACWI ex USA IMI, 20%; BBgBarc US Aggregate TR, 10%; HPRS Opportunistic Benchmark, 9%; BofA Merrill Lynch 91-Day T-Bill, 1%; HFRI Fund of Funds Composite Index, 12%; NCREIF Timberland, 3%; Alerian MLP, 2%; HPRS Private Equity Benchmark, 7%; NCREIF Property Index, 5%.

The HPRS Total Fund performance returns consist of all assets of the fund. All returns are calculated in U.S. Dollars using a time-weighted rate of return based on market values.
Performance is net of fees for alternative investments and gross of fees on all other investments. Net of fees returns are available upon request, and investment management fees vary among asset classes.
Market value adjustments made as of December 31 will be reflected in the investment returns in the next financial statement.

Source: Clearstead

Total Fund Rates of Return vs Policy Benchmark
(Gross of fees)



Domestic Equity Holdings
December 31, 2018

Security	Shares	Market Price	Fair Value
JP Morgan Chase & Co	15,600	$97.62	$1,522,872
Cisco Systems Inc	33,000	43.33	1,429,890
Bank od America Corp	57,400	24.64	1,414,336
Pfizer Inc	32,200	43.65	1,405,530
Intel Corp	28,600	46.93	1,342,198
Verizon Communications Inc	22,300	56.22	1,253,706
Exelon Corp	23,700	45.10	1,068,870
Johnson & Johnson	8,200	129.05	1,058,210
Citigroup Inc	19,400	52.06	1,009,964
Walgreens Boots Alliance Inc	12,300	68.33	840,459
Other	3,959,031		53,270,796
Total domestic equity securities	4,211,731		$65,616,831
Domestic Equity Commingled Funds			
AQR Long Short Equity Fund			$12,168,033
DFA Small Cap Subtrust			11,004,693
Diamond Hill Long Short Equity Fund			13,794,538
Jennison Growth Equity Fund			45,432,746
Vanguard Institutional Index Fund			99,107,160
Vanguard Mid Cap Index Fund			16,887,968
Total domestic equity commingled funds			$198,395,138
Total domestic equity			**$264,011,969**

International Equity Holdings
December 31, 2018

Security	Shares	Market Price	Fair Value
Eaton Corp PLC	7,100	$68.66	$487,486
Lyondellbasell Industries NV	4,500	83.16	374,220
Icon PLC	2,895	129.21	374,063
Seagate Technology	8,500	38.59	328,015
Everest RE Group LTD	1,500	217.76	326,640
Ascendis Pharma A/S – ADR	4,540	62.65	284,431
Interxion Holding NV	5,030	54.16	272,425
Nice LTD	1,910	108.21	206,681
Novocure LTD	5,900	33.48	197,532
The Bank of NT Butterfield	5,210	31.35	163,334
Other	388,894		1,248,797
Total international equity securities	435,979		$4,263,624
International Equity Commingled Funds			
DFA International Small Cap Value			$10,867,349
Driehaus International Small Cap Growth			8,242,820
Lazard International			39,234,110
OFI Emerging Markets			35,248,875
TS&W International			34,227,021
William Blair International			31,678,312
Total international equity commingled funds			$159,498,487
Total international equity			**$163,762,111**

All values are stated in U.S. dollars. A complete list of holdings is available upon request.

Fixed Income Holdings
December 31, 2018

Security	Par Value	Fair Value
USA Treasury Notes 2.500% Due 2/15/2045	$1,400,000	$1,268,750
USA Treasury Notes 2.750% Due 8/15/2047	1,225,000	1,160,161
Freddie Mac Struct Nts Call 01/12/18 @ 000 1.75% Due 07/12/2022	1,100,000	1,093,191
USA Treasury Notes 2.750% Due 2/15/2028	930,000	934,799
General Elec Cap Corp Ser Notz Unsc Var% Due 03/15/2023	1,000,000	902,050
Johnson Controls Intl Pl 5.0% Due 03/30/2020	800,000	816,704
BB&T Corp Ser Mtn Call 2/22/22 @ 100 3.950% Due 3/22/2022	800,000	810,272
Xcel Energy Inc Sr Unsec Call 11/15/19 @ 100 4.700% Due 5/15/2020	750,000	758,955
Kentucky St Property & Bld Ser C Rev 5.373% Due 11/1/2025	700,000	758,653
Kansas St Dev Fin Auth Revenue Ser H Rev 3.741% Due 4/15/2025	700,000	715,771
Other	24,066,389	24,285,374
Total fixed income securities	$33,471,389	$33,504,680
Fixed Income Commingled Funds		
Credit Suisse Secured Loan Fund		$25,977,131
HIG Whitehorse Direct Lending Adv Fund		12,610,829
JP Morgan Investment Management		35,734,895
JP Morgan Strategic Income Opp Fund		20,012,370
Silver Point Specialty Credit Fund		16,617,887
Total fixed income commingled funds		$110,953,112
Total fixed income		**$144,457,792**

Real Estate Holdings
December 31, 2018

Asset	Shares	Market Price	Fair Value
Hospitality Pptys Tr Sh Ben Int REIT	9,800	$23.88	$234,024
Total real estate assets	9,800		$234,024
Real Estate Commingled Funds			
Long Wharf Real Estate Partners Fund IV			$3,630,478
Long Wharf Real Estate Partners Fund V			19,779,096
Marathon European Credit Opportunity Fund III			11,086,465
Oaktree Real Estate Opportunities Fund IV			1,090,689
Oaktree Real Estate Opportunities Fund V			1,043,371
Oaktree Real Estate Opportunities Fund VI			4,903,589
Oaktree Real Estate Opportunities Fund VII			5,255,136
Total real estate commingled funds			$46,788,824
Total real estate			**$47,022,848**

All values are stated in U.S. dollars. A complete list of holdings is available upon request.

Private Equity Holdings
December 31, 2018

Asset	Fair Value
Blue Point Capital Partners Fund III	$6,708,419
Blue Point Capital Partners Fund IV	1,856,027
Carlyle Global Infrastructure Opportunity Fund, LP	(388,037)
Core Value, LLC	13,741,371
GCM Grosvenor Private Equity Opportunities Fund, LP[1]	4,295,802
HarbourVest Partners Co-Investment Fund IV LP	12,060,968
HarbourVest Partners Co-Investment Fund IV LP AIV	256,113
HarbourVest Partners 2013 Direct Fund LP	11,476,864
HIG Advantage Buyout Fund, LP	1,514,518
Kayne Anderson Energy Fund IV	90,271
Kayne Anderson Energy Fund V	1,849,737
Kayne Anderson Energy Fund VI	1,496,201
Kayne Anderson Mezzanine Partners	56,689
Kayne Anderson MLP Fund	14,526,554
Kayne Anderson Private Energy Income Fund	7,876,405
Pantheon Multi-Strategy Program 2014	15,268,359
Pantheon USA Fund VII, LP	9,193,714
PIMCO Corporate Opportunities Fund II	7,196,198
Quantum Energy Partners VII, LP	6,991,071
Quantum Energy Partners VII Co-Investment Fund, LP	741,296
Total private equity	**$116,808,540**

Fund of Hedge Funds Holdings
December 31, 2018

Asset	Fair Value
Evanston Capital Weatherlow Offshore Fund II	$52,512,226
Sankaty / Prospect Harbor Credit Partners	6,882
Total fund of hedge funds	**$52,519,108**

Global Tactical Asset Allocation Holdings
December 31, 2018

Asset	Fair Value
Standard Life Investments Global Absolute Return Strategy	$15,547,491
Total fund of Global Tactical Asset Allocation Holdings	**$15,547,491**

All values are stated in U.S. dollars. A complete list of holdings is available upon request.

Summary Schedule of Investment Manager Fees

Year ended December 31, 2018

Manager	Strategy	Assets Managed	Fees	Performance Fees
Domestic Equity				
Ancora Investment Advisors	Micro Cap	$10,937,332	$97,273	$-
AQR Capital Management		12,168,033	293,831	-
Diamond Hill Capital Management		13,794,538	230,434	-
Dimensional Fund Advisors	Small Cap Blend	11,004,693	67,832	-
Jennison Associates LLC	Large Cap Growth	45,432,746	227,776	-
LSV Asset Management	Large Cap Value	46,028,111	282,297	-
Vanguard Institutional Index Fund	Large Cap Blend	99,107,160	22,104	-
Vanguard Mid Cap Index Fund	Mid-Cap	16,887,968	10,718	-
WA Account	Miscellaneous	2,137	-	-
Wellington Mgmt Co., LLP	Large Cap Growth	-	12,597	-
Westfield Capital Management	Small Cap Growth	13,146,900	47,053	-
International Equity				
Dimensional Fund Advisors	Small Cap Value	10,867,349	29,084	-
Driehaus Capital Management	Small Cap Growth	8,242,820	171,126	-
Lazard Asset Management	Large Cap Value	39,234,110	351,285	-
OFI Trust Company	Emerging Markets	35,248,875	332,368	-
Thompson, Siegel & Walmsley	Large Cap Value	34,227,021	208,360	-
William Blair International	Large Cap Growth	31,678,312	266,526	-
Fixed Income				
Credit Suisse	High Yield	25,977,131	135,280	-
WhiteHorse Capital		12,610,826	207,995	278,442
Johnson Institutional Management	Intermediate-Term	33,504,680	67,636	-
JP Morgan Asset Management	Intermediate-Term	55,747,266	231,233	-
Silver Point Capital LP	Specialty Credit	16,617,887	111,202	336,377
Real Estate				
Long Wharf Real Estate Partners	Specialty Real Estate	23,409,574	366,340	398,154
Marathon Asset Management, LP	Credit Opportunity	11,086,465	154,304	383,314
Oaktree Capital Management, LP	Specialty Real Estate	12,292,785	262,325	1,618,665
Private Equity				
Blue Point Capital Partners	Mid-Market Buyout	8,564,446	159,458	874,187
The Carlyle Group		(388,037)	109,450	-
Core Value, LLC	Timber	13,741,371	155,137	-
GCM Grosvenor	Fund of Funds	4,295,802	37,888	367
HarbourVest Partners	Co-Investment	23,793,945	189,083	149,363
HIG Capital		1,514,518	436,547	-
Kayne Anderson Capital Advisors, LP	Energy, MLP, & Mezzanine	25,895,857	333,330	210,581
Pantheon Ventures LP	Fund of Funds	24,462,073	264,906	-
Pacific Investment Management Co. LLC	Corporate Opportunities	7,196,198	84,442	18,405
QEM Management LLC	Energy	7,732,367	489,080	-
Hedge Funds				
Evanston Capital Management, LLC	Fund of Funds	52,512,226	537,196	-
Sankaty Advisors, LLC	Distressed Securities	6,882	150	-
Global Tactical Asset Allocation				
Standard Life Investments	Tactical Asset	15,547,491	173,262	-
Direct Infrastructure				
Partners Group		5,186,695	196,875	-
Total		**$809,316,553**	**$7,353,784**	**$4,267,855**

Summary Schedule of Broker Fees
Year ended December 31, 2018

Broker	Fees	Shares	Average Cost
Citigroup Global	$-	6,750,000	$0.000
Wells Fargo Securities	-	4,845,000	0.000
Loop Capital Markets	-	2,100,000	0.000
Mutual Fund Agent	-	1,619,156	0.000
BNY/Suntrust Capital	-	1,600,000	0.000
JP Morgan Securities	-	1,105,280	0.000
PNC Bank, NA	-	699,694	0.000
Jones Trading Institutional Services	5,909	570,733	0.010
Mellon Bank	-	550,000	0.000
Goldman Sachs	-	525,000	0.000
Morgan Stanley	15	523,490	0.000
Ivy Securities	5,162	511,859	0.010
INTL FCStone Inc.	8	485,266	0.000
Keybanc Capital	1,375	375,824	0.004
Abel Noser Corp	3,245	322,929	0.010
Tradeweb Direct	-	240,000	0.000
Cap Institutional Services	3,122	210,622	0.015
First Tennessee	-	210,000	0.000
Robert Baird	3,089	205,902	0.015
Liquidnet Inc	2,099	186,569	0.011
Jeffries & Co	1,160	132,981	0.009
ITG Inc	881	115,329	0.008
Direct Trading	760	101,328	0.008
BTIG LLC	1,316	101,040	0.013
William Blair	851	85,111	0.010
UBS Securities LLC	525	74,980	0.007
Merrill Lynch Pierece Fenner & Smith	245	49,080	0.005
Needham and Co	600	45,409	0.013
Credit Suisse Fixed Income	304	43,460	0.007
Noble International Investments Inc	534	40,371	0.013
Weeden & Co	287	28,740	0.010
JP Morgan Securities	-	25,000	0.000
Collins Stewart	92	22,625	0.004
Investment Technology Group Inc	152	20,300	0.008
Dougherty & Company	174	17,424	0.010
Sanford C. Bernstein	90	12,030	0.008
FIS Brokerage and Securities Services Inc	59	8,420	0.007
Strategas Securities	200	6,683	0.030
COR Clearing LLC	180	6,013	0.030
DA Davidson Companies	43	1,432	0.030
Total	**$32,477**	**24,575,080**	**$0.304**

The brokerage commissions do not include commissions paid by external investment managers utilizing commingled fund structures. HPRS maintains a commission recapture program with Abel / Noser Corporation.

HPRS Investment Policy

Introduction

The State Highway Patrol Retirement System ("System") was established by section 5505.02 of the Ohio Revised Code (ORC) for State Highway Patrol employees, as defined in division (A) of ORC section 5505.01.

Pursuant to ORC section 5505.04, the administration and management of the Highway Patrol Retirement System are vested in the State Highway Patrol Retirement Board ("Board"). Members of the State Highway Patrol Retirement Board are the trustees of the funds created by ORC section 5505.03. The Board has full power to create and adopt, in regular meetings, an investment committee, policies, objectives, or criteria for the operation of the investment program that include asset allocation targets and ranges, risk factors, asset class benchmarks, time horizons, total return objectives, and performance evaluation guidelines.

System Objective

The primary objective of the State Highway Patrol Retirement System is to provide eligible members and beneficiaries with scheduled pension benefits. To reach this objective, the Board and other system fiduciaries will comply with the duty detailed in ORC section 5505.06; to exercise care, skill, prudence, and diligence -- under the circumstances then prevailing -- that a prudent person acting in a like capacity and familiar with such matters would use in the conduct of an enterprise of a like character with like aims. A secondary objective of the fund is to maintain a sufficient degree of liquidity in order to meet unanticipated demands and changing environments. Members of the Retirement Board and other fiduciaries of the Retirement System fully accept the duty to incur only reasonable expenses in the operation of the State Highway Patrol Retirement System.

Investment Policy Purpose

This Investment Policy Statement ("Statement") details the policies, procedures, asset allocation and guidelines for investment of the System, as established by the Board. It defines and assigns the responsibilities of all involved parties. The policy is intended to be sufficiently specific to be meaningful, yet flexible enough to be practical.

The investment policies and restrictions presented in this Statement serve as a framework to achieve the investment objectives at a level of risk deemed acceptable. These policies and restrictions are designed to minimize interference with efforts to attain overall objectives and to minimize the potential of excluding any appropriate investment opportunities.

Investment Objectives

The overall long-term investment objective for the System is to earn 7.25% over a market cycle. Meeting this return objective among other factors will help the System achieve fully funded status in the future. This investment objective should be achieved with the least required level of portfolio volatility.

Duties and Responsibilities

Board

The role of the Board is supervisory, and discretion is delegated to investment managers who must adhere to the general guidelines established by the Board. The primary role of the Board is to:

- Establish performance goals
- Identify and review appropriate investment policy and guidelines
- Retain outside investment and actuarial counsel
- Review the results of the fund on a regular basis and implement necessary changes in the investment policies, objectives, asset allocation, and investment managers as needed

Investment Committee

As delegated by the Board, the Investment Committee is responsible for ensuring that the investment process is managed in a prudent manner, seeking to meet the System's return objectives.

The Investment Committee will, at least quarterly, review the performance of the overall portfolio and selected components against their investment goals and policies.

The Investment Committee will, in accordance with the Manager Review Policy, consider whether the manager continues to operate in the manner represented when retained and outlined in the agreement between the Investment Committee and the investment manager. The Committee will have the discretion to accept, reject or modify, in accordance with the Manager Review Policy, any recommendation to terminate an investment manager. The elected Chair, or Vice-Chair, will report to the Board at regularly scheduled meetings.

Other roles of the Investment Committee include the following:

- Approve the initiation of a search in accordance with the Selection of Investment Managers and Agents Policy as well as the Manager Search and Termination Policy
- Validate that the search process was carried out appropriately
- Attend manager presentations at HPRS' offices when necessary
- Request additional information, if warranted.

Chief Investment Officer and Staff

The Chief Investment Officer (CIO), who is responsible for the day-to-day management of the investment program, is employed by, and is directly responsible to, the Retirement Board. A complete job description is available from HPRS upon request.

Other roles of the staff include the following:

- Rebalance the investment portfolio within the asset allocation guidelines of the Statement
- Implement tactical asset allocation positioning within the asset allocation guidelines of the Statement
- Raise cash for the payment of pension benefits
- Post the RFP to HPRS' website
- Oversee the work of the Investment Consultant
- Ensure the process is completed in an appropriate manner
- Ensure the Investment Committee and Board receive appropriate information
- Coordinate the development and execution of manager contracts and guidelines
- Conduct on-site due diligence with selected finalist firm if deemed appropriate

Investment Consultant

An Investment Consultant is employed by, and is directly responsible to, the Retirement Board. The consultant is a fiduciary to the System, attends Investment Committee and Board meetings, provides quarterly investment monitoring reports, and works with the CIO to implement the Investment Policy of the Retirement Board.

Other roles of the investment consultant include the following:

- Reviewing asset allocation and investment strategy to determine if the current strategy meets the investment objective of the System
- Monitoring the performance of the total portfolio to determine if the collective investment strategy is outperforming the established benchmarks over rolling time periods
- Recommending strategic and tactical changes to asset allocation from time to time
- Communicating with investment managers to determine portfolio composition and ascertain information concerning organizational change
- Performing an annual fee assessment of the investment portfolio
- Identify the need for new managers
- Develop any request for proposals (RFP) for new managers
- Conduct on-site due diligence with candidate firms when necessary
- Conduct on-site due diligence with existing managers when necessary
- Attend the ORSC or other legislative meetings with the Executive Director as needed

Custodian

As provided in ORC section 5505.11, the Treasurer of State is the custodian of HPRS funds. The Treasurer appoints a banking institution as a sub-custodian, which acts as the custodian of HPRS funds. All disbursements are processed under the direction of the Treasurer after authorization by the Board. The custodian will physically maintain possession of securities owned by the System, collect dividend and interest payments, redeem maturing securities, and affect receipt and delivery following purchases and sales. The custodian shall also perform regular accounting of all assets owned, purchased, or sold, as well as movement of assets into and out of the System accounts. The custodian is also responsible for providing monthly statements to the System and investment consultant.

Investment Managers

Each investment manager has discretion to purchase, sell, or hold the specific securities that will be used to meet the System's investment objectives. Each investment manager will be held responsible and accountable to achieve the objectives herein stated. While it is not believed that the limitations will hamper any investment manager, the investment manager should request modifications that it deems appropriate.

Managers are expected to:

- Act as a fiduciary to the System
- Meet with the Board or Investment Committee when requested, to review investment activity and results
- Hold and maintain errors and omissions insurance and provide proof of this insurance
- Provide frequent communication with HPRS and the Investment Consultant on all significant matters pertaining to the investment of assets
- Promptly notify HPRS and the Investment Consultant of any significant changes in the manager's investment strategy, organizational structure, financial condition, or personnel assigned to manage HPRS assets

Additional Providers

Additional specialists such as attorneys, auditors, and others may be employed by the Investment Committee to assist in meeting its responsibilities and obligations to administer the System prudently. All expenses for such experts must be customary and reasonable, and will be borne by the System as deemed appropriate and necessary.

Asset Allocation Guidelines

The asset allocation targets for the System are as follows:

		Estimated Transition		Long-Term Target		
	2018	2019	2020	Asset Class	Sub Asset Class	Range
Domestic Equity	**30.0%**	**30.0%**	**30.0%**	**30.0%**		**20% - 40%**
Large/Mid Cap	25.0%	25.0%	25.0%		25.0%	20% - 30%
Small/Micro Cap	5.0%	5.0%	5.0%		5.0%	0% - 10%
International Equity	**20.0%**	**18.0%**	**18.0%**	**18.0%**		**8% - 28%**
Developed Markets	17.5%	14.0%	14.0%		14.0%	9% - 19%
Emerging Markets	2.5%	4.0%	4.0%		4.0%	0% - 9.0%
Alternative Investments	**25.0%**	**25.0%**	**25.0%**	**25.0%**		**15% - 35%**
Absolute Return	11.0%	10.0%	7.0%		7.0%	2% - 12%
Private Equity	9.0%	10.0%	13.0%		13.0%	8% - 18%
Real Assets	5.0%	5.0%	5.0%		5.0%	0% - 10%
Real Estate	**5.0%**	**7.0%**	**7.0%**	**7.0%**	7.0%	**2% - 12%**
Fixed Income	**20.0%**	**20.0%**	**20.0%**	**20.0%**		**10% - 30%**
Core Fixed Income	10.0%	10.0%	10.0%		10.0%	5% - 15%
Opportunistic	9.0%	8.0%	8.0%		8.0%	3% - 13%
Cash	1.0%	2.0%	2.0%		2.0%	0% - 7%
Total Pension	**100.0%**	**100.0%**	**100.0%**	**100.0%**		

The Board adopted a new asset allocation in December 2018; therefore, the above detailed transition plan will be implemented by the CIO and Investment Consultant.

Asset Class Purpose

- The purpose of the equity allocation is to provide a total return that will simultaneously provide for growth in principal and current income sufficient to support the System, while at the same time preserve the purchasing power of the System's assets. It is recognized that the equity allocation entails the assumption of greater market variability and risk.
- The purpose of the real estate component is to provide for growth of principal while at the same time preserving the purchasing power of the portfolio's assets. In addition, the real estate component seeks to enhance the overall portfolio by providing income, a hedge on inflation and modest diversification.
- The purpose of the alternative investment allocation is to provide diversification, risk reduction, hedge inflation, as well as enhance the performance of the System. These purposes will vary by investment.
    - Absolute Return: The purpose of this allocation is to provide diversification, risk reduction and moderate growth.
    - Private Equity: The purpose of this allocation is to provide diversification and growth above public equity.
    - Real Assets: The purpose of this allocation is to provide diversification, income, and to hedge inflation.

- The purpose of the fixed income allocation is to provide a deflation hedge, to reduce the overall volatility of the System, and to produce income.
- The purpose of the cash allocation is to provide liquidity for short-term obligations. All cash and equivalent investments should be made with concern for quality. High return is desirable, but the highest possible investment return should be sacrificed where quality is considered questionable.

Permissible Investments

System assets may invest in the following types of investments:

Equity Securities

- Common stocks
- Convertible preferred stocks
- American depository receipts (ADRs) of non-U.S. companies
- Stocks of non-U.S. companies (Ordinary shares)
- Equity collective pools, mutual funds and exchange traded funds

Alternative Investments

- Tactical asset allocation strategies
- Absolute return strategies
- Long-short strategies
- Hedge funds or hedge fund-of-fund strategies
- Private equity and debt strategies
- Timber investments
- Energy master limited partnerships
- Infrastructure strategies
- Alternative collective pools, mutual funds and exchange traded funds

Real Estate

- U.S. and non-U.S. public real estate (REITS)
- U.S. and non-U.S. private real estate
- Real estate collective pools, mutual funds and exchange traded funds

Fixed Income Securities

- U.S. government and agency securities
- Municipal bonds
- Corporate notes and bonds
- Convertible notes and bonds

- Mortgage backed bonds
- Preferred stock
- Fixed income securities of foreign governments and corporations
- Below investment grade corporate bonds
- Tactical fixed income strategies
- Private lending strategies
- Fixed income collective pools, mutual funds and exchange traded funds

Cash Equivalents

- Treasury bills
- Commercial paper
- Banker's acceptances
- Repurchase agreements
- Certificates of deposit
- Money market collective pools, mutual funds and exchange traded funds

Performance Benchmarks

Performance results will be measured in three ways over a full business cycle:

1. The investment objective of the System: 7.25% (actuarial rate of return)
2. A blended benchmark of market indices based on the targeted asset allocation for the System portfolio:

Asset Class	Benchmark	2019 Interim Targets*
U.S. Equity	Russell 3000 Index	30%
International Equity	MSCI ACWI ex USA IMI	18%
Absolute Return	HFRI Fund of Funds Composite	10%
Private Equity	Total Portfolio: PE composite performance PE Primary: Wilshire 5000 + 3% lagged 1 quarter PE Secondary: Cambridge Private Equity Index	10%
Real Assets	40% NCREIF Timber / 40% Alerian MLP / 20% Infrastructure composite*	5%
Real Estate	Total Portfolio: Real estate composite performance Real Estate Primary: NCREIF Property Index	7%
Core Fixed Income	Barclays U.S. Aggregate	10%
Global Opportunistic Fixed Income	Opportunistic Composite: 2/3 Credit Suisse Leveraged Loans, 1/3 ML 91-Day T-Bill*	8%
Cash	ML 91-Day T-Bill	2%

The Board adopted a new asset allocation in December 2018, which is expected to take two years to implement. As the portfolio transitions to the new long-term targets, the Chief Investment Officer, Investment Committee Chair, and Investment Consultant will determine appropriate interim portfolio benchmarks.

3. The System will be compared to a peer universe of similar sized public pension funds

Separate Account Portfolio Guidelines

The following guidelines only apply to separately managed accounts. Mutual funds and collective vehicles are not expected to comply with these guidelines but rather are bound to their fund prospectus for mutual funds and ETFs or the governing documents for collective pools.

Equity

An equity manager may not:

- Hold more than 15% of the account value in a single issuer
- Where a sector is greater than 10% of the benchmark, allow that sector to exceed 60% of the portfolio
- Where a sector is 10% or less of the benchmark, allow that sector to exceed 40% of the portfolio
- Invest in international-domiciled securities exceeding 20% of portfolio value in a domestic mandate
- Allow one country to be more than 20 percentage points above the country weighting of the relative benchmark in an international mandate
- Invest in emerging markets exceeding 35% of portfolio value in a developed international mandate

Equity managers are prohibited from investing in the following:

- Private placements
- Unregistered or restricted stock
- Derivatives
- Margin Trading/Short Sales
- Commodities
- Real Estate Property (excluding REITs)
- Guaranteed Insurance Contracts
- Securities issued by Highway Patrol Retirement System or its affiliates.

Core Fixed Income

A core fixed income allocation will be diversified as to type of security, issuer, coupon, and maturity. Qualifying bonds, at the time of purchase, will be rated as investment-grade by at least two nationally-recognized bond rating services. Generally, the average maturity of a fixed income allocation will be ten years or less, although individual securities may be longer.

No more than ten percent of a fixed income allocation will be invested in the securities of any one issuer and no more than five percent in any one issue, with the exception of U.S. government securities. Diversification of the bond portfolio will be accomplished by investing in a combination of U.S. government bonds, U.S. agency bonds, U.S. corporate bonds, high yield bonds, and non-U.S. bonds.

Managers are prohibited from using derivative instruments.

Manager Selection

Investment Managers shall be selected in accordance with the Selection of Investment Managers and Agents Policy as well as the Manager Search and Termination Policy.

The Board will give consideration to investments that enhance the welfare of the State of Ohio, and Ohio citizens, where such investments offer safety and quality of return comparable to other investments currently available. Equal consideration will be given to investments otherwise qualifying under this section that involve minority-owned and controlled firms, or firms owned and controlled by women, either alone or in joint venture with other firms.

The Board will, at least annually, establish a policy with the goal to increase utilization of Ohio-qualified investment managers, when an Ohio-qualified investment manager offers quality, services, and safety comparable to other investment managers otherwise available.

The Board will, at least annually, establish a policy with the goal to increase utilization of Ohio-qualified agents for the execution of domestic equity and fixed income trades on behalf of the retirement system, when an Ohio-qualified agent offers quality, services, and safety comparable to other agents otherwise available.

Voting of Proxies

Investment managers are responsible for voting proxies and should be made in the best interest of investors.

Execution of Security Trades

The Investment Committee expects the purchase and sale of its securities to be made in a manner designed to receive the combination of best price and execution.

Directed Brokerage

In separately-managed equity accounts, HPRS investment managers are expected to use brokers that are under contract with HPRS to provide execution-only brokerage. Every five years, these brokers will be reviewed; the Board may consider issuing a Request for Proposal if it is deemed necessary. An investment manager may be excused from the directed brokerage requirement if it can document favorable execution.

Periodic Portfolio and Policy Reviews

Asset allocation should be reviewed at least annually to ensure that the plan is on track to achieve the investment goals and that all the major assumptions used to establish the plan remain reasonable. A comprehensive review of asset allocation in the form of asset-liability modeling should be conducted every five years, or whenever a major structural change occurs in liabilities or investment assets.

An asset allocation plan may require reconsideration when it becomes apparent that the assets are not keeping pace with the liabilities of a plan. This may occur not only as a result of the assets not performing as expected but also because the liabilities may not be behaving as expected.

To assure the continued relevance of the guidelines and objectives, as established in this investment policy statement, the Board should review the investment policy annually, or as deemed necessary.

Investment Policy Revisions

Approved and Revised, February 21, 2019
Approved and Revised, December 20, 2018
Revised, December 14, 2017
Revised December 15, 2016
Revised, December 17, 2015
Revised, December 18, 2014
Approved, No Revisions, December 19, 2013
Revised, February 21, 2013
Revised, February 23, 2012
Revised, October 27, 2011
Revised, August 26, 2010
Revised, April 22, 2010
Revised, February 25, 2010
Revised, April 23, 2009
Revised, October 25, 2007
Revised, June 16, 2005
Revised, June 26, 2003
Revised, November 15, 2001
Revised, June 22, 1999
Revised, March 13, 1997
Adopted and approved, September 7, 1994
Revised, June 29, 1994
Revised, September 5, 1990
Revised, June 1, 1988
Adopted and approved, June 11, 1986

Actuarial Section

GRS Retirement Consulting
800.521.0498 | P: 248.799.9000 | F: 248.799.9020 | www.grsconsulting.com

June 26, 2019

The Retirement Board
Ohio State Highway Patrol Retirement System
1900 Polaris Parkway, Suite 201
Columbus, Ohio 43240-4037

Dear Board Members:

The basic financial objective of the Highway Patrol Retirement System (HPRS) is to establish and receive contributions which:

- when expressed in terms of percents of active member payroll will remain approximately level from generation to generation, and
- when combined with present assets and future investment return will be sufficient to meet the financial obligations of HPRS to present and future retirees and beneficiaries.

The financial objective is addressed within the annual actuarial funding valuations. The valuation process develops contribution rates for the pension benefits provided by HPRS (i.e., not retiree health benefits) that are sufficient to fund the plan's current cost (i.e., the costs assigned by the valuation method to the year of service about to be rendered), as well as to fund unfunded actuarial accrued liabilities as a level percent of active member payroll over a finite period. The most recent funding valuations were completed based upon population data, asset data, and plan provisions as of December 31, 2017 and an actuarial funding valuation report was issued as of that date.

In addition to the funding valuation report, separate reports are issued to provide financial reporting information for HPRS in accordance with Governmental Accounting Standards Board (GASB) Statement Nos. 67 and 74. Financial reporting information has been produced based upon a measurement date of December 31, 2018 for GASB Statement Nos. 67 and 74.

The plan administrative staff provides the actuary with data for the actuarial valuation. The actuary relies on the data after reviewing it for internal and year-to-year consistency. The actuary summarizes and tabulates population data in order to analyze longer term trends. The plan's external auditor audits the actuarial data annually.

One Towne Square | Suite 800 | Southfield, Michigan 48076-3723

The following schedules in the Actuarial Section of the CAFR were prepared based upon certain information presented in the previously mentioned funding and financial reporting valuation reports:

- Actuarial Section
  - Summary of Assumptions
    - Funding Method, Asset Valuation Method, Interest Rate
    - Payroll Growth
    - Probabilities of Age & Service Retirement
    - Probabilities of Separation from Active Employment Before Age & Service Retirement
    - Health Care and Medicare
  - Short-Term Solvency Test
  - Recent Experience in the Health Care Fund
  - Membership Data
  - Analysis of Financial Experience
- Supplementary Schedules
  - Schedule of Funding Progress
  - Schedule of Employer Contributions
- Notes to Trend Data

For funding valuation purposes, assets are valued on a market related basis that recognizes each year's difference between actual and assumed investment return over a closed four-year period, subject to an 80% to 120% corridor on market value. The actuarial value of assets is 99% of the market value of assets as of December 31, 2017. For GASB Statement Nos. 67 and 74 purposes, assets are valued on a market basis.

Actuarial valuations are based upon assumptions regarding future activity in specific risk areas including the rates of investment return and payroll growth, eligibility for the various classes of benefits, and longevity among retired lives. These assumptions are adopted by the Board after considering the advice of the actuary and other professionals. The assumptions and the methods comply with the requirements of Statements No. 67 and No. 74 of the Governmental Accounting Standards Board and are in conformity with the Actuarial Standards of Practice issued by the Actuarial Standards Board. Each actuarial valuation takes into account all prior differences between actual and assumed experience in each risk area and adjusts the results as needed. The assumptions used for the December 31, 2017 funding valuation, and the December 31, 2018 GASB Statement No. 67 and GASB Statement No. 74 accounting information were based upon a study of experience during the years 2010 through 2014, unless otherwise noted. The December 31, 2017 funding valuation was based upon an investment return assumption of 7.75% and the MP-2015 mortality improvement scale. In February 2018, the Board adopted an investment return assumption of 7.25% and the MP-2018 mortality improvement scale for measurement dates beginning with the December 31, 2018 measurement date. The 7.25% investment return assumption was used for the December 31, 2018 GASB Statement No. 67 and GASB Statement No. 74 accounting information. The use of this assumption in combination with the long-term municipal bond rate of 3.71% resulted in a Single Discount Rate of 5.84% for GASB Statement No. 67 accounting information and 3.82% for GASB Statement No. 74 accounting information.

Investment return on a market value basis during 2017 was greater than the assumed return. However, areas of particular concern continue. These concerns include but are not limited to the following: (1) the pension unfunded actuarial accrued liability is 336% of the covered payroll, and (2) the funded ratio of the pension program is 67% based upon the actuarial value of assets and in particular the retiree and beneficiary portion is only 90% funded. Based upon a 0.0% employer contribution rate allocation to the retiree health plan in calendar years 2018 and thereafter, the pension plan has an amortization period of 27 years and the retiree health plan is expected to remain solvent until 2029 under the intermediate health trend scenario. Available resources and projected benefit payouts need to be brought in line with each other in the near future if the retiree health plan is to continue to provide benefits similar to those currently provided.

Based upon the results of the December 31, 2017 funding valuation, the Highway Patrol Retirement System of Ohio is meeting its basic financial objective with respect to pensions and continues to operate in accordance with actuarial principles of level percent of payroll financing. However, improvement in the funded ratio of the pension program will be important for its long-term financial security. Continued cost containment efforts can have a positive effect on the retiree health plan, but additional contribution income is needed or further benefit reductions will be the result.

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period or additional cost or contribution requirements based on the plan's funded status); and changes in plan provisions or applicable law.

Readers desiring a more complete understanding of the actuarial condition of HPRS are encouraged to obtain and read the complete valuation reports. The material in the Actuarial Section and Financial Section of this CAFR contains some, but not all of, the information in the valuation reports.

Mita D. Drazilov and Brian B. Murphy are Members of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein. The signing actuaries are independent of the plan sponsor.

Respectfully submitted,

Mita Drazilov

Mita D. Drazilov, ASA, FCA, MAAA

Brian B Murphy

Brian B. Murphy, FSA, EA, FCA, MAAA

BBM/MDD:mdd

GRS

Statement of Actuarial Assumptions and Methods

After consulting with the actuary, these assumptions have been adopted by the Highway Patrol Retirement System Board of Trustees, effective for the year ended December 31, 2015, following a five-year experience study covering the period January 1, 2010 through December 31, 2014. The assumptions used for funding purposes are based on the December 31, 2017 actuarial valuation, while the assumptions used for financial reporting purposes are based on the December 31, 2018 reports issued in accordance with GASB 67 and 74.

Funding Method
An entry age normal actuarial cost method of valuation is used in determining benefit liabilities and normal cost. Differences between assumed experience and actual experience ("actuarial gains and losses") become part of actuarially accrued liabilities. Unfunded actuarially accrued liabilities are amortized to produce payments (principal and interest) that are a level percent of payroll contributions.

Asset Valuation Method
The asset valuation method fully recognizes assumed investment income each year. Differences between actual and expected investment income are phased-in over a closed four-year period.

Investment Return
The investment return rates used in making valuations are 7.75% for both pension and OPEB assets, compounded annually (net of investment expenses).

Payroll Growth
Base pay increases are assumed to be 3.5% annually, attributable to broad economic effects such as inflation and real wage growth. Additional merit and seniority increases are assumed as follows:

Payroll Growth

Service Years	Merit & Seniority	Base (Economic)	Total
1 - 2	10.0%	3.5%	13.5%
3 - 5	3.0	3.5	6.5
6 - 10	1.0	3.5	4.5
11 +	0.3	3.5	3.8

Other Assumptions
85% of active participants are assumed to be married for purposes of death-in-service benefits and for purposes of retiring with the automatic joint and survivor benefit.

Health care costs are assumed to increase between 4.00% and 8.25% per year until 2027, ultimately declining to 3.5% for future years.

Each benefit recipient is assumed to be eligible for Medicare at age 65.

Post-employment mortality is based on the RP-2014 Healthy Annuitant mortality table for males and females, adjusted for mortality improvement back to the observation period base year of 2006. The base year for females was then established to be 2012. Mortality rates for a particular calendar year are determined by applying the MP-2015 mortality improvement scale to the above described tables.

Rates of separation from active service before retirement are developed on the basis of actual plan experience.

Probabilities of Separation from Active Employment before Age & Service Retirement
Percentage of Active Members Separating Within Next Year

Sample Age	Disability	Death (Men)	Death (Women)	Service	Other
20	0.08%	0.0327%	0.0168%	1	10.00%
25	0.08	0.0406	0.0163	2 - 5	4.00
30	0.23	0.0401	0.0206	6 - 15	1.00
35	0.42	0.0481	0.0305	16 - 20	0.75
40	0.70	0.0568	0.0447	21 & up	0.50
45	0.85	0.0865	0.0678		
50	1.13	0.1550	0.1066		
55	1.32	0.2678	0.1713		

Probabilities of Age & Service Retirement
Percentage of Eligible Members Retiring Within Next Year

Retirement Ages	Unreduced Benefit	Reduced Benefit
48	30%	3.0%
49	15	2.0
50	15	2.0
51	15	2.0
52	15	--
53	15	--
54	10	--
55	30	--
56	25	--
57	30	--
58	30	--
59	40	--
60+	100	--

Summary of Unfunded Actuarial Liabilities

Each time a new benefit is added which applies to service already rendered, an "unfunded actuarial accrued liability" is created. In addition, if actual financial experiences are less favorable than assumed financial experiences, the difference is added to unfunded actuarial accrued liabilities.

In an inflationary economy, the value of the dollar is decreasing. This environment results in employee pays increasing in dollar amounts resulting in unfunded actuarial accrued liabilities increasing in dollar amounts, all at a time when the actual substance of these items may be decreasing. Looking at just dollar amounts of unfunded actuarial accrued liabilities can be misleading. Unfunded actuarial accrued liabilities divided by active employee payroll provides an index, which aids understanding. The smaller ratio of unfunded liabilities to active member payroll, the stronger the system. Observation of this relative index over a period of years will give an indication of whether the system is becoming financially stronger or weaker.

Summary of Assets and Actuarial Liabilities for Retirement, Survivor, and Disability Allowances

Years Ended December 31

Year	Actuarially Accrued Liability (AAL)	Actuarial Valuation of Assets (AVA)	Unfunded Actuarially Accrued Liability (UAAL)	Ratio of AVA to AAL	Active Member Payroll	UAAL as % of Active Member Payroll
2008	$904,522,377	$603,265,803	$301,256,574	66.7%	$94,301,538	319.5%
2009	940,084,346	620,356,505	319,727,841	66.0	94,824,789	337.2
2010▲	1,017,770,449	630,971,500	386,798,949	62.0	94,767,852	408.2
2011	1,047,699,686	623,360,121	424,339,565	59.5	93,126,449	455.7
2012▲	966,310,485	658,428,914	307,881,571	68.1	98,117,403	313.8
2013►	989,101,470	690,605,582	298,495,888	69.8	98,519,844	303.0
2014	1,012,752,337	712,285,604	300,466,733	70.3	99,211,756	302.9
2015►	1,078,984,597	739,848,920	339,135,677	68.6	99,983,224	339.2
2016	1,127,927,927	763,667,712	364,260,215	67.7	108,788,871	334.8
2017▲	1,153,619,256	774,670,663	378,948,593	67.2	112,705,188	336.2

▲ Plan Amendment
► Assumption or method change

Short-Term Solvency Test

The HPRS financing objective is to pay for benefits through contributions that remain approximately level from year-to-year as a percent of member payroll. If the contributions to the system are level in concept and soundly executed, the system will pay all promised benefits when due, which is the ultimate test of financial soundness.

A short-term solvency test is one means of checking a system's progress under its funding program. In a short-term solvency test, the plan's present assets (cash and investments) are compared with (1) active member contributions on deposit, (2) the liabilities for future benefits to present retired lives, and (3) the liabilities for service already rendered by active members. In a system that has been following the discipline of level percent financing, the liabilities for active member contributions on deposit (column 1 below) and the liabilities for future benefits to present retired lives (column 2 below) will be fully covered by present assets, except in rare circumstances. In addition, the liabilities for service already rendered by active members (column 3 below) will be partially covered by the remainder of the present assets. Generally, if the system has been using level cost financing, the funded portion of column 3 will increase over time.

Short-Term Solvency Test
Accrued Liabilities and Assets Allocated to Retirement, Survivor, and Disability Allowances

Year	(1) Active Member Contributions	(2) Retirees, Beneficiaries, & Deferrals	(3) Active Members (Employer Financed Portion)	Valuation Assets	% of Accrued Liabilities Covered by Reported Assets (1)	(2)	(3)
2008	$94,749,356	$511,626,943	$298,146,078	$603,265,803	100%	99%	-
2009	101,131,517	528,087,050	310,865,779	620,356,505	100	98	-
2010▲	104,503,065	583,714,389	329,552,995	630,971,500	100	90	-
2011	104,701,161	618,984,073	324,014,452	623,360,121	100	84	-
2012▲	108,311,937	586,311,106	271,687,442	658,428,914	100	94	-
2013►	113,334,067	601,342,081	274,425,322	690,605,582	100	96	-
2014	117,441,639	622,719,141	272,591,557	712,285,604	100	96	-
2015►	122,286,821	662,562,480	294,135,296	739,848,920	100	93	-
2016	127,311,764	688,936,795	311,679,368	763,667,712	100	92	-
2017▲	130,494,700	717,621,283	305,503,273	774,670,663	100	90	-

▲ Plan Amendment
► Assumption or method change

In a short term OPEB solvency test, the plan's present assets (cash and investments) are compared with (1) the liabilities for future benefits to present retired lives, and (2) the liabilities for service already rendered by active members. In a system that has been following the discipline of level percent financing, the liabilities for active member contributions on deposit (column 1 below) and the liabilities for future benefits to present retired lives (column 1 below) will be fully covered by present assets, except in rare circumstances. In addition, the liabilities for service already rendered by active members (column 2 below) will be partially covered by the remainder of the present assets. Generally, if the system has been using level cost financing, the funded portion of column 2 will increase over time.

Short-Term Solvency Test

Accrued Liabilities and Assets Allocated to Retirement, Survivor, and Disability Healthcare

Year	(1) Retirants, Beneficiaries, & Vested Deferreds	(2) Active Members (Employer Financed Portion)	Healthcare Valuation Assets	% of Accrued Liabilities Covered by Reported Assets (1)	(2)
2012	$253,784,322	$157,683,503	$99,817,173	39%	-
2013	246,744,210	191,817,484	102,083,923	41	-
2014▲	177,574,474	199,108,639	103,812,807	58	-
2015►	195,195,607	217,156,476	106,550,139	55	-
2016	187,123,383	216,579,635	108,282,136	58	-
2017▲►	125,764,087	122,323,654	110,137,458	88	-

▲ Plan Amendment
► Assumption or method change

Additional years will be displayed as they become available. Ultimately 10 years of data will be shown.

Active Member Valuation Data

Years Ended December 31

Year	Active Members	Annual Payroll ($)	Average Annual Salary ($)	% Increase in Average Pay
2008	1,544	$94,301,538	$61,076	4.0%
2009	1,547	94,824,789	61,296	0.4
2010	1,537	94,767,852	61,658	0.6
2011	1,520	93,126,449	61,267	(0.6)
2012	1,645	98,117,403	59,646	(2.6)
2013	1,613	98,519,844	61,079	2.4
2014	1,622	99,211,756	61,166	0.1
2015	1,621	99,983,224	61,680	0.8
2016	1,670	108,788,871	65,143	5.6
2017	1,650	112,705,188	68,306	4.9

Retirees and Beneficiaries Added to and Removed from Rolls
Years Ended December 31

	Added to Rolls		Removed from Rolls		Rolls at End of Year			
Year	Number	Annual Allowances	Number	Annual Allowances	Number	Annual Allowances	% Increase in Annual Allowances	Average Annual Allowances
2008	45	$2,532,732	33	$639,576	1,371	$43,537,104	-	$31,752
2009	45	2,491,176	31	511,632	1,385	45,516,648	4.5	32,868
2010	64	3,119,568	25	497,568	1,424	48,138,648	5.8	33,804
2011	73	3,932,508	32	821,472	1,465	51,249,684	6.5	34,980
2012	79	3,380,304	47	983,484	1,497	53,646,504	4.7	35,832
2013	61	3,204,660	35	843,804	1,523	56,007,360	4.4	36,780
2014	66	3,008,568	31	723,492	1,558	58,292,436	4.1	37,416
2015	73	3,102,744	83*	1,671,876	1,548	59,723,304	2.5	38,580
2016	69	3,576,372	37	841,200	1,580	62,458,476	4.6	39,528
2017	83	3,878,244	26	675,084	1,637	65,661,636	5.1	40,116

**Includes Alternate Payee records, which were combined with Participant records beginning with December 31, 2015*

Analysis of Financial Experience
Gains and Losses in Pension Accrued Liabilities Resulting from Differences Between Assumed Experience and Actual Experience

	Gain (or Loss) for Year	
Type of Activity	**2017**	**2016**
Age & Service Retirements If members retire at older ages or with lower final average pay than assumed, there is a gain -- if younger ages or higher average pays, a loss.	($57,648)	$244,658
Disability Retirements If disability claims are less than assumed, there is a gain - if more claims, a loss.	721,566	76,712
Death-in-Service Benefits If survivor claims are less than assumed, there is a gain - if more claims, a loss.	(92,407)	402,882
Withdrawal from Employment If more liabilities are released by withdrawals than assumed, there is a gain -- if smaller releases, a loss.	493,727	1,912,187
Pay Increases If there are smaller pay increases than assumed, there is a gain - if greater increases, a loss.	(2,883,793)	(11,313,936)
Investment Income If there is greater investment return on pension assets than assumed, there is a gain - if less return, a loss.	(9,943,102)	(4,839,839)
Other Miscellaneous gains and losses resulting from data adjustments, timing of financial transactions, valuation methods, and other events.	1,189,070	(5,778,914)
Gain (or Loss) During Year From Experience	($10,572,587)	($19,296,250)
Non-Recurring Items Adjustments for benefit and assumption changes.	4,179,186	0
Composite Gain (or Loss) During Year	($6,393,401)	($19,296,250)

Analysis of Financial Experience

Gains and Losses in OPEB Accrued Liabilities Resulting from Differences Between Assumed Experience and Actual Experience

Type of Activity	Gain (or Loss) for Year 2017
Premiums Gains and losses resulting from actual premiums in valuation year versus that assumed from prior valuation	$33,659,428
Investment Income If there is greater investment income than assumed, there is a gain. If less income, a loss.	(1,345,114)
All Other Sources Gains and losses resulting from demographic experience, data adjustments, timing of financial transactions, etc.	21,446,288
Composite Gain (or Loss) During Year	$53,760,602

Number of Retired Lives Covered by Medical Mutual & Aetna Medicare Advantage - Added and Removed from Rolls

Years Ended December 31

	Added to Rolls	Removed from Rolls	Retirees with Healthcare, Dental, or Vision Coverage
Year	Number	Number	Number
2016			1,395
2017	78	87	1,386

The number of lives was compiled from data files provided by HPRS staff. This is the number of retired members covered and will differ from the number of actual lives covered based on the type of coverage elected. Additional years will be displayed as they become available. Ultimately 10 years of data will be shown.

Summary of Plan Provisions

Purpose
In 1941, the Highway Patrol Retirement System (HPRS) was created by the Ohio General Assembly to provide for retirement and survivor benefits for members and dependents.

Administration
The general administration and management of HPRS are vested in the Highway Patrol Retirement System Board of Trustees under Ohio Revised Code Chapter 5505. The eleven-member Board consists of the Superintendent of the State Highway Patrol, three appointed members, five elected active members, and two elected retired members.

The appointed members are investment experts designated by the Governor, the Treasurer of State, and the General Assembly. The active members are elected to four-year terms by members of the plan. Any contributing member is eligible to become an active member candidate, and each contributing member is eligible to vote in the active member election process. Any retiree who is an Ohio resident and who has not served as a statutory or active member of the Board during the past three years is eligible to become a retired member candidate. Each retiree is eligible to vote in the retired member election.

The Superintendent of the State Highway Patrol serves by virtue of the office held. A chairperson and vice-chairperson are elected by the Board annually. All regular Board meetings are considered to be public meetings. While the Board members serve without compensation, they are not expected to suffer any loss because of absence from regular employment while engaged in official Board duties. In addition, the members of the Board are reimbursed for actual and necessary expenses.

Employer Contributions
Ohio law requires that the Board certify the employer contribution rate to the Office of Budget and Management in even-numbered years. The employer rate may not be lower than the member rate, nor may it exceed three times the member rate. The employer contribution rate was 26.5% in 2018.

Member Contributions
Each member of HPRS, through payroll deduction, must contribute the legally established contribution rate as a percentage of salary. Individual member accounts are maintained by HPRS and, upon termination of employment, the amount contributed is refundable in lieu of the payment of a pension benefit. The member contribution rate was 12.5% in 2018.

Service Credit
Prior to retirement, the following types of additional service credit may be purchased: (1) military service, (2) prior refunded full-time service as a contributing member of the State Highway Patrol Retirement System, the Ohio Police & Fire Pension Fund, the State Teachers Retirement System of Ohio, the School Employees Retirement System of Ohio, the Ohio Public Employees Retirement System, and the Cincinnati Retirement System. Military service and prior refunded full-time service in HPRS and the Ohio Police & Fire Pension Fund may be used to meet the minimum service requirement in order to qualify

for unreduced pension benefits. In the case of prior service credit that was not refunded, service credit may be transferred directly from another Ohio retirement system to HPRS.

Retirement

Age and Service Retirement

Upon retirement from active service, a member is eligible to receive a pension by achieving a minimum age and service requirement, as follows:

Age	Service Credit
52	20 years
48*	25 years

*Age 52 for troopers hired after January 1, 2020

A member may retire at age 52 to age 60, provided he has 20 or more years of service, or at age 48 with 25 or more years of contributing service. For members hired after January 1, 2020, 52 is the minimum retirement age. The member's pension equals the sum of 2.5% of final average salary times years of service not in excess of 20, 2.25% of final average salary times years of service in excess of 20 but not in excess of 25, and 2% of final average salary times years of service in excess of 25. The maximum pension payable is 79.25% of the member's final average salary. A member must retire upon attainment of age 60.

The final average salary, which includes base pay, longevity pay, hazard duty pay, shift differential, and professional achievement pay, is the average of a member's five highest years of salary.

Benefit payments become effective the day following the last day of employment and are payable monthly throughout the retiree's lifetime.

Deferred Retirement

A member who has acquired 20 years of service and retires is eligible to receive a pension computed in the same manner as an age and service pension at the attainment of age 52. A reduced benefit is payable if the retirant elects to receive a benefit after age 48 and prior to age 52. The reduction is waived for members with 25 or more years of service.

Reduced Retirement

A member who has acquired at least 20 but less than 25 years of service and is between the ages of 48 and 52 is eligible to receive a pension computed in the same manner as an age and service pension but reduced as follows:

Age	Percent of Age & Service Pension
48	75%
49	80%
50	86%
51	93%
52	100%

The election to receive a reduced pension may not be changed once a retiree has received a benefit payment.

Other Pension

A member who has acquired 15 years of service and who voluntarily resigns or is discharged is eligible to receive a pension equal to 1.5% of final average salary multiplied by total service. The pension shall begin the first month after attainment of age 55, provided the member does not withdraw his accumulated contributions from the employees' savings fund.

Resignation or Discharge

With less than 20 years of service credit, a member may not collect a pension if "dishonesty, cowardice, intemperate habits, or conviction of a felony" was the basis for discharge or resignation from the Ohio State Highway Patrol.

Disability Retirement

A member who retires as the result of a disability that was incurred in the line of duty is eligible to receive a pension that is the larger of (1) 61.25% of average final salary, or (2) the age and service pension. A member who retires as the result of a disability that was not incurred in the line of duty is eligible to receive a pension that is the larger of (1) 30% of average annual salary or (2) the age and service pension.

Deferred Retirement Option Plan (DROP)

A member who is eligible to retire with an unreduced pension benefit may enter the DROP. The member will continue to work for the Ohio State Highway Patrol. For actuarial purposes, a DROP member is considered retired; however, instead of receiving a monthly pension benefit, the member begins to accrue funds in a tax-deferred account. The DROP account is funded by the member's continuing active contributions and a pension accrual, as well as interest that accrues on these amounts.

A member may participate in DROP until age 60, but for no more than eight years. The minimum participation period is two years for members who enter the DROP at age 52 or more and three years for members who enter the DROP before age 52. A member who terminates employment earlier than the minimum participation period will forfeit any accrued interest.

When a DROP member terminates employment with the Ohio State Highway Patrol, the member will begin to receive the monthly pension benefit that had previously been funding the DROP account. In addition, after the minimum participation period, the proceeds of the DROP account will be rolled over into a qualified plan or paid to the member in a lump sum, an annuity, or a combination of these distribution types.

Payment Plans
Each retirement applicant must select a benefit payment plan. Regardless of the plan selected, a survivor benefit is paid to an eligible survivor of a deceased active member or retiree. The plan options are as follows:

Plan 1 - Single Life Annuity
This plan pays the highest monthly benefit, calculated as a percentage of final average salary, and is limited to the lifetime of the retiree. A member who receives a disability retirement may only receive a single life annuity.

Plan 2 - Joint and Survivor Annuity
This plan pays a reduced monthly benefit for a member's lifetime and provides for a monthly benefit to a surviving beneficiary.

Plan 3 - Life Annuity Certain and Continuous
This plan is an annuity, payable for a guaranteed minimum period. If a retiree dies before the end of the period, the pension benefit is paid to the designated beneficiary for the remainder of the period.

Partial Lump-Sum (PLUS) Distribution
In addition to selecting one of the three retirement payment plans, a retiree may elect to receive a lump-sum cash payment, either as a taxable distribution, or as a rollover to a tax-qualified plan. Following this payment, a retiree will receive a reduced monthly benefit for life. To be eligible for a PLUS distribution, a retiree must have attained age 51 with at least 25 years of total service, or age 52 with at least 20 years of total service. The lump-sum amount may not be less than six times the monthly single life pension and not more than 60 times the monthly single life pension.

Survivor Benefits
A surviving spouse of a deceased retiree, or of an active member who was eligible to receive a retirement pension at the time of death, who retired or entered DROP prior to the effective date of House Bill 362 (May 11, 2018) receives a monthly benefit equal to one-half the deceased member's monthly pension benefit (minimum $900). A surviving spouse of an active member who was not eligible for a retirement benefit at the time of death, or a deceased member who retired after May 11, 2018 receives a monthly survivor benefit of $900, subject to annual review and increase by the Board.

Each surviving dependent child receives $150 monthly until age 18. If the child is a full-time student, this benefit continues until age 23. A surviving qualified disabled child receives this benefit for life, or recovery from the qualifying disability.

Health Care

A comprehensive medical health care plan is currently offered to all eligible benefit recipients and dependents. Benefit recipients may elect to cover spouses and dependent children by authorizing the appropriate premium deduction.

Dental and vision coverage is also available to benefit recipients and dependents. The Board, which has the authority to implement changes, annually evaluates the premiums and plan design.

Medicare

A portion (annually set by the Board) of the Medicare Part B basic premium amount may be reimbursed to eligible benefit recipients upon proof of coverage. The reimbursement amount was $0 monthly for 2018.

Cost of Living (COLA)

The Board has been vested with the responsibility to establish the COLA rate each year between 0.0 and 3.0%. In October 2017, the Board set a COLA rate of 1.25%, effective January 1, 2018. Various benefit recipients are eligible for a COLA according to the table below:

<table>
<tr><th colspan="3">Cost of Living Adjustment Eligibility</th></tr>
<tr><th>Type of Benefit Recipient</th><th>Pension Effective Date Prior to January 7, 2013</th><th>Pension Effective Date On or After January 7, 2013</th></tr>
<tr><td>Service Retirant / DROP Participant</td><td>The later of age 53 or the 13th month after benefit commences</td><td rowspan="3">The later of age 60 or the 13th month after benefit commences</td></tr>
<tr><td>Disability Retirant</td><td>The earlier of age 53 or the 61st month after the benefit commences</td></tr>
<tr><td>Beneficiary / Survivor</td><td>The 13th month after the benefit commences</td></tr>
</table>

Death After Retirement

Upon the death of a retiree, a lump-sum payment of $5,000 is paid to the surviving spouse or to the retiree's estate if there is no surviving spouse.

Statistical Section

Introduction

The objectives of the statistical section are to provide financial statement users with additional historical perspective, context, and relevant details that will assist in using information in the financial statements, notes to the financial statements, and required supplementary information in order to better understand and assess HPRS's overall financial condition.

The schedules, beginning on page 107, show financial trend information that will assist users in understanding and assessing how HPRS's financial condition has changed over the past ten years. The financial trend schedules presented are --

- Changes in Fiduciary Net Position - Pension
- Changes in Fiduciary Net Position - OPEB
- Benefit Deductions from Net Position by Type - Pension
- Benefit Deductions from Net Position by Type - OPEB

The schedules, beginning on page 108, show demographic and economic information. This information is designed to assist in understanding the environment in which HPRS operates. The demographic and economic information and the operating information presented include --

- Principal Participating Employer
- Benefit Recipients by Type of Benefit
- Average Benefit Payments

Changes in Fiduciary Net Position – Pension
Years Ended December 31

Additions	2018	2017	2016	2015	2014	2013	2012	2011	2010	2009
Employer contributions	$26,014,314	$26,109,836	$25,383,684	$22,895,242	$22,325,421	$22,908,182	$23,766,361	$22,966,338	$21,211,944	$20,453,914
Member contributions	14,451,649	14,504,919	14,101,170	12,711,676	10,637,385	9,082,857	8,755,937	8,348,577	8,295,882	8,624,025
Transfers from other systems	410,250	619,110	773,206	947,265	586,929	1,353,520	557,316	608,366	329,335	1,009,422
Investment income, net	(37,806,872)	101,528,022	48,099,287	(4,465,153)	44,848,656	115,686,752	63,509,018	(16,385,745)	72,161,170	109,493,243
Total additions	$3,069,341	$142,761,887	$88,357,347	$32,089,030	$78,398,391	$149,031,311	$96,588,632	$15,537,536	$101,998,331	$139,580,604
Deductions										
Benefits paid to participants	71,581,420	75,395,901	67,439,444	65,828,374	63,329,792	60,955,916	58,297,304	55,638,322	52,498,558	49,884,126
Member contribution refunds	716,739	1,074,973	1,730,725	857,626	2,177,476	943,433	179,614	451,682	476,936	1,076,685
Administrative expenses	1,435,864	1,436,879	1,352,567	1,084,161	1,031,473	909,929	859,477	948,319	637,943	758,818
Transfers to other systems	210,895	140,562	416,679	160,888	165,945	467,462	377,994	1,797,986	566,615	406,147
Total deductions	$73,944,918	$78,048,315	$70,939,415	$67,931,049	$66,704,686	$63,276,740	$59,714,389	$58,836,309	$54,180,052	$52,125,776
Change in pension net position	**($70,875,577)**	**$64,713,572**	**$17,417,932**	**($35,842,019)**	**$11,693,705**	**$85,754,571**	**$36,874,243**	**($43,298,773)**	**$47,818,279**	**$87,454,828**

Changes in Fiduciary Net Position – OPEB
Years Ended December 31

Additions	2018	2017	2016	2015	2014	2013	2012	2011	2010	2009
Employer contributions	$4,623,201	$4,640,177	$4,511,127	$4,068,887	$4,325,434	$3,658,189	$1,679,422	$1,622,889	$3,227,905	$4,281,052
Investment income, net	(5,366,447)	14,424,489	6,877,607	(647,230)	6,790,553	17,885,294	10,192,983	(2,752,009)	17,734,416	21,030,418
Health care premiums	4,062,903	3,885,594	2,918,533	2,397,253	1,756,117	1,570,692	1,283,866	1,274,337	911,076	902,310
Retiree Drug Subsidy	1,808,082	1,418,110	1,082,402	1,140,016	647,225	446,616	500,134	422,640	471,909	513,668
Prescription Drug Rebates	1,352,977	719,538	351,087	428,517	886,661	612,325	356,377	366,316	-	-
Medicare D Refunds	-	-	-	-	-	1,521	17,090	6,567	-	-
Total additions	$6,480,716	$25,087,908	$15,740,756	$7,387443	$14,405,990	$24,174,637	$14,029,872	$940,740	$22,345,306	$26,727,448
Deductions										
Health care expenses	15,762,478	15,456,987	14,594,984	13,759,103	14,055,881	13,703,605	12,302,980	12,360,917	11,447,630	9,801,853
Administrative expenses	203,812	204,143	193,401	157,150	156,176	140,676	137,943	159,271	106,450	123,210
Total deductions	$15,966,290	$15,661,130	$14,788,385	$13,916,253	$14,212,057	$13,844,281	$12,440,923	$12,520,188	$11,554,080	$9,925,063
Change in OPEB net position	**($9,485,574)**	**$9,426,778**	**$952,371**	**($6,528,810)**	**$193,933**	**$10,330,356**	**$1,588,949**	**($11,579,448)**	**$10,791,226**	**$16,802,385**

Benefit Deductions from Net Position by Type - Pension
Years Ended December 31

Type of Benefit*	2018	2017	2016	2015	2014	2013	2012	2011	2010	2009
Age & Service	$59,778,507	$63,909,049	$55,912,247	$54,637,611	$52,593,663	$50,462,318	$47,725,907	$46,540,462	$43,425,529	$41,439,766
Reduced	1,998,325	1,987,800	2,180,522	2,192,201	2,186,653	2,224,182	2,777,829	1,829,190	1,865,761	1,828,296
Disability	4,824,425	4,710,650	4,496,025	4,381,011	4,270,957	4,068,926	3,840,068	3,537,849	3,305,364	3,044,325
Survivor	4,870,163	4,688,402	4,765,650	4,307,551	4,208,519	4,080,490	3,803,500	3,670,821	3,846,904	3,496,739
Death Benefits	110,000	100,000	85,000	110,000	70,000	120,000	150,000	60,000	55,000	75,000
Total Pension Benefits	**$71,581,420**	**$75,395,901**	**$67,439,444**	**$65,828,374**	**$63,329,792**	**$60,955,916**	**$58,297,304**	**$55,638,322**	**$52,498,558**	**$49,884,126**

*Previous versions of this schedule included an "Early" category, which has now been combined with "Age & Service", since the criterion for eligibility is the same.

Benefit Deductions from Net Position by Type - OPEB
Years Ended December 31

Type of Benefit	2018	2017	2016	2015	2014	2013	2012	2011	2010	2009
Medical	$8,153,320	$8,091,247	$7,331,598	$7,087,732	$7,623,999	$7,872,163	$6,393,584	$6,755,757	$6,380,295	$4,983,739
Wellness	27,951	53,566	31,455	68,263	48,728	53,440	24,604	95,210	57,747	86,007
Prescription drugs	6,718,222	6,488,074	6,115,493	5,245,815	4,722,044	4,110,260	4,301,088	4,053,343	3,709,855	3,430,089
Medicare-B reimbursement	-	-	311,820	601,860	874,164	896,970	839,451	770,183	713,317	673,450
Dental	690,084	642,998	621,659	593,016	619,286	612,575	594,292	528,824	453,276	495,272
Vision	172,901	181,102	182,959	162,417	167,660	158,197	149,962	157,600	133,140	133,296
Total	$15,762,478	$15,456,987	$14,594,984	$13,759,103	$14,055,881	$13,703,605	$12,302,981	$12,360,917	$11,447,630	9,801,853
Member premiums/adjustments	(7,223,961)	(6,023,241)	(4,352,023)	(3,965,786)	(3,290,003)	(2,631,154)	(2,157,466)	(2,069,859)	(1,382,985)	(1,415,978)
Net paid by HPRS	**$8,538,517**	**$9,433,746**	**$10,242,961**	**$9,793,317**	**$10,765,878**	**$11,072,451**	**$10,145,515**	**$10,291,058**	**$10,064,645**	**$8,385,875**

Principal Participating Employer
2009-2018

Year	Participating Government*	Covered Employees	Year	Participating Government*	Covered Employees
2018	Ohio State Highway Patrol	1,668	2013	Ohio State Highway Patrol	1,613
2017	Ohio State Highway Patrol	1,650	2012	Ohio State Highway Patrol	1,645
2016	Ohio State Highway Patrol	1,670	2011	Ohio State Highway Patrol	1,520
2015	Ohio State Highway Patrol	1,621	2010	Ohio State Highway Patrol	1,537
2014	Ohio State Highway Patrol	1,622	2009	Ohio State Highway Patrol	1,547

*HPRS is a single-employer pension system; 100% of members are employed by the Ohio State Highway Patrol.

Benefit Recipients by Type of Benefit
December 31, 2018

Monthly Benefit	Number of Benefit Recipients	Type of Benefit 1	2	3	4	5	Retirement Option Unmodified	1	2	3	4	5	6	7
Deferred	13	-	-	-	-	-	-	-	-	-	-	-	-	-
$1 - 250	20	-	-	-	19	1	20	-	-	-	-	-	-	-
251-500	5	-	-	-	-	5	5	-	-	-	-	-	-	-
501 - 750	7	-	-	-	-	7	7	-	-	-	-	-	-	-
751 - 1000	20	-	-	-	13	7	20	-	-	-	-	-	-	-
1001 - 1250	53	2	-	1	43	7	53	-	-	-	-	-	-	-
1251 - 1500	90	-	1	1	78	10	90	-	-	-	-	-	-	-
1501 - 1750	93	5	20	1	61	6	91	1	1	-	-	-	-	-
1751 - 2000	69	18	9	8	27	7	68	-	1	-	-	-	-	-
2001 - 2250	52	20	16	3	10	3	51	1	-	-	-	-	-	-
2251 - 2500	51	12	8	20	11	-	50	-	1	-	-	-	-	-
2501 - 2750	70	34	12	14	9	1	69	1	-	-	-	-	-	-
2751 - 3000	85	56	4	23	2	-	78	-	6	1	-	-	-	-
3001 - 3250	196	161	1	33	1	-	182	-	14	-	-	-	-	-
3251 - 3500	203	189	2	11	1	-	191	1	9	1	-	-	-	1
Over 3,500	855	827	3	24	1	-	811	8	31	5	-	-	-	-
Total	**1,882**	**1,324**	**76**	**139**	**276**	**54**	**1,786**	**12**	**63**	**7**	**-**	**-**	**-**	**1**

Type of Benefit Recipient (Includes current members in DROP)*
1 – Age & Service
2 – Reduced
3 – Disability
4 – Survivor
5 – Alternate Payee (Division of Property Order)

* Previous versions of this schedule included an “Early” category, which has now been combined with “Age & Service”, since the criterion for eligibility is the same.

Retirement Option
Under the unmodified plan, a surviving spouse receives a 50% continuance (minimum, $900 monthly)
Under the following options, a surviving spouse qualifies for the above-noted 50% continuance; however, the member’s lifetime benefit is reduced:
Option 1 – Beneficiary receives 0 to <25% of member’s reduced monthly benefit
Option 2 – Beneficiary receives 25 to <50% of member’s reduced monthly benefit
Option 3 – Beneficiary receives 50% or more of member’s reduced monthly benefit
Option 4 – Beneficiary receives 100% of member’s remaining reduced monthly benefit for 5 years after benefit begins
Option 5 – Beneficiary receives 100% of member’s remaining reduced monthly benefit for >5 to 10 years after benefit begins
Option 6 – Beneficiary receives 100% of member’s remaining reduced monthly benefit for >10 to 15 years after benefit begins
Option 7 – Beneficiary receives 100% of member’s remaining reduced monthly benefit for >15 years after benefit begins

Average Benefit Payments
2009-2018

Retirement During		Years of Credited Service 20 to <25	25 to <30	30+	Overall
2018	Average Monthly Benefit	$2,761	$3,731	$3,831	$3,517
	Average Final Average Salary	$5,186	$6,064	$5,697	$5,807
	Number of Retirees	12	32	7	51
2017	Average Monthly Benefit	$3,115	$3,640	$4,219	$3,584
	Average Final Average Salary	$5,611	$5,795	$5,986	$5,775
	Number of Retirees	13	53	5	71
2016	Average Monthly Benefit	$2,511	$3,846	$4013	$3,505
	Average Final Average Salary	$5,020	$6,091	$5,678	$5,796
	Number of Retirees	13	35	2	50
2015	Average Monthly Benefit	$2,882	$3,648	$3,980	$3,478
	Average Final Average Salary	$5,287	$5,828	$5,821	$5,684
	Number of Retirees	13	31	5	49
2014	Average Monthly Benefit	$3,181	$4,063	$6,669	$4,002
	Average Final Average Salary	$5,093	$5,982	$7,824	$5,903
	Number of Retirees	6	37	1	44
2013	Average Monthly Benefit	$3,725	$4,128	$4,207	$3,936
	Average Final Average Salary	$5,190	$6,164	$5,747	$5,677
	Number of Retirees	13	33	2	48
2012	Average Monthly Benefit	$3,023	$3,453	$4,055	$3,339
	Average Final Average Salary	$5,146	$5,643	$4,922	$5,450
	Number of Retirees	15	29	2	46
2011	Average Monthly Benefit	$2,781	$3,757	$4,738	$3,685
	Average Final Average Salary	$5,734	$5,779	$6,155	$5,694
	Number of Retirees	8	42	4	54
2010	Average Monthly Benefit	$2,923	$3,571	$5,375	$3,670
	Average Final Average Salary	$5,185	$5,501	$7,123	$5,632
	Number of Retirees	7	33	5	45
2009	Average Monthly Benefit	$2,861	$4,114	$5,424	$3,826
	Average Final Average Salary	$4,975	$6,016	$7,334	$5,792
	Number of Retirees	9	19	2	30

The table above does not include active DROP participants.
The average monthly benefit is based on the benefit paid at termination from employment, not entry into DROP.

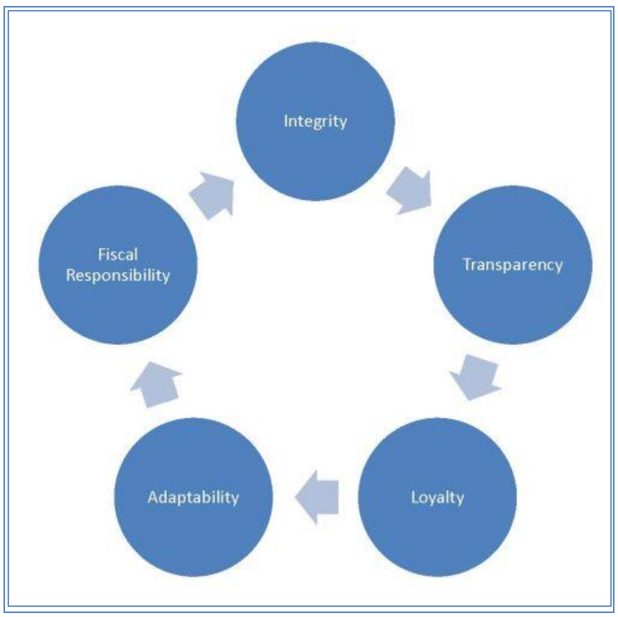
HPRS Mission Statement

Provide stable pension services that are fiscally responsible, prudently administered, and delivered with understanding and responsiveness to all members and beneficiaries.

HPRS Vision Statement

Maintain a financially sound pension system that is a leader in the oversight of our investments and liabilities, providing for the long-term financial wellbeing of our retirement system.

HPRS Values



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