



City of Harrisonburg, Virginia

OFFICE OF THE PUBLIC WORKS DEPARTMENT
320 EAST MOSBY ROAD
HARRISONBURG, VIRGINIA 22801
(540) 434-5928

STREET MAINTENANCE
TRAFFIC ENGINEERING
TRANSPORTATION PLANNING
REFUSE/ RECYCLING
CENTRAL STORES

TO: Ande Banks, Deputy City Manager
FROM: Thomas Hartman, PE, Assistant Director of Public Works
DATE: December 12, 2017
RE: Stormwater Improvement Plan

Summary: Public Hearing to consider adopting the proposed City of Harrisonburg Stormwater Improvement Plan.

Background:

The Stormwater Improvement Plan began development in July 2016 to evaluate compliance tools available to meet Chesapeake Bay TMDL and Blacks Run/Cooks Creek TMDL pollutant removal requirements. This plan is not only a project-based analysis. The plan includes all components of compliance as follows:

- Capital Projects
 - Structural BMPs
 - Urban Stream Restoration
- Programs
 - Residential Credit program (rain barrels, roof drain disconnections, etc.)
 - Septic to Sanitary Conversion
 - Tree planting
 - Street sweeping
 - Storm drain cleaning
- Nutrient Purchasing
 - Purchasing temporary nutrient credits
 - Purchasing permanent nutrient credits

For capital projects, an overall watershed and system capacity analysis were performed to evaluate where potential BMP locations would be feasible. Existing BMPs, privately owned land, and publicly owned land were all reviewed. Areas where storm sewer existed and large tracts of land were untreated by other BMPs were flagged as feasible project areas. After project locations were identified, the consulting firm performed field review to tweak, and make more accurate, this desktop analysis.

A main component of the Stormwater Improvement Plan includes a BMP siting and prioritization tool. This tool takes the form of an Excel spreadsheet with imbedded methodology for evaluating stormwater improvements throughout the City. The methodology is flexible, allowing our community to assign factors and weights reflective of our goals and values. Keep in mind this tool only used the prioritizing

factors for projects and not programs or nutrient purchasing options. Projects identified through field review were therefore evaluated and weighted on the following:

- Pounds of TN Removed
- Cost Effectiveness (\$/lb/TN)
- Project Cost (\$/design & construction)
- Land Acquisition
- Drainage Issues
- Maintenance Burden (Long-Term)
- Site Constraints & Potential Utility Constraints
- Implementation Schedule
- Synergy
- Aesthetics/Visual Appeal

A 100-point score was associated with the weight factors. Over 150 projects were identified and ranked according to those ranking factors. Additionally, staff will be trained on how to add new, not previously identified, projects to this tool so it can be used for plan updates, etc.

For programs, current program implementation was outlined and reviewed for any needed changes or improvements to increase pollution reduction potential. This includes an overall perspective of cost-share programs as well as a perspective of existing programs such as the stormwater utility fee program.

For nutrient purchasing, local/allowable nutrient banks were researched to outline potential purchasing options. The costs associated with only a project and program based plan would have the implication of raising the stormwater utility fee billing rate. Since staff would like to minimize the need to raise this billing rate, nutrient purchasing (particularly temporary nutrient purchases) has been viewed as a more attractive option.

Key Issues: None.

Environmental Impact: To be determined through required project environmental documentation.

Fiscal Impact: None at this time.

Prior Actions: The Stormwater Utility Fee Ordinance and Stormwater Utility Fee Credit Program were established in 2014.

Alternatives: None.

Community Engagement: Stormwater Improvement Plan Public Information Meeting was held on March 22, 2017. Stormwater Improvement Plan Public Input Meeting on October 18, 2017. A public

The City With The Planned Future

comment period was open after both meetings to collect feedback and recommendations from the public.

Recommendation: Staff recommends adoption of this plan to guide the city in pollution reduction efforts.

Attachments: Stormwater Improvement Plan (main body, without appendix items), Identified Projects, Ranking Criteria, Stormwater Improvement Plan Council Presentation

Review:

The initiating Department Director will place in Legistar, in sequence of transmittal, the names of each department that must initial their review in order for this item to be placed on the City Council agenda. The completion of review only addresses the readiness of the issue for Council consideration. This does not address the recommendation for approval or denial of the issue.

###

Project Prioritization and Ranking Criteria

Ranking Factor	Scoring Technique	Scoring Range	Max Score
Pounds TN Removed	The project with the highest TN pollutant removal receives the highest score. Projects are scored as a percent of the best pollutant removal, multiplied by 20, so the score can range from 0 to 20.	0-20	20
Cost Effectiveness	Cost effectiveness is calculated by dividing the total project cost by the pounds of TN removed. Projects are scored as a percent of most cost effective project multiplied by 20, so the score can range from 0 to 20.	0-20	20
Project Cost	Project cost includes projected cost for design and construction. The lowest project cost receives the highest score, so the score can range from 0 to 10.	0-10	10
Land Acquisition	Projects located on city-owned land earn the highest score as there will be no land acquisition needed.	10	10
	Projects located on private property where minimal easement acquisitions will be needed earn a mid-range score.	5	
	If a project crosses multiple private properties and significant easement or property acquisition will be needed, the project will earn the lowest score.	0	
Drainage Issues	A project that addresses flooding or infrastructure risk in areas with known drainage issues earns the highest score. Drainage issues have been mapped based on staff knowledge and public involvement.	10	10
	Projects that provide detention or conveyance benefits but are not in area with known drainage issues earn a mid-range score.	5	
	Projects that are purely water quality projects and do not provide additional detention or conveyance benefits earn the lowest score.	0	
Maintenance Burden (Long-term)	Projects that require little maintenance earn the highest score.	10	10
	Projects with a medium maintenance burden will earn a mid-range score.	5	
	When extensive staff time and money is needed to maintain the project, it will earn the lowest score.	0	
Site Constraints & Potential Utility Constraints	If there are no constraints such as large trees or underground utilities that would need to be relocated, then the project will earn the highest score.	7	7
	If there are utilities or vegetation present that would be easy to avoid, such as overhead electric or phone lines, then projects will earn this score.	5	
	If access is somewhat constrained, making it difficult for construction or maintenance vehicles to access the site, the project will earn a mid-range score.	3.5	
	If vegetation or utilities are present but relatively easy to avoid and access is only somewhat constrained, then projects will earn this score.	2.5	
	If there is poor access, major grading required, karst topography, or major utilities like a sewer line that must be moved, then a project will earn this score.	1	
	If there is poor access, major grading is required, major utilities must be moved, or karst topography is present, a project will earn the lowest score.	0	
Implementation Schedule	If a project can be implemented in under 12 months, with no permitting requirements, it will earn the highest score.	6	6
	If a project can be implemented in under 12 months with permitting requirements or a project can be implemented in 12 to 24 months with no permitting requirements, it will earn this score.	4	
	If a project can be implemented in 12 to 24 months with permitting requirements or a project cannot be implemented in under 2 years with no permitting requirements, it will earn this score.	2	
	If a project cannot be implemented in under 2 years with permitting requirements, it will earn the lowest score.	0	
Synergy	If a project can be incorporated within other city infrastructure plans and projects and it also provides environmental benefits beyond water quality benefits, then the project will earn the highest score.	5	5
	If a project can be incorporated within other city infrastructure plans and projects (including other potential BMPs) but does not provide additional environmental benefits, then it will earn this score.	4	
	If a project provides multi-purpose or environmental benefits beyond water quality benefits, then the project will earn a mid-range score.	2.5	
	A project will earn the lowest score if it provides only water quality benefits.	0	
Aesthetics / Visual Appeal	If a project adds landscaping or would enhance aesthetics at the site, it will earn the highest score.	2	2
	If the project neither detracts from aesthetics nor adds much in the way of value, or the project is out of general public view, it will earn a mid-range score.	1	
	If a project provides only water quality benefits and does not enhance aesthetics of a site, it will earn the lowest score.	0	

SWIP Identified Projects

Site Names - New Best Management Practices (BMPs)	Type	Total Ranking	TN Load Reduction (lb/yr)	TP Load Reduction (lb/yr)	TSS Load Reduction (lb/yr)
Parks and Recreation Facility - Waterman Drive	Veg Filter Strip	78.7	50.3	4.6	3,429
Ralph Sampson Park - Basketball Courts	Bioretention	76.4	30.7	2.0	1,154
Morrison Park	Veg Filter Strip	76.1	88.9	7.5	5,450
Maryland Ave - by Railroad Tracks	Veg Filter Strip	73.5	124.5	10.5	7,874
Waterman Elementary School	Bioretention	73.2	35.4	2.5	1,645
Westover Park (B)	Bioretention	73.0	21.0	1.5	960
Norwood Street Field	Bioretention	72.8	34.4	2.8	2,020
Ramblewood Road (2100 Block)	Veg Filter Strip	72.5	76.1	6.2	4,532
East Market Street Median	RSC	72.2	417.8	54.2	48,010
Kiwanis Park (B)	Veg Filter Strip	71.9	30.4	2.7	2,015
Ralph Sampson Park - Cul-de-sac	Veg Filter Strip	71.3	6.2	0.6	424
Westover Park (D)	Veg Filter Strip	67.3	5.0	0.4	323
Harrisonburg Central Stores (North)	Bioretention	66.3	24.8	2.3	1,731
Harrisonburg Public Works	Veg Filter Strip	65.5	7.3	0.6	544
Holy Myrrhbearers Orthodox Christian Church - S. Main Street	Veg Filter Strip	65.4	236.1	19.2	13,409
Chicago Avenue Bike Trail	Veg Filter Strip	64.8	9.4	0.9	706
Frazier Quarry	Veg Filter Strip	64.3	23.1	2.2	1,675
HEC Operations - N. Liberty Street (South)	Bioretention	64.0	39.3	3.5	2,878
Pheasant Run Townhomes	Veg Filter Strip	63.8	23.4	2.0	1,453
East Market Street (800 Block)	Veg Filter Strip	63.8	243.9	30.9	22,709
Electric Substation - Mt. Clinton Pike	Bioretention	63.2	22.7	2.3	1,757
Old South High Street	Bioretention	63.1	17.4	1.5	1,080
Emerson Lane beside Fine Earth Landscape Management	Veg Filter Strip	63.1	260.9	26.3	18,338
Massanutten Technical Center (B)	Veg Filter Strip	62.9	10.8	0.8	697
Harrisonburg Central Stores (South)	Bioretention	62.6	10.3	0.9	728
Harrisonburg Mennonite Church - South High Street (B)	Veg Filter Strip	62.2	15.3	1.5	1,116
Packaging Corporation of America - Pleasant Valley Road (A)	Veg Filter Strip	61.5	35.5	3.5	2,691
Motel 6 - South Main Street	Veg Filter Strip	61.1	24.6	1.9	1,353
Rockingham New Holland - W. Market Street	Veg Filter Strip	61.1	97.1	7.2	4,869
Harrisonburg Public Utilities	Wet Pond	61.0	235.3	31.5	24,240
Valley Mall (Popeye's)	Veg Filter Strip	61.0	289.2	45.3	34,604
HEC Operations - N. Liberty Street (North)	Bioretention	60.9	29.4	2.4	2,100
Hunters Ridge Apartments (E)	Veg Filter Strip	60.4	10.6	0.9	654
Waterman Drive (C)	Bioretention	60.3	32.3	2.9	2,103
First Church of the Brethren (Back)	Bioretention	59.8	22.2	2.0	1,501
Massanutten Technical Center (C)	Veg Filter Strip	59.4	8.7	0.7	687
Keister Elementary	Wet Pond	59.3	114.4	23.7	20,618
Harrisonburg Rescue Squad	Bioretention	59.2	7.2	0.6	465
Mosby Heights Bus Shelter	Bioretention	59.2	24.7	1.9	1,374
Packaging Corporation of America - Pleasant Valley Road (B)	Veg Filter Strip	59.1	5.7	0.4	334

Site Names - New Best Management Practices (BMPs)	Type	Total Ranking	TN Load Reduction (lb/yr)	TP Load Reduction (lb/yr)	TSS Load Reduction (lb/yr)
Holtzman Propane	Bioretention	58.8	49.0	3.5	2,370
Summit Avenue (South)	Veg Filter Strip	58.7	30.5	2.0	1,268
George's Inc. - N. Liberty Street	Veg Filter Strip	58.6	24.0	2.4	1,815
Waterman Drive (D)	Bioretention	58.5	27.8	2.5	1,810
First Church of the Brethren (Side)	Bioretention	58.3	11.1	1.0	693
Harrisonburg Public Utilities	Bioretention	57.3	8.6	0.7	630
Harrisonburg Mennonite Church - South High Street (A)	Bioretention	57.0	9.1	0.8	593
Purcell Park	Bioretention	56.9	18.1	1.4	1,291
Keister Elementary - Parking Lot	Bioretention	56.7	4.9	0.5	362
Fire Station #3 - Lucy Drive	Bioretention	56.6	4.0	0.4	284
Chestnut Ridge Apartments (B)	Veg Filter Strip	56.4	8.3	0.5	298
Tenneco Inc - Abbot Lane	Veg Filter Strip	56.3	30.3	2.6	2,069
Millwood Loop	Veg Filter Strip	55.9	45.2	4.0	2,944
Ramblewood Road (East)	Veg Filter Strip	55.9	12.7	0.6	271
Ramblewood Road (West)	Veg Filter Strip	55.5	12.5	0.6	302
Monroe Street (North)	Veg Filter Strip	55.5	15.5	1.0	963
Hardee's - Reservoir Street (B)	Bioretention	55.4	7.4	0.7	522
Waterman Drive (B)	Bioretention	55.3	62.9	4.9	3,380
Manheim Auto Auction	Veg Filter Strip	55.0	130.0	11.6	10,629
United Rentals - Leray Circle	Veg Filter Strip	55.0	64.1	5.4	4,215
Chestnut Ridge Apartments (A)	Veg Filter Strip	54.8	30.6	2.2	1,467
Waterman Drive (A)	Bioretention	54.7	48.1	3.3	2,136
Trinity Presbyterian Church (East)	Bioretention	54.1	4.9	0.5	335
Holly Court	Bioretention	54.0	27.8	2.4	1,735
Hardee's - Reservoir Street (A)	Bioretention	53.5	3.0	0.3	187
Heritage Oaks Golf Course Pond	Wet Pond	53.3	384.8	60.2	51,112
Trinity Presbyterian Church (West)	Bioretention	53.0	3.6	0.3	259
Liberty Square Community - Founders Way	Bioretention	52.6	100.6	8.7	6,323
Waterman Elementary School (North)	Bioretention	52.6	17.0	1.5	1,138
Hunters Ridge Apartments (F)	Veg Filter Strip	52.5	5.2	0.5	377
Valley Mall (Belk B)	Bioretention	52.5	16.9	1.7	1,289
Rockingham County Administrative Center	Bioretention	52.2	12.4	1.1	972
Blue Stone Hills Drive (100 Block)	Bioretention	52.0	31.1	2.0	1,357
Leray Circle	Bioretention	52.0	32.5	3.0	2,294
Foxhill Townhomes (A)	Bioretention	51.9	10.5	0.9	720
Pearl Lane (North)	Bioretention	51.8	10.3	0.6	366
Hardee's - Reservoir Street (C)	Bioretention	51.8	3.1	0.3	211
Emerald Drive Cul-de-sac	Bioretention	51.5	51.2	4.1	2,744
Target (Parking Lot)	Bioretention	51.4	15.8	1.6	1,173
University Place Condos - South Ave	Bioretention	50.6	20.0	1.3	873
Pearl Lane (South)	Bioretention	50.4	12.1	0.9	658
Westover Park (C)	Bioretention	50.4	3.0	0.3	204
Sandtrap Lane - NE Corner	Bioretention	50.2	41.4	3.1	2,151

Site Names - New Best Management Practices (BMPs)	Type	Total Ranking	TN Load Reduction (lb/yr)	TP Load Reduction (lb/yr)	TSS Load Reduction (lb/yr)
Valley Mall (Belk D)	Bioretention	49.6	5.8	0.6	440
Waterman Elementary School (South)	Bioretention	49.4	6.0	0.5	401
Pheasant Run Townhomes	Bioretention	48.9	28.9	2.1	1,803
Foxhill Townhomes (B)	Bioretention	48.8	4.9	0.5	341
United Bank - University Boulevard (East)	Veg Filter Strip	48.7	6.5	0.6	444
Mosby Heights Townhomes	Bioretention	48.7	15.6	1.2	1,113
West Side Baptist Church - W. Wolfe Street	Bioretention	48.3	23.8	2.1	1,575
Hunters Ridge Apartments (A)	Bioretention	48.0	2.8	0.2	162
Foxhill Townhomes Welcome Center - Devon Lane	Bioretention	47.6	4.8	0.4	334
Massanutten Regional Library	Bioretention	47.4	1.7	0.2	135
Valley Mall (Belk C)	Bioretention	47.2	3.4	0.3	262
Westover Park (A)	Shallow Marsh	47.2	5.7	0.9	805
Kenmore Street	Veg Filter Strip	47.0	20.7	1.6	1,108
Divine Unity Community Church - Country Club Road	Bioretention	46.7	11.7	1.0	900
Hampton Inn - University Blvd (North)	Bioretention	45.5	18.1	1.7	1,244
Sunchase Apartments	Wet Pond	45.5	70.5	13.6	13,300
Motel 6 - South Main Street	Wet Pond	45.2	72.3	12.1	10,550
Kiwanis Park (A)	Bioretention	45.2	6.0	0.5	394
Vista Terrace Estates - Blue Stone Hills Drive	Bioretention	45.0	60.3	5.2	3,733
Virginia Clean Cities - Technology Drive	Bioretention	44.6	16.6	1.3	1,118
Valley Mall (Kohl's B)	Bioretention	44.6	31.2	4.8	3,638
Mountain View Drive (1100 Block)	Bioretention	44.4	17.3	1.6	1,216
Virginia Mennonite Retirement Community	Wet Pond	44.0	252.9	44.1	39,537
Blue Stone Hills Dentistry and Benchmark Mortgage, Inc.	Bioretention	43.9	8.4	0.8	632
Valley Mall (Kohl's D)	Bioretention	43.3	1.5	0.1	111
Harrisonburg Hyundai (A)	Bioretention	42.8	13.5	1.3	1,006
Valley Mall (Kohl's C)	Bioretention	42.6	1.1	0.1	78
United Bank - University Boulevard (West)	Veg Filter Strip	42.5	4.5	0.4	323
Hampton Inn - University Blvd (South)	Bioretention	42.2	10.6	1.0	729
Valley Mall (JCPenney)	Veg Filter Strip	42.1	3.7	0.3	220
Valley Mall (Kohl's E)	Bioretention	41.5	9.9	1.5	1,155
Reherd Acres - Vine Street (900 Block - East)	Bioretention	41.0	12.2	1.2	898
Squire Hill Apartments	Bioretention	41.0	9.8	0.9	661
Evelyn Byrd Avenue (2500 block)	Bioretention	40.9	47.9	4.0	2,517
Harrisonburg Truck Services	Bioretention	40.9	10.0	1.0	723
EMU University Commons - Park Road	Bioretention	40.8	7.9	0.8	603
Linda Lane Quarry	Wet Pond	39.5	299.7	28.1	25,931
Hunters Ridge Apartments (D)	Veg Filter Strip	39.4	13.6	1.3	1,011
Massanutten Technical Center (A)	Bioretention	38.9	12.8	1.1	975
Target (Entrance)	Bioretention	38.9	11.6	1.1	672
Roses Stores	Bioretention	38.8	23.2	2.2	1,801
Valley Mall (Belk A)	Bioretention	38.2	5.4	0.5	417
Foxhill Townhomes (C)	Bioretention	37.9	5.1	0.5	345

Site Names - New Best Management Practices (BMPs)	Type	Total Ranking	TN Load Reduction (lb/yr)	TP Load Reduction (lb/yr)	TSS Load Reduction (lb/yr)
Hunters Ridge Apartments (C)	Bioretention	37.6	6.7	0.6	429
Valley Mall (Kohl's F)	Bioretention	35.6	1.8	0.2	138
Valley Mall (Wells Fargo)	Bioretention	35.1	6.5	0.6	439
Foxhill Townhomes (D)	Bioretention	34.1	5.2	0.5	356
Reherd Acres - Vine Street (900 Block - West)	Bioretention	34.0	3.9	0.3	250
IHOP - University Blvd	Bioretention	33.6	15.2	1.4	1,062
Harrisonburg Hyundai (E)	Bioretention	33.5	4.9	0.5	386
Harrisonburg Hyundai (B)	Bioretention	33.3	4.8	0.5	377
Harrisonburg Hyundai (G)	Bioretention	33.0	4.7	0.5	367
Hunters Ridge Apartments (B)	Bioretention	32.6	1.7	0.2	110
Valley Mall (Belk D)	Bioretention	32.4	3.7	0.4	264
Valley Mall (Kohl's A)	Bioretention	32.0	3.4	0.3	244
Harrisonburg Hyundai (D)	Bioretention	30.7	2.9	0.3	226
Suntrust Bank - East Market Street	Bioretention	30.5	8.1	0.8	594
Harrisonburg Hyundai (C)	Bioretention	30.4	2.5	0.3	197
Harrisonburg Hyundai (F)	Bioretention	29.0	0.8	0.1	63
University Fields at Port Road (C)	Bioretention	28.7	6.2	0.6	433
University Fields at Port Road (A)	Bioretention	27.4	2.7	0.2	183
University Fields at Port Road (B)	Bioretention	26.4	2.3	0.2	171

Site Names - BMP Retrofits	Type	Total Ranking	TN Load Reduction (lb/yr)	TP Load Reduction (lb/yr)	TSS Load Reduction (lb/yr)
Thomas Harrison Middle School - Beside Track & Basketball Court	Bioretention	77.0	94.3	6.8	4,766
Thomas Harrison Middle School	Bioretention	74.9	72.0	5.3	3,775
West Market Street - Beside Entrance to Thomas Harrison Middle School	Wet Pond	74.4	77.1	11.9	11,220
Lucy Simms School - East Washington Street	Bioretention	72.7	27.8	2.4	1,748
Massanutten Technical Center - Pleasant Valley Road	Veg Filter Strip	70.0	20.9	1.4	1,244
Stone Spring Elementary - Peach Grove Ave	Bioretention	67.4	45.2	3.3	2,320
Westover Park - Parking Lot Loop	Bioretention	65.3	12.5	1.3	975
Stone Spring Elementary - Near Track	Bioretention	65.1	43.4	3.6	2,748
West Market Street - Beside White House	Extended Detention	63.5	13.8	0.8	2,775
West Market Street - Beside Spotless Car Wash	Extended Detention	63.1	20.9	1.0	3,454
Erickson/Stone Spring Phase 2 - Stone Spring Bridge	Wet Pond	63.1	55.5	17.0	17,414
Manheim Auto Auction - Early Road	Wet Pond	59.8	105.5	14.1	17,248
EMU Wooded Trails	Enhanced Extended Detention	58.1	153.3	23.7	22,247
Skyline Middle School - Linda Lane	Extended Detention	56.1	12.1	0.6	1,155
Westover Park - S Dogwood Drive	Enhanced Extended Detention	52.7	42.7	22.3	5,246
Erickson/Stone Spring Phase 1 - Pear Street	Extended Detention	51.9	5.1	0.4	800
Spotswood Elementary School - Mountain View Drive	Bioretention	50.2	2.5	0.8	276
Virginia Clean Cities - Technology Drive	Bioretention	46.7	16.1	0.8	224
Smithland/Skyline Schools	Enhanced Extended Detention	45.1	0.0	6.4	0
Harrisonburg Nissan - East Market Street	Veg Filter Strip	44.2	9.1	0.4	0

Site Names - Stream Restorations	Type	Total Ranking	TN Load Reduction (lb/yr)	TP Load Reduction (lb/yr)	TSS Load Reduction (lb/yr)
North End Greenway Trail	Stream Restoration	55.1	595.0	86.0	40,475
Mountain View Drive	Stream Restoration	48.8	100.0	101.5	63,260
Keister Elementary School	Stream Restoration	45.2	78.9	71.9	47,410
East Mosby Rd to City Limits	Stream Restoration	42.6	856.5	787.8	512,559
EMU Gym	Stream Restoration	40.2	23.2	21.0	13,855
Charles Street to Ashby Avenue	Stream Restoration	39.0	79.6	78.9	50,466
Westover Park to South Willow Street	Stream Restoration	37.7	89.9	88.8	58,682
Mall Creek - Country Club Road	Stream Restoration	34.9	597.2	662.2	424,987
South Avenue to South Main Street	Stream Restoration	33.3	149.9	135.9	89,688
Mongers to Ohio Avenue	Stream Restoration	27.5	93.4	84.7	55,920
Heritage Oaks Golf Course	Stream Restoration	19.0	92.0	97.8	61,585
Ice House to Chesapeake Avenue	Stream Restoration	16.9	48.8	44.3	29,226