Human Resources and Finance Department

Human Resources

MEMORANDUM

TO: Femi Fletcher, Chief Examiner, and Civil Service Commission

FROM: Human Resources Staff

DATE: March 27, 2024

SUBJECT: Request to Establish Passing Scores – Firefighter/EMT

Action Requested

In order to publish an initial eligibility list, Human Resources staff requests the Commission to establish passing scores for the written examination at 76, and for the total, weighted written and subjective components of the examination for Firefighter/EMT at 52.

Background and Authority

Per *65 ILCS 5/10-2.1-6.3*:

In order to qualify for placement on the final eligibility register, an applicant's score on the written examination, before any applicable preference points or subjective points are applied, shall be at or above the minimum score as set by the Commission.

An initial eligibility list shall be posted containing those candidates who meet or exceed the passing score established by the Commission: The commission shall prepare and keep a register of persons whose total score is not less than the minimum score for passage and who have passed the physical ability examination.

A list of candidate scores, along with a disparate impact report, is attached to this memo. The recommended passing scores will place a total of 41 candidates on the initial eligibility list.

Recommendation

It is recommended that the Commission establish the following passing scores for this year's Firefighter/EMT examination:

Minimum raw written score: 76
Minimum total weighted score (written and subjective): 52

CITY OF URBANA

City of Urbana
Firefighter/EMT 2024
Initial Eligibility List

Application Number	Human Relations Score	Mechanical Score	Math Score	Reading Score	NTN Score	Weighted Exam	Raw Interview Score	Weighted Interview Score	Total
2049	71.67	88.00	100.00	100.00	89.92	35.97	84.40	50.64	86.61
16758	83.19	76.00	94.44	100.00	88.41	35.36	78.00	46.80	82.16
16477	84.86	96.00	94.44	100.00	93.83	37.53	71.60	42.96	80.49
17266	75.14	84.00	100.00	100.00	89.79	35.91	70.00	42.00	77.91
15271	79.58	68.00	94.44	100.00	85.51	34.20	69.00	41.40	75.60
17297	81.81	68.00	83.33	100.00	83.29	33.31	69.20	41.52	74.83
16969	75.42	80.00	94.44	100.00	87.47	34.99	65.60	39.36	74.35
17193	81.25	100.00	100.00	100.00	95.31	38.13	60.20	36.12	74.25
15216	93.54	92.00	100.00	100.00	96.39	38.55	58.60	35.16	73.71
16488	72.99	88.00	94.44	100.00	88.86	35.54	62.80	37.68	73.22
16788	95.56	92.00	100.00	100.00	96.89	38.76	56.20	33.72	72.48
16897	76.39	88.00	94.44	100.00	89.71	35.88	59.80	35.88	71.76
17196	91.04	80.00	94.44	100.00	91.37	36.55	54.40	32.64	69.19
7732	89.38	96.00	100.00	100.00	96.35	38.54	51.00	30.60	69.14
15112	73.19	92.00	94.44	100.00	89.91	35.96	54.80	32.88	68.84
16496	70.42	88.00	94.44	100.00	88.22	35.29	54.40	32.64	67.93
16591	80.90	68.00	88.89	100.00	84.45	33.78	56.40	33.84	67.62
16961	93.96	92.00	88.89	100.00	93.71	37.49	50.20	30.12	67.61
16859	79.86	100.00	100.00	100.00	94.97	37.99	48.60	29.16	67.15
15149	93.61	84.00	94.44	93.33	91.35	36.54	50.80	30.48	67.02
17250	91.04	72.00	94.44	100.00	89.37	35.75	51.60	30.96	66.71
16502	86.74	64.00	88.89	100.00	84.91	33.96	53.80	32.28	66.24
15184	82.71	68.00	77.78	100.00	82.12	32.85	55.20	33.12	65.97
15318	95.00	88.00	100.00	100.00	95.75	38.30	45.60	27.36	65.66
16918	81.94	68.00	94.44	100.00	86.10	34.44	52.00	31.20	65.64
16852	76.32	64.00	77.78	100.00	79.53	31.81	55.40	33.24	65.05
12564	87.22	80.00	100.00	100.00	91.81	36.72	46.00	27.60	64.32
2631	82.50	76.00	88.89	100.00	86.85	34.74	48.80	29.28	64.02
17006	71.32	92.00	94.44	100.00	89.44	35.78	46.40	27.84	63.62
16885	84.86	72.00	88.89	100.00	86.44	34.58	48.40	29.04	63.62
16652	74.03	92.00	88.89	100.00	88.73	35.49	46.80	28.08	63.57
16964	78.54	60.00	72.22	100.00	77.69	31.08	53.80	32.28	63.36
16861	95.56	92.00	83.33	100.00	92.72	37.09	42.20	25.32	62.41
14939	81.60	64.00	83.33	100.00	82.23	32.89	46.80	28.08	60.97
11985	85.69	88.00	94.44	100.00	92.03	36.81	40.00	24.00	60.81
16517	73.33	80.00	88.89	100.00	85.56	34.22	43.40	26.04	60.26
16873	74.10	72.00	83.33	100.00	82.36	32.94	43.80	26.28	59.22
16638	71.18	76.00	94.44	86.67	82.07	32.83	43.20	25.92	58.75
17247	84.38	72.00	100.00	100.00	89.10	35.64	36.80	22.08	57.72
16952	73.13	68.00	72.22	93.33	76.67	30.67	37.40	22.44	53.11
16443	75.14	92.00	94.44	86.67	87.06	34.83	29.20	17.52	52.35

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Disparate Impact Analysis

(an On-Line Internet based application)

Instructions: Please fill out the information into the form below. Once you have entered your data below, you may select the types of analysis to be conducted by checking the appropriate boxes. Then press the compute button at the bottom of the form to view the results.

Select the type of employment decision: Selection

Enter a title for your report:

DI Report - Firefighter Initial Eligibility List 2024

Sex		Race		Age		Disability	
Number of Male		Number of Non-Minority		Number of Younger		Number of Non-Disabled	
39	Applicants	29	Applicants		Applicants		Applicants
39	Selected	29	Selected		Selected		Selected
Number of Female		Number of Minority		Number of Older		Number of Disabled	
1	Applicants	11	Applicants		Applicants		Applicants
1	Selected	11	Selected		Selected		Selected

☑ -Adverse Impact ☑ -Chi-Square ☑ -Standard Deviation ☑ -Confidence Intervals ☑ Probability Distribution	Select the Statistical Tests you wish to execute by checking or unchecking the boxes on the left. Then press the 'Compute' button below.
	Compute
Display: ☑ Description of Statistic ☑ Interpretation of Results	

DI Report - Firefighter Initial Eligibility List 2024

Adverse-Impact Report

Adverse Impact and the "four-fifths rule." - A selection rate for any race, sex, or ethnic group which is less than four-fifths (4/5ths) (or eighty percent) of the rate for the group with the highest rate will generally be regarded by the Federal enforcement agencies as evidence of adverse impact. *Uniform Guidelines on Employee Selection Procedures*

Rate of Female Applicants Selected	Rate of Male Applicants Selected	Adverse Impact Ratio for Female	Adverse Impact Ratio for Male
(1/1) = 1	(39/39) = 1	(1/1)=1	(1/1)=1
Adverse impact as defined by the 4/5ths rule was not found in the above data.			

Rate of Minority Applicants Selected	Rate of NonMinority Applicants Selected	Adverse Impact Ratio for Minority	Adverse Impact Ratio for NonMinority
(11/11) = 1	(29/29) = 1	(1/1)=1	(1/1)=1
Adverse impact as defined by the 4/5ths rule was not found in the above data.			

Chi-Square Report

Observed Expected	Selected	Not Selected	Row Totals
Male	39 39	0 0	39
Female	1 1	0 0	1
Column Total	40	0	40
Chi-Square = NaN **The value of the statistic is less than 3.841. This indicates that there is a 95 percent chance that these results have been obtained absent any form of bias. Therefore, you may conclude that these results fall within normal random variations and are not the result of bias.**			

Observed Expected	Selected	Not Selected	Row Totals
NonMinority	29 29	0 0	29
Minority	11 11	0 0	11
Column Total	40	0	40
Chi-Square = NaN **The value of the statistic is less than 3.841. This indicates that there is a 95 percent chance that these results have been obtained absent any form of bias. Therefore, you may conclude that these results fall within normal random variations and are not the result of bias.**			

Standard-Deviation Report

The difference between the proportion of the protected class Selected and the proportion of all Applicants Selected has a normal distribution with a mean and standard deviation. The statistic is shown below:

```
          (r / n) - p
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sqrt(p * (1-p) / n) * sqrt(1-q)
```

***Analysis of proportion of Female Selected*where:**

- **r = number of Female Selected.**
- **n = number of Selected (Female and Male).**
- **p = proportion of Applicants that are Female.**
- **q = proportion of Applicants Selected.**

	Selected	Not Selected	Row Totals
Male	39	0	39
Female	1	0	1
Column Total	40	0	40

r = 1
n = 40
p = 1 / 40 = 0.025
q = (1 + 39) / (1 + 39) = 1

Standard Deviation Statistic = NaN

These results show that the proportion of Female Selected is NaN standard deviations below the proportion of Applicants Selected.A result of less than 2 standard deviations is generally considered non-significant.

***Analysis of proportion of Minority Selected*where:**

- **r = number of Minority Selected.**
- **n = number of Selected (Minority and NonMinority).**
- **p = proportion of Applicants that are Minority.**
- **q = proportion of Applicants Selected.**

	Selected	Not Selected	Row Totals
NonMinority	29	0	29
Minority	11	0	11
Column Total	40	0	40

r = 11
n = 40
p = 11 / 40 = 0.275
q = (11 + 29) / (11 + 29) = 1

Standard Deviation Statistic = NaN

These results show that the proportion of Minority Selected is NaN standard deviations below the proportion of Applicants Selected.A result of less than 2 standard deviations is generally considered non-significant.

Confidence Interval Report

The proportion of the protected class Selected has an expected value that would fall within a specified confidence interval.
The statistic is shown below:
Observed value = (r / n)
Expected value = p

Standard Deviation = sqrt(p * (1-p) / n) * sqrt(1-q)

Confidence Interval:
Lower Bound = p - 1.96 * Std Dev
Upper Bound = p + 1.96 * Std Dev

Analysis of proportion of Female Applicants Selected**where:**

- **r = number of Female Selected.**
- **n = number of Applicants Selected.**
- **p = proportion of Female among those Selected.**
- **q = proportion of Applicants Selected.**

r = 1
n = 40
p = (1/(1+39))=0.025
q = ((1 + 39)/(1 + 39))=1
(r/n)=1/40=0.025

The lower bound of the confidence interval is: 0.025-(1.96*0)=0.025
The upper bound of the confidence interval is: 0.025+(1.96*0)=0.025

Confidence Interval = 0.025 to 0.025

These results show that the proportion of Applicants Selected who were Female (r/n=0.025) is not contained in the confidence interval. Therefore a finding of disparate impact is supported by this data.

Analysis of proportion of Minority Applicants Selected**where:**

- **r = number of Minority Selected.**
- **n = number of Applicants Selected.**
- **p = proportion of Minority among those Selected.**
- **q = proportion of Applicants Selected.**

r = 11
n = 40
p = (11/(11+29))=0.275
q = ((11 + 29)/(11 + 29))=1
(r/n)=11/40=0.275

The lower bound of the confidence interval is: 0.275-(1.96*0)=0.275
The upper bound of the confidence interval is: 0.275+(1.96*0)=0.275

Confidence Interval = 0.275 to 0.275

These results show that the proportion of Applicants Selected who were Minority (r/n=0.275) is not contained in the confidence interval. Therefore a finding of disparate impact is supported by this data.

Probability Distribution Report

Number Female Selected	Number Male Selected	Rate of Female Applicants Selected	Rate of Male Applicants Selected	Adverse Impact Ratio of Female	Adverse Impact against Female ?	Probability	Cumulative Probability
Selected->1	39	(1/1)	(39/39)	1	NO	1	1

Given that 40 were Selected from a pool of 39 Male and 1 Female it was possible to have Selected from 1 to 1 females.

Adverse Impact would be found if you Selected 0 or fewer Female.

The probability of Adverse Impact occurring even if the employment decisions were random (i.e. unbiased) is 0 (the sum of the probabilities of having Selected 0 or fewer Female).

Since the probability of Adverse Impact occurring even if the selection was random (i.e. unbiased) is less than 10%, an observed Adverse Impact may be significant since there is a low probability that Adverse Impact would have occurred by chance.

Probability Distribution of the variable: Number of Female Selected.

1

Number of female Applicants Selected

The probability distribution of having Selected from 1 to 1 females is displayed above. The graph above is shown starting with 1 since the probabilities below this point are near zero. As can be seen, the most likely event (highest probability) to have occurred by chance (or decisions not affected by any form of bias) is to have Selected 1 female Applicants. This represents the mean of the probability distribution. Approximately half of the probability distribution is above this point and approximately half is below this point. The total area contained in the probability distribution is equal to 1. Thus, probabilities for each number of female Applicants Selected are a fraction of the total probability distribution. The larger areas of the distribution represent higher probabilities of occurance. Adding the individual probabilities up to a certain point enable you to compute the probability of having Selected that many or fewer females Applicants. Adding the individual probabilities from a certain point and higher enable you to compute the probability of having Selected that many or more females Applicants.

The characteristics of the probability distribution--its mean and standard deviation--are a function of the number of female and male Applicants and the number of Applicants to be Selected. Though it is possible to have Selected from 1 to 1 female Applicants, the individual probabilities of having Selected each number of female Applicants can be computed and accumulated. As noted before, these individual probabilities are a function of the number of female and male Applicants and the number of Applicants to be Selected.

Using the distribution above, a 90 percent confidence interval on the variable 'Number of Female Selected' would have a lower bound of 1 and an upper bound of 1.

The significance of having Selected 1 or fewer Female is graphically displayed below.

1

Number of female Applicants Selected

As noted earlier, Adverse Impact, according to the 4/5ths rule, would be found if you Selected 0 *or fewer* female Applicants.

You have Selected 1 female Applicants. The probability of having Selected 1 *or fewer* Female is equal to the cumulative probability for having Selected 1 Female Applicants. The cumulative probability of having Selected 1 female Applicants is 1 and is graphically displayed, in red, above.

Since the probability is greater than 10%, we are unable to reject the hypothesis that the decisions occurred due to chance. Therefore, we must conclude that it is entirely possible that having Selected 1 or fewer female Applicants is an event that occurred due to chance and not from discriminatory actions by the employer.

Probability Distribution Report

Number Minority Selected	Number NonMinority Selected	Rate of Minority Applicants Selected	Rate of NonMinority Applicants Selected	Adverse Impact Ratio of Minority	Adverse Impact against Minority ?	Probability	Cumulative Probability
Selected->11	29	(11/11)	(29/29)	1	NO	1	1

Given that 40 were Selected from a pool of 29 NonMinority and 11 Minority it was possible to have Selected from 11 to 11 minorities.

Adverse Impact would be found if you Selected 0 or fewer Minority.

The probability of Adverse Impact occurring even if the employment decisions were random (i.e. unbiased) is 0 (the sum of the probabilities of having Selected 0 or fewer Minority).

Since the probability of Adverse Impact occurring even if the selection was random (i.e. unbiased) is less than 10%, an observed Adverse Impact may be significant since there is a low probability that Adverse Impact would have occurred by chance.

Probability Distribution of the variable: Number of Minority Selected.

11

Number of minority Applicants Selected

The probability distribution of having Selected from 11 to 11 minorities is displayed above. The graph above is shown starting with 11 since the probabilities below this point are near zero. As can be seen, the most likely event (highest probability) to have occurred by chance (or decisions not affected by any form of bias) is to have Selected 11 minority Applicants. This represents the mean of the probability distribution. Approximately half of the probability distribution is above this point and approximately half is below this point. The total area contained in the probability distribution is equal to 1. Thus, probabilities for each number of minority Applicants Selected are a fraction of the total probability distribution. The larger areas of the distribution represent higher probabilities of occurance. Adding the individual probabilities up to a certain point enable you to compute the probability of having Selected that many or fewer minorities Applicants. Adding the individual probabilities from a certain point and higher enable you to compute the probability of having Selected that many or more minorities Applicants.

The characteristics of the probability distribution--its mean and standard deviation--are a function of the number of minority and non-minority Applicants and the number of Applicants to be Selected. Though it is possible to have Selected from 11 to 11 minority Applicants, the individual probabilities of having Selected each number of minority Applicants can be computed and accumulated. As noted before, these individual probabilities are a function of the number of minority and non-minority Applicants and the number of Applicants to be Selected.

Using the distribution above, a 90 percent confidence interval on the variable 'Number of Minority Selected' would have a lower bound of 11 and an upper bound of 11.

The significance of having Selected 11 or fewer Minority is graphically displayed below.

11

Number of minority Applicants Selected

As noted earlier, Adverse Impact, according to the 4/5ths rule, would be found if you Selected 0 *or fewer* minority Applicants.

You have Selected 11 minority Applicants. The probability of having Selected 11 *or fewer* Minority is equal to the cumulative probability for having Selected 11 Minority Applicants. The cumulative probability of having Selected 11 minority Applicants is 1 and is graphically displayed, in red, above.

Since the probability is greater than 10%, we are unable to reject the hypothesis that the decisions occurred due to chance. Therefore, we must conclude that it is entirely possible that having Selected 11 or fewer minority Applicants is an event that occurred due to chance and not from discriminatory actions by the employer.

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