Memorandum

Human Resources Division

TO: Vacellia Clark, Chief Examiner
Civil Service Commission

FROM: Human Resources Staff

RE: Establish a Passing Score for the Planner I register

DATE: July 23, 2014

A. Summary

City of Urbana Human Resources staff recommends a passing score of 50 percent using the application as the Civil Service Exam. This would result in an eligibility register of 14 candidates.

B. Background

The position was open for applications from May 30 – June 22, 2014; in response, the City received 36 applications for the position.

Numerically, the breakdown of applicants is as follows:

Male	28	78%
Female	7	19%
No response or "n/a"	1	3%

Non-Minority	30	83%
Minority	5	14%
No response or "n/a"	1	3%

C. Application Screening

The scoring plan utilized to evaluate applications is detailed in Appendix A of this memo. A total of 20 points were possible. Points were also given for related experience, knowledge of relevant software programs, and certifications from the International Code Council (ICC).

Using this scoring plan, the following statistics are observed:

Average	29%	Max	75%
Median	30%	Min.	0%

D. Passing Score and Recommendation

The hiring manager for this position requests that the passing score be established at 50 percent. At this score, the resulting register will consist of 14 candidates. HR staff concurs with the hiring manager to establish the register based on a 50% passing score to allow for a well-qualified candidate pool for consideration. According to the Adverse/Disparate impact report (Appendix B), adverse impact to minority groups is observed using the "4/5ths Rule"; however, further analyses using more sophisticated measurement tools including the standard deviation and confidence interval indicates that the number of

minority candidates selected at this pass rate is likely the result of random selection and bias is not supported by the data.

	Applied	On Register
Males	28	12
Females	7	1
n/a	1	1

	Applied	On Register
Non-Minority	30	12
Minority	5	1
n/a	1	1

E. Attachments

Appendix A: Application Exam Scoring Plan

Appendix B: Disparate Impact Report for a 50% Passing Score

Appendix A: Application Exam Scoring Plan

1. Please select the box that represents the highest level of education achieved to date.
    a. No diploma or degree (0 pts.)
    b. High School diploma or equivalent (0 pts.)
    c. Some College or Technical Training (1 pt.)
    d. Associate's degree (2 pts.)
    e. Bachelor's degree or higher (3 pts.)

2. Do you have at least two years of experience in any of the following? (1 pt. each, 5 pts. possible)
    a. Building construction experience
    b. Journey level trades
    c. Contractor for a variety of building construction projects
    d. Relevant code enforcement activities
    e. Other related experience
    f. None of these

3. Do you have direct, professional experience and/or training with any of the following? (1 pt. each, 4 pts. possible)
    a. Conducting building inspections and code enforcement.
    b. Complaint investigation and resolution.
    c. Preparing and presenting cases.
    d. Experience and/or training as a housing inspector.
    e. None of these

4. Select the software programs you have experience with: (1 pt. each, 6 pts. possible)
    a. Word
    b. Excel
    c. Access
    d. E-mail
    e. Adobe (creating .pdf)
    f. Permit software (e.g., Permits Plus, Citizen Serve, etc.)
    g. None of these

5. Do you currently possess a valid I.C.C. Property Maintenance or other Inspection Certificate? (2 pts. possible)
    a. Yes
    b. No

Appendix B
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: [Housing Inspector (7.23.2014)]

Number of Male		Number of Non-Minority		Number of Younger		Number of Non-Disabled	
28	Applicants	30	Applicants		Applicants		Applicants
12	Selected	12	Selected		Selected		Selected
Number of Female		Number of Minority		Number of Older		Number of Disabled	
7	Applicants	5	Applicants		Applicants		Applicants
1	Selected	1	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

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 Females Applicants Selected	Rate of Males Applicants Selected	Adverse Impact Ratio for Females	Adverse Impact Ratio for Males
(1/ 7) = 0.1429	(12/ 28) = 0.4286	(0.1429/ 0.4286)= 0.33	(0.4286/ 0.1429)= 3

The Adverse Impact Ratio for Females is less than 0.80.
Females Applicants are Selected at a rate less than 80% (4/5ths) of the rate that Males Applicants are Selected.

Rate of Minorities Applicants Selected	Rate of Non-Minorities Applicants Selected	Adverse Impact Ratio for Minorities	Adverse Impact Ratio for Non-Minorities
(1/ 5) = 0.2	(12/ 30) = 0.4	(0.2/ 0.4)= 0.5	(0.4/ 0.2)= 2

The Adverse Impact Ratio for Minorities is less than 0.80.
Minorities Applicants are Selected at a rate less than 80% (4/5ths) of the rate that Non-Minorities Applicants are Selected.

Chi-Square Report

Observed Expected	Selected	Not Selected	Row Totals
Males	12 10.4	16 17.6	28
Females	1 2.6	6 4.4	7
Column Total	13	22	35

Chi-Square = 1.958
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
Non-Minorities	12 11.1429	18 18.8571	30

Minorities	1 1.8571	4 3.1429	5
Column Total	13	22	35

Chi-Square = 0.7343
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:

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      (r / n) - p

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 sqrt(p * (1-p) / n) * sqrt(1-q)
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Analysis of proportion of Females Selected **where:**

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

	Selected	Not Selected	Row Totals
Males	12	16	28
Females	1	6	7
Column Total	13	22	35

r = 1
n = 13
p = 7 / 35 = 0.2
q = (1 + 12) / (7 + 28) = 0.371

Standard Deviation Statistic = -1.399

These results show that the proportion of Females Selected is -1.399 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 Minorities Selected **where:**

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

	Selected	Not Selected	Row Totals
Non-Minorities	12	18	30
Minorities	1	4	5
Column Total	13	22	35

r = 1
n = 13
p = 5 / 35 = 0.143
q = (1 + 12) / (5 + 30) = 0.371

Standard Deviation Statistic = -0.857

These results show that the proportion of Minorities Selected is -0.857 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 Females Applicants Selected **where:**

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

r = 1
n = 13
p = (7/(7+28))=0.2
q = ((1 + 12)/(7 + 28))=0.371
(r/n)=1/13=0.0769

The lower bound of the confidence interval is: 0.2 -(1.96* 0.088)= 0.0276
The upper bound of the confidence interval is: 0.2 +(1.96* 0.088)= 0.3724

Confidence Interval = 0.0276 to 0.3724

These results show that the proportion of Females Females (r/n=0.0769) is contained in the confidence interval. Therefore a finding of disparate impact is not supported by this data.

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

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

r = 1
n = 13
p = (5/(5+30))=0.143
q = ((1 + 12)/(5 + 30))=0.371
(r/n)=1/13=0.0769

The lower bound of the confidence interval is: 0.143 -(1.96* 0.077)= -0.008
The upper bound of the confidence interval is: 0.143 +(1.96* 0.077)= 0.2937

Confidence Interval = -0.008 to 0.2937

These results show that the proportion of Minorities Minorities (r/n=0.0769) is contained in the confidence interval. Therefore a finding of disparate impact is not supported by this data.

Probability Distribution Report

| Number Females Selected	Number Males Selected	Rate of Females Applicants Selected	Rate of Males Applicants Selected	Adverse Impact Ratio of Females	Adverse Impact against Females ?	Probability	Cumulative Probability
0	13	(0/7)	(13/28)	0	YES	0.025362	0.025362
Selected-> 1	12	(1/7)	(12/28)	0.3333	YES	0.144244	0.169605
2	11	(2/7)	(11/28)	0.7273	YES	0.305457	0.475062
3	10	(3/7)	(10/28)	1.2	NO	0.311114	0.786176
4	9	(4/7)	(9/28)	1.7778	NO	0.163744	0.94992
5	8	(5/7)	(8/28)	2.5	NO	0.044211	0.994131
6	7	(6/7)	(7/28)	3.4286	NO	0.005614	0.999745
7	6	(7/7)	(6/28)	4.6667	NO	0.000255	1

Given that 13 were Selected from a pool of 28 Males and 7 Females it was possible to have Selected from 0 to 7 Females.

Adverse Impact would be found if you Selected 2 or fewer Females.

The probability of Adverse Impact occurring even if the employment decisions were random (i.e. unbiased) is 0.4751 (the sum of the probabilities of having Selected 2 or fewer Females).

Since the probability of Adverse Impact occurring even if the employment decisions were random (i.e. unbiased) is greater than 10%, an observed Adverse Impact may be not significant since the probability is greater than 1 in 10 that Adverse Impact would have occurred due to chance.

Probability Distribution of the variable: Number of Females Selected.

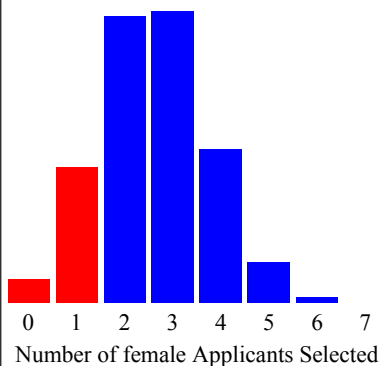Number of female Applicants Selected
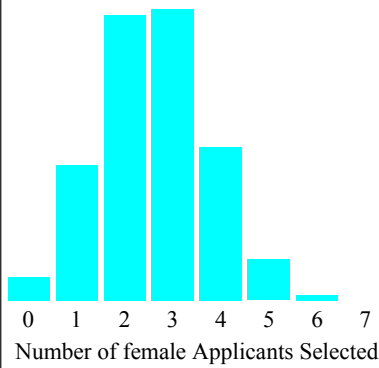
The probability distribution of having Selected from 0 to 7 Females is displayed above. As can be seen, the most likely event (highest probability) to have occurred by chance (or decisions not affected by any form of bias) is to have Selected 3 female Applicants. This represents the mean of the probability 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 female Applicants. Adding the individual probabilities from a certain point and higher enable you to compute the probability of having Selected that many or more female 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 0 to 7 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 Females Selected' would have a lower bound of 1 and an upper bound of 5.

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

Number of female Applicants Selected

As noted earlier, Adverse Impact, according to the 4/5ths rule, would be found if you Selected 2 *or fewer* female Applicants.

You have Selected 1 female Applicants. The probability of having Selected 1 *or fewer* Females is equal to the cumulative probability for having Selected 1 Females Applicants. The cumulative probability of having Selected 1 female Applicants is 0.1696 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.

| Number Minorities Selected	Number Non-Minorities Selected	Rate of Minorities Applicants Selected	Rate of Non-Minorities Applicants Selected	Adverse Impact Ratio of Minorities	Adverse Impact against Minorities ?	Probability	Cumulative Probability
0	13	(0/5)	(13/30)	0	YES	0.08112	0.08112
Selected-> 1	12	(1/5)	(12/30)	0.5	YES	0.292932	0.374051
2	11	(2/5)	(11/30)	1.0909	NO	0.370019	0.74407
3	10	(3/5)	(10/30)	1.8	NO	0.20351	0.947581
4	9	(4/5)	(9/30)	2.6667	NO	0.048455	0.996036
5	8	(5/5)	(8/30)	3.75	NO	0.003964	1

Given that 13 were Selected from a pool of 30 Non-Minorities and 5 Minorities it was possible to have Selected from 0 to 5 Minorities.

Adverse Impact would be found if you Selected 1 or fewer Minorities.

The probability of Adverse Impact occurring even if the employment decisions were random (i.e. unbiased) is 0.3741 (the sum of the probabilities of having Selected 1 or fewer Minorities).

Since the probability of Adverse Impact occurring even if the employment decisions were random (i.e. unbiased) is greater than 10%, an observed Adverse Impact may be not significant since the probability is greater than 1 in 10 that Adverse Impact would have occurred due to chance.

Probability Distribution of the variable: Number of Minorities Selected.

0   1   2   3   4   5

Number of minority
Applicants Selected
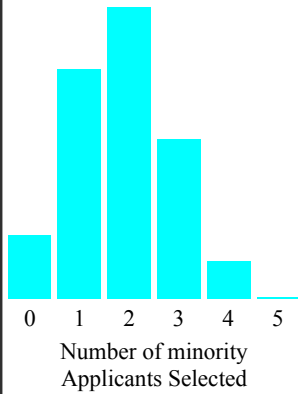
The probability distribution of having Selected from 0 to 5 Minorities is displayed above. As can be seen, the most likely event (highest probability) to have occurred by chance (or decisions not affected by any form of bias) is to have Selected 2 minority Applicants. This represents the mean of the 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 minority Applicants. Adding the individual probabilities from a certain point and higher enable you to compute the probability of having Selected that many or more minority 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 0 to 5 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 Minorities Selected' would have a lower bound of 0 and an upper bound of 4.

The significance of having Selected 1 or fewer Minorities is graphically displayed below.
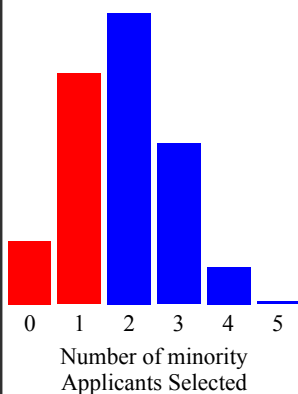
0   1   2   3   4   5

Number of minority
Applicants Selected

As noted earlier, Adverse Impact, according to the 4/5ths rule, would be found if you Selected 1 *or fewer* minority Applicants.

You have Selected 1 minority Applicants. The probability of having Selected 1 *or fewer* Minorities is equal to the cumulative probability for having Selected 1 Minorities Applicants. The cumulative probability of having Selected 1 minority Applicants is 0.3741 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 minority Applicants is an event that occurred due to chance and not from discriminatory actions by the employer.

Disparate Impact analysis: a program by hr-software.net to analyze employment decisions for a variety of EE...

View Source Code

Send questions or comments to webmaster@hr-guide.com. Thank you.

Monday, July 21, 2014