Memorandum

Human Resources Division

TO: Vacellia Clark, Chief Examiner
Civil Service Commission

FROM: Human Resources Staff

RE: Establish a Passing Score for ARMS Programmer/Analyst

DATE: January 29, 2014

A. Summary

City of Urbana Human Resources staff recommends a passing score of 65% using the application as the Civil Service Exam. This would result in an eligibility register of 5 candidates.

B. Background

The position was open for applications from Nov. 1, 2013 – Jan. 17, 2014; in response, the City received 10 applications for the position.

Numerically, the breakdown of applicants is as follows:

Male	6	60%
Female	4	40%
No response or "n/a"	0	–

Non-Minority	7	70%
Minority	2	20%
No response or "n/a"	1	10%

C. Application Screening

The scoring plan utilized to evaluate applications is detailed in Appendix A of this memo. A total of 31 points were possible. Scores of over 100 percent were possible due to additional related certifications, knowledge and experience with computer programming languages, and/or Civil Service preference points

Qualifications include:

1) An associate's degree in an IT-related field and four (4) years of work experience in programming and operation or a bachelor's degree in an IT-related field and two (2) related years of comparable experience (or equivalent experience and education).
2) Knowledge of structured computer programming, SQL, file maintenance procedures and relational database design.
3) Knowledge of modern iSeries communication protocols utilizing TCPIP.
4) Ability to efficiently operate and control the IBM iSeries computer.

Using this scoring plan, the following statistics are observed:

Average	40%	Max	84%
Median	44%	Min.	0%

D. Passing Score and Recommendation

The hiring manager for this position requests that the passing score be established at 65 percent; at this score, the resulting register will consist of 5 candidates. HR staff concurs with the hiring manager to establish the register based on a 65% passing score to allow for the best-qualified candidate pool for consideration.

According to the Adverse/Disparate impact report (Appendix B), adverse impact to women 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 female candidates selected at this pass rate is likely the result of random selection and bias is not supported by the data.

	Applied	On Register
Men	6	4
Women	4	1
n/a	0	0

	Applied	On Register
Non-Minority	7	5
Minority	2	0
n/a	1	0

E. Attachments

Appendix A: Application Exam Scoring Plan

Appendix B: Disparate Impact Report for a 44% Passing Score

Appendix C: ARMS Programmer-Analyst job description

Appendix A: Application Exam Scoring Plan

1. Which best describes your highest level of education completed?

High school or GED **(0)**
Some college but no degree **(1)**
Associate's degree **(2)**
Bachelor's degree **(3)**
Master's degree or higher **(4)**
Did not graduate high school **(0)**

2. In reference to the above question, was your major course work in Information Technology or a related field?

Yes **(2)**
No **(0)**

Questions of experience refer to full-time, professional work. If you have worked part time, you must adjust the experience you are reporting accordingly. For example, if you worked part-time at 20 hours per week for two years, this is equivalent to one (1) year of full-time experience (40 hrs./week). The work experience you report should also be reflected in the Work Experience section of this application. Be sure to include the specific job title, job duties, and the organization and dates where the work was performed in your narrative.

3. How many years of full-time employment experience do you have as a programmer?

Fewer than 2 years **(0)**
At least 2 years to 4 years **(1)**
Over 4 years to 7 years **(2)**
Over 7 years to 10 years **(3)**
More than ten years **(4)**

4. How many years of verifiable work experience do you have in writing mainframe or mid-size application programs?

None **(0)**
Less than 1 year **(1)**
1-3 years **(2)**
4-7 years **(3)**
8-10 years **(4)**
More than ten years **(5)**

5. Do you have experience working with IBM iSeries computer systems?

- Yes **(2)**
- No **(0)**

5b. Please provide a brief narrative supporting your answer to the above question.

6. How much MS SQL experience do you have?

- None **(0)**
- Less than 1 year **(1)**
- Over 1 year to 3 years **(2)**
- Over 3 years to 6 years **(3)**
- Over 6 years to 9 years **(4)**
- More than 10 years **(5)**

6b. Please provide a narrative supporting your answer to the above question.

7. If you have any Information Technology certifications, please list them in the box below. If you do not have any, please type NA.

8. If you have experience with programming languages, please list them in the box below. If you do not have any, please type NA. **(1 pt. each)**

9. With which of the following software development life cycle activities do you have professional work experience? Check all that apply. **(1 pt. each)**

- Design
- Development
- Testing
- Implementation
- Support
- None of the above

10. Briefly describe your professional work experience with the above software development life cycle activities, referencing positions listed on your application/resume. If you do not have this experience, type "None" in the space provided.

11. Do you have experience in web development (HTML, CSS, DHTML)?

- Yes **(2)**
- No **(0)**

11b. Please provide a narrative supporting your answer to the above question.

12. Do you have experience you have working in local government information technology/programs?

- Yes **(2)**
- No **(0)**

12b. Please provide a narrative supporting your answer to the above question.

13. Are you willing to travel to Urbana, Illinois at your own expense, for a job interview?

14. This position requires the completion of a comprehensive background investigation including criminal background, credit, employment, and reference checks. Are you willing to participate in the comprehensive investigation?

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: ARMS Programmer/Analyst

Number of Male	Number of Non-Minority	Number of Younger	Number of Non-Disabled
6 Applicants	7 Applicants	Applicants	Applicants
4 Selected	5 Selected	Selected	Selected
Number of Female	**Number of Minority**	**Number of Older**	**Number of Disabled**
4 Applicants	2 Applicants	Applicants	Applicants
1 Selected	0 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

ARMS Programmer/Analyst

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/ 4) = 0.25	(4/ 6) = 0.6667	(0.25/ 0.6667)= 0.38	(0.6667/ 0.25)= 2.67
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
(0/ 2) = 0	(5/ 7) = 0.7143		
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
Males	4 3	2 3	6
Females	1 2	3 2	4
Column Total	5	5	10
Chi-Square = 1.6667 **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	5 3.8889	2 3.1111	7
Minorities	0 1.1111	2 0.8889	2
Column Total	5	4	9

Chi-Square = 3.2143
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 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	4	2	6
Females	1	3	4
Column Total	5	5	10

r = 1
n = 5
p = 4 / 10 = 0.4
q = (1 + 4) / (4 + 6) = 0.5

Standard Deviation Statistic = -1.291

These results show that the proportion of Females Selected is -1.291 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	5	2	7
Minorities	0	2	2
Column Total	5	4	9

r = 0
n = 5
p = 2 / 9 = 0.222
q = (0 + 5) / (2 + 7) = 0.556

Standard Deviation Statistic = -1.793

These results show that the proportion of Minorities Selected is -1.793 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 = 5
p = (4/(4+6))=0.4
q = ((1 + 4)/(4 + 6))=0.5
(r/n)=1/5=0.2

The lower bound of the confidence interval is: 0.4 -(1.96* 0.155)= 0.0964
The upper bound of the confidence interval is: 0.4 +(1.96* 0.155)= 0.7036

Confidence Interval = 0.0964 to 0.7036

These results show that the proportion of Females Females (r/n=0.2) 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 = 0
n = 5
p = (2/(2+7))=0.222
q = ((0 + 5)/(2 + 7))=0.556
(r/n)=0/5=0

The lower bound of the confidence interval is: 0.222 -(1.96* 0.124)= -0.0207
The upper bound of the confidence interval is: 0.222 +(1.96* 0.124)= 0.4652

Confidence Interval = -0.0207 to 0.4652

These results show that the proportion of Minorities Minorities (r/n=0) 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	5	(0/4)	(5/6)	0	YES	0.02381	0.02381
Selected-> 1	4	(1/4)	(4/6)	0.375	YES	0.238095	0.261905
2	3	(2/4)	(3/6)	1	NO	0.47619	0.738095
3	2	(3/4)	(2/6)	2.25	NO	0.238095	0.97619
4	1	(4/4)	(1/6)	6	NO	0.02381	1

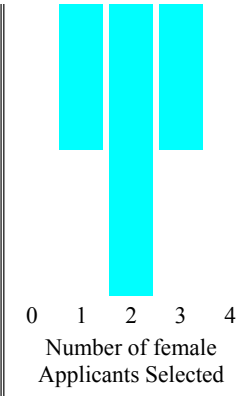
Given that 5 were Selected from a pool of 6 Males and 4 Females it was possible to have Selected from 0 to 4 Females.

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

The probability of Adverse Impact occurring even if the employment decisions were random (i.e. unbiased) is 0.2619 (the sum of the probabilities of having Selected 1 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.

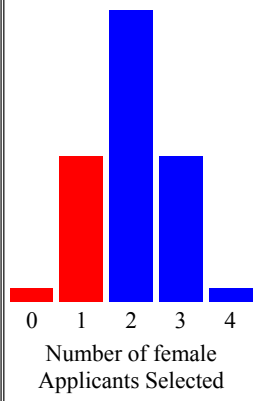


The probability distribution of having Selected from 0 to 4 Females is displayed above. As can be seen, the most likely event (highest probability) to have occurred by chance (or decisions not affected by any form of bias) is to have Selected 2 female Applicants. This represents the mean of the probability 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 4 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 3.

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



As noted earlier, Adverse Impact, according to the 4/5ths rule, would be found if you Selected 1 *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 0.2619 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
Selected-> 0	5	(0/2)	(5/7)	0	YES	0.166667	0.166667
1	4	(1/2)	(4/7)	0.875	NO	0.555556	0.722222
2	3	(2/2)	(3/7)	2.3333	NO	0.277778	1

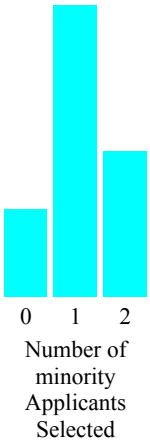
Given that 5 were Selected from a pool of 7 Non-Minorities and 2 Minorities it was possible to have Selected from 0 to 2 Minorities.

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

The probability of Adverse Impact occurring even if the employment decisions were random (i.e. unbiased) is 0.1667 (the sum of the probabilities of having Selected 0 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.

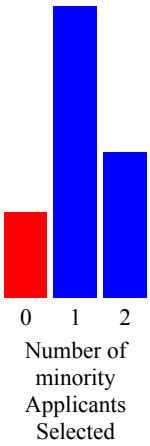


The probability distribution of having Selected from 0 to 2 Minorities is displayed above. As can be seen, the most likely event (highest probability) to have occurred by chance (or decisions not affected by any form of bias) is to have Selected 1 minority Applicants. This represents the mean of the 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 2 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 2.

The significance of having Selected 0 or fewer Minorities is graphically displayed below.



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 0 minority Applicants. The probability of having Selected 0 *or fewer* Minorities is equal to the cumulative probability for having Selected 0 Minorities Applicants. The cumulative probability of having Selected 0 minority Applicants is 0.1667 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 0 or fewer minority Applicants is an event that occurred due to chance and not from discriminatory actions by the employer.

View Source Code

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

CITY OF URBANA
Human Resources Division

AREA-WIDE RECORDS MANAGEMENT SYSTEM (A.R.M.S) PROGRAMMER/ANALYST

JOB DESCRIPTION

Division:	Information Technology
Department:	Executive
Reports To:	Information Technology Director
FLSA Status:	Non-Exempt
Job Type:	Civil Service, Non-Union
EEO-4 Category:	Technician

JOB SUMMARY

Designs and codes new computer programs; modifies existing computer programs; trains users in usage of IBM iSeries computer and programs; provides help desk support to users as needed; performs routine computer system maintenance and problem resolution for both hardware and software issues as required; maintains database structure and integrity.

ESSENTIAL FUNCTIONS

- Researches requests for new programs, as approved by the Information Technology Director and the Area-Wide Records Management System (A.R.M.S.) user group, using standard data analysis and structured design techniques.
- Creates and codes new computer programs and modifies existing programs in the IBM iSeries Native Environment using RPG, CL, Java, JavaScript, SQL, HTML, CSS employing structured programming techniques.
- Designs web pages, screens, menus and programs for computer applications.
- Prepares and writes program modifications for users of the A.R.M.S. programs.
- Assists trainers at the member agencies in the adoption of new programs and enhancements to existing programs.
- Creates and maintains system, program and user documentation for assigned programming projects.
- Assists Information Technology Director in preparing system specifications for, and subsequent maintenance of, hardware and software contracts.
- Provides technical expertise and advice as assigned to various committees and projects such as software and hardware searches.
- Provides primary help desk support to users of A.R.M.S. software and secondary support for hardware related issues.

- Maintains the A.R.M.S. database on the iSeries computer. Responsible for integrity, verification and administration of data elements and providing secure access to users as needed.
- Creates and provides various status reports as directed to include a weekly project and duty status report to the Information Technology Director and a monthly A.R.M.S. project status report to the A.R.M.S. user group.
- Performs other related duties as assigned.

JOB REQUIREMENTS

KNOWLEDGE, EXPERIENCE & SKILLS

- Knowledge, skills, and abilities typically acquired through completion of an associate's degree in data processing or an IT-related field and four (4) years of work experience in programming and operation computers, program analysis and development or related comparable education and experience or a bachelor's degree in an IT-related field and two (2) related years of comparable experience; or equivalent experience and education that would likely provide the relevant knowledge and abilities.
- Knowledge of structured computer programming, SQL, file maintenance procedures and relational database design.
- Knowledge of modern iSeries communication protocols utilizing TCPIP.
- Knowledge of necessary to connect and maintain various hardware such as: printers, local area networks, terminals and personal computers.
- Skills necessary to perform minor computer technician tasks such as replacing component in failed hardware and installing cable and wire lines.

ABILITY TO:

- Design and write code for the compilation of computer programs, screens, menus and Control Language procedures on IBM iSeries computer using RPG, CL, Java, JavaScript, SQL, HTML, CSS and IBM utility software including SEU, SDA, PDM, interactive SQL, Qshell and Rational Developer for Power Systems.
- Effectively communicate orally and in writing with users and management in a variety of levels including; preparing large group presentations, leading small group discussions, creation of formal report status, effective memo writing and one- on-one discussions.
- Complete system analysis of existing procedural and application systems through the use of proper interview, documentation, needs assessment and review methodologies and to then design appropriate systems and make recommendations for procedural system changes.
- Train and communicate with staff, regarding the operation of personal computers and the IBM iSeries Computer System keyboards and programs.
- Efficiently operate and control the IBM iSeries computer.
- Use proper research techniques, such as user interviews, program reviews and problem analysis.
- Maintain confidentiality.
- Multi-task.
- Identify key issues, develop action plans, maintain project schedules, manage resources, coordinate in-depth analysis, and deliver quality solutions on time and within budget.
- Accept criticism and calmly and effectively handle highly stressful situations.

- Establish and maintain cooperative working relationships with those contacted in the course of work.
- Work independently in the absence of supervision.

LICENSES, CERTIFICATIONS AND MEMBERSHIPS REQUIRED

- Valid Illinois driver's license.

RESPONSIBLE FOR:

- Providing timely status reports as directed to Information Technology Director and the members of the A.R.M.S. user group.
- Completing systems analysis and design for new programming assignments; including user interview, system data flow diagrams and other charts and structured design methodologies.
- Administration and maintenance of the A.R.M.S. data base including data description specifications, table data and documentation of system, and changes made to the system.
- Preparing and writing new programs and modifications for existing programs.

SUPERVISORY GUIDANCE RECEIVED/GIVEN

- No supervisory responsibility.
- Reports to the Information Technology Director who provides a general outline of work in terms of objectives rather than methods.
- Work requests generally are received from users. Assignments require the regular use of discretion, resourcefulness, and independent judgment to provide innovative solutions for a wide range of programming problems and telecommunications problems including, but not limited to, system design, installation, maintenance and repair. Exercises considerable discretion and independent judgment in deciding how to perform the work assigned.

CONTACTS: INTERNAL/EXTERNAL

- Regular contact with members of A.R.M.S. user group to report programming status.
- Regular contact with users for program design, testing, implementation and training.
- Periodic contact with industry representatives to obtain current state-of-the-art knowledge to monitor performance of current hardware and software.

WORK ENVIRONMENT

- Standard office setting.
- Occasional travel to various user agencies that are participating in the A.R.M.S project, as well as travel required for periodic training and conference attendance.
- Forty-hour workweek schedule, but may occasionally require overtime. May include pressure generated by equipment malfunctions, deadlines, and workload.

The work environment characteristics described herein are representative of those an employee encounters while performing the essential functions of this job. Reasonable accommodations may be made to enable individuals with disabilities to perform the essential functions.

SPECIAL EFFORT REQUIRED:

- Attention to detail
- Must keep abreast of changes in the computer industry, both software and hardware.
- Participation and membership in various committees, user groups, and standing meetings with other information services and data processing organizations and individuals as well as other governmental bodies as directed.

The physical demands described herein are representative of those that must be met by an employee to successfully perform the essential functions of this job. Reasonable accommodations may be made to enable individuals with disabilities to perform the essential functions.

The duties listed above are intended only as illustrations of the various types of work that may be performed. The omission of specific statements of duties does not exclude them from the position if the work is similar, related or a logical assignment to the position.

The job description does not constitute an employment agreement between the employer and employee and is subject to change by the employer as the needs of the employer and requirements of the job change.

Prepared By: Allen Jordan, ARMS Programmer Analyst and Elizabeth Borman, Asst. Human Resources Manager, 7/11/2013

Approved By: _____
Department Head Date

Approved By: _____
Human Resources Manager Date

Class Specification History:
General revision: 11/1995
General revision approved by the Urbana Civil Service Commission: 9/25/2013