

<b>AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT</b>			I. CONTRACT ID CODE <b>J</b>	PAGE OF PAGES <b>1</b>   <b>18</b>
2. AMENDMENT/MODIFICATION NO. <b>0001</b>		3. EFFECTIVE DATE <b>18-Sep-2003</b>	4. REQUISITION/PURCHASE REQ. NO. W22W9K-3210-9025	
6. ISSUED BY CODE <b>DACA27</b> USA ENGINEER DISTRICT, LOUISVILLE ATTN: CELRL-CT 600 DR. MARTIN LUTHER KING PLACE ROOM 821 LOUISVILLE KY 40202		7. ADMINISTERED BY (If other than item 6) CODE <b>DACA27</b> MILITARY/RESERVE TEAM 600 DR. M. L. KING, JR. PL., RM 821 ATTN: DEBRAUH M. LARDNER LOUISVILLE KY 40202-2230		
8. NAME AND ADDRESS OF CONTRACTOR (No., Street, County, State and Zip Code)			<input checked="" type="checkbox"/> 9A. AMENDMENT OF SOLICITATION NO. <b>DACA27-03-R-0020</b>	<input checked="" type="checkbox"/> 9B. DATED (SEE ITEM 11) <b>14-Aug-2003</b>
			<input type="checkbox"/> 10A. MOD. OF CONTRACT/ORDER NO.	<input type="checkbox"/> 10B. DATED (SEE ITEM 13)
CODE		FACILITY CODE		
11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS				
<input checked="" type="checkbox"/> The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offer <input type="checkbox"/> is extended, <input checked="" type="checkbox"/> is not extended. Offer must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended by one of the following methods: (a) By completing Items 8 and 15, and returning <u>  1  </u> copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.				
12. ACCOUNTING AND APPROPRIATION DATA (If required)				
13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS. IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.				
A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.				
B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(B).				
C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:				
D. OTHER (Specify type of modification and authority)				
E. IMPORTANT: Contractor <input type="checkbox"/> is not, <input type="checkbox"/> is required to sign this document and return _____ copies to the issuing office.				
14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.) Solicitation No. DACA27-03-R-0020, 2-Phase Design/Build Contract for Whole Neighborhood Renewal, Ft. Knox, KY, is amended as follows:  -This a clarification of the numbering of this solicitation. System does not account for documents imported into the solicitation and does not count these pages. There were no pages omitted from original solicitation. -Section 00115 and 00130 are deleted and the attached Section 00115 and 00130 (Amdt. #0001) are incorporated into the solicitation. -Statement of Work is deleted and the attached Statement of Work (Amdt. #0001) is incorporated into the solicitation. Paragraph 1-2.1 has been revised to allow concrete exterior wall framing/structural systems. -All other terms and conditions remain the same.				
Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.				
15A. NAME AND TITLE OF SIGNER (Type or print)		16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)		
		TEL: _____ EMAIL: _____		
15B. CONTRACTOR/OFFEROR  _____ (Signature of person authorized to sign)	15C. DATE SIGNED	16B. UNITED STATES OF AMERICA  BY _____ (Signature of Contracting Officer)	16C. DATE SIGNED  <b>18-Sep-2003</b>	

SECTION SF 30 BLOCK 14 CONTINUATION PAGE

**SUMMARY OF CHANGES**

SECTION SF 30 - BLOCK 14 CONTINUATION PAGE

The following have been added by full text:

AMDT. #0001

SECTION 00115

PROCEDURES FOR SUBMITTAL OF OFFERS

**1. GENERAL REQUIREMENTS.**

- 1.1** The intent of this solicitation is to select one contractor for the design and construction of the Whole Neighborhood Renewal, Ft. Knox, Kentucky. This project is a Two-(2) Phase Design-Build.
- 1.2** Proposal Submissions and the Two (2) Phase Design-Build Process. This process requires potential contractors to submit their performance and capability information in Phase I for review and consideration by the Government. Following the review, evaluation and rating of these proposals, the Government will select a maximum of five Offerors for Phase II to receive the technical requirements package and provide a technical and cost proposal for consideration by the Government. For the selected offerors, the Government will conduct a pre-proposal conference at Ft. Knox, KY prior to the Phase II proposal submission. The technical information contained in this Phase II proposal will be reviewed, evaluated, and rated by the Government staff in direct response to the evaluation criteria set forth in Section 00130 – PROPOSAL EVALUATION CRITERIA. The Contracting Officer will use the results of both Phase I and Phase II to make a best value determination for selection and award of the contract. Cost information will not be rated in either Phase, however cost will be considered in Phase II.

**All evaluation factors and sub-factors other than cost or price, when combined are significantly more important than cost or price. Phase II is significantly more important than Phase I and the combined Phase I and Phase II ratings is significantly more important than cost or price.**

**PRICE LIMITATION** - The **funds available** for design and construction of the Whole Neighborhood Renewal at Ft. Knox, KY is **\$36,950,000.00**. Offerors are under no obligation to approach this amount.

The proposal process for this two (2)-phase procurement consists of the following sections. **Evaluation factors and sub-factors are listed in descending order of importance.**

**PHASE I PROPOSAL:**

**SECTION 1- Experience**

- A. Prime Contractor Experience**
- B. Design Team Experience**
- C. Individual Personnel Experience**
- D. Subcontractor Experience**

**SECTION 2- Past performance (Include the Architect-Engineer and Construction)**

- A. Completed Projects & Ratings**
- B. Utilization of Small Business**

**SECTION 3- Technical Approach**

**Financial Capability: (submit the following in a separate envelope)**

- Completed Section 0600, Representations and Certifications
- Proof of Financial Ability (most recent financial statement showing assets and liabilities)
- Line of credit letter from financial institution (if needed for Proof of Financial Capability)
- Name, address and telephone number of two credit/trade references
- Name, address and telephone number of the firm's bonding company
- A statement of how many years the firm(s) have been in business

**PHASE II PROPOSAL:**

**SECTION 1- Management Approach**

**SECTION 2- Subcontracting**

**A. Narrative**

**B. Subcontracting Plan**

**SECTION 3- Technical and Design Documents**

**SECTION 4- Betterments**

**SECTION 5- Sustainable Design Qualifications**

**SECTION 6 – Price**

**Completed Price Proposal Information along with the following: (in a separate envelope)**

- Completed Standard Form 1442 and Proposal Bid Schedule
- Subcontracting Plan & Narrative
- Pricing of Betterments

1.3 Offerors submitting proposals for this project should limit submissions to data essential for evaluation of proposals so that a minimum of time and monies will have been expended in preparing information required herein. However, in order to be effectively and equitably evaluated, the proposal must include information sufficiently detailed to clearly describe the offeror's Management Approach, Subcontracting Information, Technical and Design Information and Sustainable Design Qualifications to successfully complete the project. Proposals should follow in the order of sequence set forth in the RFP. Information provided out of sequence may not be evaluated and may result in the offeror's disqualification from award. Requirements stated in this RFP are minimums. Innovative, creative or cost-saving proposals that meet or exceed the requirements are encouraged and will be rated accordingly.

1.4 Offerors shall submit their proposals for Phase I to the U.S. Army Corps of Engineers, 600 Dr. Martin Luther King, Jr. Place, Room 821, Louisville, KY 40202-2230 no later than the time and date specified in Block 13 of Standard Form 1442.

1.5 All proposal materials shall be submitted in binders with a table of contents and tabbed section dividers. The sections should parallel the submissions requirements identified below. Phase I shall be submitted in original and (7) copies. Section 00600 and your Financial Information shall be submitted in original only and placed in a separate envelope. For Phase II Sections 1, 4 and 5 shall be submitted in original and (7) copies. Section 2 & 6 shall be submitted in original only and placed in a separate envelope along with the pricing information. Proposed betterments are to be indicated in a separate section of the proposal and tabbed "Betterments". Refer to Section 3, Technical and Design Documents for submission requirements for this portion of the RFP package. There is a limit of 100 pages (excluding dividers) using a minimum font size of 11 and a minimum margin size of one half inch on all sides. The schedule may be printed on a larger sheet (maximum size 36" x 48") and included in a pocket in the binder. Format restrictions will be strictly adhered to and enforced. Information submitted which exceeds the specified limit may not be evaluated

## 2. PROPOSAL SECTIONS

### **PHASE I**

#### **SECTION 1- Experience**

##### **A. Prime Contractor Experience.**

Provide descriptions of up to 5 projects, including design/build projects, within the past five years, which are similar to this project in scope and size and complexity. Projects considered similar to this project include Large Residential Development type project. Identify any projects that the proposed team has accomplished together. Include Leadership in Energy and Environmental Design (LEED) registered and/or certified projects. Identify project name, location, owner's name, telephone number(s) and point of contact, description of work self-performed, the original and final contract amounts, and the original and final beneficial occupancy dates. An experience form is included for your use, if you elect not to use the format, all information identified on it is still required for evaluation of this item. If the original and final amounts and/or the dates differ, provide an explanation as to why this occurred.

##### **B. Design Team Experience:**

Provide descriptions of up to 5 projects, including design/build projects, within the past five years, which are similar to this project in scope and size and complexity. Projects considered similar to this project include Large Residential Development type project. Identify any projects that the proposed team has accomplished together. Include Leadership in Energy and Environmental Design (LEED) registered and/or certified projects. Identify project name, location, owner's name, telephone number(s) and point of contact, description of work self-performed, the original and final contract amounts, and the original and final beneficial occupancy dates. An experience form is included for your use, if you elect not to use the format, all information identified on it is still required for evaluation of this item. If the original and final amounts and/or the dates differ, provide an explanation as to why this occurred.

##### **C. Individual Personnel Experience:**

Identify, by resume, key personnel to be assigned to this project, including:

- (1) The Project Manager (responsible for both design & construction throughout the life of project)
- (2) On Site Project Superintendent
- (3) Architect
- (4) Mechanical Engineer
- (5) Civil Engineer
- (6) Quality Control Manger

**NOTE:** The identified personnel must be used on the project. Any substitution of these persons will not be permitted without prior approval of the Contracting Officer. A format for Personnel Resume is included for your use. If you elect not to use the format, all information identified on it is still required for evaluation of this item. Identification of two individuals proposed for a single position will result in the evaluation of only the least qualified person.

##### **D. Subcontractor Experience.**

Provide a list of key subcontractors for this project and their respective areas of responsibilities. Key subcontractors shall include:

- (1) Geothermal
- (2) Electrical
- (3) Mechanical

- (4) Site Development
- (5) Masonry

Formats for Subcontractor Experience are included for your use. Use as many forms as necessary to meet the criteria. If you elect not to use the formats, all information identified on the formats is still required for evaluation of this item. **NOTE:** The proposed subcontractors must be used on the project. No deviations will be permitted unless approved by the Contracting Officer. Work must have been self-performed to qualify as experience. Identification of more than 1 subcontractor for a particular type of work will result in the evaluation of only the least qualified subcontractor.

## **SECTION 2 - Past Performance**

- a. Provide points of contacts on projects listed in “Experience” including phone numbers for verification of performance. The offeror may provide documentation that would support successful completion of similar projects (examples; copies of outstanding awards or letter of appreciation). The Government may also use other methods to obtain past performance information such as **CCASS, ACASS, PPIMS, Dun & Bradstreet, contacting references, etc.** The offeror is authorized and may provide information on problems encountered on identified projects and what corrective actions were taken to solve the problem.
- b. Past Performance on Utilization of Small, Small Disadvantaged, and Women-Owned Small Businesses. All firms must identify your efforts to comply with Clause 52.219-8, Utilization of Small Business Concerns. If you are a large business, provide copies of subcontracting plans, both initial and final, which clearly represent your efforts to comply with FAR Clause 52.219-9, Small Business Subcontracting Plan. If you are a small business, provide details of efforts on previous projects that clearly represent your efforts to comply with FAR Clause 52.219-8. Information is to be limited to the projects identified under Section 1, Experience.

## **SECTION 3 - Technical Approach**

Describe in general terms how the Offeror will approach the design and construction of these facilities. The narrative should include considerations of “Fast Track” construction and other time saving and/or streamlining techniques whereby preliminary site construction activities can begin prior to 100% completion of the design documents. The roles and responsibilities of the various sub-contractors for both design and construction shall also be addressed. Include in the narrative the Offeror’s proposed processes for handling field problems and assuring Designer of Record involvement throughout the construction period. Identify the time allowed for the design team to do on-site inspections, design compliance reviews and problem resolution. This narrative shall be limited to a maximum of four (4) typewritten pages (11 Pt font size).

## **PHASE II PROPOSALS:**

### **SECTION 1-Management Approach**

The Offeror shall provide a management approach showing how they will control the job. The “Management Approach” should include the following: Subcontracting approach, Quality Control and Design Approach, Organization Chart and Integrated Design and Construction Schedule bar chart with all “Fast Tracking” areas clearly identified. The bar chart for design and construction shall be task oriented, indicating dates by which milestones are to be achieved. The quality control approach provided by the Offeror will be reviewed and evaluated for inclusion of the quality control practices and requirements necessary for the successful completion of all phases of this project. These phases include design stages as well as construction specialties. Offeror’s plan must show the inclusion of the Corps Three Phase

Inspection process and address the implications and operations of the Quality Control Plan and its integration with the Quality Assurance Operations performed by the Government (Refer to Section 01453, Para. 3.7).

## **SECTION 2- Subcontracting Narrative**

It is the government's firm intention to insure that a fair and proportionate share of this contract be awarded to small business in the various small business categories.

It is a requirement of this procurement that a minimum of 20% of the **total award dollars** must go to small business and due to the nature of the work this should be readily achieved. Contractors shall propose in a narrative what they plan to commit to small business and this will be used as part of the proposal evaluation.

The narrative needs to reflect diversity among the various small business socio-economic programs (20%-Small Business, 15%-SBA certified Small Disadvantaged or 6%-SBA certified HUBZone SB, 10%-Woman-Owned SB, 6%-Veteran-owned SB and 3%-Service Disabled Veteran-owned SB). We will evaluate the narrative using these objectives and incorporate into the contract.

Because of the size of the potential contract award and the small business initiative we are requiring a **SUBCONTRACTING NARRATIVE** from "ALL" contractors (large or small) showing how they plan to achieve this goal. Your narrative **MUST INCLUDE** a listing of your subcontractors (large or small) the company name, the product or service being subcontracted, the percentage and dollar amounts along with the appropriate size and the socio-economic program(s).

**THIS NARRATIVE WILL BE USED AS AN EVALUATION FACTOR.**

**PLEASE NOTE: THIS INFORMATION IS SEPARATE FROM THE FORMAL SUBCONTRACTING PLAN REQUIREMENTS FOR SUBMITTAL BY LARGE BUSINESS ONLY.**

In the Formal Subcontracting Plan to be submitted by large business only, you are expected to achieve no less than 57.2% of "all subcontracted dollars" to go to small business which must equate to no less than 20% of the **total contract dollars awarded** to small business. For the various socio-economic programs the following percentages are also required: 8.9% to SBA certified Small Disadvantaged Business (SDB), 8.1% to Women-Owned Small Business (WOSB), 3% to HUBZone Certified Small Business, 6% to Veteran Owned Small Business (VOSB) and 3% to Service Disabled Veteran Owned Small Business (SDVOSB). (These percentages are subset from the total subcontracted dollars. The DOD mandates what Subcontracting Goals need to be achieved.

## **SECTION 3- TECHNICAL AND DESIGN DOCUMENTS**

Submit this information in separate three-ring binders labeled "Technical and Design Documents". This category consists of design documents, drawings, sketches, outline specifications, design analysis, catalog cuts (as a minimum for catalog cuts; Light Fixtures, Windows, Masonry, Flooring, Appliances, Exterior Doors, Cabinetry, Counter Tops and Window Coverings) and other information. Provide four (4) copies of half-size drawings and one full-size set; and four (4) copies of catalog cuts and other technical data. In addition one (1) sample of the following items are to be included: Brick, Stone, Flooring, Wood and Ceramic Tiles (this includes floor, wall, and tiles for kitchen) blinds and counter tops. The drawings shall be bound.

The following technical data shall be submitted as part of the formal proposal. Proposals shall include a graphic description of the design included in the basic proposal, clearly indicated as such. Offerors are advised that the required data listed below will be utilized for technical review and evaluated by the Source

Selection Evaluation Board (SSEB). The offeror shall also include a list without prices of any betterments (those systems or components which exceed the RFP's minimum stated requirements) included in the proposal (See Section 00800, Para. 1.65, Proposed Betterments).

Drawings shall be dimensioned to show building separations, set back, etc. If required drawings are common for more than one type of building or dwelling unit, simply indicate so on the drawing. Provide an index of drawings. Do not provide foundation plans or structural, civil, plumbing, mechanical, or electrical details. Section a, Site Plans, b, Housing Units & c, Exterior Elevations are of equal importance. Section d, Typical Wall Sections and e, Special Features are in descending order of importance. As a minimum, the drawings shall include:

**a. Site Plans**

1. Overall Site Layout w/Conceptual Grading: Scale 1:1000

Show:

- Location of streets and sidewalks
- Driveways
- Parking
- Building configurations
- Play Lots, hiker/biker path
- Features to be retained or removed unless shown on landscaping plan
- Project boundaries
- Variation of structure setback
- Conceptual grading plan

2. Landscaping & Tree Preservation Plan: Scale 1:1000

**b. Housing Units**

3. Floor Plans: Scale 1:50

For each type of Housing Unit, show the following:

- Overall dimensions
- Room descriptions with dimensions and areas
- Appliances (including location of occupant-owned washer and dryer)
- Plumbing fixtures & vanities
- Bathroom Layouts
- Kitchen layout
- Door swings
- Window Placement & Size
- Garage location and dimensions
- Patio
- Exterior bulk storage
- Service (trash) area
- Mechanical Room w/HVAC Unit and Hot Water Heater Equipment Size & Location
- Calculated Gross and Net Floor Areas
- Porches
- Walkways
- Furniture Layout using Standard Size Template

**c. Exterior Elevations:** Scale 1:100

For each type of unit show all sides.

**d. Typical Wall Sections:** Scale 1:20

For each housing unit type show the following:

- Typical Wall

- Foundation
- Floor and Roof Section
- Cavity Wall

- e. **Special Features:** Scale as required
- Retaining Wall (if needed)
  - Entrance Sign

**SECTION 4 – Betterments.**

“Betterment” is defined as any component or system identified by the government that exceeds the minimum requirements stated in the Request for Proposal. In narrative form address each Betterment (if any are possible without exceeding the price target) that you have included in your proposal. Indicate Quality of Materials, Workmanship, Design and Functional Benefits of the betterment.

**SECTION 5 - Sustainable Design Qualifications.** Describe how the proposal will incorporate sustainable design techniques related to the site and building design, construction, operation and deconstruction of the project.

The offeror shall include in their proposal a narrative describing preliminary strategy to achieve a minimum Gold rating as determined by the US Army Corps of Engineers SPiRiT (Sustainable Project Rating Tool, version 2.1). The narrative shall be formatted to the SPiRiT point system and provided for evaluation. The proposals shall include a detailed analysis documenting how each of the required and claimed points was achieved. Special attention should be give to the identification and specification of energy conservation features included in the proposal, particularly those which exceed the minimum requirements of the Statement of Work. Submit as part of the Design information.

**SECTION 6 – Price (One copy only)**

The offeror shall submit in a separate envelope, Standard For 1442 and Section 00010, Proposal Bid Schedule in original only. Both of these forms are included in Section 00010 of this solicitation. Any proposed betterments identified in the proposal are to be listed with a separate price included for each.

**SOLICITATION NO. DACA27-03-R-0020**

Whole Neighborhood Renewal, Ft. Knox, KY

**PROJECT EXPERIENCE FORM**

**Provide a completed form for each project for which experience is being claimed. Submit only projects on which the offeror was the prime contractor or prime construction contractor.**

Name of Offeror \_\_\_\_\_

Work performed by Offeror [ ] and [ ] or key subcontractor(s) \_\_\_\_\_  
\_\_\_\_\_ and [ ] or [ ] design firm \_\_\_\_\_.  
(Enter firm name(s) and check "and" or "or" as applicable)

Was the project design-build? \_\_\_\_\_

Name of Project: \_\_\_\_\_

Location of Project: \_\_\_\_\_

Was Project a firm fixed price contract (Y/N) ? \_\_\_\_ If no, what type was it? \_\_\_\_\_

Brief Description of Project

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Contract Amount at Award: \_\_\_\_\_ Amount Added by Modification: \_\_\_\_\_

Final Contract Amount or Estimated Cost at Completion: \_\_\_\_\_

Explanation of any Cost Growth

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Multiple Interim Schedule Milestones (to include scheduled start date):

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Original Contract Completion Date: \_\_\_\_\_ Final Contract Completion Date: \_\_\_\_\_

Actual Completion Date: \_\_\_\_\_ Time Added by Modification: \_\_\_\_\_

Explanation of any Late Finish

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Was the project terminated early or were cure/show cause letters received? \_\_ Yes \_\_ No

Explain early termination (default/convenience) or cure/show cause letters: \_\_\_\_\_

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Safety Record: Accidents \_\_\_\_\_, Incidents \_\_\_\_\_, Violations \_\_\_\_\_.

List and explain any customer concerns or dissatisfaction. Explain how you responded.

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What were the SDB, WOB, and Small Business percent goals in the original contract?

SDB:\_\_\_ WOB:\_\_\_ Small Business:\_\_\_ HBCU:\_\_\_ HUBZONE:\_\_\_ MI:\_\_\_

What was the actual percent achieved at contract completion?

SDB:\_\_\_ WOB:\_\_\_ Small Business:\_\_\_ HBCU:\_\_\_ HUBZONE:\_\_\_ MI:\_\_\_

Extent and Types of Work Subcontracted: \_\_\_\_\_

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Was the project owner an agency of the Federal Government? Yes \_\_\_ No \_\_\_

Name, address, FAX, and telephone number of the owner: \_\_\_\_\_

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Name and phone number of a representative of your firm who is knowledgeable of this project and can be readily contacted: \_\_\_\_\_

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Name, address, FAX, and telephone number of a representative of the owner who is knowledgeable of this project and can be readily contacted: \_\_\_\_\_

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Name, address, FAX, and telephone number of the Contracting Officer if project was for Federal Government:

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**SUBCONTRACTOR EXPERIENCE**

Name of your firm \_\_\_\_\_

Project Name/Location

\_\_\_\_\_

General Scope of Project

\_\_\_\_\_

\_\_\_\_\_

Your role (prime, joint venture, subcontractor) and the work your firm self-performed

\_\_\_\_\_

\_\_\_\_\_

Description of work subcontracted to others

\_\_\_\_\_

\_\_\_\_\_

Your subcontract amount:

At Award: \$ \_\_\_\_\_

Reason for the cost growth:

Final Cost \$ \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Award Date: \_\_\_\_\_

Schedule Completion: \_\_\_\_\_

Reason for the time growth:

Actual Completion: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Your performance evaluation by Owner

\_\_\_\_\_

\_\_\_\_\_

Your performance evaluation by Prime

\_\_\_\_\_

\_\_\_\_\_

Owner's POC for reference (name and company and telephone number)

\_\_\_\_\_

**SUBCONTRACTOR EXPERIENCE (continued)**

Prime contractor's POC for reference (name and company and telephone number)

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Past Working History/Relationship with Prime (including joint ventures and partnering experience)

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## SECTION 00130 - PROPOSAL EVALUATION CRITERIA

1. **GENERAL.** A Source Selection Evaluation Board (SSEB), comprised of representatives of the Corps of Engineers, User/Customer, and other required personnel, will evaluate the proposals. This is a Two (2) Phase Design-Build project. Offerors are advised that the technical evaluation and rating of proposals will be conducted in strict confidence in that technical/quality proposals are reviewed and rated without knowledge of the price offered. Proposals will be evaluated based on the factors described herein, and the basis of award is the Tradeoff Process.  
At the completion of the evaluation process each proposal that completed both phases of the evaluation process will be assigned a single adjectival rating for best value analysis as applicable. Phase II is significantly more important than Phase I and the combined Phase I and Phase II rating is significantly more important than cost or price. All evaluation factors other than cost, or price, when combined are significantly more important than cost or price.
2. **EVALUATION PROCESS.** The evaluation process essentially consists of four parts: proposal compliance review and responsibility determination, technical/quality evaluation, price evaluation and cost/technical trade-off analysis.
  - 2.1. Proposal Compliance Review: This is an initial review to ensure that all required forms and certifications are complete and that both a technical and price proposal were received.
  - 2.2. Technical/Quality Evaluation: The SSEB will evaluate and rate those proposals passing the first review, above. Proposals will be evaluated against the RFP requirements. Some factors will be rated using an adjectival-based system. Others will be rated on a “go, no-go” basis.
  - 2.3. Price Evaluation: The SSEB will evaluate price proposals independent of the technical/quality evaluation. The SSEB will not have access to price information until completion of the technical/quality evaluation. (For Phase II only)
  - 2.4. Cost/Technical Trade-off Analysis: After all above evaluations are complete, the SSEB will compare the relative advantages and disadvantages of technical proposals and compare prices. The Source Selection Authority (SSA) will then consider all factors to determine the proposal offering the most advantage to the Government.

The proposal and evaluation process for this project will take place in two phases. Each Phase will include unique requirements to the potential offerors. The offerors responses to these requirements will be evaluated with respect to the evaluation criteria set forth in this Section.

**PHASE I** will concern itself with Experience, Past Performance and Technical Approach. All proposals received in response to Phase I will be evaluated and rated. The maximum of five (5) proposals will move forward into Phase II which will define the technical requirements of the project and request the offeror’s technical solutions to the project parameters.

**PHASE II:** The maximum of five (5) proposals which are determined to present the most advantages to the Government will receive the Phase II amendment to the solicitation which will include a detailed Statement of Work w/Attachments and Drawings from the Government. These Offerors will review, evaluate and propose a creative solution to the design problem presented. Offerors will also include sustainable design requirements, and cost information with this technical proposal. Only Offerors who reach Phase II will be provided the opportunity to submit design solutions and cost information.

### **3. BASIS OF AWARD**

The Government will award a firm-fixed price contract to the Offeror of the proposal that represents the best overall value to the Government. Phase II is significantly more important than Phase I and the combined Phase I and Phase II rating is significantly more important than cost or price. All evaluation factors and sub-factors other than cost or

price, when combined are significantly more important than cost or price. The Government reserves the right to accept other than the lowest priced offer. The right is also reserved to reject any and all offers. The basis of award will be a conforming offer, the price or cost of which may or may not be the lowest. Offerors are reminded to include their best technical and price terms (for Phase II) in their initial offer and not to automatically assume that they will have an opportunity to participate in discussions or be asked to submit a revised offer. The Government may make award of a conforming proposal without discussions, if deemed to be within the best interests of the Government.

#### **4. EVALUATION PROCEDURES AND CRITERIA:**

The proposals will be evaluated by a team of Government staff to determine general compliance with this solicitation and to evaluate the quality of the proposals. Each of the evaluation factors and sub-factors will be evaluated by the Government and a combination of the Phase I rating and Phase II rating will be combined to determine a final overall rating for each proposal. This shall be determined by consensus of the Government evaluation team. Proposals will be evaluated in accordance with the factors and sub-factors below, which are listed in descending order of importance.

#### **Phase I**

##### **Section 1-Experience**

- A. Prime Contractor Experience**
- B. Design Team Experience**
- C. Individual Personnel Experience**
- D. Subcontractor Experience**

##### **Section 2-Past Performance**

- A. Performance on Projects & Ratings**
- B. Utilization of Small Business**

##### **Section 3-Technical Approach**

#### **Phase II**

##### **Section 1-Management Approach**

##### **Section 2-Subcontracting**

- a. Subcontracting Narrative**
- b. Subcontracting Plan**

##### **Section 3-Technical and Design Documents**

##### **Section 4-Betterments**

##### **Section 5-Sustainable Design Qualifications**

##### **Section 6 – Price**

All evaluation factors and sub-factors, other than cost or price, when combined are significantly more important than cost or price.

#### **PHASE I:**

##### **Section I - Experience**

- A. Prime Contractor Experience.**

The SSEB will evaluate both the extent and quality of recent experience identified in the proposal. Documentation of successful completion of projects similar in nature and scope to this project will be favorably considered in the evaluation. Conversely, proposals that do not include substantial evidence that the offeror has experience, qualifications and production capability to successfully execute the proposed project will be unfavorably considered. Previous teaming will be rated higher. Additional consideration will be given for Leadership in Energy and Environmental Design (LEED) registered and/or certified projects. (Similar to this project in scope, size and complexity).

B. Design Team Experience.

The SSEB will evaluate both the extent and quality of recent experience identified in the proposal. Documentation of successful completion of projects similar in nature and scope to this project will be favorably considered in the evaluation. Conversely, proposals that do not include substantial evidence that the offeror has experience, qualifications and production capability to successfully execute the proposed project will be unfavorably considered. Previous teaming will be rated higher. Additional consideration will be given for Leadership in Energy and Environmental Design (LEED) registered and/or certified projects. (Similar to this project in scope, size and complexity).

C. Individual Personnel Experience.

The SSEB will evaluate the adequacy and strength of the six (6) key personnel requirements listed in Section 00115, Section I C, Individual Personnel Experience. The SSEB will also evaluate for compliance with specified minimum requirements, degree of qualification and experience, familiarity with local conditions, etc. At a minimum the Overall Project Manager shall have a minimum of five years experience as a project manager on similar construction projects. The Project Engineer for Design at a minimum will have a degree in engineering, and a minimum three years experience in design and construction. If the Overall Project Manager or Project Engineer has a professional registration the individual may be evaluated more favorably. The Project Superintendent shall have a minimum ten years of similar construction experience. The CQC System Manager will be evaluated using the qualification listed in Section 01451 paragraph 3.5. The Architect, Mechanical and Civil Engineers shall have a minimum of 8 years experience and have Professional Registration. The SSEB may give additional credit for more experience, licenses, degrees beyond the minimum specified.

NOTE: The identified personnel must be used on the project. Any substitution of these persons will not be permitted without prior approval of the Contracting Officer. A format for Personnel Resume is included for your use. If you elect not to use the format, all information identified on it is still required for evaluation of this item. Identification of two individuals proposed for a single position will result in the evaluation of only the least qualified person.

D. Subcontractor Experience.

The SSEB will evaluate both the extent and quality of recent experience identified in the proposal. Documentation of successful completion of projects similar in nature and scope to the work being performed for this project will be favorably considered in the evaluation. Extra consideration may be given for subcontractors who have prior experience with and can demonstrate team continuity with the prime contractor. Conversely, proposals that do not include substantial evidence that the offeror has experience, qualifications and production capability to successfully execute the work being performed will be unfavorably considered. The SSEB may give additional credit for previous successful working relationships with any proposed subcontractors.

**SECTION 2 - Past Performance.**

- a. The SSEB will evaluate the degree of successful completion of all experience identified in the proposal for A, B and C, above. Documentation of satisfactory performance of projects similar in size, scope, complexity and dollars will be favorably considered. Conversely, offers which do not achieve satisfactory performance will not be favorably considered. The Government reserves the right to check any or all cited references to verify supplied information and to assess owner satisfaction. The Government may also use other tools such as CCASS, ACASS, PPIMS, Dun & Bradstreet, etc. to gather information regarding an offeror's qualifications and past performance.

- b. Submit information for the adequacy, capabilities and strengths of the offeror's past efforts to comply with FAR Clause 52.219-8, Utilization of Small Business Concerns based on achieving their actual goals. For large business firms, the rating will be based on the successes of meeting and/or exceeding the goals on previous projects containing subcontracting plans. If the large business firm has consistently met proposed goals, lacking any extraordinary explained circumstances, the submitted information will be rated Go. For small business firms, the rating will be based on the efforts made on past projects to comply with FAR Clause 52.219-8. If the small business firm has consistently made efforts to subcontract in accordance with FAR Clause 52.219-8, the submitted information will be rated Go.

### **Section 3 – Technical Approach.**

The SSEB will evaluate the overall understanding of the design/build process as well as the Offeror's implementation plans to utilize "fast track" procedures on this project. Particular attention will be paid to the inclusion of the major construction subcontractors during the design process as well as the definition of their roles and responsibilities of the various subcontractors. How the contractor proposes to handle field problems and shows how the Design Team maintains involvement throughout the life of the project will be evaluated favorably. Show the time allowed for on-site inspection, design compliance reviews and problem resolutions.

## **PHASE II**

### **SECTION 1 – MANAGEMENT APPROACH**

The SSEB will evaluate the offeror's ability to demonstrate sound management practices, both at the home office as well as at the project site. Comprehensive approaches that demonstrate a clear understanding of the work and an ability to coordinate resources to ensure successful pursuit of the work will be evaluated favorably. Approaches that do not demonstrate a clear understanding of the work, that do not demonstrate a capability to coordinate resources, or that do not demonstrate appropriate excess capacity will be evaluated less favorably. Approaches will be evaluated based on the level of involvement the contractor will have in the management, oversight, schedule, quality control, and coordination of the work performed by subcontractors. Approaches with more involvement may be rated more favorably. The SSEB will evaluate the clarity, adequacy, capabilities and strengths of the offeror's organizational chart or managing a successful project. An organizational chart that clearly depicts a highly qualified on-site team supported by appropriate resources off-site and that clearly defines responsibilities will be evaluated favorably. Charts that are confusing, cluttered with duplicative entries, or that do not clearly define responsibilities will be evaluated less favorably.

### **SECTION 2- Subcontracting.**

- a. Narrative: The SSEB will evaluate the distribution of dollars that are being utilized for small businesses. Narrative must include a listing of the subcontractors being used, their business size, name, product being subcontracted, the percentage and dollar amount.
- b. Subcontracting Plan for Large Business. The plan will be evaluated for acceptability in accordance with AFARS 19.705. To be acceptable, the subcontracting plan must:
  - (1) Adequately address the required statutory elements.
  - (2) Provide sufficient information to enable the Contracting Officer to answer affirmatively questions A through H of Appendix DD (AFARS 19.705). (Appendix DD can be found at <http://farsite.hill.af.mil/reghtml/regs/other/afars/APDD.htm>).
  - (3) To be acceptable, subcontracting plans must be rated 71 percent or higher under the AFARS evaluation system. Any subcontracting plan that is rated 70 percent or less will be carefully considered for acceptability. If discussions with offerors are necessary, those areas where the plan is deficient will be reviewed with the offeror with the goal of correcting deficiencies.

### **SECTION 3 - Technical and Design Documents**

The technical portion of the proposal consists of the Statement of Work for the Whole Neighborhood Replacement, Ft. Knox, KY, along with all associated Attachments and Drawings. The SSEB will evaluate the acceptability of the Offeror's proposals in accordance with the program, Code compliance, Quality of Materials submitted per catalog cuts and samples required in Section 3 of Section 00115, and technical requirements as reflected in the Statement of Work and associated Attachments and Drawings. The adequacy of the Offeror's understanding of these requirements will be evaluated. Desirability of the proposals in terms of aesthetics, functionality, durability, and cost effectiveness will rank high in the evaluation.

The SSEB will evaluate and consider materials and equipment proposed by brand name and model based on the RFP requirements. Any substitutions in these proposed items must be equal in function, performance, quality and salient features to those initially proposed and must be approved by the Contracting Officer or his Authorized Representative.

### **SECTION 4: BETTERMENTS**

In the factor Betterments, the government will evaluate the significance, number and quality of the components in the proposed Betterments that can be included within the target ceiling.

### **SECTION 5 - Sustainable Design**

This factor evaluates the Offeror's narrative describing preliminary strategies to achieve the minimum Gold rating as determined by the U.S. Army Corps of Engineers SPiRiT (Sustainable Project Rating Tool, version 2.1). The evaluation of this factor shall be as follows:

<b>FACTOR RATING</b>	<b>SPiRiT Level</b>
Unacceptable	Bronze
Unacceptable	Silver
Average	Gold
Excellent	Platinum

### **SECTION 6 – PRICE**

The price will be evaluated by the SSEB for reasonableness and realism through the use of cost/price analysis. Price will also be checked for unbalancing of line items. Offerors are cautioned to distribute costs appropriately. Pricing of betterments will be evaluated for reasonableness and realism through the use of cost/price analysis. Total price will be evaluated on base and all options before betterments will be considered. (See Section 00100, FAR Clause 52.217-5).

(End of Summary of Changes)

**STATEMENT OF WORK**

STATEMENT OF WORK

NUMBER	PARAGRAPH HEADING	PAGE
1.	DESIGN OBJECTIVES.....	1
2.	CRITERIA REFERENCES.....	10
3.	SITE PLANNING AN DESIGN.....	20
4.	SITE ENGINEERING.....	38
5.	UNIT DESIGN – ARCHITECTURE .....	49
6.	UNIT DESIGN – STRUCTURAL.....	68
7.	UNIT DESIGN – THERMAL PERFORMANCE .....	71
8.	UNIT DESIGN – PLUMBING.....	73
9.	UNIT DESIGN – ELECTRICAL.....	77
10.	UNIT DESIGN – HEATING VENTILATING, AND AIR CONDITIONING.....	81
11.	ENERGY CONSERVATION.....	90
12.	CONTRACTOR PREPARED SPECIFICATIONS .....	92
13.	SUSTAINABLE DESIGN CONSIDERATIONS.....	94

LISTING OF TABLES

NUMBER	TABLE HEADING	PAGE
<u>Paragraph 1.</u>		
1-1	HOUSING TYPE.....	3
1-2	HOUSING UNITS.....	3
<u>Paragraph 2.</u>		
2-1	FEDERAL LAWS & REGULATIONS .....	11
2-2	AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI) STANDARDS .....	13
2-3	AMERICAN SOCIETY OF HEATING, REFRIGERATION, AND AIR-CONDITIONING ENGINEERS (ASHRAE).....	14
2-4	AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) SPECIFICATIONS .....	15
2-5	BUILDERS HARDWARE MANUFACTURERS ASSOCIATION (BHMA) SPECIFICATIONS .....	17
2-6	NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) CODES .....	18
2-7	UNDERWRITERS LABORATORIES SPECIFICATIONS .....	19
<u>Paragraph 3.</u>		
3-1	HOUSING UNITS PER HECTARE (ACRE).....	22
3-2	HOUSING UNIT TYPES BY DENSITY .....	22
3-3	RECREATION ELEMENTS.....	23
3-4	MINIMUM SETBACKS AND SPACING, LOW DENSITY SITES .....	25
<u>Paragraph 4.</u>		
4-1	SOIL COMPACTION.....	39
4-2	TAPE COLOR.....	43

**LISTING OF TABLES (CONTINUED)**

NUMBER	TABLE HEADING	PAGE
<u>Paragraph 5.</u>		
5-1	MINIMUM SIZE OF HOUSING UNITS BY PAY GRADE .....	49
5-2	NOT USED	
5-3	MINIMUM AREAS AND DIMENSIONS - INTERIOR SPACES .....	52
5-4	MINIMUM AREAS AND DIMENSIONS - EXTERIOR SPACES .....	53
5-5	KITCHEN CABINET, COUNTER, & PANTRY AREA.....	53
5-6	MINIMUM CLOSET WIDTHS .....	53
5-7	MINIMUM INTERIOR, EXTERIOR, & COMBINED BULK STORAGE .....	54
5-8	BATHROOM REQUIREMENTS.....	55
5-9	ROOF SLOPES .....	58
5-10	HARDWARE SPECIFICATIONS .....	62
5-11	KITCHEN CABINET SPECIFICATIONS.....	65
 <u>Paragraph 7.</u>		
7-1	WEATHER REGION DEFINITIONS .....	71
 <u>Paragraph 8.</u>		
8-1	WATER HEATER SIZING.....	76
 <u>Paragraph 10.</u>		
10-1	WEATHER DATA .....	81
10-2	MINIMUM EQUIPMENT EFFICIENCY.....	82
10-3	GEOTHERMAL AIR CONDITIONING/HEAT PUMP FEATURES .....	84
 <u>Paragraph 11.</u>		
11-1	GLAZING .....	90

## STATEMENT OF WORK

### 1. DESIGN OBJECTIVES.

1-1 The design and construction shall comply with the specifications and requirements contained in this Request for Proposals (RFP). The design and technical criteria contained and cited in this RFP establish minimum standards for design and construction quality. All housing units constructed in accordance with these standards are “Energy Star Homes”.

The Contractor shall incorporate sustainable design techniques as they relate to site design, site engineering, unit design, and unit engineering. The Contractor shall use the US Army Corps of Engineers’ Sustainable Project Rating Tool (SPiRiT) as a guide to obtain a minimum of 50 points in order to achieve a Gold Rating. See Chapter 13 Sustainable Design Considerations and Attachment 13 Sample Sustainability Matrix for additional information.

1-1.1 This project implements the Whole Neighborhood Replacement of Military Family Housing at Fort Knox, Kentucky. The objective is to construct 178 family housing units comparable to new construction standards in the private sector, within the funds available. The units will be located in a new neighborhood constructed on a site currently occupied by Binter Court subdivision and the Anderson Golf Course. See Section 00800, Paragraph 1.3 for project schedule information.

Fort Knox intends to privatize military family housing in the future, under the Residential Communities Initiative (RCI). Future military family housing developments at Fort Knox will be designed, constructed and managed by the private sector under a contract with the Government. This project is intended to set the standard for such future RCI projects, and may be privatized under RCI when completed.

1-1.2 Primary Consideration. The PRIMARY CONSIDERATION of this solicitation process is to provide the entire number of housing units identified in this statement of work. All proposals received MUST include the total number of units required to be considered for evaluation and award. In no case will a smaller number of units be accepted to allow inclusion of betterments or enhancements. Options, betterments and enhancements will not be considered unless the proposal includes ALL units required. Offerors are encouraged to review the statement of work to familiarize themselves with all of the available options included herein.

1-1.3 Option Items – The Government has identified Option Items that they wish included in the project. The Option Items are shown individually on the Bid Form, and described below.

All Offerors should provide a design proposal and price proposal as a best value offering to the Government within the construction cost limit (CCL). In addition, the Offerors are required to provide proposals and prices for Options that may be purchased by and contracted for by the Government at the Government’s discretion. Offerors shall provide sufficient information on options for the Government to determine quality.

Option A – Provide a walking path to the swimming pool complex (Buildings 7956 through 7958). Construct path to the specifications for the jogging track, and connect the path to the other site pedestrian circulation elements.

Option B – Provide rapidly renewable hardwood flooring, such as bamboo, in lieu of the specified hardwood flooring for the housing units. Provide flooring of a grade suitable for heavy residential use.

Option C – Provide a grass volleyball court, with net, as a part of the recreational facilities for the housing development. Locate near one of the picnic shelters.

Option D – Provide 180 additional trees as a part of the landscaping plan, distributed throughout the units and common areas. Provide trees to the specifications in this Statement of Work.

Option E – Provide all trees in the landscape plan with a minimum caliper of 2 ½ inches, rather than the 1 7/8-

inch caliper specified in this Statement of Work.

Option F – Provide raised panel interior doors throughout the housing units. Interior doors shall be 2050mm (6 feet-8 inches) in height by 35mm (1 3/8-inch) thick, solid core wood, raised panel doors. Wood doors shall be primed and painted. Pocket doors are prohibited. Design consideration should be given to the use of stain as the door finish (with stain grade wood) in lieu of providing a painted finish and/ for the use of Stewardship Council certified wood products for wood doors.

Option G - Additional Phone Outlets. Provide an additional duplex jack outlet for a total of two duplex jack outlets in dining room, family room, living room and all bedrooms.

Option H - Additional CATV Outlets. Provide an additional cable TV outlet for a total of two cable TV outlets in dining room, family room, living room and all bedrooms.

Option I – Provide a recessed soap/shampoo shelves. Recessed soap/shampoo shelves shall be designed and built within the tub/shower area and surfaced with a solid polymer to match the surround. A minimum of three shelves shall be provided with minimum dimension (height, width and length) to provide space for two bars of soap, and four bottles of shampoo.

Option J – Extended roof to cover the unit patio. The patio roof shall be integral with the roof of the structure. Roof overhangs shall be a minimum of 457mm (18 inches) beyond the length and width of the patio. Soffits of overhangs shall be perforated vinyl or aluminum. The roof shall also be linked to the unit's gutter and downspout drainage system.

Option K – Provide full-height brick on the front façade on 25% of the units to diversify the look of unit facades within the streetscape. Brick shall conform to ASTM C216, Standard Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale). Provide brick cap and flashing for all offset brick veneer. For grade beam design, the brick shall run a minimum of one course below the finished floor and shall be flashed at that level.

Option L – Provide full-height cultured stone on the front façade on 25% of the units to diversify the look of unit facades within the streetscape. Cultured stone shall conform to ASTM C67, Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile.

Option M – Provide chair rail in the living room, dining room, and family room. Chair rail shall be paint or stain grade wood and located 914mm (36 inches) above the finished floor. Railing shall be firmly secured at a minimum every 610mm (2 feet). All interior trim shall have solid wood paint grade trim as a minimum. Caulking of trim and wall joints shall be provided.

Option N – Provide full height brick exterior finish to all elevations on all one-story units.

Option O - Provide a street with street lighting from the housing development to MacDonald School to the west, as shown on the conceptual sketch which is Attachment 10 to the Statement of Work. Provide chain link fencing between street and school as shown on sketch. Design street and lighting to same criteria as streets and lighting for housing development. On school grounds, provide speed bumps in street every 300 feet.

1-1.4 Betterments - Betterments are features, materials or systems that exceed the requirements of the RFP. Betterments must be included in the Base Bid price. Proposals that include and identify betterments will be given additional consideration if all other RFP requirements are met. Offerors shall provide sufficient information on betterments in their proposal for the Government to determine quantity and quality. Some Government-suggested betterments are listed below and mentioned in the RFP as items to which “design consideration” should be given. Offerors are also encouraged to propose additional betterments they believe will add to the quality of life for the residents.

- a. Simple programmable thermostats
- b. 2 additional picnic shelters
- c. Avoid building on slopes between 15 and 25%
- d. Upgraded unit lighting fixtures
- e. Upgraded window blinds
- f. Open wood stair railings
- g. Decorative columns
- h. Kitchen island
- i. Cathedral ceilings
- j. Higher gauge metal shelving
- k. Save 95% of significant trees

1-2. Work Scope. The objective of this solicitation is to obtain housing complete and adequate for assignment as quarters for military personnel and their families. This contract shall consist of the demolition of Building 7955 and Binter Street housing units and the design and construction of a total of 178 housing units on Government-owned land at Fort Knox, Kentucky, which comply with the requirements of this RFP. This work shall also include sitework (utilities, streets, recreation areas, etc.) and landscaping, plumbing, mechanical, electrical, and incidental related work. All of the units shall be detached houses. Work shall consist of the following:

1-2.1 Housing Units. The Whole Neighborhood Renewal project consists of the construction of 178 Senior Non-commissioned Officer military family housing units; 118 three-bedroom units and 60 four-bedroom units and associated neighborhood infrastructure. All units shall have attached single-car garage. All units shall be single family detached dwelling units, as shown in Table 1-1 below:

**TABLE 1-1 – HOUSING TYPE**

Housing Type	Number of Units
Single Family Detached	178
<b>Total</b>	<b>178</b>

**\*\*** All housing unit construction shall be wood or steel frame, slab on grade or foundation walls and footings, and one or two stories in height. **Exterior wall structure may be of cast-in-place concrete, precast concrete panels, insulating concrete forms, or concrete masonry units, providing that all other requirements of this RFP are met, including requirements for insulation value for the exterior wall, and requirements for interior and exterior finishes for the exterior wall.** All housing units shall provide, at a minimum, ample living space, a patio or balcony, one car garage, exterior and interior storage, individual central heating systems, energy conservation systems and central air conditioning. The garbage disposal, dishwasher, range hood, water heater, carbon monoxide alarms, and smoke detectors shall be Contractor-furnished/Contractor-installed (CF/CI). The range (30-inch width) and refrigerator (36-inch width) shall be Government-furnished and Contractor-installed. Exterior finishes include brick and vinyl siding. Housing units shall be a mix of three- and four-bedroom housing units as shown in Table 1-2:

**\*\***

**TABLE 1-2 – HOUSING UNITS**

Pay Grade	Number of Bedrooms	Number of Units
E-7 through E-9 (SNCO)	5	0
	4	60
	3	118
	2	0

1-2.2 Accessible units. No less than five (5) percent of each unit type at each site shall be single-story ground floor housing units. These housing units shall be designed and built in such a way that they may be easily and readily modified to accommodate physically challenged occupants at time of occupancy. See Chapter 5 Unit Design – Architecture, Paragraph 5-1.3. Design of accessible housing units shall conform to the Uniform Federal Accessibility Standards (UFAS) and American Disabilities Act Accessibility Guidelines (ADA-AG). Accessible housing units shall be well dispersed throughout the development and shall not be grouped or clustered so as to create segregated pockets within the housing community. The requirement to have an additional two (2) percent of housing units equipped with warning devices for the hearing impaired will be met by the Government at the time the unit is assigned to an occupant needing this equipment.

#### 1-2.3 Site area and density.

1-2.3.1 Site area. The site/s is/are described on the RFP drawings included as part of this solicitation; the preferred housing development area includes approximately 34.8 hectares (86 acres). The total housing development area includes approximately 38.8 hectares (96 acres). Additional consideration will be given to proposals that use only the preferred housing development area. Site work includes all design and construction of the site design to include grading, storm drainage, erosion control, pedestrian and vehicular circulation, utility systems, outdoor lighting, play lots, and neighborhood parks.

1-2.3.2 Site density. This project consists of 178 housing units on approximately 86 to 96 acres of land area. The project site is approved for LOW DENSITY siting. Site development shall comply with the minimum requirements for LOW DENSITY siting. Siting and construction of housing and infrastructure shall not disturb portions of development area with slopes exceeding 25%; additional consideration will be given to proposals in which siting and construction of housing and infrastructure do not disturb all or most portions of development area with slopes exceeding 15%.

1-2.3.3 The Contractor's site plan shall provide for 183 housing sites, to provide five spare sites in the event that some housing sites prove to have soil or underground conditions which are not conducive to construction.

1-2.3.4 In addition to the housing development area described above, an additional area has been designated for construction of a soccer field to serve the housing development and Fort Knox. Only the soccer field and associated amenities may be constructed in this area; no housing is permitted.

1-2.3.5 Known sinkholes and significant trees on the site are identified on the RFP drawings. The Contractor is required to provide a buffer area of 75 feet around sinkholes, and to preserve 85% of the significant trees.

#### 1-2.4 Special utilities and supplementary construction.

1-2.4.1 Electrical distribution on Fort Knox has been privatized under a contract with Nolin Rural Electrical Cooperative Corporation (Nolin RECC). Nolin RECC will provide design and construction of electrical power and distribution as described in Paragraph 4-8 of this Statement of Work. Nolin RECC will design and construct their work in compliance with their contract with the Government. The Contractor is responsible for coordination of Nolin RECC design and construction with the other portions of Contractor's design and construction.

1-2.4.2 If necessitated by the Offeror's site and utility layout, sanitary sewer pump station(s) will be required.

1-2.4.3 Buildings 7956 through 7963 house a Guest House, swimming pool complex, and Club House/Lounge. These facilities are not a part of the project, and will remain in operation throughout the construction of the housing development. Maintenance of utility services and unobstructed vehicle and pedestrian access to these buildings is required; short interruptions in service and access for necessary construction operation will be allowed, but must be scheduled through the Contracting Officer 14 days in advance of their occurrence.

1-2.4.4 This RFP requires the use of geothermal air conditioning/heat pump systems for unit HVAC. See Paragraph

10 of this Statement of Work for additional information.

#### 1-2.5 Demolition

The Contractor is responsible for the demolition and removal of all existing improvements on the designated site prior to the start of construction. The units and improvements to be demolished include the Golf Cart Storage Building/Old Club House (Building 7955) at Anderson Golf Course and the Binter Street Housing Development. Demolition and removal shall include, but is not limited to, all structures, associated utilities, paving, curb and gutter, landscaping and other site amenities. All buildings will be vacated prior to starting demolition. All unused utilities lines (gas, potable water, irrigation, sanitary sewer and electrical) shall be disconnected and capped at the point of connection nearest the main utility line.

##### 1-2.5.1 Golf Cart Storage/Old Club House (Building 7955) at Anderson Golf Course.

The Golf Cart Storage/Old Club House (Building 7955) is a warehouse type building combined with a finished lounge/retail type building for the Club House. Demolish the building structure completely, including the concrete floor slabs and footings and remove entirely from the site. Remove concrete stoops completely. Demolish all associated site improvements, such as lead walks, foundation plants, etc. Before beginning any demolition work, the Contractor shall survey the site and examine the drawings and specifications to determine the extent of the work. The Contractor shall use methods to avoid free fall and shall prevent ground impact and dust generation.

Gas and water main piping entering the building shall be removed to the perimeter of the site and capped. Sanitary Piping shall be removed to outside the building perimeter.

The Contractor shall field verify all existing conditions and verify the quantity of the above items prior to starting demolition.

The Government will remove hazardous materials from Building 7955 prior to the start of any contractor demolition work, and will provide a certification that the buildings are free of hazardous materials, except for lead-based paint in quantities that will allow disposal without special provisions. Any suspected asbestos containing material (ACM) encountered by the Contractor shall be reported immediately to the Contracting Officer.

##### 1-2.5.2 Binter Street Housing Development

Demolition of the Binter Street Housing development involves the complete demolition and removal of 52 housing units. The Contractor shall demolish the building structures completely, including the concrete floor slabs, footers and remove all debris entirely from the site. Remove concrete stoops completely. Demolish all associated site improvements, such as lead walks, foundation plants, etc. Before beginning any demolition work, the Contractor shall survey the site and examine the drawings and specifications to determine the extent of the work. The Contractor shall use methods to avoid free fall and shall prevent ground impact and dust generation.

Gas and water main piping entering building shall be removed to the perimeter of the site and capped. Sanitary Piping shall be removed to outside the building perimeter.

The Contractor shall verify the quantity of the above items prior to starting demolition. All material is to be salvaged or disposed in accordance with existing installation procedures and specific instructions provided by the Contracting Officer.

The Government will remove hazardous materials from the Binter Court Housing prior to Contractor demolition of the buildings, and will provide a certification that the buildings are free of hazardous materials, except for lead-based paint in quantities that will allow disposal without special provisions. Any asbestos containing material (ACM) encountered by the Contractor shall be reported immediately to the Contracting Officer.

1-2.5.3 Demolished materials become the property of the Contractor and shall be disposed of off of Fort Knox, except as noted below, and in compliance with all applicable laws and regulations. Recycling of demolished

materials is encouraged and may contribute to obtaining the required sustainability rating for the project.

1-2.5.3.1 Fort Knox has a construction landfill site which accepts only inert solid material; see location map in Attachment 6 of this Statement of Work. No soil may be disposed of at this site, or anywhere on Fort Knox. Contractor is responsible for segregating any debris taken to this site to comply with Fort Knox requirements. Operating hours are 0800 through 1630, Monday through Friday. Contractor shall haul to the route by taking Wilson Road north to Baker Road, and then proceeding west on Baker Road to the landfill site.

1-2.5.3.2 Fort Knox has a facility that makes firewood available for various uses; see location map in Attachment 6 of this Statement of Work. Contractor shall deliver all cut timber two inches or larger in diameter to this location, in lengths of at least sixteen inches and not to exceed eight feet.

1-2.6 Survey and geotechnical investigation – Site existing condition drawings and a preliminary geotechnical investigation report are provided in this RFP for information only pursuant to Offerors' preparation of proposals. After contract award, the Contractor shall prepare his own site survey and geotechnical investigation on which the Contractor's final design shall be based. Site survey shall be tied to the Fort Knox coordinate system. See Paragraph 4-1 of this Statement of Work for geotechnical investigation requirements.

1-3 Energy Star Homes Program Requirements: The Contractor, at the direction of the USACE Contracting Officer's Representative, shall be required to submit to the EPA the necessary information and certifications to register the units constructed in this project as Energy Star Homes. The Contractor constructing housing units in accordance with this Statement of Work is not required to be a registered Energy Star Contractor. The required information can be submitted to EPA in several methods:

1-3.1 Through the Internet by clicking on the *certificate automation system* icon at the World Wide Website <http://yosemite.epa.gov/appd/eshomes/eshomes.nsf> and following the instructions

1-3.2 By e-mailing to [certificates@epa.gov](mailto:certificates@epa.gov)

1-3.3 By mailing to the EPA Customer Service Manager. Contact information is provided below in Paragraph 1-3.5)

The information for each home may be submitted *individually* (each home individually tested/rated) or in a "*batch*" (for batches of homes, particular unit types). The following data shall be provided for each home (note: this can be in the form of a spreadsheet, database, word processing file or e-mail; if the format changes in the future EPA will inform the Contractor of the changes):

Contractor company name (ex. Jones Construction Co.)

Contractor telephone number (ex. 703-123-4567)

Name of company/organization performing testing/rating (ex. Jones Construction Co.)

Telephone number of company/organization performing testing/rating (ex. 703-123-4567)

Street address of home being submitted, including city, state & zip code (ex. 123 Smith St., City, State 12345)

Type of verification:

**"FEP"** --- if this particular home underwent infiltration testing (and possibly duct leakage testing). Please list the tested infiltration value in ACH/nat (natural air changes per hour) and if tested, the duct leakage to nonconditioned spaces in cfm and % of air handler flow at a pressure of 25 pascals.

**SEP"** --- if this particular home did *not* undergo infiltration and/or duct leakage testing, but was a member of a batch out of which at least 15% DID; if so, then the address of a home that was a tested member of this batch should also be identified as the tested member of the batch.

1-3.4 The following statement: "This home qualifies as an EPA Energy Star Home by conforming to the residential energy efficiency specifications and quality control confirmation of U.S. Army Corps of Engineers TI 801-02, Family Housing, 01-11-02, which has been determined by the EPA and USACE to be an **Equivalent Program** to the EPA Energy Star Homes Program." In addition, the "checklist" of home specifications that the USACE Contracting Officer's Representative uses to ascertain if the TI 801-02 specifications and testing results were met should be submitted. The statement and checklist should have the USACE Contracting Officer's Representative's signature affixed.

The year the house was built (ex. 2003)

The year the house was submitted for Energy Star certification (ex. 2003)

The name and title/rank, mailing address, e-mail address, telephone number and fax number of the USACE Contracting Officer's Representative overseeing the Contractor's adherence to construction specifications, quality control of construction and testing/rating activities.

1-3.5 The Contractor shall make arrangements with the EPA for receipt of the "Energy Star Homes" certificates and unit plaques and shall provide the certificates to the USACE Contracting Officer's Representative and include in the project the installation of the plaques on each of the housing units. Coordination point with the EPA regarding Energy Star certification and plaques shall be as follows:

United States Environmental Protection Agency  
Climate Protection Division  
US EPA 6202J  
Washington DC 20460  
ENERGY STAR Homes Customer Service Manager  
ATTN: Mr. Brian Ng, [Ng.Brian@epa.gov](mailto:Ng.Brian@epa.gov), 202-564-9162, fax: 202-565-2079  
<http://www.energystar.gov/homes>

Technical questions on the Energy Star Homes Program in general can be addressed to:

ENERGY STAR Homes Technical Coordinator  
ATTN: Mr. Glenn T. Chinery, [Chinery.Glenn@epa.gov](mailto:Chinery.Glenn@epa.gov), 202-564-9784,  
fax: 202-565-2079

1-4 Design Freedom. Requirements stated in this RFP are minimums. Innovative, creative, or cost-saving proposals which meet or exceed these requirements are encouraged and will receive additional consideration in the evaluation process provided that all required units are included in the proposal. Existing housing plans or modifications thereof that meet the design and construction criteria specified herein, which an Offeror has previously constructed and priced, may be submitted. They may include designs incorporating factory fabricated components or modules. Deviations from space and adjacency requirements are discouraged unless the changes result in improvement to the facilities.

1-5 Housing Units. Site-built, factory-built, and manufactured-housing units are acceptable options for this project.

1-6 Definition of Housing Unit Types. Terms for housing unit types used in these criteria are defined as follows:

1-6.1 Site-built housing. A residential building or housing unit wholly or substantially constructed at the site.

1-6.2 Factory-built housing. Construction consisting of components, sub-assemblies such as modules, panelized walls, roof trusses, floor joists, and other factory-assembled components, which are transported to the construction site and further assembled into completed housing units. All interior and exterior walls, regardless of whether they are structural (load bearing) or not, are plant fabricated (panelized). Panels must be fabricated to the extent that the structure of the panel or truss is factory-assembled. Finishes such as interior wallboard may be site applied.

1-6.3 Manufactured housing. As defined in Public Law 93-383, Title 24, Chapter XX amended (1977, 1978, 1979, and 1980), a manufactured home is "a structure, transportable in one (1) or more sections which in the traveling mode is eight body feet or more in width, or forty body feet or more in length, or, when erected on site, is built on a permanent foundation when connected to the required utilities, and includes the plumbing, heating, air conditioning and electrical systems contained therein."

1-6.4 Apartment buildings. Prohibited, therefore not used.

1-6.5 Garden apartments. Prohibited, therefore not used.

1-6.6 Duplex. Prohibited, therefore not used.

1-6.7 Townhouses. Prohibited, therefore not used.

1-6.8 Detached house. A single-family, free standing, housing unit which is not attached to another housing unit.

1-7 Design Quality. The objectives are to obtain housing structures and complimentary site development, within funds available, and to optimize livability. The housing development should reflect comparable private-sector housing communities. Design quality is achieved through the optimization of interior planning, integration of housing structures to the site, and balancing architectural attractiveness, variety, function, and design for low-cost maintenance and operation. Offerors should consider sustainable design applications in developing proposals, see Section 13.

The design of housing units including the selection and specifying of exterior and interior finishes, equipment, appliances, and systems shall include consideration of maintenance ease and cost. Avoid products that require continuing maintenance at high cost.

1-8 Not used.

1-9 Energy and Resources Conserving Features. Public Law 102-486, Executive Order 13123, and Federal Regulations 10 CFR 435, require Federal buildings to be designed and constructed to reduce energy consumption in a life-cycle, cost-effective manner using renewable energy sources when economical. Products designed to conserve energy and resources by controlling the amounts of consumed energy or by operating at increased efficiencies should be considered. Offerors are required to provide Energy and Resource conserving improvements that at least insure compliance with the Energy Star Homes Program parameters.

1-10 Prototype Housing Units. The purpose of the prototype housing unit is to verify the details of the approved design and material selections, and to establish the quality level against which the remaining work will be judged. At the plant, construction connection details shall be exposed for study by authorized Government inspectors for a period of time agreed to by the Contractor and the Contracting Officer. The housing unit or units at the plant and/or the prototype at the site are subject to Contracting Officer's approval. At the site, the complete prototype shall be constructed for each housing unit floor plan. Each stage of work shall be completed and accepted on the prototype prior to starting work on the same stage for similar housing units in the project. The stages of work for the prototypes shall be:

- a. Foundation, slab and under-slab rough-ins complete
- b. Framing, exterior wall sheathing, roof sheathing, and rough-ins complete
- c. Housing unit complete

1-10.1 "Site-Built." One prototype housing unit shall be required for each housing unit floor plan. The construction of the prototypes shall be coordinated with the Contracting Officer so that several stages of completion can be reviewed as the units are built.

1-10.1.1 One prototype unit shall be left in the "rough in" stage (no interior finishes) so that the utility systems and framing construction is exposed. Exteriors of the prototype shall be completely finished. When the last new units are constructed, the "rough in" stage prototype unit shall be completed and turned over to the Government with the last turnover group.

1-10.1.2 Perform blower door test on each prototype housing unit in accordance with SOW Paragraph 7-3.2. Blower door test is not required for prototype unit remaining in the "rough in" state.

1-10.2 "Manufactured" or "Factory-Built." A prototype housing unit shall be required for each housing unit type of each run fabricated at the plant for manufactured or factory-built homes.

1-10.2.1 Manufactured. If the housing units are classified as manufactured housing, all interior and exterior systems that form integral parts of the transportable module shall be constructed and assembled for inspection by the Government. This shall include, as a minimum, wall and ceiling construction, interior finishes, utility piping, wiring, and ductwork fastening and assembling of adjacent modules, connection details to sinks, installed kitchen cabinets and countertops. Portions of the work shall be left unfinished or exposed to demonstrate interior construction details.

1-10.2.2 Factory-Built. If the housing units are classified as factory-built housing, all wall panels that are fabricated in the plant for shipment to the site shall have prototype units constructed and assembled for in-plant inspection by the Government. This shall include, as a minimum, wall framing, roof and ceiling framing, connection details, utility piping, wiring and ductwork, interior and exterior wall finishes which form part of the factory-built wall. In addition, the Contractor shall construct as part of the factory-built prototype, installed samples of wall insulation, finished siding (if not part of wall assembly), sample installed bathtub and sink and installed kitchen sink and cabinets to demonstrate proper installation and wall connections. Portions of the work shall be left unfinished or exposed to demonstrate interior construction details.

1-10.2.2.1 One Floor Prototype. If only one floor of the prototype is manufactured or factory-built, factory assembly of the manufactured or factory-built portion of the prototype is required. In all cases, the factory prototype shall consist of one of each building type. The factory prototype shall be assembled to verify assembly connections, details, construction, and transportation of the finished housing unit.

1-11 Structural Integrity. Manufactured and factory-built homes shall be of individual housing units attached to one another in a manner which shall provide a finished structural assembly having an appearance and structural integrity comparable to a site-built single or multi-family residence built to applicable codes.

1-12 Construction Tolerances. Assembled housing units shall be true and plumb and all within specified construction tolerances for all alignments represented on the drawings. Adjacent walls shall be attached at roof and floor levels in such a manner as to preclude placing any wood member in cross-grain bending or cross-grain tension, and to avoid putting nails in withdrawal.

1-13 Force Protection & Anti-Terrorism Considerations. Not required therefore not used.

1-14 Prototype Kitchen – The Contractor shall construct a complete prototype kitchen in a building on Fort Knox. This prototype kitchen shall reflect the kitchen design of one of the four-bedroom units, and shall be complete in every way, except for the installation of plumbing piping. The prototype kitchen shall remain in place until the construction of the final units in the housing development, or until the Government decides it can be disassembled, at which time the Contractor shall remove the kitchen and restore the Government space to its original condition. The Contractor may not use the kitchen components in the construction of units to be occupied, and shall dispose of them in compliance with the requirements of the RFP. The Government will provide the range and refrigerator for the prototype kitchen; the Contractor shall pick the appliances up at a warehouse on Fort Knox, transport them to the prototype kitchen site and install them, and shall return them to the warehouse when the kitchen disassembly is complete.

## 2. CRITERIA REFERENCES.

2-1 Criteria to be used for design and construction shall be taken from the most current references at the date of issue of the RFP. Administrative, contractual, and procedural features of the contract shall be as described in other sections of the RFP. Referenced codes and standards herein and those listed below are minimum acceptable criteria.

2-2 Local and State Codes or Standards. The following specifications, standards, bulletins, and handbooks form a part of this document to the extent specified herein. The edition of the code or standard current as of the day of contract award shall be used.

2-2.1 Local. – Not used.

2-2.2 State. Water and sanitary sewer service shall comply with the regulations of the Kentucky Department of Natural Resources.

Kentucky State Building Code  
Kentucky Transportation Cabinet (KYTC) Highway Design Manual

2-2.3 National.

2-2.3.1 Design and construction shall comply with the requirements of the following codes, unless other criteria in this RFP have more stringent requirements. In such cases the more stringent requirement shall govern.

International Residential Code  
International Building Code  
International Plumbing Code  
International Mechanical Code

2-3 Federal Laws. The Federal laws and regulations listed in Table 2-1 form a part of this document. They are available from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20401-9325 (202) 512 – 1800.

**TABLE 2-1 – FEDERAL LAWS & REGULATIONS**

CFR/USC No.	Description
7 CFR 17xx	U.S. Department of Agriculture (USDA) Rural Utilities Service (RUS) Electric Program Regulations
10 CFR 430	National Appliance Energy Conservation Act (NAECA)
10 CFR 435	Voluntary Performance Standards for New Commercial and Multi-Family High Rise Residential Buildings; Mandatory for Federal Buildings.
16 CFR 1630	Standard for Surface Flammability of Carpet and Rugs
40 CFR 247.12	Comprehensive Procurement Guideline for Products Containing Recovered Materials, Construction Products
41 CFR 101	Uniform Federal Accessibility Standards (UFAS)
49 CFR 192	Transportation of Natural Gas and Other Gas by Pipeline: Minimum Federal Safety Standards
42 USC 4321-4361	National Environmental Policy Act (NEPA)
Army Regulation 200-1	Environmental Protection and Enhancement, May 1990
E.O. 13123	Energy Efficiency and Water Conservation in Federal Facilities

Note: 7 CFR 17xx denotes all applicable part 1700 as required by USDA Rural Utilities Service (RUS) Electric Program Regulations.

2-4 Other Government Documents and Publications. The following Government documents and publications form a part of this document to the extent specified herein:

2-4.1 Americans With Disabilities Act Accessibility Guidelines (ADA-AG), are available from U.S. Architectural and Transportation Barriers Compliance Board, 1331 F Street, N.W., Washington, D.C. 20004-1111

2-4.2 Environmental Protection Agency, Ariel Rios Building, 1200 Pennsylvania Avenue, N.W., Mail Code 3213A, Washington, DC 20460, (202) 260-2090. 833R92001 Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices; Summary Guidance available from: <http://www.epa.gov/clariton/clhtml/pubtitle.html>

2-4.3 “Recommended Standards for Sewage Works”, 1990, Great Lakes-Upper Mississippi River Board of State Sanitary Engineers (also identified as the 10-State Standards).

2-4.4 Uniform Federal Accessibility Standards (UFAS) <http://www.access-board.gov/indexes/accessindex.htm>

2-4.5 Department of the Army, U.S. Army Corps of Engineers, Washington, D.C., 20314-1000: Sustainable Design

for Military Facilities (TL 1110-3-491) <http://www.usace.army.mil/inet/usace-docs/eng-tech-ltrs/>

2-4.6 Military Handbook 1008C, Fire Protection for Facilities Engineering Design and Construction

2-4.7 Federal Emergency Management Agency; Building Seismic Safety Council, National Earthquake Hazards Reduction Program (NEHRP) Recommended Provisions for Seismic Regulations for New Buildings and Other Structures, 1997 Edition; Part 1: Provisions (FEMA 302)

2-4.8 Federal Manufactured Housing Construction and Safety Standards Act (FMHCSS) USC Title 42.

2-4.9 Not used.

2-4.10 U.S. Army Corps of Engineers Sustainable Project Rating Tool (SPiRiT), version 1.4.1, June 2002. Available from: <http://www.usace.army.mil/inet/usace-docs/eng-tech-ltrs/etl1110-3-491/a-c.pdf>.

2-4.11 Handbook for Public Playground Safety, Consumer Product Safety Commission of the United States, 4330 East-West Highway, Bethesda, Maryland, 20814-4408; Tel: 301-504-6816, Fax: 301 504-0124 or 0025; [www.cpsc.gov](http://www.cpsc.gov).

2-4.12 Manual on Uniform Traffic Control Devices, Office of Transportation Operations, Federal Highway Administration, Room 3416, 400 Seventh Street SW, Washington D.C. 20590.

2-4.13 Sign Standards Manual, EM 1130-2-322, Army Corps of Engineers, [www.mvp.usace.army.mil/cxm/sign\\_standards\\_prog/Ch1singmansamp.pdf](http://www.mvp.usace.army.mil/cxm/sign_standards_prog/Ch1singmansamp.pdf)

2-5 Non-Government Publications. The following publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are Department of Defense (DoD) adopted are those listed in the Department of Defense Index of Specifications and Standards (DODISS).

2-5.1 Air-Conditioning and Refrigeration Institute (ARI). Information listed below is available from ARI, 4301 Fairfax Dr., Suite 425, ATTN: Pubs Dept., Arlington, VA 22203, Ph: 703-524-8800, Fax: 703-528-3816, Internet E-Mail: [ari@dgsys.com](mailto:ari@dgsys.com), Directory of Certified Unitary Air Conditioners, Unitary Heat Pumps and Sound Rated Outdoor Unitary Equipment; ARI 210/240, Unitary Air Conditioning and Air-Source Heat Pump Equipment : <http://www.ari.org/>

2-5.2 Air Movement and Control Association (AMCA), AMCA 210, Laboratory Methods of Testing Fans For Rating, is available from AMCA, 30 West University Drive, Arlington Heights, IL 60004, (312) 394-0150: <http://www.amca.org/>

2-5.3 American Architectural Manufacturers Association (AAMA). AAMA specifications are available from AAMA, 1540 East Dundee Rd., Suite 310, Palatine, IL 60067-8321, Ph: 708-202-1350, Fax: 708-202-1480 2700 River Road, Suite 118, Des Plaines, IL 60018, (312) 699-7310. AAMA 1002.10 "Voluntary Specifications for Aluminum Insulating Storm Products for Windows and Sliding Glass Doors".

2-5.4 Air Conditioning Contractors of America (ACCA). Manual S, Residential Equipment Selection. Publication for sale at: ACCA, 2800 Shirlington Road, Suite 300, Arlington, VA 22206. Ph: 1-888-290-2220.

2-5.5 American Concrete Institute International (ACI). Publications for sale at: <http://www.concrete.org/BOOKSTORE/BKSTR.HTM> or ACI International, Member/Customer Services, P.O. Box 9094, Farmington Hills, MI 48333-9094, (248) 848-3801. ACI 318 Building Code Requirements for Structural Concrete and Commentary.

2-5.6 American Society of Civil Engineers (ASCE). 1801 Alexander Bell Drive, Reston, VA 20191-4400, (800) 548-

2723. <http://www.asce.org> ASCE 7 Minimum Design Loads for Buildings and Other Structures.

2-5.7 American National Standards Institute, Inc. (ANSI). Copies of the standards listed in Table 2-2 are available from ANSI, 11 West 42nd St., New York, NY 10036, Ph: 212-642-4900, Fax: 212-302-1286: <http://www.ansi.org/>

**TABLE 2-2 – AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI) STANDARDS**

Std. No.	Std. Description
A112.19.1	Enameled Cast Iron Plumbing Fixtures
A112.19.2	Vitreous China Plumbing Fixtures (DoD Adopted)
A112.19.3	Stainless Steel Plumbing Fixtures (Designed for Residential Use)
A112.19.4	Porcelain Enameled Formed Steel Plumbing Fixtures (DoD Adopted)
A112.19.5	Trim for Water-Closet Bowls, Tanks, and Urinals (Dimensional Standards) (DoD Adopted)
A161.1	Recommended Construction and Performance Standards for Kitchen and Vanity Cabinets
B16.5	Steel Pipe Flanges and Flanged Fittings (DoD Adopted)
B16.22	Wrought Copper and Copper Alloy Solder Joint Pressure Fittings (DoD Adopted)
B16.26	Cast Copper Alloy Fittings for Flared Copper Tubes (DoD Adopted)
B31.8	Gas Transmission and Distribution Piping Systems
C2	National Electrical Safety Code
ANSI C105 AWWA A21.5	Polyethylene Encasement for Ductile-Iron Pipe Systems
Z21.10.1	Water Heaters, Gas, Volume I, Storage Type, 75,000 BTUH Input or Less
Z21.45	Flexible Connectors of Other Than All-Metal Construction for Gas Appliances
Z60.1	American Standard for Nursery Stock
Z124.1	Plastic Bathtub Units
Z124.2	Plastic Shower Receptors and Shower Stalls

2-5.8 American Society of Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE) documents, listed in Table 2-3, are available from ASHRAE, 1791 Tullie Cir., NE, Atlanta, GA 30329-2305, Ph: 404-636-8400 Fax: 404-321-5478 1791 Tullie Circle, N.E., Atlanta, GA 30329, (404) 636-8400: <http://www.ashrae.org/>

**TABLE 2-3 – AMERICAN SOCIETY OF HEATING, REFRIGERATION, AND AIR-CONDITIONING ENGINEERS (ASHRAE)**

No.	Description
ASHRAE	Handbook of Fundamentals
ASHRAE	Residential Cooling Load Calculations
ASHRAE 62	Ventilation for Acceptable Indoor Air Quality
ASHRAE 52	Method of Testing Air Cleaning Devices used in General Ventilation for Removing Particulate Matter
ASHRAE 55	Thermal Environmental Conditions for Human Occupancy, Addenda 1995
ASHRAE 90.2	Energy Efficient Design Residential Buildings
ASHRAE 111	Practices for Measurement, Testing, Adjusting, and Balancing of Building Heating, Ventilation, Air Conditioning, and Refrigeration Systems
ASHRAE 129	Measuring Air-Change Effectiveness

2-5.9 American Society of Mechanical Engineers (ASME). ASME B16.11, Forged Fittings, Socket-Welding and Threaded, and ASME B31.8, Gas Transmission and Distribution Systems, are available from ASME, 22 Law Dr., Box 2300, Fairfield, NJ 07007-2900, Ph: 800-843-2763, Fax: 201-882-1717: <http://www.asme.org/>

2-5.10 American Society of Safety Engineers (ASSE). ASSE 1008. Publication available from: ASSE, 1800 East Oakton Street, Des Plaines, IL 60018. Ph: (847) 699-2929.

2-5.11 American Society for Testing and Materials (ASTM). ASTM specifications listed in Table 2-4 are available from ASTM, AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) 1916 Race St., Philadelphia, PA 19103, Ph: 215-299-5585, Fax: 215-977-9679: <http://www.astm.org/>

**TABLE 2-4 – AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) SPECIFICATIONS**

Spec. No.	Spec. Description
A53	Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless
A526	Specification for Steel Sheet Zinc-Coated (Galvanized) by the Hot-Dip Process, Commercial Quality (DoD Adopted)
B117	Method of Salt Spray (Fog) Testing (DoD Adopted)
C90	Specification for Hollow Load-Bearing Concrete Masonry Units (DoD Adopted)
C216	Standard Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale) (DoD Adopted)
D1557	Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft 2700kN-m/m)
D1785	Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120 (DoD Adopted)
D2513	Standard Specification for Thermoplastic Gas Pressure Piping (DoD Adopted)
D2683	Standard Specification for Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing (DoD Adopted)
D2846	Standard Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Hot and Cold-Water Distribution Systems (DoD Adopted)
D3018	Specification for Class A Asphalt Shingles Surfaced with Mineral Granules (DoD Adopted)
D3679	Specification for Rigid Poly (Vinyl Chloride) (PVC) Siding
E84	Standard Test Method for Surface Burning Characteristics of Building Materials (DoD Adopted)
E90	Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions (DoD Adopted)
E108	Standard Methods of Fire Tests of Roof Coverings
E119	Standard Methods of Fire Tests of Building Construction and Materials
E162	Standard Test Method for Surface Flammability of Materials Using a Radiant Heat Energy Source (DoD Adopted)

**TABLE 2-4 – AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) SPECIFICATIONS**

Spec. No.	Spec. Description
E283	Standard Test Method for Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors
E330	Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference
E336	Standard Test Method for Measurement of Airborne Sound Insulation in Buildings
E408	Standard Test Methods for Total Normal Emission of Surfaces Using Inspection-Meter Techniques
E547	Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Cyclic Static Air Pressure Differential
E648	Critical Radiant Flux of Floor-Covering Systems Using a Radiant Energy Source
E779	Measuring Air Leakage by the Pressurization Method
E1007	Standard Test Method for Field Measurement of Tapping Machine Impact Sound Transmission Through Floor-Ceiling Assemblies and Associated Support Structures
E1465	Standard Guide for Radon Control Options for the Design and Construction of New Low-Rise Residential Buildings
F1292	Specification for Impact Attenuation of Surface Systems Under and Around Playground Equipment
E1423	Standard Practice for Determining the Steady State Thermal Transmittance of Fenestration Systems
E 1554	Determining External Air Leakage of Air Distribution Systems by Fan Pressurization.
F 1066	Standard Specification for Sheet Vinyl Composition Floor Covering
F1487-98	Standard Consumer Safety Performance Specification for Playground Equipment for Public Use
G90	Standard Practice for Performing Accelerated Outdoor Weathering of Nonmetallic Materials Using Concentrated Natural Sunlight

2-5.12 American Water Works Association, Inc. (AWWA). Specifications listed below are available from AWWA, 6666 West Quincy, Denver, CO 80235, Ph: 800-926-7337, Fax: 303-795-1989, AWWA C500, Gate Valves for Water and Sewerage Systems (DoD adopted); AWWA C502, Dry-Barrel Fire Hydrants; and AWWA C503, Wet-Barrel Fire Hydrants: <http://www.awwa.org/>

2-5.13 National Association of Corrosion Engineers (NACE). NACE RP-0286, The Electrical Isolation of Cathodically Protected Pipelines, is available from NACE, P.O. Box 218340, Houston, TX 77218: <http://www.nace.org/>

2-5.14 American Association of Textile Chemists and Colorists (AATCC). AATCC 134, Electrostatic Propensity of Carpets, is available from AATCC, P.O. Box 12215, Research Triangle Park, NC 27709, (919) 549-8141.: <http://www.aatcc.org/>

2-5.15 Builders Hardware Manufacturers Association, Inc. (BHMA). Specifications shown in Table 2-5 are available from the Builders Hardware Manufacturers Association, Inc. (BHMA), 355 Lexington Ave., New York, NY 10017, Ph: 212-661-4261, FAX: 212-370-9047.

**TABLE 2-5 – BUILDERS HARDWARE MANUFACTURERS ASSOCIATION (BHMA) SPECIFICATIONS**

No.	Description (Specs. are DoD Adopted)
BHMA-01	Directory of Certified Locks & Latches.
BHMA-02	Directory of Certified Door Closers.
BHMA 156.1	Butts and Hinges
BHMA 156.2	Auxiliary Locks and Associated Products Bored & Preassembled Locks & Latches
BHMA 156.4	Door Controls - Closers
BHMA 156.5	Auxiliary Locks & Associated Products
BHMA 156.7	Template Hinge Dimensions
BHMA 156.9	Bored and Preassembled Locks and Latches Cabinet Hardware
BHMA 156.13	Mortise Locks and Latches
BHMA 156.16	Auxiliary Hardware
BHMA 156.18	Auxiliary Hardware Materials and Finishes
BHMA 156.21	Thresholds

2-5.16 International Code Council (ICC). The International Residential Code One (1) and Two (2) Family Dwelling Code, the International Building Code (IBC), the International Mechanical Code, and the International Plumbing Code are available from the International Code Council, Inc. (ICC), 5203 Leesburg Pike, Suite 708, Falls Church, VA 22041-3401, Fax: 703-931-4533: <http://www.iccsafe.org/>

2-5.17 Electronic Industries Association Telecommunications Industry Association (EIA/TIA). EIA/TIA Standards

EIA/TIA 568A and EIA/TIA-570 are available from Electronic Industries Association, Engineering Department, Order From: Global Engineering Documents, 15 Inverness Way East, Englewood CO 80112, Phone: 800-854-7179, Fax: 303-397-2740.

2-5.18 Institute of Electrical and Electronics Engineers (IEEE): The National Electrical Safety Code (NESC) C2-2002. IEEE 445 Hoes Lane, P.O. Box 1331, Piscataway, NJ, 08855; Phone 800-678-4333, Fax 732-981-9667.

2-5.19 Illuminating Engineering Society of North America (IESNA). The IESNA Lighting Handbook, is available from Illuminating Engineering Society of North America, (IESNA), 120 Wall St., 17th Floor, New York, NY 10005-4001, Ph: 212-248-5000, Fax: 212-248-5017: <http://www.iesna.org/>

2-5.20 Not used.

2-5.21 International Ground Source Heat Pump Association. Oklahoma State University, P.O. Box 1688, Still Water, Oklahoma 74076-1688.

2-5.22 National Electrical Manufacturers Association (NEMA). NEMA standards listed below are available from the National Electrical Manufacturers Association (NEMA), National Electrical Manufacturers Association (NEMA), 2101 L St., NW, Suite 300, Washington, DC 20037-1526  
Ph: 202-457-8474 Fax: 202-457-8473 NEMA DC 3, Wall-Mounted Room Thermostats; and NEMA WD 1, General Requirements for Wiring Devices: <http://www.nema.org/>

2-5.23 National Environmental Balancing Bureau (NEBB), NEBB-01, Procedural Standards for Testing-Adjusting-Balancing of Environmental Systems, is available from NEBB, 875 Grove Mount circle, Gaithersburg, MD 20877-4121, Ph: 301-977-3698, Fax: 301-977-9589: <http://www.nebb.org/>

2-5.24 National Fenestration Rating Council (NFRC). NFRC 100-91, Procedure for Determining Fenestration Product Thermal Properties, is available from NFRC, 1300 Spring Street, Suite 500, Silver Spring, MD. Telephone: (301) 589-NFRC, <http://www.nfrc.org>

2-5.25 National Fire Protection Association, Inc. (NFPA). NFPA codes listed in Table 2-6 are available from the National Fire Protection Association, Inc. (NFPA), 1 Battery March Park, P.O. Box 9101, Quincy, MA 02269. Telephone: (617) 770-3000, Fax: (617) 770-0700: <http://www.nfpa.org/>

**TABLE 2-6 – NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) CODES**

Code No.	Code Description
NFPA 70	National Electrical Code (DoD Adopted)
NFPA 72	National Fire Alarm Code
NFPA 101	Life Safety Code
NFPA 101M	Alternative Approaches to Life Safety
NFPA 255	Method of Test of Surface Burning Characteristics of Building Materials
NFPA 501A	Manufactured Home Installations
NFPA 701	Standard Methods of Fire Tests for Flame Resistant Textiles and Films

2-5.26 National Wood Window and Door Association (NWWDA) standard, NWWDA I.S.2, Standard for Wood Window Units is available from the National Wood Window and Door Association (NWWDA), 1400 East Touhy Ave., Suite 470, Des Plaines, IL 60018, (847) 299-5200, Fax: (847) 299-1286: <http://www.nwwda.org/>.

2-5.27 Sheet Metal and Air Conditioning Contractors National Association (SMACNA). SMACNA Installation Standards for Residential Heating and Air Conditioning Systems and SMACNA-07, HVAC Systems, Testing, Adjusting, and Balancing, are available from SMACNA, 4201 Lafayette Center Drive, Chantilly, VA 22180, (703) 803-2980, Fax: (703) 803-3732: <http://www.smacna.org/>

2-5.28 Underwriters Laboratories, Inc. (UL) specifications listed in Table 2-7 are available from the Underwriters Laboratories, Inc. (UL), 333 Pfingston Road, Northbrook, IL 62096. Telephone: (847) 272-8800. Fax: (847) 509-6220: <http://www.ui.com/>.

**TABLE 2-7 – UNDERWRITERS LABORATORIES SPECIFICATIONS**

No.	Description (Specs. Are DoD Adopted)
UL 174	Water Heaters, Household Electric Storage Tank Type
UL 181A	Closure Systems for Factory-Made Rigid Ducts
UL 430	Waste Disposers
UL 507	Electric Fans
UL 746C	Polymeric Materials - Use in Electrical Equipment Evaluations
UL 749	Household Dishwashers
UL 858	Household Electric Ranges
UL 900	Test Performance of Air Filter Units

### 3. SITE PLANNING AND DESIGN.

3-1 Scope. This project consists of 183 housing sites to be planned, 178 housing units to be constructed on the preferred housing development area of 34.8 hectares (86 acres) of land, with an additional 4 hectares (10 acres) of land available for development at the south end of the project area. However, it is preferred that only the area of 86 acres be developed. The project site is approved for LOW DENSITY siting. Site development shall comply with the minimum requirements for LOW DENSITY siting. Siting, grading and construction of housing and infrastructure shall not disturb portions of development area with slopes exceeding 25%. Additional consideration shall be given to proposals in which siting and construction of housing and infrastructure do not disturb portions of development area with slopes exceeding 15%.

3-2 Site Verification. The existing landscape is a mix of predominantly Oak and Maple deciduous hardwood trees with some Cherry, Poplar, Walnut and Sycamore and scattered Cedar conifers on forest edges. The proposed site comprises 86 acres of moderately sloped hillsides and large expanses of rolling open space incorporating the first, tenth, eleventh, seventeenth and eighteenth holes of the golf course. Immediately to the east of the proposed home sites and west of Wilson Road, which may be widened at some future date, is the existing club house, an indoor swimming pool, the Wickam Guest House for visitors to Fort Knox. An existing area of housing, known as the Binter Court neighborhood, shall be demolished to accommodate some of the new home sites for this initial phase of development. Existing underground irrigation piping shall be capped at the development area boundary. Remove all existing irrigation lines, heads, manifolds, valves and riser cabinets within the area.

3-3 Area Development Plan. Landscape and site improvements include the planning and construction of pedestrian sidewalks, patios, planting, recreation area development, site furnishings and signage. The site design and construction shall incorporate single family homes. The tenets of sustainable design should be implemented wherever possible. Creative site design is encouraged. Site boundaries and project composition, and thus the density of 3-5 units per acre net plus open space, are fixed.

3-3.1 Density. The project site is approved for LOW DENSITY, siting.

3-3.2 Land use. A major site planning objective is to ensure an interesting, attractive, livable residential environment and to utilize the potential advantages of the site. Planning shall incorporate consideration of topography, existing significant trees, plus other significant vegetation worth protecting, natural characteristics of the site, climatic conditions, and prevailing winds. Design should capitalize upon ecological and economical opportunities inherent in the natural character of the site, using existing terrain to minimize cut and fill, minimizing impervious surfaces and combining utilities and common open spaces. Site design shall be based upon, and include, spatial balance, environmental sensitivity, site composition, life safety and reduction of conflict between pedestrian and vehicular circulation patterns. Buffer zones, visual and sound control and landscaping shall be coordinated with storm water drainage, utilities, roadways and passive outdoor recreation areas. Units shall incorporate a commonality of theme and character, but offer a variety of unique facades and floor plans and orientation to the street and to side and backyards.

3-3.3 Environment. The environment and natural setting of the site should be maintained during and after construction by providing houses that accommodate the existing topography and by selective cutting of the trees and/or shrubs. Excessive cutting, filling, and re-contouring of the site is discouraged. Avoid site clearing that removes and/or destroys trees without preserving groups of trees in front of, between, behind, and/or around the houses. Design should focus on integrating the new improvements, including units and recreational facilities, into the existing assets of the site with emphasis on cross-utilization of existing recreational and meeting facilities as well as parking.

3-3.4 Buffers and Screening. Provide appropriate buffer areas to separate and visually isolate the residential community from undesirable external influences. Provide berming and vegetative screening around existing public elements, such as the Guest House, Pool Building, Gallota's, and along Wilson Road to enhance the neighborhood atmosphere. Berms shall have a natural form, slopes 4:1 or less, and mixed vegetation on and around the landform. Berm height shall not exceed eave-line of adjacent homes and screening shall benefit the new housing, and existing buildings. All possible methods of mitigating the impact to the site and adjacent areas shall be explored. Berm &

buffer plantings shall not be located closer than 18m (60 feet) to the westerly edge of pavement/back of curb along Wilson Road. Screen unsightly structures, including transformers and other utilities, and trash receptacles, with buffer plantings .91m (3 feet) from structures. Planting shall be on three sides.

3-3.4.1 Provide a buffer area of at least seventy five feet around sinkholes; no housing, yards or recreation facilities shall be located in this buffer area.

3-3.4.2 If streets walks or utility lines are located within a known sinkhole buffer zone, they shall be designed and constructed according to the requirements of the Kentucky Division of Water and in accordance with the written recommendations of Contractor's geotechnical engineer, and as approved by the Contracting Officer. At a minimum, the Contractor's design shall:

3-3.4.2.1 Prohibit ponding or drainage to such sinkholes and provide adequate support for the street, walk or utility line.

3-3.4.2.2 Provide for removal of soft soils, lining of the sinkhole with filter fabric, and filling the sinkhole with KY #57 aggregate. Above and around the filled sinkhole, three 20.32 cm (8") lifts of KY #57 shall be placed, with geogrid over the first two lifts. The third lift shall receive a layer of filter fabric, after which compacted fill for street or utility line construction can be placed in compliance with the provisions of this RFP. As an alternative, the top three lifts of KY #57 aggregate and geogrid may be replaced with 61 cm (two feet) of concrete, with compacted fill for construction placed above the concrete.

3-3.4.2.3 The filter fabric shall meet the following criteria: non-woven and AOS of 70 to 100 (ASTM D4751-87). Materials that meet these requirements include Amoco (BP) ProPex 4506, Carthage Mills FX-40HS, and Mirafi 140N.

3-3.4.2.4 The geogrid shall meet the following criteria: polypropylene or polyethylene grids with a minimum Wide Width Tensile Strength of 150 psf at 5% strain (ASTM D4595-86), and seams run on the north south axis. Materials that meet these requirements include Tensar BX 1100, Hueskar Fornit 20 and Tenax Corporation LBO202/SAMP.

3-3.5 Housing unit grouping. Variety in groupings, arrangements, and siting configurations of housing units is encouraged to fit varying terrain conditions and to provide compatible and functional residential layouts and street scapes. Building arrangements should be informal and imaginative with setbacks and orientation to provide for the best view, privacy, and variety. The proper grouping of housing units will provide backyard screening, separation of pedestrian and vehicular traffic, play lots, neighborhood parks, and natural open spaces. The layout should reflect simplicity of design and provide a visual sense of community.

3-3.6 Housing unit variation. Housing unit variation shall afford distinctly different exterior appearances within each housing unit type. Provide stylistic compatibility that will give the neighborhood a sense of order. Housing units shall vary in two or more of the following: Floor plans, massing, elevation, garage location (with face of garage set back a minimum of 1.5m (5 feet) from principle structure, and exterior materials. In addition, housing units shall vary in color and siting. A reverse floor plan (mirror-image), although an acceptable means of creating variety, shall not constitute a housing unit change. Offerors shall comply with land-use restraints set forth in this document and shall design a minimum of six (6) different unit types: 2 four-bedroom, 2 three- bedroom, and one each four-bedroom and three-bedroom accessible. To accept the design freedom objective of this RFP, Offerors are encouraged to offer 1-story and 2-story construction for detached units. The preferred colors are earth tones available in commonly used durable materials. The design shall reflect life cycle maintenance and energy efficiency. Variation in the arrangements and siting of dwelling units to fit varying terrain conditions and to provide attractive residential patterns and streetscapes shall be viewed as an opportunity, not a constraint. Building arrangements along curvilinear roadways shall be informal and imaginative as they are in the private sector with setbacks and orientation to provide for the best view, privacy and variety. The proper grouping of units shall provide backyard screening, separation of pedestrian and vehicular traffic, recreation, and natural open spaces.

3-3.7 Housing unit orientation. Whenever possible, it is desirable that the housing units be situated along the east-west axis, exposing more surface area to the south during the winter for the collection of solar radiation.

This allows the south elevation to receive much less radiation in comparison to the roof and east and west elevations during the summer. Existing and proposed vegetation shall be incorporated to provide screening from solar gain wherever feasible.

3-3.8 Grading. Avoid construction on slopes greater than 15%. Construction and grading on slopes in excess of 25% is prohibited. Added value is brought to a development that facilitates an appropriate balance of unit floor area, open space, recreation space, and pedestrian and vehicular circulation consistent with quality design, good land planning practices and economics.

3-4 Site Design Criteria. The following specific criteria are to be used as guidance in site design, and offers will be scored accordingly.

3-4.1 Housing units per hectare (ha) (acre (ac)) by site density are shown in Table 3-1 below.

**TABLE 3-1 - HOUSING UNITS PER HECTARE (ACRE)**

Pay Grade	Low Density	
	units/ha	units/ac
E-7 - E-9	7.4-12.4	3-5

3-4.2 Housing unit types by site density are shown in Table 3-2.

**TABLE 3-2 - HOUSING UNIT TYPES BY DENSITY**

Bedrooms/ Grade	Low Density
3 & 4 Bedrooms E-7 - E-9	1-2 Floor Detached Homes

3-4.3 Parking Requirements. Three spaces per unit – one garage and two off-street in driveway, 3m X 6m (10 feet x 20 feet) parallel to one another, and ½ space per unit grouped on-street guest parking in clusters of 2 to 4 spaces, perpendicular to the road and dispersed throughout the neighborhoods.

3-4.4 Children's outdoor play areas. Recreational Facility Requirements – All recreational facilities and picnic areas shall be accessible, including the path of travel to these facilities.

**TABLE 3-3 - RECREATION ELEMENTS**

Facility:	Quantity:	Requirements:
Play Lot	3	Surface of poured, recycled rubber aggregate.
Basketball Court	2 Full	Regulation size.
Picnic Shelter	2	Group picnic shelter w/ 4 picnic tables & 2 grills
Jogging Path	1	1.8m (6 feet 0 inches) wide, 1.6 km (1 mile) long.
Soccer Field	1	Non- regulation size with fixed posts, located on old par 3 course.
Pre-Teen Play Areas	2	Surface of poured, recycled rubber aggregate.
Open Space	N/A	Design open space to be integrated as comparable to similar private sector residential communities.

3-4.4.1 Play Lot. Each play lot shall be a minimum of total area of 325 m<sup>2</sup> (3,500 ft<sup>2</sup>) and shall be sized to fit the appropriate scale of the neighborhood where they are to be located. The play lot shall be designed to accommodate two age groups; 6 weeks to 5 years age group and 5 to 9 years age group. The play lot shall have a capacity for approximately 15 to 35 children. These play lots should be located within site lines of the housing units and provide colorful, imaginative play experiences with elements such as slides, swings with tot-buckets, climbing/crawling areas and interactive play panels . All play (tot) lots shall be ADA accessible and provide the minimum number of accessible-level play experiences as outlined in the Consumer Product Safety Commission’s Handbook for Public Playground Safety, and ASTM’s Standard Consumer Safety Performance Specification for Playground Equipment in Public Use F1487-98. Play lots shall have a 1.2m (4-foot 0-inch) tall vinyl coated chain-link fence around the perimeter, out of the safety buffer area if located within 18.3m (60 feet) from a collector street and /or within 12.2m (40 feet) of a slope greater than 25%. Design consideration shall be given to the use of play equipment made from recycled plastic & metals in lieu of treated wood or virgin metals.

3-4.4.2 Basketball Court. The basketball courts should be located within a safe buffer from play lot areas. Basketball courts shall be regulation size, 25.6m (84 feet) by 15.2m (50 feet) with a 6m (20-foot) clear safety zone. Courts shall be orientated on a north/south axis. Rims shall be breakaway style. Standards shall be fixed. Provide one trash container for each basketball court.

3-4.4.3 Picnic Shelter. As a component of the open space development, provide for two sheltered picnic areas, ADA accessible, which shall contain one covered picnic shelter, an enclosure capable of holding four trash receptacles at each picnic shelter, four picnic tables, one of which shall be wheelchair accessible, and two embedded barbecue grills, briquette-burning type out from under the roof drip-line yet wheelchair accessible. Locate picnic areas within close proximity to parking areas and sidewalk access. Landscape enhancements shall provide for shade and shrub material which create a buffer area around the picnic spaces. Design consideration shall be given to the incorporation of two additional (4 total) shelters.

3-4.4.4 Jogging Path. A bituminous jogging path / bike path at least 1.6 km (one mile) in length, 1.8m (6 feet-0 inches) wide over 101.6mm (4 inches) of compacted aggregate over filter fabric soil separator on a compacted sub-grade. Loop trail independent of the street network. Trail shall conform to the rules of ADA accessibility, with a

maximum 5% vertical slope and 2% cross-slope. Provide curb-cuts, crosswalk striping and accessible pedestrian ramps where trail bi-sects roads. Include (1) park bench every 304m (1000 feet) and a minimum of (2) litter receptacles along the path. Refer to Paragraph 3-4.4.8. Provide a path connection to the MacDonald School adjacent to this development, conforming to the jogging path construction specifications.

3-4.4.5 Soccer Field. A soccer field with fixed goals shall be located on the existing par 3 golf course area east of the Wickam Guest House. Recommend the use of natural land forms for grass stadium-style seating for viewers. No fixed seating structures shall be required and no nets are to be installed. Minimum soccer field size is 50m (165 feet) x 91m (300 feet), to be located on a north-south axis.

3-4.4.6 Pre-Teen Play Areas. Provide two play areas for pre-teens and teenage users, age group of 9 years to 15 years, in close proximity to tot-lot play areas. Play areas shall encourage group interaction while providing both active and passive recreation spaces. Elements such as wall climbers, swings, overhead ladders, rockers and small group congregation spaces are desired. Design consideration should be given to the implementation of one additional (3 total) pre-teen play areas and the development of an access drive with off-street parking and picnic shelter proximity. See Paragraph 3-4.4.1 for regulatory agency references.

3-4.4.7 Open Space. Through the planning of picnic space, play lots, etc. open space should occur such to reflect the character found in most private sector residential areas. Design consideration should be given to the preservation of as much natural open space, topography and existing trees as possible. Consideration should also be given to the incorporation of one turf volleyball court, minimum size to be 9m (30 feet) x 18m (60 feet), with a 6m (20-foot) clear-zone for safety, with fixed poles in proximity to picnic shelters and pre-teen play areas.

3-4.4.8 Seating. Provide the following two bench types, where noted, in the development of recreational spaces.

3-4.4.8.1 Recreational Bench: A back-less bench without arms, 1.8m (6 feet) in length, direct bury, recycled plastic seat and metal frame. Locate out of the safety buffer but intermixed with play lot equipment. Refer to Specifications Section 02870A, Site Furnishings.

3-4.4.8.2 Park Bench: A backed bench with arm rests at each end, 1.8m (6 feet) in length, direct bury, recycled plastic seat and metal frame. Locate along the edge of play lot paving, orientated to view the play lot and along the jogging path, facing the path itself. Refer to Specifications Section 02870A, Site Furnishings.

3-5 Building Setbacks and Spacing. Clearances between and adjacent to buildings must consider requirements for fire protection, safety, privacy, and emergency access in addition to the following minimum criteria. Setback or yard dimensions shall be from the building wall to an imaginary lot line around each building measured perpendicular to the building. Wall lengths with horizontal offsets of 1.8m (6 feet) or more may be measured separately when determining yard depth. Distance between buildings shall be not less than the sum of setbacks or yards, as required.

3-5.1 Minimum setbacks and spacing for low density sites is shown in Table 3-4.

**TABLE 3-4 - MINIMUM SETBACKS AND SPACING, LOW DENSITY SITES**

(See Notes at the end of the Table)

Description	Meters	(Feet)
From front of house to curb of residential street.	9.0	30
From house to major/arterial highway. (Edge of pavement)	39.0	130
Setback to Wilson Road	39.0	130
Side of garage to curb.	6.0	20
Side of house to curb.	7.6	25
Between sides of garages to houses.	6.0	20
Between outside walls of houses.	7.6	25
Between rear walls of houses.	24.0	80
Rear backyard.	6.0	20
Design consideration for rear yard.	7.6	25

Table 3-4 Notes:

- (a) Projections into required yards shall not exceed 40 percent of the setback (yard) distance.
- (b) Where slope is 3:1 or steeper, top and toe of slope shall be a minimum of 4.5m (15 feet) from the building.
- (c) When patios are located within the side yard, provide a 40-foot minimum separation.
- (d) No housing may be located on collector streets.
- (e) Vary house setback distance from streets, within allowable minimum, for visual interest throughout the development.
- (f) Setback from Wilson Road measured from the westerly edge of pavement/back of curb.
- (g) Building setback from the water tower shall be equivalent to the height of the tower, to be field-verified by Offeror.
- (h) When patios are located within the rear yard a minimum 5% slope for a distance of 6m (20 feet) shall be provided.

3-5.2 Setback Notes.

3-5.2.1 Where the slope is 3:1 or steeper, top and toe of slope shall be a minimum of 4.5m (15 feet) from the building. Slope 3:1 or greater are to be sodded and staked.

3-6 Circulation, Parking, and Bus Stops. The vehicular and pedestrian circulation system shall promote safe, efficient movement of vehicles and pedestrians within the housing area. It should maintain the maximum separation of vehicles and pedestrians. Safe circulation systems have a clear hierarchy of movement, lead to a clear destination, and do not interrupt other functions. The following criteria shall be considered for designing streets and drives for vehicles and pedestrians:

3-6.1 Vehicular circulation. Vehicular circulation layout is determined by applying the design vehicle templates to

the site design. The passenger car class includes passenger cars and light delivery trucks, such as vans and pick-ups. The passenger car template is equivalent to the non-organizational - privately owned vehicle (POV). The truck class template includes single-unit trucks, recreation vehicles, buses, truck tractor/semi-trailer combinations, and trucks or truck tractors with semi-trailers in combination with full trailers. Templates showing the turning movements for design vehicles are provided by the American Association of State Highway and Transportation Officials (AASHTO). Design site entrances, exits, service drives, and special circulation areas to accommodate the largest vehicle and therefore the design vehicle that uses the area. In the case of family housing the largest vehicle to use the area on a weekly basis would be the 18m (60-foot) tractor/semi-trailer combination. Provide the vehicle clearances that are required to meet traffic safety for emergency vehicles, service vehicles, and moving vans. Streets shall include required traffic control and street identification signage, maximum spacing between drives, right-angle turns, and limit points of conflicts between traffic.

### 3-6.1.1 Definitions.

#### 3-6.1.1.1 Nonresidential Streets

3-6.1.1.1.1 Arterial. Major roads and street systems external to the residential area.

3-6.1.1.1.2 Collector. Feeder street connecting external street system with residential streets in the subdivision and adjoining areas subject to future development.

#### 3-6.1.1.2 Residential Streets

3-6.1.1.2.1 Loop. Both ends open to traffic.

3-6.1.1.2.2 Cul-De-Sac. Only one end open to access street and a turnaround (Circle) at the other end.

3-6.1.2 Cul-De-Sac Design. The circulation system may be based on cul-de-sacs a maximum 250m (820 feet) long, measured from the center of the cul-de-sac to the centerline of the access street.

3-6.1.3 Intersection Design. Provide "T" intersection offsets of at least 38.1m (125 feet). The preferred angle of intersection is right-angle (90 degrees).

3-6.1.4 Street design. Street dimensions are determined by the selected design vehicle templates. Separation, corner clearances, and sight distance are established when the design vehicle templates and speed limits are selected. Streets shall be designed for vehicles with not less than 2721.5 kg (6,000 lb) code wheel load. Streets shall be provided with concrete curbs and gutters. Curbs shall be depressed at entrances to driveways. All gradients shall provide positive drainage with no ponding. A meandering street design, similar to those found in the private sector subdivision developments, is preferable over a straight road layout. Street design is also encouraged to use traffic circles at the intersection of roads leading to and from major collectors to help calm traffic speeds.

3-6.1.5 Unit Driveways. Minimum width of driveway shall be 6.1m (20 feet- 0 inches) for two-car parking to allow for circulation. Drives shall be concrete with control joints every 3m (10 feet-0 inches) and expansion joints every 12m (40 feet-0 inches). Use expansion joint material where driveway meets building, back of curb and any other permanent man-made element.

3-6.2 Recreation Accessible-Only Parking. A 90-degree parking layout is preferable. Provide two parking spaces at each picnic and play area.

3-6.3 Bus stops. Four school bus stops with shelters shall be provided along collector streets at intersections with residential streets for use as school bus stops. Bus stop shelters shall have roofs, a compatible style of architecture, concrete slab floor and shall be located near street lights to provide illumination. Tee intersections may share bus stops if within reasonable walking distances of these intersections. Provide for four school bus stops distributed equally throughout the neighborhood depending upon the design. Sidewalks at bus stops shall be located adjacent

to the curb for ADA access. Roads shall have pull-outs located in front of bus shelters for full-sized busses to load and unload safely.

3-6.4 Pedestrian circulation. Pedestrian circulation should be safe, separated from vehicle circulation, and relate to the housing units, parking, and community facilities. Pedestrian circulation should be based on pedestrian desired lines of walking between facilities. Desired lines should be weighted to predict the most traveled routes. These routes would require paving. Topography and vegetation can be used to reinforce a sense of movement. Design pedestrian concentration areas with adequate paved area.

3-6.4.1 Sidewalk design. Walks shall be provided to allow pedestrian circulation between various elements of the project including units, parking, streets, recreation, etc. Sidewalks are required on both sides of the street where housing is located and all sidewalks to be placed 4 feet from the back of the curb and on one side of the street along the internal parkway collector. Walks shall be a minimum of 4 feet wide, exclusive of curb width, and made of non-reinforced concrete with a minimum thickness of 4 inches over a 6-inch compacted base. Sidewalks shall be constructed with a 2% cross slope to promote drainage to the street. Where walks are adjacent to the curb, such as bus stops, the curb width is not to be included as sidewalk. Ramps for the handicapped shall be provided at intersections by depressing street curbs and adjacent sidewalk.

3-6.5 Site Planning – Roadway Planning.

3-6.5.1 Streets, Parking, Walks and School Bus Stops. The street system shall provide convenient and safe access and circulation (including collections, deliveries, and fire protection) within the housing area.

3-6.5.1.1 Street Types.

3-6.5.1.1.1 Nonresidential Streets.

3-6.5.1.1.1.1 Arterial. Major road/street systems external to residential area. No housing units shall front on arterial streets and no direct individual driveway or lot access shall be provided to arterials. Only collector streets shall access arterials.

3-6.5.1.1.1.2 Collector. No housing units shall front on collectors and no direct lot or driveway access shall be provided to collectors. Residential streets only access collectors, except as specifically allowed herein.

3-6.5.1.1.2 Not used.

3-6.5.1.1.2.1 Not used.

3-6.5.1.1.2.2 Not used.

3-6.5.2 Street Layout. The criteria presented in “A Policy on Geometric Design of Highways and Streets”, 2001 Edition, American Association of State Highway and Transportation Officials, shall be used in the design of the street system. The following specific criteria shall be considered for designing streets and roads for family housing.

3-6.5.2.1 Avoid rigid gridiron-like street and building layouts. Layout should relate to the natural contours of the site and should take into account adverse weather conditions such as snow and ice.

3-6.5.2.2 Avoid street patterns which encourage on-post vehicular traffic through housing areas. Circulation plans based on courts and cul-de-sacs are more desirable. Houses shall be clustered around courts and cul-de-sacs whenever possible.

3-6.5.2.3 Avoid loop streets that are either excessively long or excessively short (forming small islands with few dwelling units surrounded by streets).

3-6.5.2.4 Limit the number of intersections. Avoid four-way intersections and intersections near the crests of hills. Provide 'T' intersection offsets of at least 38.1 meters (125 feet). The angle of intersection shall be between 60 and 90 degrees (the minimum angle permitted being 60 degrees and the maximum angle permitted being 90 degrees). 'T' and 'Y' turn-arounds are not permitted.

3-6.5.2.5 Minimize paved areas as much as possible to increase the green space in the community; large areas of paved parking should be broken up by green islands or dividers in such a way as to not adversely affect routine ground maintenance.

3-6.5.2.6 Provide appropriate buffer areas to separate and visually isolate the community from undesirable external influences.

3-6.5.2.7 Pedestrian circulation shall relate to housing units, parking and community facilities, and shall be safe and attractive. Sidewalks in this development shall be made of concrete and located on both sides of residential streets, 0.9m (4 feet-0 inches) in width and placed 4 feet from the back of the curb. Along collector streets, sidewalk on one side of the street, 0.9m (4 feet-0 inches) is required. Sidewalks to the entrance of the development shall also be 0.9m (4 feet-0 inches). Design consideration shall be given to providing sidewalks that meander away from the road and that are within street light illumination along collector streets. See Paragraph 3-6.4.1.

3-6.5.2.8 Local streets should provide convenient access to housing units and all housing shall be accessible by emergency vehicles, service vehicles and moving vans.

3-6.5.2.9 Housing unit entrances should relate to parking spaces to provide convenient and safe access. Avoid siting houses such that driveways have steep drives, greater than 5% vertical slope.

3-6.5.2.10 Not used.

3-6.5.2.11 Emergency Vehicle Access Road: Include the construction of a 'buried street' for fire department access to the Wickam Guest House from the residential area. This road is to have a sub-grade support system of synthetic grid designed for the purpose of supporting heavy emergency vehicles yet allowing turf grass to grow on the surface or between the grid cells.

3-6.5.2.12 The project is allowed one collector street access to each of Dixie Street and Wilson Road.

3-6.5.2.13 The collector access from Wilson Road is required to provide the sole access from Wilson Road to the former clubhouse facility, Wickam Guest House and the pool. If the existing access onto Wilson Road is utilized, the existing traffic control signal system must be reinstalled at the intersection. In addition, the existing intersection must be reconstructed to provide a maximum slope of 0.5 percent for a distance of 50 feet from the shoulder of Wilson Road. If the current access off Wilson is closed and a new one created, the existing intersection shall be removed in its entirety and the existing signal shall be removed from its current location and re-installed at the new intersection. Any new intersection must be constructed in accordance with the requirements of the design guidelines of Kentucky Transportation Cabinet (KYTC) Geometric Design Standards 500-04. If a shared access is proposed, access to existing buildings for vehicles must be maintained throughout the demolition/construction period. Offerors shall submit a traffic routing plan and schedule for work on Dixie Street and Wilson Road, with regard to access construction.

3-6.5.2.14 Access to Gallota's, the Wickam Guest House and pool area shall be from the Wilson Road collector street and not through housing area residential streets.

3-6.5.2.15 The primary north-south collector street is to be extended to the southern boundary of the project to provide access to a potential future housing development. A temporary cul-de-sac shall be constructed at the southern end of the street stub.

3-6.5.2.16 The existing access from Binter Court onto Wilson Road must be demolished and cannot be utilized in

the design of the project road system.

3-6.5.3 Minimum Street Dimensions

3-6.5.3.1 Streets shall have the following minimum dimensions face to face of curb.

<u>Type of Street</u>	<u>On-Street Parallel Parking (Guest &amp; Service)</u>	
	<u>None</u>	<u>One Side</u>
Width, main collector road:	26 ft	N/A
Width, all residential streets:	N/A	28 ft
Minimum cul-de-sac radius:	N/A	55 ft
Minimum 'T' or 'Y' turn-around size	Not Permitted	Not Permitted

NOTE: Center planting circle is not permitted in a cul-de-sac.  
Street widths are measured from the face of the curb.  
All streets shall have signs at intersections indicating the street name, MUTCD std. size.

3-6.5.4 Street Design

3-6.5.4.1 Streets shall be provided with 152mm (6-inch) Type V (non-mountable) concrete curbs and gutters. Curbs shall be depressed at entrances to driveways. Sidewalks shall be designed to work with driveway grades with a maximum cross-slope of 2%. All gradients shall provide positive drainage (no ponding). Streets shall be designed for vehicles with not less than a 6,000-pound code wheel load. Pavement shall be asphaltic concrete. Design speed for main collector streets shall be 25 miles-per-hour and the design speed for residential streets shall be 15 miles-per-hour.

3-6.5.4.2 Crosswalks: All intersections where sidewalk and accessible curb ramps are on opposite sides of the street shall have surface paint on the roadway indicating crosswalk, as well as vehicular signage noting 'Crosswalk-Yield to Pedestrians'.

3-6.6 Street Signage and Striping

3-6.6.1 General Criteria: Manual on Uniform Traffic Control Devices, Latest Edition, US Department of Transportation.

3-6.6.2 Specific Requirements.

3-6.6.2.1 No centerline striping will be required on residential streets.

3-6.6.2.2 Signage. Add the following signs, on telespar poles, throughout the proposed development using the standards as outlined in the Manual noted in Paragraph 3-6.6.1.

'NO PARKING' Within 9m (30 feet) of intersections at collector streets, at beginning, midpoint and end of side of street with mailboxes, every 152.4m (500 feet) along streets not designed for on-street parking, at handicapped loading stalls, on doors of trash enclosures.

'NO PARKING-FIRE LANE' To be located where directed by the local fire marshal.

‘SPEED LIMIT’	Post speed limit signs along all roadways with the applicable speed for each road type. For each speed limit sign located closest to the entrance to the development, add ‘speed enforced by radar’ sign below speed limit, facing incoming traffic.
‘STOP’	Place stop signs at all road intersections and place smaller stop signs where the biking/jogging trail intersects any roadway, facing trail traffic.
‘CROSSWALK’ (GRAPHIC) ‘YIELD TO PEDESTRIANS’	Where surface crosswalks are painted, place signs facing both directions of traffic.
‘HANDICAPPED’ (GRAPHIC) ‘VAN-ACCESSIBLE ONLY’ ‘UNAUTHORIZED VEHICLES SUBJECT TO \$200 FINE’	Install wherever dedicated handicapped parking is placed, in conjunction with required surface painting.
‘PLAY AREA RULES’	Install at the entry to all play areas.
‘NATURAL AREA’	Install every 152m (500 feet) at native prairie grass installations such as the sink-hole buffer zones.

3-7.1 Child Safety and Accessibility.

3-7.1.1 Accessibility to children and adults with disabilities. Play areas shall be accessible to children and adults with disabilities. In addition to wheelchair users, the needs of children and adults who walk with canes, walkers, or crutches; who have limited use of the upper body; who have visual or hearing disabilities, or who have developmental disabilities shall be considered. Design criteria based on child dimensions should be used for the proper functioning of the play area. Every part of a play area may not be accessible to all its users, but the social experience provided should be accessible to everyone. When more than one play activity of the same type is provided, one shall be accessible. When one activity is provided, it shall be accessible. A diverse play area has the greatest potential for meeting the needs of all users. Separate play areas for the physically challenged are not acceptable. Integrating all children in the same play setting shall be emphasized. Guidelines available from this design district for accessible routes, ramps for wheelchair access, transfer points, wheelchair accessible platforms, and accessible stepped platforms should be followed.

3-7.1.2 Age appropriate scale. Age appropriate scale is a term used to describe equipment, which will allow safe and successful use by children of a specific chronological age, mental age, and physical ability. Play equipment height and complexity will not exceed the user's ability. The children's outdoor play areas shall meet age appropriate scale for the age groups that the areas are designed to accommodate.

3-7.1.3 Use zones. In accordance with ASTM F 1487, a use zone is a clear, unobstructed area under and around play equipment where a child would be expected to land when jumping or falling from a piece of play equipment. These zones require a playground safety surface in accordance with ASTM F 1292. Requirements for use zones vary for the age group and for different pieces of equipment. All use zones for play equipment should be shown on the site plan to ensure there is no conflict between play activities on the ground and swinging or jumping from the equipment. Use zones shall not overlap except for spring rocking equipment, balance beams, and play houses.

3-7.1.4 Playground safety surface. A playground safety surface is constructed of a poured, recycled rubber aggregate over 101.6mm (4-inch) reinforced concrete base that meets the shock absorbency criteria recommended in ASTM F 1292. Playground safety surfaces shall be provided throughout all use zones and under all play equipment as required. Ensure playground surface has adequate drainage, not to exceed slope requirements. Any drains proposed must meet with regulatory requirements in Paragraph 3-4.4.1.

3-7.1.5 Inappropriate play events. The following play events are not appropriate for use in unsupervised play areas, only for children under 9 years of age: Chain walks, chain or tire climbers, fulcrum seesaws, log rolls, May poles, merry-go-rounds, rotating equipment, spring rocking equipment intended for standing, swinging exercise bars, trapeze bars, and whirls. Any skateboard related elements are strictly prohibited for all age groups.

3-7.2 Manufactured play equipment setting. This setting includes an age appropriate composite structure consisting of multiple play events for each of the following age groups: 6 weeks to 5 years of age, 5 to 9 years of age, and 9 to 15 years of age (pre-teen). Other play events include free standing equipment such as spring rocking equipment, swing, and balance beam. The swing shall be located as a free standing play event on the perimeter. Play lots shall be composed of the following minimum of colorful, multi-user and accessible play equipment elements:

Play Lots for 6 weeks to 5 years of age and 5 to 9 years of age. Play lots shall include:

- (a) One play structure for each age group, per play lot, with interactive play panels, transfer platforms, climber, tunnel or bridge connection piece and partial roof.
- (b) One 6-unit swing set, 2.4m (8 feet) high
- (c) One slide, 1.8m (6 feet) high
- (d) One kindergarten swing set (8 feet) high with child bucket seats only.
- (e) Four spring rider play pieces to accommodate 1 to 3 children.
- (f) Two Recreational Benches and Two Park Benches
- (g) One litter receptacle
- (h) One bicycle rack (six bikes per rack)

Pre-teen Play Lots 9 years of age to 15 years. Play lots shall include:

- (a) One play structure with slide, climbing wall, rope wall and partial roof.
- (b) One overhead-ladder or zip-line play piece.
- (c) One 4-unit swing set, 3.6m (12 feet) high with belt seats only.
- (d) One small group congregation play piece, with partial roof.
- (e) Two spring mounted, group play pieces
- (f) Two Recreational Benches and Two Park Benches
- (g) One litter receptacle
- (h) One bicycle rack (six bikes per rack)

3-7.3 Plant materials. Plants and ground cover should be integrated into play settings. Plants provide a variety of learning opportunities, as they become a source for play material for crafts, dramatic play, and sensory experience. Plants define space and provide shade. Poisonous plants and plants with thorns are not allowed and should be removed from the play areas.

3-8 Landscape Planting Plan. Landscaping with trees and shrubs is a mandatory requirement for this project. A minimum preservation of 85% of those trees identified and located as significant is required. A damage clause is included for failure to comply with this requirement. Protection of all existing mature trees is desirable. Design consideration should be given to the preservation of 95% of the significant trees. Offerors are encouraged to incorporate as many existing mature trees into their proposal as possible, including those not specifically marked as significant in the field.

3-8.1 A complete and comprehensive landscaping design shall be provided for the overall family housing project including the site restoration made necessary by demolition and construction activities as required. Seed and/or sod all disturbed areas. Sod and stake slopes of 3:1 or greater.

3-8.2 The plan is required to incorporate only material complying with ANSI/ANLA 260.1 and compatible with stock approved by the University of Kentucky and Kentucky Department of Transportation. It shall provide trees and shrubs of adequate size, species, quantity and grouping, of foundation plantings, yard, common green area, streetscape and solar shading of each housing unit to insure a complete landscaped project. Use of deciduous vegetation as a solar screen is a mandatory requirement. Deciduous trees on the south side shall allow for shading in summer and direct solar gain in winter. Selected plant materials shall be easily maintained, locally hardy, and tolerant of the specific site conditions. The Contractor shall provide water and maintenance to the newly planted turf, perennials, shrubs and trees to ensure their survival. A penalty equivalent to the cost of the plant plus labor, shall be assessed against the Contractor should plants die and not be replaced within 60 days of notification. The Contractor shall provide a warranty for one full growing season, from the date of Government acceptance, all work and new plantings.

3-8.3 One shade tree, one evergreen tree, and 8 shrubs per unit is mandatory. Minimum 1-3/4-inch caliper deciduous stock is required. Evergreen trees shall be a minimum of 1.8m (6 feet-0 inch) height. A casual feel is desired at residences and a park-like character is desired throughout the open spaces system. Street trees planted every 18m (60 feet) on-center are required, as well as additional open space, recreational and buffer plantings. Locate trees to provide shade on roads and parking areas. Shrubs shall be a minimum of 0.6m (24-inch) spread and/or height. Additional plant materials to supplement the allocated unit planting shall be installed throughout open spaces, at recreational areas and at picnic areas. Locate some shrubs in the sink-hole buffer area which are compatible with native grasses to create a natural landscape.

3-8.3.1 Choose plant materials on the basis of plant compatibility, climate, soil conditions, low maintenance, and esthetic suitability. Refer to Specification Section 02930A for a listing of approved plants.

3-8.3.2 Contractor shall be responsible for proper care and watering of ground cover and plants for the period of time required for their establishment. The entire housing area, within the limits of construction, shall present a neat and finished appearance.

3-8.3.3 Contractor shall review the site and remove any construction debris, foreign or natural, prior to any planting activities. Smooth any rough areas, fill depressions and provide a uniform finished grade to the landscaped areas.

3-8.3.4 In accordance with the project sustainability requirements, plantings shall be drought-tolerant. Irrigation is prohibited anywhere in the development.

3-8.3.5 Existing trees within the work limits, that can be adapted to fit the Contractor's landscaping scheme, shall remain if the following requirements are met:

3-8.3.5.1 No fill is placed within the drip line.

3-8.3.5.2 No construction traffic is permitted within the drip line.

3-8.3.5.3 No utility cuts are to be made within 10 feet of the trunk.

3-8.3.5.4 Tree protective structures are to be provided to insure that 3-8.3.5.1, 3-8.3.5.2, and 3-8.3.5.3 are met.

3-8.4 Trees, shrubs, and ground cover. Plant varieties shall be nursery grown or plantation grown stock conforming to ANSI/ANLA Z60.1. They shall be grown under climatic conditions similar to those in the locality of the project. Plants shall be locally available and of species presently growing in the greater Fort Knox region. Ornamental trees which produce fruit or unpleasant odor, or are messy plants are prohibited.

3-8.4.1 Quality. Well shaped, well grown, vigorous, healthy plants having healthy and well branched root systems shall be provided. Plants shall be free from disease, harmful insects and insect eggs, sun-scald injury, disfigurement, and abrasion. Plants shall be provided that are typical of the species or variety, and conforming to standards as set forth in ANSI/ANLA Z60.1.

3-8.4.2 Shade and flowering trees. A height relationship to caliper shall be provided as recommended by ANSI/ANLA Z60.1. Height of branching should bear a relationship to the size and variety of tree specified, and with the crown in good balance with the trunk. Trees shall not be "poled" or the leader removed.

3-8.4.2.1 Single stem. Trunk shall be reasonably straight and symmetrical with crown and have a persistent main leader.

3-8.4.2.2 Multi-stem. All countable stems, in aggregate, shall average the size specified. To be considered a stem, there should be no division of the trunk that branches more than 150mm (6 inches) from the ground level.

3-8.4.2.3 Specimen. A plant shall be provided that is well branched and pruned naturally according to the species. The form of growth desired, which may not be in accordance with natural growth habit, shall be as indicated.

3-8.4.3 Deciduous shrub. Plants shall be provided that have the height and number of primary stems as recommended by ANSI/ANLA Z60.1. An acceptable plant shall be well shaped with sufficient well-spaced side branches recognized by the trade as typical for the variety grown in the region.

3-8.4.4 Coniferous evergreen. Trees shall be provided that have the height-to-spread ratio as recommended by ANSI/ANLA Z60.1. Trees shall not be "poled" or the leader removed. An acceptable plant shall be exceptionally heavy, well shaped and trimmed to form a symmetrical and tightly knit plant. The form of growth desired shall be as indicated.

3-8.4.5 Broadleaf evergreen. Plants shall be provided that have ratio of height-to-spread as recommended by ANSI/ANLA Z60.1. An acceptable plant shall be well shaped and recognized by the trade as typical for the variety grown in the region.

3-8.4.6 Ground cover. Plants shall be provided with the minimum number of runners and length of runner as recommended by ANSI/ANLA Z60.1. Plants shall be furnished that have heavy, well developed, and balanced top with vigorous well developed root system, and shall be furnished in containers.

3-8.4.7 Measurement. Plant measurements shall be in accordance with ANSI/ANLA Z60.1.

3-8.4.8 Percolation test. Test for percolation shall be done to determine positive drainage of plant pits and beds. All soil and drainage conditions detrimental to the growth of plant material shall be identified and a proposal correcting the conditions shall be submitted.

3-8.5 Soil test. A soil test shall be performed for pH, chemical analysis, and mechanical analysis to establish the quantities and type of soil amendments required to meet local growing conditions for the type and variety of plant material specified.

3-8.6 Installation. Verify the location of underground utilities. When obstructions below ground or poor drainage affect the planting operation, proposed adjustments to plant location, type of plant, and planting method or drainage correction shall be submitted. The plant material shall be installed during appropriate planting times and conditions recommended by the trade for the type and variety of plant material specified. Plant pits shall be excavated and backfilled as recommended by the trade and ANSI/ANLA Z60.1. The planting operation shall be performed only during periods when beneficial results can be obtained. When special conditions warrant a variance to the planting operations, proposed planting times shall be submitted.

3-8.7 Pruning. The total amount of foliage shall be pruned by one-fourth to one-third on installed trees and shrubs to compensate for loss of roots and transplanting shock. The typical growth habit of individual plants shall be retained. Trees shall not be poled or the leader removed, nor shall the leader be pruned or "topped off."

3-8.8 Maintenance during planting operation. Installed plants shall be maintained in a healthy growing condition. Maintenance operations shall begin immediately after each plant is installed and shall continue until the plant establishment period commences.

3-8.9 Plant establishment period and warranty. If turf is not established as defined in the specifications, at the time of turnover to the Government, the Contractor is required to return until acceptable turf is established. Furthermore, the tree and shrub warranty period of one growing season, (12-month minimum), shall commence upon turnover to the Government.

3-8.10 Maintenance during establishment period. The maintenance of plants shall include straightening plants, tightening stakes and guying material, repairing tree wrap, protecting plant areas from erosion, maintaining erosion material, supplementing mulch, accomplishing wound dressing, removing dead or broken tip growth by pruning, maintaining edging of beds, checking for girdling of plants and maintaining plant labels, watering, weeding, removing and replacing unhealthy plants.

3-8.11 Unhealthy plant. A plant shall be considered unhealthy or dead when the main leader has died back, or 25 percent of the crown is dead. Determine the cause for an unhealthy plant. Unhealthy or dead plants shall be removed immediately and shall be replaced as soon as seasonal conditions permit in accordance with the following warranty paragraph.

3-8.12 Plant replacement. Furnished plant material shall be guaranteed to be in a vigorous growing condition upon planting and for a period of one growing season, regardless of the contract time period. A plant shall be replaced one time under this guarantee and be of the same size & species. Substitute for an alternate species if directed by the Government.

3-8.13 Turf. Turf consists of seed, sod, and sprigs. There may be several different types of turf mixtures applied; one for lawn areas around housing units and one for field or recreation areas. The boundaries of each area shall be clearly defined on the planting plan. Lawns, boulevards and open spaces shall incorporate a rolling landform where appropriate and shall be seeded or sodded and appropriately landscaped. All disturbed areas not otherwise surfaced shall incorporate topsoil, be tilled, receive soil amendments, and either seeded or sodded. Inverts of all drainage ditches and swales shall be sodded. Sod shall be laid between the residential street curb and sidewalk, for .9m (3 feet) along the unit drive/walkway, and for .9m (3 feet) along the unit patio areas. Sod shall be placed and staked on all slopes of 3:1 or greater. Turf seed shall be placed in all other disturbed areas, except in the 22.8m (75-foot) sink-hole buffer area, which will be seeded with native prairie grass seed. See Paragraph 3-8.9 above for warranty.

3-8.13.1 Seed quality. State approved seed of the latest season's crop shall be provided in the original sealed packages bearing the producer's guaranteed analysis for percentages of mixture, purity, germination, hard seed, weed seed content, and inert material. Labels shall be in conformance with applicable State seed laws. Seed mixtures shall be proportioned by weight. Weed seed shall not exceed one percent by weight of the total mixture. All ground areas to be seeded shall be topsoiled to a minimum depth of 4 inches using topsoil stripped at the project site and supplemented as necessary by offsite topsoil. Topsoil shall be leveled and brought to proposed grades. All topsoil utilized shall be submitted for a soil test and amended accordingly.

3-8.13.2 Sod. State approved sod shall be provided as classified by applicable State laws. Each individual sod section shall be of a size to permit rolling and lifting without breaking.

3-8.13.2.1 Quality. The sod shall be relatively free of thatch, diseases, nematodes, soil-borne insects, weeds or undesirable plants, stones larger than 50mm (2 inches) in any dimension, woody plant roots, and other material detrimental to a healthy stand of turf. Sod that has become dry, moldy, or yellow from heating, or has irregular shaped pieces of sod and torn or uneven ends shall be rejected.

3-8.13.2.2 Thickness. Sod shall be machine cut to a uniform thickness of 31.75mm (1 1/4-inch) within a tolerance of 6mm (1/4-inch) excluding top growth and thatch. Measurement for thickness shall exclude top growth and thatch.

3-8.13.2.3 Time limitation. The limitation of time between harvesting and placing sod shall be 36 hours.

3-8.13.3 Sprig quality. The cultivar shall be provided as healthy living stems, stolons, or rhizomes with attached roots, including two or three nodes, and shall be from 100mm to 150mm (4 inches to 6 inches) long, without adhering soil. Sprigs shall be provided which have been grown under climatic conditions similar to those in the locality of the project. Sprigs shall be obtained from heavy and dense sod, free from weeds or other material detrimental to a healthy stand of turf. Sprigs that have been exposed to heat or excessive drying shall be rejected. The time limitation between harvesting and placing sprigs shall be 24 hours.

3-8.13.3.1 Soil test. A soil test shall be performed for pH, chemical analysis, and mechanical analysis to establish the quantities and type of soil amendments required to meet local growing conditions for the type and variety of turf specified.

3-8.14 Temporary turf cover. When there are contract delays in the turfing operation or a quick cover is required to prevent erosion, the areas designated for turf shall be seeded with a temporary seed. When no other turfing materials have been applied, the quantity of one-half of the required soil amendments shall be applied and the area tilled.

3-8.15 Installation. The turf shall be installed during appropriate planting times and conditions recommended by the trade for the type and variety of turf specified. The turf operations shall be performed only during periods when beneficial results can be obtained. Drainage patterns shall be maintained. The turf shall be installed by using the methods as recommended by the trade for the type and variety of turf specified.

3-8.16 Protection. Immediately after turfing, the area shall be protected against traffic or other use by erecting barricades and providing signage as required. Install erosion control blanket over newly seeded areas where drainage patterns indicate erosion has or could occur during a standard rain event. Also install erosion control blanket over native seed planted in the sink-hole buffer area.

3-8.17 Turf establishment period. The turf establishment period for establishing a healthy stand of turf shall begin on the first day of work under the turfing contract and shall end three months after the last day of the turfing operation. An unsatisfactory stand of turf shall be repaired as soon as turfing conditions permit.

3-8.18 Satisfactory stand of turf.

3-8.18.1 Seeded lawn area. A satisfactory stand of turf from the seeding operation for a lawn area is defined as a minimum of 160 grass plants per square meter. Bare spots shall be no larger than 150mm (6 inches) square. The total bare spots shall not exceed two (2) percent of the total seeded area.

3-8.18.2 Seeded field area. A satisfactory stand of turf from the seeding operation for a field area is defined as a minimum of 100 grass plants per square meter. The total bare spots shall not exceed two (2) percent of the total seeded area.

3-8.18.3 Sodded area. A satisfactory stand of turf from the sodding operation is defined as living sod uniform in color and texture. Bare spots shall be no larger than 50mm (2 inches) square.

3-8.18.4 Sprigged area. A satisfactory stand of turf from the sprigging operation is defined as a minimum of 20 sprigs per square meter. Bare spots shall be no larger than 225mm (9 inches) square. The total bare spots shall not exceed two (2) percent of the total sprigged area.

3-8.19 Maintenance during establishment period. The maintenance of the turfed areas shall include eradicating weeds, eradicating insects and diseases, protecting embankments and ditches from erosion, maintaining erosion control materials and mulch, protecting turf areas from traffic, mowing, watering, post-fertilization, and replacing unsatisfactory turf areas.

3-9 Sprinkler and/or Irrigation system. Irrigation systems are prohibited anywhere in the development. Water for newly planted materials shall be potable and applied with a commercial watering truck.

3-10 Seed Classification. State-approved seed of the latest season's crop shall be provided in original sealed packages bearing the producer's guaranteed analysis for mixture percentage, purity, germination, weed seed content, and inert material. Labels shall be in conformance with USDA-01 and applicable state seed laws.

#### 3-10.1 Seed Mixtures

3-10.1.1 Turf Seed mixture shall be KDoT for its Seed Mix #1 proportioned by weight as recommended and outlined in Kentucky Standard Specifications for Construction, 2000 edition.

3-10.1.2 Native seed mixes, forbes and wildflowers with mix as recommended by local growers and appropriate to the sight shall be proposed for review and consideration as part of the detailed landscape plan. Limit the planting of native grasses to the 22.8m (75-foot) buffer zone around sink-holes and to transition between the development back-yards and the existing tree/underbrush stands.

#### 3-10.2 Weed Seed

3-10.2.1 Weed seed shall not exceed 1 percent by weight of the total mixture. Wet, moldy, or otherwise damaged seed will be rejected. Perform field mixes on site in the presence of the Contracting Officer. All seed and mulch shall be certified weed free.

#### 3-10.3 Seeding

3-10.3.1 Lawns and other grass areas within the project limits (and outside the project limits where disturbed by construction) shall be seeded. Seed shall be sown from 25 April to 15 May for spring planting and from 15 September to 15 October for fall planting. Broadcast seeding or Drill seeding shall be at an application rate of 6 pounds per 1000 square feet. Hydroseeding shall be as directed by the Contracting Officer. Germination shall be 85% or better. Seed shall be labeled in accordance with U. S. Department of Agriculture Rules and Regulations under the Federal Seed Act in effect on the date this solicitation. Planting shall not be done when the ground is frozen, snow covered or otherwise in an unsatisfactory condition for planting.

#### 3-10.4 Sod

3-10.4.1 State-certified Nursery-grown sod shall be provided as classified by applicable state laws. Each individual sod section shall be of a size to permit rolling and lifting without breaking. Grass species shall be proportioned as defined by KDot Seed Mix #1 and as outlined in Kentucky Standard Specifications for Construction, 2000 edition.

3-10.4.2 The sod shall be relatively free of thatch, diseases, nematodes, soil-borne insects, weeds or undesirable plants, stones larger than 2 inches in any dimension, woody plant roots and other material

detrimental to a healthy stand of turf. Sod that has become dry, moldy, or yellow from heating, or has irregularly shaped pieces of sod and torn or uneven ends shall be rejected. Sod shall be machine cut to a uniform thickness of 1-1/4 inches within a tolerance of 1/4-inch. Measurement for thickness shall exclude top growth and thatch. Refer to specifications for sod anchoring.

### 3-10.5 Mulches

3-10.5.1 Mulches shall be certified weed free and devoid of mold, and other deleterious materials. Mulch shall be disk anchored after application. A 9.5mm (3/8-inch) thick commercial grade black steel edger strip shall be installed to contain all foundation planting beds, at the entrance signs, and other ground cover / flower beds. Use commercial grade weed barrier fabric under woody shrubs and around non-spreading perennials. Install mulch to a uniform depth and remove mulch from the branches of newly planted materials. A mulch minimum depth of 76mm (3 inches) shall be maintained.

3-10.5.1.1 Straw. Straw shall be stalks from oats, wheat, rye, barley, or rice and shall be furnished in air-dry condition in a consistency for placing with commercial mulch blowing equipment.

3-10.5.1.2 Not used.

3-10.5.1.3 Wood Cellulose Fiber. Wood cellulose fiber shall not contain any growth or germination-inhibiting factors and shall be dyed an appropriate color to facilitate visual metering during application. Composition on air-dry weight basis: 9 to 15 percent moisture, pH range from 3.5 to 5. Use with hydroseeding application of grass seed and fertilizer. When added to water, it forms a homogenous slurry.

3-10.5.1.4 Wood Chips. Wood chips shall be chips or shredded bark with maximum particle size of 3/16-inch.

3-10.6 Mowing. The seeded or sodded areas (as applicable) shall be mowed with approved mowing equipment to height of 2 inches whenever the height of vegetation becomes 4 inches, until the entire project is accepted by the Government.

3-10.7 Repairing Sod and Reseeding. The Contractor shall replace all damaged grassed areas. These areas shall be made to present a neat and finished appearance prior to final acceptance

3-11 Housing Area Signs. Each entrance to the housing area shall have a sign of permanent, low maintenance construction with the project name in relief lettering. Signs shall be constructed from durable, low maintenance materials such as stone, brick, or other masonry products. Wood signs and/or components are prohibited. Signs shall be located out of the sight-triangle of intersections for safety. Low, colorful plantings shall be placed around the sign base as well as an edger strip for the maintenance of turf grass. Signs shall be orientated to face travelers entering the development. The back of the sign shall be incorporated into a natural landform or screened with natural plant materials. No part of the sign may be neon, marquee or automated.

3-12 Retaining Walls. Any retaining walls proposed as part of the development shall be designed and certified by a professional registered engineer, who is to be hired by the Offeror. Walls composed of pre-cast concrete block, form-lined and stained cast-in place concrete, or natural stone are acceptable. Materials such as wood timbers, rubber tires, railroad ties, concrete cores or other hazardous/bio-degradable materials are prohibited.

3-13 Fencing. In addition to the fencing required in Paragraph 3-4.4.1, provide fencing at the top of slopes of 4:1 or greater, adjacent to housing areas. Fencing is not desired around individual house lots. Screen fencing at the garbage storage areas of homes is per Paragraph 5-22. Also, refer to Specification Section 02821A, Fencing.

#### **4. SITE ENGINEERING.**

##### 4-1 Soils.

4-1.1 Soil and Foundation Report (Geotechnical Report). A preliminary Soil and Foundation Report is provided as part of this RFP. A drawing indicating Subsurface Explorations and Geologic Profiles for the proposed site is also provided. The report provides an overview of soils and geologic conditions, and is furnished for informational purposes only. The Offeror to whom this contract is awarded shall, with his or her consulting professional geotechnical engineer experienced in geotechnical engineering, be responsible for determining site specific geotechnical conditions.

4-1.1.1 The Contractor provided site specific geotechnical conditions report shall include, but not be limited to:

4-1.1.1.1 Classification of soil and rock.

4-1.1.1.2 Depth to bedrock.

4-1.1.1.3 Extent of boulders.

4-1.1.1.4 Bearing capacity of soil and rock.

4-1.1.1.5 Settlement potential.

4-1.1.1.6 Compaction requirements.

4-1.1.1.7 Groundwater characteristics.

4-1.1.1.8 Infiltration and permeability.

4-1.1.1.9 Erosion and siltation.

4-1.1.1.10 Surface and subsurface drainage.

4-1.1.1.11 Soil resistivity.

4-1.1.1.12 Sinkhole location, extent, condition, and recommendations for sinkhole repair for street or utility construction. See also SOW 3-3.4.2.

4-1.1.1.13 Recommendations for paving sections, with a minimum requirement of an 11cm (4-inch) base layer, an 11cm (4-inch) drainage layer, and an 11cm (4-inch) paving course.

4-1.1.2 The Offeror and his or her professional geotechnical engineer consultant shall certify in writing that the design of the project has been developed consistent with the site specific geotechnical conditions. The certification shall be stamped by the consulting professional geotechnical engineer and shall be submitted with the 50 percent design submission. If revisions are made to the 50 percent design submission, a new certification shall be provided with the final design submission.

##### 4-1.2 Soil compaction.

4-1.2.1 Soil compaction shall be achieved by equipment approved by a professional geotechnical engineer. Material shall be moistened or aerated as necessary to provide the moisture content that will readily facilitate obtaining the compaction specified with the equipment used. Compact each layer to not less than the percentage of maximum density specified in Table 4-1, determined in accordance with ASTM D 1557 Method D.

**TABLE 4-1 – SOIL COMPACTION**

Subgrade Preparation, Fills, Embankments, and Backfills	Cohesive Soils Compaction Requirements (Percentage of Maximum Density)	Cohesionless Soils Compaction Requirements (Percentage of Maximum Density)
Structures & Building Slabs	90	95
Streets, Paved Areas, Bike Paths	90	95
Sidewalks	85	90
Grassed Areas	85	90

4-1.2.2 The requirements shall be verified or modifications recommended by the consulting professional geotechnical engineer in the report wherever engineering, soils, or climatic factors indicate the necessity. Any modification to the stated compaction requirements shall require the approval of the Contracting Officer.

4-1.3 Capillary water barrier. A capillary water barrier is required for all interior slabs on grade, including garages, carports and storage rooms. As a minimum, the capillary water barrier shall consist of a capillary fill base course of clean, crushed, nonporous rock, crushed gravel, or uncrushed gravel, 15cm (6 inches) thick. The base course shall be overlaid with a 10-mil vapor barrier membrane. The membrane shall be overlaid by a minimum of 10mm (4 inches) of capillary fill. The maximum particle size shall be 1 1/2-inches and no more than 2 percent by weight shall pass the No. 4 size sieve.

4-1.4 Soil treatment. Soil treatment for termites shall be by the chemical method. Methods and extent of protection required shall follow State and Local codes. Prior to soil treatment, the Contractor shall submit a soil treatment plan to the Contracting Officer for approval.

4-1.5 Radon mitigation. The design and construction of foundation walls, slabs, and crawl spaces shall include provisions for the reduction of radon entry and facilitate its removal. Radon mitigation shall comply with the requirements of ASTM E1465. The Contractor shall provide a passive soil depressurization system (passive subslab suction system) for each unit. Such systems shall be based on criteria available at the EPA's radon website: <http://www.epa.gov/iaq/radon/>.

4-2 Water Distribution System. Connection to the existing water distribution system shall be made as required.

4-2.1 Water Mains and Building Service Connections. Mains shall be considered as that part of the distribution system supplying fire hydrants, or fire hydrant laterals. Service connections supply water from the main to the building. Mains shall be looped with no dead ends and be of adequate size to satisfy both domestic and fire flow requirements. Minimum main size is 0.15m (6 inches). Sufficient sectional control valves shall be provided so that no more than two fire hydrants will be out of service in the event of a single break in a water main. A copper tracer wire shall be placed directly above all non-metallic mains when plastic marking tape does not provide means of determining alignment of pipe by metal detecting equipment. The pipe, valves, and all other materials shall meet the American Water Works Association (AWWA) standards for a 1,034.2 kPa (150 psi) working pressure system. Provide sacrificial anodes for all valves and metal pipe. Building connections shall be designed and constructed in accordance with the International Plumbing Code.

4-2.2 Flow requirements. Water must be supplied by mains of appropriate capacity to provide 1125 gpm at all structures for a flow duration of 1-1/2 hours. This mandatory flow is over and above domestic requirements. Domestic

requirements shall be based on 1135.6 liters/day (300 gal/day) per housing unit for single family housing, and 946.3 liters/day (250 gal/day) per housing unit for multi-family housing. Mains shall be sized to carry this flow with a 2.5 peak hourly factor. Pressure shall be a minimum of 137.9 kPa (20 psi) at each fire hydrant, and a maximum of 1,034.2 kPa (150 psi) at each outlet after allowing for friction, elevation, and other pressure losses. Pressure at each housing unit shall not exceed 517.1 kPa (75 psi). No specific pressure test has been conducted on the area in question. DBOS staff state that the existing water pressure is between 45 and 55 psi. The DBOS point of contact for Site utilities is Warren Clifford (502-624-7917), Building 1110A – Third Floor.

4-2.3 Trenches. Water mains shall have a minimum of 0.9m (3 feet) of earth cover. Minimum cover above water lines shall be 0.75m (2 feet-6 inches) in grassed areas and 0.9m (3 feet) in paved areas. Adequate cover must be provided for freeze protection. Where frost penetrates to a depth greater than the minimum above, greater cover will be required. Sufficient cover must also be provided to protect the pipe against structural damage due to superimposed surface loads. Lines laid lower than the minimums stated shall be concrete encased with a minimum concrete thickness of 0.15m (6 inches).

4-2.4 Fire hydrants. Hydrants shall conform to AWWA C502, Dry-Barrel Fire Hydrants, or AWWA C503, Wet-Barrel Fire Hydrants, except as required by the local utility supplier. Valves shall conform to AWWA C500, Gate Valves for Water and Sewerage Systems. Fire hydrants shall be compatible with those presently in use at the installation or local Government Jurisdiction, with similar pump and hose connections. Fire hydrant spacing shall be no greater than 152m (500 feet) apart, by paved road. In addition, a hydrant shall be provided so that all parts of the housing units can be reached by hose lines not over 107m (350 feet) long. Hydrant laterals shall be 0.15m (6 inches) minimum size, shall not exceed 150 feet in length, and shall have an underground shutoff valve. Valve box, at each lateral, shall be located within 3m (10 feet) of the hydrant, and shall not be located where obstructed by parked vehicles, shrubbery.

4-2.5 Shutoff valve. Each unit shall be provided with a separate service and main shutoff valve, readily accessible to maintenance and emergency personnel. Shutoff valves in walks are prohibited.

4-2.6 Metering. Metering of utilities shall be provided as follows:

4-2.6.1 Master Meters. Master meters for water shall be provided for the project.

4-2.6.2 Individual Meter and Meter Drops. Individual water utility meters shall be provided for all housing units. Locate meter drops in an area readily accessible by service personnel. Meters and meter bases shall be sight screened, and located to provide convenient access while not distracting from building appearance.

4-2.6.3 Shutoff Valve

4-2.6.3.1 Each dwelling unit shall be provided with a separate service and main shutoff valve, readily accessible to maintenance, emergency personnel and the occupant. Shutoff valves shall not require special tools to operate. Shutoff valves in walks are prohibited.

4-2.6.4 Back Flow Prevention Device: All individual water meters shall be equipped with a backflow prevention device.

4-2.6.5 During demolition of the Binter Court facilities, sanitary, water, gas and electrical supply to the Wickam Guest House and pool shall not be interrupted without written permission by the Base Engineer. At the conclusion of the project, the connections to Wickam Guest House, Pool and Clubhouse facilities shall be made permanent and shall be equal in capacity to the existing connections.

4-3 Sanitary Sewerage System. Design of the sanitary sewerage system and its components shall comply with the requirements of "Recommended Standards for Sewage Works", 1990, Great Lakes-Upper Mississippi River Board of State Sanitary Engineers (known as the 10-State Standards). A Wastewater Facility Construction permit is required from the Kentucky Department of Environmental Protection (KYDEP), Division of Water, Facilities

Construction Branch, Design and Construction Section. The Contractor shall be responsible for the preparation, submittal and support of the permit application as well as for the associated review fee of \$800. Connection to the existing sewage collection system shall be made at the appropriate location best serving the housing sites. Sewage collection systems shall be designed and constructed in accordance with the International Plumbing Code criteria in this Paragraph, and installation requirements. Pipe sizes and slopes shall be calculated using the Manning Formula. Manholes are required at all changes of direction and spaced not more than 400 feet apart. Curved sewers are prohibited. Pipes shall be designed to flow at one-half full and maintain a minimum velocity of 0.6m (2 feet) per second. If siphons are used, two lines of equivalent capacity shall be used with cleanouts. Where pumping is required, force mains shall be sized to minimize pumping head, with a 0.9m to 1.5m (3 feet to 5 feet) per second velocity. The DBOS point of contact for Site utilities is Warren Clifford (502-624-7917), Building 1110A – Third Floor.

4-3.1 Sewer mains. Design shall be based on an average daily per capita flow of sanitary sewage of 378.5 L (100 GAL) per day with a 4.0 peak hourly factor. Mains shall be a minimum of 0.2m (8 inches) in diameter.

4-3.2 Sewer Building Laterals. Each building lateral shall be connected directly to a sewer main. Combining multiple building laterals is prohibited. Multiple housing units within a building may not use a single building lateral. Cleanouts shall be provided to allow cleaning of all lines to grade. Cleanouts, in yard areas, shall be set in a box with a bolted cover. Laterals from one building shall not cross under another building. Lines shall be sized in accordance with the International Plumbing Code. Sewer laterals shall be a minimum of 0.15m (6 inches) in diameter. Laterals serving three or more housing units shall be a minimum of 0.2m (8 inches) in diameter.

4-3.3 Trenches. Sewer and water lines, mains or laterals, shall be placed in separate trenches. The separate trenches shall maintain a minimum lateral separation of 3.0m (10 feet).

4-3.4 Cover. Sewer lines shall be located at a depth greater than the frost penetration. Minimum cover above the top of pipes shall be 0.6m (2 feet) in areas not subject to vehicular loads and 0.9m (3 feet) in all other areas. If the minimum cover can not be met, the length of pipe shall be concrete encased with a minimum 0.07m (3-inch) thickness of concrete.

4-3.5 Pump Stations.

4-3.5.1 Design of the pump station and its components shall comply with the requirements of “Recommended Standards for Sewage Works”, 1990, Great Lakes-Upper Mississippi River Board of State Sanitary Engineers (known as the 10-State Standards) and NFPA 820. Pump stations shall be designed to pump the peak flow for the entire pump station service area such that the minimum cycle time between two successive cycles in 15 minutes. Pump stations shall be of the duplex type either dry pit with wet well or submersible grinder. Pump stations shall have a pedestal mounted exterior control panel.

4.3.6 During demolition of the Binter Court facilities, sanitary, water, gas and electrical supply to the Wickam Guest House and pool shall not be interrupted without written permission by the Base Engineer. At the conclusion of the project, the connections to Wickam Guest House, Pool and Clubhouse facilities shall be made permanent and shall be equal in capacity to the existing connections.

4-4 Storm Drainage System. Contractor must apply for a Kentucky Stormwater Discharge Permit for Construction Activity. Compliance with that permit will require preparation of a Stormwater Best Management Practices Plan to be submitted to Ft. Knox DBOS. The storm drainage system shall be properly coordinated with surrounding properties to ensure that runoff does not cause damage to other properties. All drainage lines, if required, shall remain in conduit to stable grade. The minimum velocity of flow in conduits during a design storm shall be 0.07 m/s (2 ft 6 in/s). Storm water collection, disposal and retardation system shall be designed for a minimum of a 10-year return frequency. Rainfall intensities for project locations shall be in accordance with KYDOT design parameters. The DBOS point of contact for Site utilities is Warren Clifford (502-624-7917), Building 1110A – Third Floor.

4-4.1 Site specific storm drainage criteria. Maximum stormwater discharge rates shall be controlled through the use of “Best Management Practices” (BMPs) and shall conform to the requirements of TM 5-804-4. Temporary or

permanent stormwater storage will not be allowed in yards and recreation areas. Connections to the existing storm drainage system shall be verified for capacity and the existing lines increased to adequate capacity or rerouted as necessary. Sinkholes shall not be used to collect storm drainage, unless approved in writing by the Base Engineer. The maximum allowable grade for any open drainage swale or ditch is 2%.

4-4.2 Manholes. Manholes shall be located at intersections and changes in alignment or grade. Intermediate manhole maximum spacing shall be 76.2m (250 feet) for pipes 0.9m (3 feet) or less in diameter or box drains with the smallest dimension less than 0.9m (3 feet). Maximum spacing for intermediate manholes on larger pipes and drain boxes shall be 152m (500 feet). Manholes shall be 4-foot diameter precast concrete and shall conform to ASTM C 478 or AASHTO M 199. Rubberized or plastic rungs shall be installed where the depth of the manhole exceeds 0.9m (3 feet). The wall along the rungs shall be vertical. The manhole shall have a 0.6m (2-foot) minimum opening as measured from the face of the rungs.

4-4.3 Drainage of roads and pavements. Provide a positive crown or sheet drainage to all streets and roads. Pavement collectors for storm water shall be primarily by curb inlets and gutters. Open areas shall be drained by surface water collection systems or by field inlets and an underground collection system. No roadside ditches shall be permitted. Overland flow shall be held to a minimum and shall be confined to non-residential areas. Sheet flow is encouraged where practical in overland flow regimes. Vertical curbs may be replaced with flat or rolled curbs on collector streets to facilitate overland sheet flow as required for low-impact stormwater management.

4-4.4 Pipe for culverts and storm drains may be of concrete, clay, corrugated steel, corrugated aluminum alloy, PVC, or PE.

#### 4-4.5 Grates and Covers

4-4.5.1 Inlets shall have openings sized to carry the inflow but shall not have openings large enough to catch a bicycle tire or child's foot. Grates and covers shall be secured or locked so as to be non-removable without a special tool.

#### 4.5 Utility Easement:

4-5.1 Right-of-way for all utilities that connect to family housing shall be in a dedicated strip where no permanent construction will be permitted except for road crossings. A minimum of 15 feet in width shall be required for all incoming utilities and distribution systems.

#### 4-6 Roadway Design:

4-6.1 All roadway designs, including both geometric and pavement designs, shall comply with the requirements of the Kentucky Transportation Cabinet (KYTC) Highway Design Manual (most current revision).

4.6.2 The DBOS point of contact for Site transportation coordination is Warren Clifford (502-624-7917), Building 1110A – Third Floor.

#### 4-7 Tracer Wire and Plastic Marking Tape:

4-7.1 Plastic marking tape shall be acid and alkali-resistant polyethylene film, 150mm (6 inches) wide with minimum thickness of 0.004 inches. Tape shall have a minimum strength of 1750 psi lengthwise and 1500 psi crosswise. The tape shall be of a type specifically manufactured for marking underground utilities. A copper tracer wire shall be placed directly above all non-metallic conduits to provide a means of determining alignment of conduit by metal detecting equipment. The tracer wire shall be brought to the surface at all risers and connection shall be made by split-bolt connectors. Tape color shall be as specified in TABLE 4-2 and shall bear a continuous printed inscription describing the specific utility. Tape shall be located 12 inches above the pipe in the backfill.

**TABLE 4-2 – TAPE COLOR**

Tape Color	Utility
Red	Electric
Yellow	Gas Oil Dangerous Materials
Orange	Telephone Telegraph Television Police and Fire Communication
Blue	Water Systems
Green	Sewer Systems

4-8 Electrical distribution. The main electric power service will be provided by Nolin Rural Electric Cooperative Corporation (RECC). The contact person is Mr. Vince Heuser, Vice President System Operations, Nolin RECC, 411 Ring Road, Elizabethtown, KY 42701-8701. Phone: (270-765-6153). Fax (270-735-1068). E-mail: vheuser@nolinrecc.com. The cost of the Contractor's work required to coordinate and support Nolin's distribution system design and construction (as described below) shall be included in the Contractor's base bid. Nolin's work will be performed under their existing contract with the Government, and payment for Nolin's work will be made directly from the Government to Nolin under that contract.

4.8.1 System design. Nolin RECC will assign and identify a design project manager to design the electrical distribution and lighting systems and to assist the Contractor in coordinating utilities. Nolin RECC shall provide a new electrical distribution system as necessary to serve the new housing units and connect it to Nolin RECC's existing system. The electrical distribution system shall be comprised of a medium voltage, underground, looped distribution system fed from existing systems and with provisions for extension to serve future housing in the adjacent site. Nolin RECC will probably provide 4 feeds into the development. One from Dixie Street, one from Miami Street, and two from Wilson Road. Three switch cabinets will likely be installed at different street intersections to accommodate distribution. A switch cabinet will be placed at the dead end street for future development. This provision for future development shall provide capacity for additional load equal to twice the load anticipated for this project without substantial revisions to the systems installed in this project.

4-8.1.1 Coordination. Each Offeror selected to participate in Phase 2 of the selection process shall submit proposed site plans to Nolin, so that Nolin can develop a preliminary design for site electrical distribution and site lighting. The site plans submitted to Nolin shall show as a minimum: the street, sidewalk, and building layout as well as individual dwelling unit electrical load calculations. Load calculations for the dwelling units shall be in accordance with the NEC. The plans must be submitted to Nolin no later than three (3) weeks prior to the date the Contractor's Phase 2 proposal is due to the Government. The Contractor's submittal to Nolin shall include all Contractor requirements for temporary power and phasing.

4-8.1.1.1 After contract award, and during preparation of project design, the Contractor shall coordinate final site plans with Nolin RECC so that Nolin RECC can finalize their design for the site electrical distribution and site lighting. The final site plan design shall be closely coordinated with Nolin RECC to ensure a properly designed and efficient electrical system. The timing of the final site plan submittal to Nolin RECC shall be coordinated with Nolin RECC to allow them adequate time to finalize their design and coordinate with the local telephone and CATV service providers.

4-8.1.1.2 The Contractor shall coordinate among Nolin RECC, the local telephone service provider, Bell South (see Paragraph 4-10), and the local CATV service provider, Insight Communications (see Paragraph 4-11) to ensure the common trench system and service lateral trenches are adequate for all three service providers and

coordinated with all site utilities. The Contractor shall conduct a minimum of one face-to-face meeting of utility representatives before starting construction. Utility equipment installed below ground and above ground shall be coordinated with all trades. Equipment installed above ground shall be located so as to not detract from the residential aesthetics of the project.

4-8.1.2 Nolin RECC shall provide the Contractor with an electrical distribution design that complies with the NESC, applicable parts of 7 CFR as described in the USDA RUS Electric Program Regulations, and Nolin RECC's corporate rules and operating procedures.

4-8.1.3 Nolin RECC shall provide master metering of the new distribution system and individual metering of each dwelling unit.

4-8.1.4 Service laterals. Service laterals shall be underground in conduit. The length of secondary distribution service laterals from the transformer secondary to the building service entrances shall be minimized.

4-8.1.5 Service entrance. One service entrance per dwelling unit shall be provided. The service entrance conduit shall be buried 48 inches below finished grade with a minimum separation of 12 inches from telephone or TV cables. System shall be designed such that the fault current available at the service entrance equipment will not exceed 10,000 amps.

4-8.1.6 Transformers. Transformers shall be pad-mounted with secondary voltages of 120/240 volt, single-phase, three-wire, with a solid neutral.

4-8.1.6.1 Transformers shall be Energy Star compliant.

4-8.1.6.2 Transformers shall be located on the street side of the dwelling units in the side yard. Rear lot placement shall not be used.

4-8.2 Nolin RECC shall provide all conduit, wire, transformers, vaults, switch cabinets and metering equipment necessary for electric service to each dwelling unit. This includes primary distribution through secondary service to each dwelling unit meter. Both primary and secondary feeders will be in conduit Nolin RECC will assign and identify a construction project manager to install the electrical distribution and lighting systems and to assist the Contractor in field coordinating utilities.

4-8.2.1 The Contractor shall provide trenches and excavation necessary for conduit and transformer placement. Trenching shall be on one side of the street. The trenches shall be 48 inches deep (measured from final grade) and a minimum of 24 inches wide at the bottom. In addition, the trench must provide a minimum of 12 inches of separation from the electrical conduits and telephone and CATV conduits/cables. Trenches shall be inspected and approved by Nolin RECC before they will begin installation work. The Contractor shall provide proper backfill and compaction of trenches.

4-8.2.2 The Contractor shall provide trenches for secondary service from transformers to each housing unit. Trench depth shall be 48 inches. Trenches shall be inspected and approved by Nolin RECC before they will begin installation work. The Contractor shall provide proper backfill and compaction of trenches.

4-8.2.3 The Contractor shall provide a poured, 4-inch thick concrete pad for each transformer and switch cabinet per Nolin RECC specifications.

4-8.2.4 The Contractor shall provide lever bypass type meter base for each dwelling unit per Nolin RECC specifications and connect to underground service conduit at grade level. The meter base shall be inspected and approved by Nolin RECC before Nolin RECC will install the meter.

4-8.2.5 Nolin RECC shall terminate all wire in the distribution system, up to and including the secondary attachment in meter base at each dwelling unit.

4-8.2.6 The Contractor shall provide a UL Listed, copper clad ground rod, minimum eight feet long and one-half inch diameter and grounding electrode conductor per NEC at each meter location.

4-8.2.7 The Contractor shall secure service lateral conduit to each dwelling unit.

4-8.2.8 The Contractor shall provide a minimum of four convenience GFCI receptacles on a minimum of two circuits in the picnic pavilion.

4-8.2.9 Nolin RECC shall provide power for picnic pavilion convenience receptacles and lighting derived from adjacent roadway lighting circuits. See Paragraph 4-8.4.5.

4-8.3 Demolition of Binter Court. The Contractor shall coordinate with Nolin RECC (see Paragraph 4-8), Bell South (see Paragraph 4-10), and Insight Communications (see Paragraph 4-11) for the disconnection and removal of services from the existing buildings on Binter Court and any service interruptions to the Wickam Guest House. In addition, the Contractor shall coordinate with the Housing Division for any service interruptions to the Wickam Guest House. Expect significant restrictions on allowable service interruptions to the Wickam Guest House. The point of contact for housing is Melinda Stickle (502) 943-1000.

4-8.3.1 The Contractor shall disconnect and remove electrical equipment from the buildings except for the disconnection of services as noted below.

4-8.3.2 Nolin RECC shall remove the overhead electrical services from the buildings.

4-8.3.3 Nolin RECC shall remove poles, transformers, and site lighting equipment.

4-8.3.4 The existing overhead electric line shall remain as a temporary feed until new permanent underground feeds are installed.

4-8.3.5 Nolin RECC shall set a new switch cabinet to intercept the existing underground feed to the Wickam Guest House and provide new permanent, underground feed as required to serve the Wickam Guest House.

4-8.3.5.1 The Contractor shall provide a poured, 4-inch thick concrete pad for the switch cabinet.

4-8.3.6 Bell South shall remove the overhead telephone cables up to the demarcation point on the buildings. See Paragraph 4-10 for contact information.

4-8.3.6.1 Bell South shall provide new permanent underground service to the Wickam Guest House.

4-8.3.7 Insight Communication shall remove the overhead CATV cables up to the point of termination on the buildings.

4-8.3.7.1 Insight Communications shall provide new permanent underground service to the Wickam Guest House. See Paragraph 4-11 for contact information.

4-8.3.8 The Housing Division has installed a 12 strand, single mode, 8.3/125, fiber optic cable from Wilson Road to the Wickam Guest House routed through Binter Court. The Contractor shall provide a new 12 strand, single mode 8.3/125 fiber optic cable to match existing and in compliance with ANSI/TIA/EIA-568-B from the pole on Wilson Road to the Wickam Guest House. Provide conduit from the point of entry into the Wickam Guest House, in the utility trench and up the existing pole on Wilson Road. Provide a pole mounted, weatherproof splice box on the pole at the height of the existing cable. Install the new cable from the point of termination in the Wickam Guest House to the splice box, disconnect the existing cable and terminate the new one in its place in accordance with ANSI/TIA/EIA-568-B. Splice the new cable to the existing in the splice box on the pole (at Wilson Road) in accordance with ANSI/TIA/EIA-568-B. Visually inspect connectors for scratches, pits or chips and re-terminate if any adverse conditions exist. Test each circuit lag and complete circuit in accordance with

ANSI/TIA/EIA-568-B. Test at 1310 and 1550 mm using a light source similar to the existing communication equipment. Perform High Resolution Optical Time Domain Reflectometer (OTDR) tests from one end of each fiber. Scale of the OTDR trace shall be such that the entire circuit appears over a minimum of 80 percent of the ordinate axis. Verify proper operation of the existing communications equipment over the circuits and make corrections to the circuits as necessary to restore full operation.

4-8.4 Roadway and area lighting. Nolin RECC (see Paragraph 4.8) shall provide roadway and area lighting based on the Contractor's site design and submittal per Paragraph 4.8.1. Nolin RECC's lighting shall include luminaires, poles, lamps, conduit, wire, control devices, and accessories for a complete roadway and area lighting system as described below.

4-8.4.1 The roadway lighting design shall meet the IES recommended average maintained illuminance values and uniformity ratios for residential collector and local streets.

4-8.4.1.1 The poles shall be located primarily on one side of the street (the same side as the underground primary feeder) with a maximum spacing of 200 feet.

4-8.4.1.2 The baseline luminaire shall be a commercial, specification grade, high pressure sodium, decorative "Historic" lantern style fixture with cast iron or cast aluminum housing; segmented, cut-off type, optics; tempered glass lens; straight, round, fluted steel or aluminum pole; cast iron or cast aluminum decorative base; cast iron or cast aluminum decorative fitter and polyester powder-coat finish. The pole shall match the luminaire and the assembly shall have a residential scale and appearance. The fixture and pole shall match the existing assembly presently installed in the Historic District. The existing fixture is W.J. Whately Model 1010LS/33-100HPS-D-MT-TA-BK. The roadway lighting shall have simple photocell control.

4-8.4.2 Sidewalks along roadways shall be lit in accordance with IES recommended average maintained illuminance levels for pedestrian ways in residential areas adjacent to roadways.

4-8.4.3 Sidewalks that meander or diverge slightly from the roadway shall be considered adjacent to the roadway. Walkways that depart from the roadway routing for another destination such as the adjacent school or pool complex shall be lit in accordance with IES recommended average maintained illuminance levels for pedestrian ways (walkways) distant from roadways. The luminaires used for walkways distant from roadways shall be the same as those used for roadways but should have lower wattage lamps and shorter poles.

4-8.4.4 Basketball courts shall be lit in accordance with IES recommended average maintained illuminance values and uniformity ratios for class III or IV recreational facilities. The baseline luminaire shall be a commercial, specification grade, 250 watt metal halide rectangular floodlight fixture with die cast aluminum housing and front bezel; hydroformed, NEMA distribution rated optics, tempered glass lens; straight, square, steel pole; polyester powder-coat finish. The pole shall match the luminaire and the assembly shall have a residential scale and appearance. Lighting control for recreational areas shall be via a timer switch and photocell for each court. The photocell shall prevent the operation of the lights during daylight and allow the use of the lights (through the timer) after dark. The timer shall allow manual selection of time periods from 15 minutes to 2 hours and shall have an adjustable lock-out timer feature (in series) to prevent lights from being operated after 10 PM (nominal). Power for basketball court lighting shall be derived from adjacent roadway lighting circuits.

4-8.4.5 Picnic pavilions shall be lit in accordance with IES recommended illuminance levels for outdoor entertainment lighting. The fixtures provided for inside the pavilions shall be vandal resistant and wet location listed. The open area adjacent to the picnic pavilion shall be provided with general lighting using two (2) luminaires of the same type as used for roadway lighting. Power for picnic pavilion convenience receptacles and lighting shall be derived from adjacent roadway lighting circuits. Picnic area lighting controls shall be the same as described for basketball courts above.

4-8.4.6 Bus stop lighting shall be accommodated by strategic placement of streetlights so that there is a light next to each bus stop.

4-8.4.7 Not used.

4-8.4.7.1 Not used.

4-8.4.8 Soccer field will not be lit.

4-8.4.9 Jogging path will not be lit.

4-8.4.10 Playgrounds will not be lit.

4-8.4.11 The Contractor shall provide trenches for lighting conduits.

4-8.4.12 The Contractor shall provide concrete pedestals for roadway and area lighting poles. The pedestals shall be flush with the final finished grade. The pedestals shall be designed to properly support the pole and light fixture in the wind and soil conditions for the location.

4-9 Not used.

4-10 Telephone. Telephone service to the dwelling units will be provided by Bell South. The contact person is Mr. Bob Kohler, Bell South Telecommunications, 3719 Bardstown Road, Louisville, KY, 40218. Phone: (502-452-8815).

4-10.1 Telephone service design, equipment and installation will be in accordance with the rules and operating procedures of Bell South and industry standards.

4-10.2 Telephone cable shall be placed in a common trench with the electrical distribution cable (see Paragraph 4-8.2.1). The Contractor shall closely coordinate exact routing, requirements, and installation.

4-10.2.1 Where telephone cables cross under roadways, the Contractor shall provide 4-inch conduit in the trench for the telephone cable.

4-10.2.2 Where the trench cannot be excavated to the required depth due to subsurface rock or other conditions, the Contractor shall provide 4-inch conduit to protect the telephone cable.

4-10.3 The Contractor shall provide payment to Bell South for the cost of the new cable to serve the Wickam Guest House.

4-11 Cable Access Television (CATV). Cable television service will be provided by the local CATV service provider, Insight Communications. The contact person is Mr. Danny Campbell, Insight Communications, 4701 Commerce Crossings Drive, Louisville, KY, 40229. Phone: (502-357-4387), Cell: (502-817-4928).

4-11.1 CATV service design, equipment and installation shall be in accordance with the rules and operating procedures of Insight Communications and industry standards.

4-11.2 CATV cable shall be placed in a common trench with the electrical distribution cable (see Paragraph 4-8.2.1). The Contractor shall closely coordinate exact routing, requirements, and installation.

4-11.2.1 Where CATV cables cross under roadways, the Contractor shall provide 4-inch conduit in the trench for the CATV cable.

4-11.2.2 Where the trench cannot be excavated to the required depth due to subsurface rock or other conditions, the Contractor shall provide 4-inch conduit to protect the CATV cable.

4-11.3 The Contractor shall provide payment to Insight Communications for the cost of the new cable to serve the Wickam Guest House.

Whole Neighborhood Renewal, Fort Knox, KY

\*\*\*Safety Pays\*\*\*

DACA27-03-R-0020

**5. UNIT DESIGN - ARCHITECTURE.**

5-1 Unit Design. The dwelling unit design shall be one- and two-story detached single family units. A total of 178 new dwelling units shall be built consisting of 118 three-bedroom units and 60 4-bedroom units. Five percent of each bedroom type shall be handicapped adaptable. A minimum of 6 unit types and distinct designs are required. Variety in the exterior appearance is required to enhance the streetscape and provide individuality. No two identical units shall be sited adjacent to each other. All garage entrances shall be recessed from the front and side facades a minimum of 1.5m (5 feet). Design consideration should be given to and proposed by the Offeror for building systems that incorporate measures beyond the minimum requirements of this Statement of Work and RFP. Design consideration should also be given for providing an enhanced living environment, such as, bigger bedroom spaces, flexible open spaces and other unique design features (proposed at the Offeror's discretion) to enhance his/her proposal, providing best value to the Government within the Construction Cost Limit (CCL).

The minimum net and gross area for each unit type is listed in the table below.

**TABLE 5-1- MINIMUM SIZE OF HOUSING UNITS BY GRADE**

Pay Grade	Number of Bedrooms	Minimum Gross Floor Area		Minimum Net Floor Area	
		M <sup>2</sup>	Ft <sup>2</sup>	M <sup>2</sup>	Ft <sup>2</sup>
E-7 to E-9 SNCO	4	200	2,153	170	1,830
	3	173	1,862	147	1,582

Note<sup>1</sup>: Minimum Net Floor Area is 85% of Gross Floor Area.

5-1.1 Gross and Net Area Definitions. Gross building area is measured to the outside face of exterior enclosure walls. Do not include normal roof overhangs in gross building area. Exterior covered areas such as covered entries count as half area towards gross area, and are measured from the face of the enclosure wall to the edge of the covered area. Net floor area is defined as the space inside the exterior walls. Net area excludes:

- (a) Exterior and party walls.
- (b) Half thickness of interior walls adjacent to excluded areas.
- (c) Utility and laundry rooms.
- (d) Interior and exterior bulk storage.
- (e) Washer and dryer room (not to exceed 2.8 square meters (30 square feet)).
- (f) Furnace, domestic water heater, and solar equipment spaces.
- (g) Stairwells
- (h) Landings
- (i) Walls and interior spaces specifically designed for passive solar systems (other than required habitable areas).
- (j) Weather vestibules (not to exceed 1.5 square meters (16 square feet) sheltering the main entry).

- (k) Unfinished attic space.
- (l) Patios (covered or uncovered), porches or balconies and terraces.
- (m) Garages.
- (n) Increases required to meet adaptability standards.

5-1.2 Allowable area increases.

5-1.2.1 Net floor area may be increased to meet ADAAG requirements.

5-1.3 Handicapped adaptability is required. Five percent (5%) of each dwelling unit type shall be handicapped adaptable. The facility shall be designed and constructed to meet the requirements of UFAS and ADA-AG. These units shall be one-story dwelling units. The adaptable units shall be evenly distributed throughout the neighborhood.

5-1.3.1 Handicapped adaptable dwelling units shall be provided with the same spaces and finish requirements specified in this Statement of Work. Interior and exterior unit circulation shall be a minimum of 1219mm (48 inches) wide. Entry doors shall be 914mm (36 inches) wide and provided with a second viewer located 1067mm (42 inches) above finished floor. Extra blocking shall be provided in the bathroom walls and other areas for future installation of grab bars, lower light switches and modifications to bathroom fixture height. Faucet handles and door hardware shall be lever type. Provisions shall be taken to adjust height of cabinets. Van accessible garages shall be provided in 30% of the handicapped adaptable units. A ramp shall be provided to the garage as well as access to the patio. Additional egress shall be provided from the unit such as the patio and kitchen.

5-2 Functionality. Rooms shall be sized and arranged for efficient use, good circulation, and furniture placement. Room spaces shall be arranged according to good spatial relationships and functions. The distribution of space for food preparation, living and dining, sleeping, bathing, halls, closets, and utility/laundry and garage areas shall be balanced and shall enhance the intended functions. Wasted spaces shall be avoided and minimized as much as possible. Bathrooms shall be designed to avoid direct sight lines into common areas, such as living/dining rooms, family rooms, and kitchens.

5-2.1 Habitable rooms shall not be used as halls for entry into a housing unit or for primary circulation within a housing unit.

5-2.2 Provide convenient access between garage and laundry areas, garage and kitchen areas and between kitchen and laundry areas.

5-2.3 Sliding glass door shall not be used as a primary housing unit access.

5-3 Indoor and Outdoor Integration. Emphasize factors that enhance indoor and outdoor living and features that encourage family use of outdoor areas, such as patios, porches and yards. Design considerations should be given to larger sized patios, patios with stamped colored concrete finish, and front porches.

5-4 Fire Protection and Safety. Housing units shall comply with the applicable National Fire Codes, including NFPA 101, Life Safety Code. Contractor shall use the latest edition of the Fire Protection Life Safety Code review form, as provided as an attachment to this RFP. Construction features shall be provided in accordance with the International Building Code (IBC).

5-4.1 Fire resistance of roof material. Provide Class A (ASTM E108, Standard Methods of Fire Tests of Roof Coverings) roof covering material throughout.

5-4.1.1 Duplexes. Prohibited, therefore deleted.

5-4.1.2 Townhouses. Prohibited, therefore deleted.

5-4.1.3 Apartments. Prohibited, therefore deleted.

5-4.2 Party Floors. Prohibited, therefore deleted.

5-4.3 Utility Rooms and Chases. Provide full clearance from within the utility room around mechanical equipment with access in accordance to manufacturer's requirements. Provide one-hour fire rated walls and ceilings.

All horizontal runs for mechanical, electrical and/or plumbing shall be contained within an interstitial space between the first floor ceiling and the second floor structure of the two-story units. A chase shall be provided in non-livable spaces (i.e. storage, closet, bathrooms) for vertical runs of mechanical, electrical and/or plumbing. HVAC distribution in the attic is prohibited in two-story construction. HVAC distribution is allowed in the attic for one-story construction.

For additional information regarding chases refer to Chapter 10 Unit Design – Heating, Ventilating, and Air Conditioning. HVAC supply and return air ductwork in the attic is prohibited in two-story housing units but permitted in single-story housing units.

5-4.4 Alarm Systems. Not required, therefore deleted.

5-4.5 Sprinkler Systems. Single family detached dwelling units do not require sprinklers.

5-5 Sound Attenuation:

5-5.1 Testing. Certified proof-of-performance field tests shall be conducted to demonstrate that the floor and wall systems as constructed provide the required sound isolation. Tests for air-borne sound shall be made in compliance with ASTM E336. Tests for impact sound shall be made in compliance with ASTM E1007. Testing of 10 percent (minimum) of each type of floor and wall system is required. Location of test sites will be chosen at random by the Contracting Officer.

5-5.1.1 Primary habitable areas (living, dining, family room, bedrooms, and hallways) shall provide a minimum of FSTC 52 and 52 Field Impact Isolation Class (FIIC). Wet areas (kitchen, baths, laundry, and utility room) shall provide a minimum of FSTC 52 and 52 FIIC. Habitable areas over garages shall provide a minimum of FSTC 52.

5-5.1.2 Any wall or floor system found to be inadequate shall have the deficiencies corrected and the additional qualifying tests conducted at the Contractor's expense. Testing at the Contractor's expense of greater than 10 percent of each system may be required if the Contracting Officer determines that the quality of construction requires this additional testing.

5-5.1.3 Wall, floor, and ceiling systems shall be designed to meet or exceed the requirements stated above. In cases where the field tested performance of the systems does not meet the designed performance, the maximum acceptable difference between field tests and sound transmission ratings shall be 2 decibels (dB) for airborne sound ratings and 5 dB for impact sound ratings.

5-5.2 Plumbing and HVAC equipment. Design of plumbing and Heating, Ventilating, Air-Conditioning (HVAC), and dehumidifying equipment shall include design provisions such as location, enclosure and acoustical treatment, to minimize transmission of noise generated by equipment within each housing unit. Provide a HVAC isolation pad to localize the vibration of equipment from the rest of the structure.

5-6 Dimensions and Areas. Minimum areas and dimensions for interior spaces are shown in Table 5-3. Minimum areas and dimensions for exterior spaces are shown in Table 5-4.

**TABLE 5-3 - MINIMUM NET AREAS AND DIMENSIONS - INTERIOR SPACES**

Space	Area		Length		Width/Depth		Height <sup>1</sup>	
	m <sup>2</sup>	ft <sup>2</sup>	mm	ft-in	mm	ft-in	mm	ft-in
Living <sup>2,9</sup>	14.0	150	3550	11-8	3910	12-10	2438	8-0
Dining (3 BR) <sup>2</sup>	8.4	90	2900	9-6	2900	9-6	2438	8-0
Dining (4 BR) <sup>2</sup>	10.2	110	3200	10-6	3200	10-6	2438	8-0
Family Room <sup>2,9</sup>	14.0	150	3550	11-8	3910	12-10	2438	8-0
Kitchen <sup>3,4,6,9</sup>	9.3	100	3050	10-0	3050	10-0	2438	8-0
Laundry Room <sup>5</sup>	1.7	18	1800	6-0	900	3-0	2438	8-0
Master Bedroom #1 <sup>8</sup>	14.0	150	3658	12-0	3656	12-0	2438	8-0
BR #2 <sup>8</sup>	11.2	121	3353	11-0	3353	11-0	2438	8-0
BR #3 <sup>8</sup>	11.2	121	3353	11-0	3353	11-0	2438	8-0
BR #4 <sup>8</sup>	11.2	121	3353	11-0	3353	11-0	2438	8-0
Half Bath <sup>6</sup>	-	-	-	-	900	3-0	2438	8-0
Full Bath <sup>6</sup>	-	-	-	-	1500	5-0	2438	8-0
Vestibule	1.2	13	1000	3-3	1200	4-0	2438	8-0
Hall <sup>6</sup>	-	-	-	-	1200	4-0	2438	8-0
Stairway Width <sup>6,7</sup> (interior)					965	3-2		

Note<sup>1</sup>: Ceiling heights in all rooms shall be a minimum of 2438mm (8 feet-0 inches). Ceiling heights shall not be reduced.

Note<sup>2</sup>: Room dimensions are exclusive of circulation. Circulation paths along one side of a room are permitted but add 1200mm (4 feet-0 inches) to the minimum dimension.

Note<sup>3</sup>: A minimum of 1200mm (4 feet-0 inches) must be maintained in front of and between cabinets.

Note<sup>4</sup>: Minimum area and dimensions are measured from face of cabinets to walls.

Note<sup>5</sup>: Dimensions indicated are for washer and dryer appliances and does not include circulation.

Note<sup>6</sup>: Accessible units must conform to UFAS and ADA-AG. UFAS and ADA-AG require greater minimum dimensions.

Note<sup>7</sup>: Clear width is measured between railings.

Note<sup>8</sup>: Design consideration should be given to larger bedrooms.

Note<sup>9</sup>: Preference for larger square footage in these areas.



**TABLE 5-4 - MINIMUM NET AREAS AND DIMENSIONS - EXTERIOR SPACES**

Spaces	Area		Length		Width/Depth		Height <sup>1</sup>	
	m <sup>2</sup>	ft <sup>2</sup>	mm	ft-in	mm	ft-in	mm	ft-in
Garage <sup>2</sup>	21.6	240	6100	20-0	3650	12-0	2300	7-6
Patio - 3 BR <sup>1</sup>	25.1	270	3048	10-0	8230	27-0	2400	7-10
Patio - 4 BR <sup>1</sup>	25.1	270	3048	10-0	8230	27-0	2400	7-10

Note<sup>1</sup>: Ceiling heights apply when patios, porches and balconies are covered.

Note<sup>2</sup>: Garages for handicap units shall comply with UFAS and ADA-AG.

5-6.1 Minimum area requirements for kitchen cabinets, counters, and pantries are shown in Table 5-5. Flat area is shown for countertops and drawers. Combined shelf area is shown for pantry and base, wall and wall cabinets.

**TABLE 5-5 - KITCHEN CABINET, COUNTER, & PANTRY AREA**

Type of Housing Unit	Wall		Base		Drawer		Counter		Pantry	
	m <sup>2</sup>	ft <sub>2</sub>	m <sup>2</sup>	ft <sup>2</sup>						
4 BR	2.8	30	3.8	40	1.7	18	1.5	16	1.5	16
3 BR	2.3	24	3.0	32	1.3	14	1.1	12	1.5	16

5-6.2 Minimum closet width requirements are stated in Table 5-6. Closets requirements are the same for three- and four-bedroom units.

**TABLE 5-6 - MINIMUM CLOSET WIDTHS<sup>1</sup>**

Type of Closet	SNCO	
	mm	ft
Coat/ Entry Hall	900	3
Master BR #1	1800	6
BR #2	1200	4
BR #3	1200	4
BR #4	1200	4
Broom	1200	4
Linen <sup>2</sup>	900	3

Note<sup>1</sup>: Minimum inside clear depth for standard/broom closets shall be 600mm (2 feet).

Note<sup>2</sup>: Minimum clear inside depth for linen closets shall be 430mm (1 foot-6 inches).

5-6.3 Minimum requirements for interior, exterior, and combined bulk storage are shown in Table 5-7.

**TABLE 5-7 - MINIMUM INTERIOR, EXTERIOR, & COMBINED BULK STORAGE<sup>1</sup>**

Unit Type	Storage Type	SNCO	
		m <sup>2</sup>	ft <sup>2</sup>
3 BR	Int.	3.0	32
	Ext.	3.7	40
	Comb.	7.9	85
4 BR	Int.	3.7	40
	Ext.	4.5	48
	Comb.	9.3	100

Example<sup>1</sup>: If interior bulk storage is 2.3 m<sup>2</sup> (24.8 ft<sup>2</sup>), then exterior bulk storage must be 4.2 m<sup>2</sup> (45.2 ft<sup>2</sup>) to obtain the combined bulk storage requirement of 6.5 m<sup>2</sup>.

5.7 Not used, therefore deleted.

5-8 Major Zones. Living and Dining, Kitchen, Family Room, and Bedrooms.

5-8.1 Living and dining. The living room shall have direct access to the front entrance foyer and to the dining area without passing through another room. When circulation is required along the perimeter of the space or between areas in open plans, minimum circulation space of 1219mm (4 feet) shall be added to the required minimum room dimension. Ceiling fans with lights shall be provided in the living room, family room, dining room, and all bedrooms. Fireplaces are not permitted.

5-8.1.1 The dining area may be an extension of, or an "L" off the living room.

5-8.1.2 The dining area shall be directly accessible from the kitchen without passing through another room.

5-8.1.3 Design consideration should be given to enhancing the living and dining areas by providing architectural features such as cathedral ceilings, crown moldings, columns, built-in book shelves, open floor plans and open stairs with wood banisters, etc.

5-8.2 Kitchen

5-8.2.1 Kitchen design shall provide an efficient work triangle. A base cabinet, minimum 460mm (18 inches) wide, shall be provided on the handle side of the refrigerator. The range shall not be located adjacent to the refrigerator or sink, in a corner, or adjacent to a passageway. The dishwasher shall be installed adjacent to the kitchen sink. Provide a backsplash behind the range, extending to the underside of the range hood, finished to match the range and the range hood. Kitchen sinks shall be commercial quality stainless steel 18 gauge, double bowl, having a

minimum depth of 178mm (7 inches). A cabinet opening for a tenant-owned microwave oven shall be provided in the kitchen. A breakfast bar shall be provided in the kitchen. The breakfast bar shall be part of one of the kitchen base cabinets. The breakfast bar shall not face or be part of the living and/or dining room spaces. In the kitchen, shoe molding (1/4 round) shall be required at all base cabinets where they meet the floor surface. Design consideration should be given to enhancing the kitchen area by amenities such as kitchen islands and greater counter, base, and wall cabinet space.

5-8.3 Family room. Provide a separate family room, adjacent to and contiguous with the kitchen. The family room is the primary family gathering place and shall be designed for use as casual dining, seating for TV watching, games, and for doing homework. Ceiling fans with lights shall be provided in the family room. Design consideration should be given to enhancing the family rooms by providing architectural features such as cathedral ceilings, crown moldings, columns, built-in book shelves, open railing, etc.

5-8.4 Bedrooms. Bedrooms shall be designed to accommodate king-size beds in master bedrooms and two twin beds in the other bedrooms. Window, door, and closet placement should enhance furnishability. Each bedroom shall be accessible without passing through another bedroom. Ceiling fans with lights shall be provided in all bedrooms. Design consideration should be given to enhancing all bedrooms by providing cathedral ceilings, crown moldings, etc., and by providing greater square footage.

5-9 Minor Zones. Bathrooms, Laundry, Closets, Utility Room, Garage, and Bulk Storage.

5-9.1 Bathrooms. Emphasis shall be placed on size, furnishings, layout, and privacy. The Master Baths shall have double sinks in the vanities. Design consideration should be given to separating the vanity space from the tub and toilet space in the Master Bathroom. Vanities that are a minimum of 1524mm (5 feet) long shall be provided for all double bowl sinks. Vanities that are a minimum of 914mm (3 feet) long shall be provided for all single bowl sinks. Determine the number of bathrooms based on Table 5-8.

**TABLE 5-8 - BATHROOM REQUIREMENTS**

Number of Bedrooms per Floor	Number of Bathrooms Per Floor
None	.5
1 - 2	1
3 - 4	2

5-9.1.1 The full bath shall contain a water closet, lavatory, and a tub with shower assembly. Full baths shall be directly accessible from the bedroom hall without passing through another room. Master Baths shall have a direct access to the Master Bedroom. All tubs shall have a solid surface full height surround. Tubs with shower assemblies shall include shower rods. Glass or plastic enclosures and doors are prohibited. Bathtubs shall be constructed of porcelain enameled formed steel. See Chapter 8, Unit Design Plumbing, Paragraph 8-4.4, "Bathtubs" for additional information on tub materials. A half bath shall contain a lavatory and a water closet. The half-bath shall be located on the first floor of all two-story units.

5-9.1.2 Provide solid surface integral lavatories mounted in 610mm (2-foot) deep (minimum) countertops, with vanity bases. Countertops shall be solid surface type material, with minimum 102mm (4-inch) high back splashes.

5-9.1.3 Bathroom accessories may be surface mounted or recessed, of non-corrodible metal or ceramic tile, and shall include a toilet paper holder, soap dish (at tub/shower), shower curtain rod, bathrobe hook, and towel bars totaling not less than 1067mm (42 inches) for a full bath and not less than 762mm (30 inches) for a half bath. Provide blocking for all accessories that are to be wall mounted.

5-9.1.4 A recessed medicine cabinet shall be provided in each bathroom. Cabinets shall be the corrosion-resistant, hinged door type.

5-9.1.5 A full width vanity mirror shall be provided in each bathroom. Vanity mirrors shall be mounted flush to the vanity backsplash. Provide blocking for the mounting of mirrors. Vanity mirrors shall have a minimum height of 914mm (3 feet) with the top of the mirror set 1 inch below the light fixtures.

5-9.1.6 Tubs and showers shall not be placed under windows.

5-9.1.7 Exhaust fans shall be provided in all baths. See Chapter 10 Unit Design – Heating, Ventilating, and Air-Conditioning, Paragraph 10-6 Exhaust Fans for additional information.

5-9.2 Laundry. Units shall have a separate laundry room equipped with a utility sink. Utility sinks shall be on four legged stands. The stands shall be securely fastened to the floor and wall using bolts and washers with an epoxy bonding agent in the floor slab. Self tapping screws or mechanically driven fasteners are prohibited. Plastic utility sinks are prohibited. Washer and dryer are tenant-provided. Design consideration should be given for laundry rooms to be sized to accommodate extra shelving and adequate space for a free-standing freezer measuring 610mm x 914mm x 1828mm (2 feet deep x 3 feet wide x 6 feet high).

5-9.2.1 Two full-length vinyl-coated wire shelves, 250mm (10-inch) minimum nominal depth, are required above the washer and dryer. One of the shelves shall be equipped with a hanging rod. Design consideration should be given to providing additional hanging and shelving space.

5-9.2.2 Minimum net clear door width to washer and dryer space when open is 864mm (2 feet-10 inches).

5-9.2.3 Utility Room. Units shall have one utility room to house all mechanical equipment. The utility room shall have exterior access; however, the exterior access shall be restricted from resident use. Interior access shall only be sufficient for residents to change equipment filters. Exterior access shall be limited to maintenance personnel and shall be keyed separately from housing unit. The mechanical equipment shall be arranged so that the filter can be changed by the occupant through an access wall panel without entering the utility room and maintenance personnel can change the filter from within the utility room without disturbing the occupant. Full access from within the utility room to three sides of all the mechanical equipment without moving any equipment or fixtures shall be provided for maintenance purposes.

5-9.3 Closets. Closets shall provide the minimum widths indicated in Table 5-6. Broom and pantry closets shall be provided convenient to the kitchen, linen closets shall be provided convenient to bathrooms, and a coat closet shall be provided convenient to the housing unit entrance. A walk-in closet shall be provided in the Master Bedroom.

5-9.3.1 Closet shelving. Closets (except linen, broom, and pantry closets) shall be equipped with a 305mm (12-inch) deep shelf and a clothes hanger rod. Linen and pantry closets shall be provided with at least four full-depth shelves. Broom closets shall be provided with a 305mm (12-inch) deep shelf. Closet shelving and rods in excess of 1200mm (4 feet) shall have center supports. Supports must be anchored to studs or blocking. Shelves and supports shall be capable of carrying 52 kg/m (35 lbs/ft). Closet shelving shall be factory finished, vinyl-coated, welded wire shelving meeting the capacity requirements. Design consideration should be given to heavier gauge vinyl-coated wire shelving.

5-9.3.2 Closet doors. Closet doors should be located to permit placement of furniture in the corners of the rooms by providing a 460mm (18-inch) return adjacent to a furnishable wall. Closets 1800mm (6 feet) or more in width shall have hinged double doors, maximum 2000mm (6 feet-8 inches) high. Wall closet width shall not extend beyond either door jamb more than 510mm (20 inches). Sliding and bi-fold doors are prohibited.

5-9.4 Garage. Garages shall be fully finished, including base molding. The garage walls and ceiling shall be taped and finished smooth. For more information on garages, see Paragraph 5-11, Garages, in this Section.

5-9.5 Bulk storage. Provide each housing unit with interior and exterior bulk storage space meeting the minimum requirements of Table 5-7. Provide interior storage in a separate room. Provide exterior storage in the garage or a separate storage area with access from the rear yard, integrated into the building design. Interior bulk storage shall have vinyl composition tile with wood base. Exterior bulk storage flooring shall have sealed and broom finished concrete with no base. If the exterior storage is in the garage, then it, too, shall have base molding.

5-9.5.1 Not used, therefore deleted.

5-9.5.2 Bulk storage space should be at least 1200mm (4 feet) in depth and a minimum clear height of 2000mm (6 feet-6 inches). Space under stairs shall not be counted as bulk storage.

5-9.5.3 Provide a minimum of three nominally 305mm (12-inch) deep shelves with a combined length of 7300mm (24 feet) within each bulk storage room. Design consideration should be given to providing additional shelving/storage space above the minimum requirement.

5-9.5.4 Common walls and ceilings. Not used, therefore deleted.

5-9.5.5 Stairs. Interior stairs shall have oak treads and oak risers. Tread and riser dimensions shall conform to the International Building Code and to International Residential Code (IRC) One and Two Family Dwelling Units. Stairs shall provide sufficient space to allow for residents to easily move furniture from floor to floor. Design consideration shall be given to floor plan layouts that provide for the use of open wood staircase with open railing and banister.

## 5-10 Interior Finishes

5-10.1 Walls and ceilings. Provide 13mm (1/2-inch) gypsum wallboard, taped and smooth finished. Water-resistant wallboard shall be used in wet areas such as full and half baths, laundry rooms, and at wet areas of kitchen. Cementitious backer board shall be used for ceramic tile applications and solid polymer (solid surface) tub and shower surrounds. Water-resistant wallboard shall be used for painting purposes in all wet areas not receiving ceramic tile. Provide 16mm (5/8-inch) type 'x' gypsum wallboard in the garage for walls and ceilings. Interior wall and ceiling finishes shall have a flame-spread rating of 25 or less and a smoke-developed rating of 50 or less when tested in accordance with ASTM E84. Painted finishes shall be smooth and durable (scratch, chip mold and mildew resistant). A 1219mm (4-foot) high ceramic tile wainscot shall be provided in all full bathrooms. All finishes shall contain low VOC (Volatile Organic Compound) emitting products.

5-10.2 Flooring, stairs, and base. Living room, dining room, family room, bedrooms and hallways shall have hardwood floors with a clear finish, and a wood base with wood shoe molding (1/4 round). Interior stairs shall be hardwood (oak treads and oak riser) with clear finish. Veneer, parquet, and laminate flooring are prohibited. Kitchen and foyer shall have ceramic tile flooring with wood base. Bathroom flooring shall be non-skid (slip-resistant) ceramic tile with ceramic tile cove base. Laundry and interior storage flooring shall be vinyl composition tile with wood base. Sustainable design consideration shall be given to the use of ceramic tile flooring and VCT flooring with a high recycled material content. Utility rooms shall have broom finished, sealed concrete floors. Wood base in the utility room is not required.

5-10.2.1 Vinyl composition floor tile (VCT) shall conform to ASTM F1066, Standard Specification for Vinyl Composition Floor Tile, and have a minimum thickness of 2.381mm (3/32-inch). Design consideration should be given for use of recycled content material as well as locally available vinyl composition floor tile material. Glues used for vinyl composition tile shall be low VOC (Volatile Organic Compound) emitting glue.

5-10.2.2 Sheet vinyl. Prohibited, therefore deleted.

5-10.2.3 Ceramic tile shall conform to ANSI 137.1, moderate or heavy grade. Ceramic tile flooring shall be provided in the entry, kitchen, and bathrooms. Ceramic tile shall be non-skid/slip resistant. Larger sized ceramic tiles shall be provided in the kitchen and bathrooms, i.e., 355mm x 355mm (14 inch x 14 inch) or larger. Tile flooring

with thin joints. i.e., 6.35mm (1/4-inch) or less. Grout joints shall be colored (not white or cream) to complement the flooring. Ceramic tile with dimensions less than 152mm x 152mm (6 inches x 6 inches) is prohibited. Design consideration should be given for use of recycled content material as well as locally available ceramic tile flooring material.

5-10.2.4 Carpet. Prohibited, therefore deleted.

5-10.2.5 Hardwood flooring shall conform to NOFMA Grading Rules. Hardwood flooring shall be required in all living areas, except entries, storage areas, laundry rooms, utility rooms, kitchens, and bathrooms. Flooring shall be installed on 1x strip sleepers. Hardwood flooring shall be 19mm (3/4-inch) thick, 57mm (2 1/4-inch) wide, tongue and groove hardwood flooring. Design consideration should also be given to locally available hardwood flooring material.

5-10.3 Painting. Finishes shall be lead free. All interior surfaces, except factory pre-finished material, shall be painted a minimum of one prime coat and two finish coats. All interior trim shall have solid wood paint grade trim as a minimum. Caulking of trim and wall joints shall be provided. All walls shall have smooth finish and painted with satin or eggshell washable paint. All ceilings shall have a smooth finish using flat finish paint only. All painted trim shall be semi-gloss. All paints shall be specified as washable. Colors shall be submitted by the Contractor and approved by the Contracting Officer. Colors shall be white, off-white, or a neutral earth tone. Cold gray finishes are prohibited. Blown-on acoustical finish is prohibited. Design consideration shall be given to the use of low or no VOC (Volatile Organic Compound) emitting paints and stains such as water based products. Design consideration should be given for use of stain on trim and interior doors (using stain grade wood) in lieu of paint.

5-11 Garages. Provide a single-car garage for each housing unit. If trash or bulk storage areas are included in the garage, such areas are in addition to the required car storage area. Refer to Table 5-4 for minimum dimensions. Set the garage slab elevation a minimum of 100mm (4 inches) below the level of the housing unit floor and the floor of the adjoining exterior storage. Slope slabs to drain out the garage door. Provide movement joint between garage and driveway. Garages shall be designed to be recessed a minimum of 1524mm (5 feet) from the front facade. Garage doors shall have hardware that can be opened and locked from inside and outside of the garage. Garages shall be pre-wired to receive a resident-provided automatic garage door opener. Garages shall have insulated metal sectional overhead doors. Design consideration should be given to providing painted OSB over the gypsum board above 1067mm (3 feet-6 inches) around the garage interior and to providing a work bench with peg board on one interior wall.

5-12 Roofing and Drainage. Minimum slopes for roofs shall be as shown in Table 5-9.

**TABLE 5-9 – ROOF SLOPES**

Roof Types	Rise	Run
Shingle	1	4

5-12.1 Roof water. Gutters and downspouts shall be provided for all roof areas. Roof runoff shall be collected into the gutter system. Uncontrolled roof runoff shall not be allowed to flow onto lower roof surfaces or the ground without passing through a collection system. A one-piece integral cover and gutter "leaf guard type" shall be provided. Downspouts draining onto a lower roof shall have metal or plastic splash deflectors. Concrete splash blocks shall be provided under downspouts if not downspouts are not connected to the storm drainage system. Splash blocks shall extend a minimum 0.610mm (2 feet) beyond the exterior wall of the house. Proper backfilling, drainage away from the building, and soil compaction along the perimeter of the building and around downspout locations is required to minimize soil erosion.

5-12.1.1 Eaves and Valleys. Provide an ice and water barrier sheathing for all eaves and valleys.

5-12.2 Roof surface. Wood shake or shingle roofs. Prohibited, therefore deleted.

5-12.2.1 Roofing shall be limited to the following: Provide 113 kg (250 lb), Class A wind-resistant, anti-algae, anti-fungus fiberglass shingles with a 30-year warranty. The shingles provided shall conform to ASTM D3018, Specification for Class A Asphalt Shingles Surfaced with Mineral Granules. Shingles shall be hail resistant. Contractor shall provide a minimum of three (3) alternative color selections to the Contracting Officer. The Contracting Officer shall make the final color selection. Shingles shall have a uniform color on the surface and throughout the thickness of the shingle and shall come from the same color lot.

5-12.2.2 Standing or flat seam, metal roofing. Prohibited, therefore deleted.

5-12.2.3 Clay, concrete, metal, or fiberglass tile. Prohibited, therefore deleted.

5-12.2.4 Aluminum standing seam roofing. Prohibited, therefore deleted.

5-12.2.5 Copper. Prohibited, therefore deleted.

5-12.3 Common roofs. Parapet walls. Prohibited, therefore deleted.

5-12.4 Ridge vents. Ridge vents shall be provided at all roof ridges. Ridge vent installation shall comply with manufacturer's recommendations. Ridge colors shall match roofing material colors.

5-12.5 Roof overhangs. Roof overhangs shall be a minimum of 457mm (18 inches). Soffits of overhangs shall be perforated vinyl or aluminum.

5-12.6 Roof extensions. Not used, therefore deleted.

5-12.7 Roof penetration. All roof penetrations shall be provided at rear elevations of the units.

5-13 Exterior Finishes. Vinyl siding shall be provided on all sides of one-story units. A 1.2meter (4-foot) high wainscot of brick veneer shall be provided on all sides of one-story units. The entire first story of two-story units shall be fully bricked on all sides. The roof coverage shall be asphalt shingles. Emphasis shall be placed on low maintenance and durability for exterior finish materials. Materials shall be residential in size, scale, and texture.

Flat front building facades are prohibited. Front facade elevations shall have relief and depth as can be achieved by using, for example, different masonry, building configurations, bump outs, porches, dormer windows, etc. Exterior finish materials for exterior bulk storage buildings and garages shall match the primary dwelling unit. The following siding materials shall be used:

5-13.1 Brick and Cultured Stone. Brick shall conform to ASTM C216, Standard Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale). Cultured stone shall conform to ASTM C67, Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile. Brick and cultured stone shall have a uniform color on the surface and throughout the thickness of the brick and cultured stone and shall all come from the same lot. The Contractor shall provide the Contracting Officer alternative color schemes so that the CO may select a minimum of 3 alternative color schemes. Provide brick cap and flashing for all offset brick veneer. Provide concrete cap and flashing for all offset cultured stone veneer. For grade beam design, the brick shall run a minimum of one course below the finished floor and shall be flashed at that level.

5-13.2 Factory-prefinished siding.

5-13.2.1 Vinyl siding shall conform to the requirements of ASTM D3679, Rigid Poly (Vinyl Chloride) (PVC) Siding and shall be a minimum of 1.16mm (0.046-inch) thick, maximum 127mm (5-inch) exposure. Use either nails or staples for fastening methods, complying with the siding manufacturer's instructions. Vinyl siding shall have a wind load resistance of 90 mph. Earth tone and off-white colors shall be used for vinyl siding. Green colors are prohibited. The Contractor shall provide the Contracting Officer alternative color schemes so that the CO may select a minimum of 3 alternative color schemes. Color and style shall be as approved by the Contracting Officer. Provide vinyl mounting blocks for all exterior wall mounted items on vinyl siding surfaces. Horizontal siding panels shall have a

maximum length of 3.68 meters (12 feet–1 inch). Panels shall have a uniform color on the surface and throughout the thickness of the panel and of the same color/dye lot.

a) Manufacturer's Representative: A manufacturer's representative shall instruct the installer of the siding, appurtenances, and accessories as to the manufacturer's required installation procedures. The Army construction inspectors for this project shall be included in their instruction.

b) Minimum exterior wall construction for installation of vinyl siding: Wood framing shall be as a minimum 51mm x 10 mm (2-inch x 4-inch) studs at 406mm (16 inches) on center with manufactured wood sheathing (plywood, oriented strand board, etc.) and covered with building (air infiltration) wrap or building paper (roofing felt). Framing/sheathing system shall be in compliance with the siding manufacturer's recommendations.

5-13.2.2 Aluminum Siding. Prohibited, therefore deleted.

5-13.2.3 Steel Siding: Prohibited, therefore deleted.

5-13.2.4 Hardboard and cement asbestos shingle siding: Prohibited, therefore deleted.

5-13.3 Concrete masonry units. Prohibited, therefore deleted.

5-13.4 Stucco. Prohibited, therefore deleted.

5-13.5 Trim elements. Aluminum or vinyl clad wood trim is required.

5-13.5.1 Fascias and Rakes. Fascias and rakes are required and shall be vinyl or prefinished metal. Plywood, hardboard, or gypsum board are not permitted for fascias or rakes.

5-13.5.2 Exposed wood, such as window trim, door sills, window sills, railings and balusters, wood fencing, solar shading devices including louvers, arbors, and trellis shall not be permitted.

5-13.5.3 Exterior surfaces requiring painting shall be minimized. These surfaces shall be back primed and receive a minimum of one prime coat and two finish coats of paint.

5-13.6 Exterior ceilings and soffits. Ceilings and soffits shall be of vinyl or prefinished metal and all joints shall be trimmed or otherwise architecturally treated. Soffits shall be perforated. Cement asbestos shingle siding, ceiling or soffit shall not be permitted.

5-13.7 Patios, Porches, and Balconies. Patios and porches shall be sloped to drain away from the unit and have a broom-finished concrete floor surface. Plastic coating or films over concrete decks are not acceptable. Exposed wood decks, stained or painted, are prohibited. Exterior rails and trim shall be vinyl or aluminum. Exposed wood rails and trim are prohibited.

5-13.8 Balconies. Plastic coating or films over concrete decks are not acceptable. Exposed wood decks, stained or painted, are prohibited. Exterior rails and trim shall be vinyl or aluminum. Exposed wood rails and trim are prohibited. If balconies and porches are provided, then they shall be sloped to drain away from the unit and have a concrete floor surface that provides a waterproof and non-slip surface. Design consideration shall be given for using stamped colored concrete for patios.

5-13.9 Exterior Stairs. Exterior stair treads and landings shall be constructed of concrete and provided with non-slip finish.

5-14 Glazed Openings. Windows and glazed door (50 percent or more glass, such as French patio doors) units shall meet the following standards and must be certified by an independent testing laboratory. Double-hung window units are required. Skylights are prohibited. All windows in habitable rooms shall be operable. All windows in

bedrooms shall comply with NFPA. Windows above the first floor shall have operable sections that tilt in or are removable for cleaning. Weather stripping shall be factory applied. Casement windows are prohibited. Window units shall be constructed of either aluminum clad wood or vinyl clad wood. All windows shall have solid-wood, paint-grade interior stools with a minimum thickness of 19mm (3/4-inch). Integral blinds are prohibited. As a minimum, windows shall be double-pane, low-E2 (insulated glazing). Design consideration should also be given to better sealing windows with higher insulated glazing as well as Energy Star qualified windows.

Windows and glass exterior doors shall meet or exceed the requirements of the following standards.

Vinyl Clad Wood Windows: NWWDA I.S. 2-87, Class B.

Aluminum Clad Wood Windows: NWWDA I.S. 2-87 Class B.

The Contractor shall provide the manufacturer's certification that the window provided meets or exceeds the following test requirements:

5-14.1 Required tests. Hung units shall meet a National Fenestration Rating Council (NFRC) design pressure rating of 25. Evidence of passing the following specific tests and minimum standards are required to achieve these design pressure standards.

5-14.1.1 Structural testing. Using ASTM E330 test results shall demonstrate no glass breakage, damage to hardware, or permanent deformation that would cause any malfunction or impair the operation of the unit. Residual deflection of any member shall not exceed 0.4 percent of its span. Hung windows shall be tested at pressures of 1796 Pa (37.5 lb/ft<sup>2</sup>).

5-14.1.2 Operating force. The force necessary to unlatch and open units shall not exceed 13.6 kg (30 lb) for hung units.

5-14.1.3 Air infiltration. Using ASTM E283 leakage rate shall not exceed 0.65 l/min/m<sup>2</sup> (0.25 ft<sup>3</sup>/min/ft<sup>2</sup>) for hung units, at a test pressure of 7.66 k/m<sup>2</sup> (1.57 lb/ft<sup>2</sup>).

5-14.1.4 Water penetration. Using ASTM E547, no leakage shall be evident when tested in three, five-minute cycles with a one-minute rest period between cycles at 18.3 k/m<sup>2</sup> (3.75 lb/ft<sup>2</sup>) for hung units.

5-14.1.5 U-Value. Whole window U-values shall comply with Chapter 7 (Unit Design – Thermal Performance), Paragraph 7-1 Thermal Characteristics. U-values shall be calculated using ASHRAE calculations and standards.

5-14.2 Glazed doors. Glazed French doors to patio shall be provided to rear patio spaces. Glazed doors shall be insulated steel, vinyl clad wood, or thermally broken aluminum frames conforming to the above requirements. Finish shall be factory applied and conform to 44-C-22431 in accordance with the requirements of the National Association of Architectural Metal Manufacturers (NAAMM) Metal Finishes Manual. Doors shall have interior operated latch, and securing pin or throw-bolt in frame. Sliding glass doors are prohibited.

5-14.3 Glazing. Units shall be double glazed with low-E2 insulated glazing.

5-14.4 Interior window stools shall be solid-wood, paint-grade with a minimum thickness of 19mm (3/4-inch).

5-15 Screens. Screens shall be provided at all operable sashes. Screens shall be nonferrous, of window manufacturer's standard design, and conform to AAMA 1002.10, Voluntary Specification for Aluminum Insulating Storm Products for Windows and Sliding Doors. Screens shall be factory finished to match the window.

5-16 Window Treatments. Provide 25mm (1-inch) metal blinds at windows. Provide 76mm (3-inch) vertical metal blinds at glazed hung doors (French patio doors). All blinds shall be a minimum 8 gauge metal. Color shall be manufacturer's standard off white, and shall be coordinated with wall color. Design consideration should be given for

a higher gauge, commercial grade, mini-blind or 50mm (2-inch) wooden plantation style blind.

5-17 Doors. See Chapter 7 (Unit Design – Thermal Performance), Paragraph 7-3.2 Air Infiltration for thermal performance requirements for exterior doors.

5-17.1 Entrance doors (Front and Rear Entry and Garage Pedestrian). Raised panel, insulated, metal entry doors shall be provided. The housing unit primary entrance shall be a thermal insulated metal door measuring 914mm (3 feet) wide by 2050mm (6 feet-8 inches) in height by 45mm (1-3/4 inches) thick, with a 305mm (12-inch) wide sidelight. A door viewer shall be provided for the primary entrance door. Insulated glazing shall be provided for sidelight at entry door. Rear entry and garage pedestrian doors shall meet the above requirements, but shall be 914mm (3 feet) wide only and without a sidelight. Exterior doors and frames shall be galvanized. Doors shall have top edges, closed flush and sealed against water penetration. Doors and frames shall be prepared to receive hardware. Rubber silencers shall be installed into factory predrilled holes in door frames. Adhesive applied silencers are not acceptable. Design consideration should be given to providing a 914mm (3-foot) wide by 2050mm (6 feet-8 inches) in height by 45mm (1 3/4-inch) thick thermal insulated metal entry door, flanked by two sidelights (one on each side of the door), each measuring 457mm (18 inches) wide by 2050mm (6 feet-8 inches) in height by 45mm (1-3/4 inches) thick, and an oval shaped glass on the entry door. Sidelights and oval glass light on door shall have insulated glazing.

5-17.2 Overhead garage door. Provide insulated metal, sectional garage door. Garage door shall have hardware that can be opened and locked from the inside and outside of the garage.

5-17.3 Bulk storage and Utility room doors. Exterior bulk storage door shall be a minimum 35mm (1-3/8 inches) thick, exterior grade, thermal metal or hollow core metal. Doors may be omitted when storage areas are located in garages. Design consideration should be given to using raised panel metal doors for all exterior application. For utility room doors, door shall be accessible to exterior only. Utility room doors shall be keyed different from resident doors and accessible only to the Government.

5-17.4 Aluminum screen and storm doors. Screen and self-storing storm doors shall be provided for all housing unit exterior hinged doors except French patio doors, utility room, and garage doors. Frames shall be a minimum of 32mm (1-1/4 inches) thick and 51mm (2 inches) wide. Aluminum alloy materials shall be not less than 1.27mm (0.05-inch) thick and 51mm (2 inches) wide. Doors shall have solid bottom panels and midsection protective grills. Screening materials shall be nonferrous.

5-17.5 Interior doors. Interior doors shall be 2050mm (6 feet-8 inches) in height by 35mm (1-3/8 inches) thick by 914mm (3 feet) wide, solid core wood doors for the living room, dining room, family room, kitchen, and all bedrooms. Wood doors shall be primed and painted. Pocket doors and bi-fold doors are prohibited. A full height door shall be provided for the pantry. Design consideration should be given to the use of stain as the door finish (with stain grade wood) in lieu of providing a painted finish and for the use of Stewardship Council certified wood products for wood doors. Design consideration should be given for the use of raised panel solid wood doors.

5-18 Builders Hardware. Hinges, locks, and latches shall comply with the specifications indicated in Table 5-10, and the following subparagraphs:

**TABLE 5-10 – HARDWARE SPECIFICATIONS**

Hardware Type/ Specification	Specific Requirements
BHMA-01	Directory of Certified Locks & Latches.
BHMA-02	Directory of Certified Door Closers.

Hardware Type/ Specification	Specific Requirements
Butts and Hinges BHMA 156.1	Hinges shall be 102mm x 102mm (4 inches x 4 inches) at exterior doors, and 90mm x 90mm (3-1/2 inches x 3-1/2 inches) at interior doors.
Bored & Preassembled Locks & Latches BHMA 156.2	Series 4000, Residential grade, Bored Locks and Latches, with F75 or F76 operations, Grade 2.
Door Controls - Closers BHMA 156.4	Series CO2000, Grade 1, surface type, standard cover, with options PT-4H, PT-4F, and PT-4D with back check position valve.
Auxiliary Locks & Associated Products BHMA 156.5	Series 4000, Grade 2. Provide matching trim of wrought brass, aluminum, or stainless steel.
Template Hinge Dimensions BHMA 156.7	Template Hinge dimensions shall use the full mortise template hinges 63.5mm (2.5-inch) and 76.2mm (3-inch) sizes (A25M & A30M).
Cabinet Hardware BHMA 156.9	<p>Back mounted knobs: Knobs shall be fastened from back. Series B02131.</p> <p>Frame Concealed Hinges or Frameless concealed hinges: These hinges shall be mounted to either framed or frameless type cabinets. Series B01602 or B01603 for frameless concealed hinges. Series B01612 or B01613 for frame concealed hinges.</p> <p>Side mounted Self Closing Drawer Slides: Slides shall be mounted on sides of drawer. Slides shall cause drawer to self close from open position. Series B05091 or B05092.</p>
Mortise Locks and Latches BHMA 156.13	F13 operation: Comply with BHMA A156.13, (Mortise Locks and Latches), series 1000, Grade 1 Operational and Grade 1 Security. Locksets in fire rated doors shall also comply with NFPA 80. Inactive leaf on patio doors (French Doors) shall have one pair of flushbolts.

Hardware Type/ Specification	Specific Requirements
Auxiliary Hardware BHMA 156.16	Auxiliary hardware, consisting of Floor and Wall Bumpers, Combination Stop and Holders, Door Viewers, Garment Hooks, Garment Rods, Hand Rail Brackets, and Coat Hooks shall incorporated into each unit and shall comply with BHMA A156.16, Grade 1. Door Viewers shall be mounted at eye level on all exterior doors (except exterior storage units and utility room doors).
Materials and Finishes BHMA 156.18	Finishes shall be either 612 or 640.
Thresholds BHMA 156.21	Series J16190 or J36190. Bronze, latching/rabbeted with fluted surface and barrier free.

5-18.1 Locks and keys. Lock cylinders shall have six pin tumblers and interchangeable cores that are removable by a control key manufactured by Best or approved equal. Each unit shall have its own unique and matching locking system (keyed alike), including the garage, throughout the unit. A total of 178 different lock combinations, one for each unit shall be provided. Locks and keys shall conform to the standards and requirements of the Builders Hardware Manufacturers Association (BHMA) listed above. All utility rooms shall be keyed alike but shall be different from the units.

5-18.2 Weather stripping and Exterior Thresholds. Weatherstripping shall consist of extruded aluminum retainers not less than 1.8mm (0.07-inch) wall thickness with vinyl, neoprene, silicone rubber, polyurethane or vinyl brush inserts. Aluminum shall be bronze anodized. Weatherstripping material shall be of an industrial/commercial grade. Seals shall remain functional through all weather and temperature conditions. Exterior thresholds shall be bronze, latching/rabbeted with fluted surface and barrier free, conforming to BHMA A156.21 (Thresholds). Air leakage rate of weatherstripping shall not exceed 14.2 L (0.5 cubic feet) per minute per lineal foot of crack when tested in accordance with ASTM E 283 at standard test conditions.

5-18.3 Applications. Locks and hinges shall be applied as follows:

5-18.3.1 Exterior hinged doors shall have 1-1/2 pair (3 pair on French Doors) of full mortise hinges complying with BHMA A156.1 (Butts and Hinges). Hinges used on metal doors and frames shall also conform to BHMA A156.7 (Template Hinge Dimensions). Locksets (with minimum 1-inch deadbolt) shall comply with BHMA A156.13 (Mortise Locks and Latches) with F13 operation, Grade 1 Operational and Grade 1 Security. Inactive leaf on patio doors (French Doors) shall have one (1) pair of flushbolts.

5-18.3.2 All *front* entry doors that are windowless shall have a viewer mounted at eye level.

5-18.3.3 Exterior bulk storage doors shall have 1-1/2 pair of full mortise hinges complying with BHMA A156.1 (Butts and Hinges). Hinges used on metal doors and frames shall also conform to BHMA A156.7 (Template Hinge Dimensions). Locksets (with minimum 25.4mm (1-inch) deadbolt) shall comply with BHMA A156.13 (Mortise Locks and Latches) with F13 operation, Grade 1 Operational and Grade 1 Security.

5-18.3.4 Interior doors shall have 1-1/2 pair of full mortise hinges complying with BHMA A156.1 (Butts and

Hinges). Locks and Latches shall comply with BHMA A156.2 (Bored and Preamsembled Locks and Latches).

5-18.3.5 Doors in fire-rated walls, housing unit to garage, shall have 1-1/2 pair of ball-bearing hinges, lockset, auxiliary lock or interconnected lock and latch and closer.

5-18.3.6 Not used therefore deleted.

5-19 Postal Service and Building Signage.

5-19.1 Postal Service. Mail boxes shall be provided in accordance with the local US Postal Service and shall be located at the curb in front of the units on one side of the street.

5-19.2 Building Signage. All new units shall be provided with building identification signage. Cast aluminum house numbers are required. Street names, neighborhood identification signs, and house numbers shall be coordinated with Bill Hickok, Directorate of Base Operations Support Group (DBOS). Mr. Hickok may be contacted at (502) 624-8515. House number signs shall conform to the following requirements:

Size. 229mm (9 inches) horizontal x 127mm (5 inches) vertical x 6.35mm (1/4-inch) thick.

Material/Finish. 6.35mm (1/4-inch) thick cast aluminum, plain border, black leatherette background.

Typestyle. Helvetica medium, with 76.2mm (3-inch) characters raised 6.35mm (1/4-inch) centered on plaque.

Placement. Place house number sign on front of each dwelling unit in location identified by DBOS representative.

5-19.3 Flag Bracket. A mounted flag bracket shall be provided for each unit.

5-20 Kitchen Cabinets. Cabinets shall be factory manufactured of solid oak with raised cathedral style panel doors. Wall cabinets shall be full height and extend to the ceiling. Bulkheads and furred-down soffits are prohibited. Wall cabinets shall have adjustable shelves. Cabinets shall have spring-loaded self-closing hinges. European style hinges are preferred. Cabinets shall include pulls and shall conform to ANSI A161.1, Recommended Performance and Construction Standards for Kitchen and Vanity Cabinets, except where modified below. Wall and base cabinets shall be essentially of the same construction and appearance. Refer to Table 5-5 for minimum kitchen cabinet area requirements. Design consideration should be given for additional cabinet and counterspace.

5-20.1 Cabinet Construction. Construct cabinets with frame fronts and solid ends, or of frame construction throughout. Frame members shall be mortised and tenoned, dove-tailed or doweled, and glued together. Brace the top and bottom corners with hardwood blocks that are glued with water-resistant glue and nailed in place. Wood blocking behind the wall shall be provided for upper cabinets. Materials and minimum dimensions and thicknesses for cabinet construction materials shall comply with Table 5-11.

**TABLE 5-11 – KITCHEN CABINET SPECIFICATIONS**

Element Description	Specific Requirements
Frame Members	19mm x 38mm (3/4-inch x 1-1/2 inch) kiln-dried solid oak.
Base Cabinet Toe Space	64mm deep x 102mm high (2-1/2 inches x 4 inches). Minimum (base cabinets).

Element Description	Specific Requirements
Cabinet Bottoms, Backs & Tops (Unexposed)	5mm (3/16-inch) hardwood plywood. Provide bottoms in kitchen sink cabinets. Brace bottoms with wood members glued in place.
Cabinet Ends & (Exposed Backs/Bottoms)	Hardwood plywood, 5 ply, good grade for natural finish to match door front finish. Base Cabinets: 13mm (1/2-inch). 5 ply material to match door front finish. Wall Cabinets: 10mm (3/8-inch) to match door front finish.
Doors	16mm (5/8-inch) solid oak, good grade for natural finish, with hardwood trim. Raised panel with rail and stile frame.
Drawer Slides/Glides	20 gauge metal.
Drawer Fronts	16mm (5/8-inch) solid hardwood, matching doors.
Drawer Bottoms	3mm (1/8-inch) softwood plywood, Grade A-A veneer or 3mm (1/8-inch) hardwood plywood. Bottoms 380mm (15 inches) wide shall be braced and glued in place.
Drawer Backs	12mm (1/2-in) hardwood.
Interior Partitions	13mm (1/2-inch) hardwood or softwood plywood, Grade A-A or 12mm (1/2-inch) hardwood of comparable grade.
Shelves	12mm (1/2-inch) softwood plywood, Grade A-B veneer; 12mm (1/2-inch) hardwood plywood, good grade veneer; or 12mm (1/2-inch) glued-up solid wood. Support shelves on ends and on 610mm (24-inch) centers.  Plywood shelf edges that are exposed when cabinet doors are open shall have an hardwood edge rounded, filled, and sanded prior to finishing. Exposed plywood surfaces are unacceptable.

5-20.2 Countertops. Countertops shall be solid polymer (solid surface) fabrication with integral backsplash. Backsplashes and endsplashes shall be 12.7mm (1/2-inch) thick and 102mm (4 inches) high. See Chapter 8 Unit Design – Plumbing, for information on sinks.

5-21Appliances. Provide the following equipment in accordance with specifications listed, one each per housing unit. A listing of currently labeled Energy Star appliances is available through the internet at the EPA website:

[http://www.energystar.gov/index.cfm?c=appliances.pr\\_appliances](http://www.energystar.gov/index.cfm?c=appliances.pr_appliances).

5-21.1 Refrigerators. Refrigerators are Government-furnished and Contractor-installed items. See Chapter 8 Unit Design – Plumbing, Paragraphs 8-6 Refrigerator Ice Maker Connection , and 8-7 Kitchen Appliances for additional for information.

5-21.2 Ranges and ovens. Ranges and ovens are Government-furnished and Contractor-installed items.

5-21.2.1 Not used, therefore deleted.

5-21.2.2 Not used, therefore deleted.

5-21.3 Microwave ovens. Provide a microwave cabinet opening at least 24 inches wide, 18 inches high and 18 inches deep with a dedicated receptacle located within the opening for a resident-provided microwave oven.

5-21.4 Range hoods. See Chapter 8 Unit Design – Plumbing for information on range hoods.

5-21.5 Dishwashers. See Chapter 8 Unit Design – Plumbing for information on dishwashers.

5-21.6 Water heater. See Chapter 8 Unit Design – Plumbing, Paragraph 8-11 Water Heater.

5-21.7 Ceiling Fans. See Chapter 10 Unit Design – Heating, Ventilating and Air Conditioning, Paragraph 10-9 Ceiling Fans.

5-21.8 Washers and Dryers. Washers and dryers are tenant-provided.

5-21.9 Freezers. Freezers are tenant-provided.

5-21.10 Color. Kitchen appliances, except disposals, shall be of matching finish, white in color.

5-22 Garbage Storage Area. The garbage storage area shall be screened and located near the kitchen or within the garage with direct access to the street. Design consideration should be given to providing a recycle bin area with the garbage area. Sustainable design consideration should be given to the use of reconstituted plastic screening.

5-23 Not used.

## 6. UNIT DESIGN - STRUCTURAL.

6-1 Structural design for residential housing (materials and construction) shall comply with the International Building Code (IBC) and with International Residential Code (IRC) One and Two Family Dwelling Units. Structures which qualify as "Manufactured Homes" shall comply with the Federal Manufactured Housing Construction and Safety Standards Act (FMHCSS) USC Title 42, except as modified herein, and with the regional model code (International Building Code). Structural calculations shall be provided by a Registered Engineer.

6-1.1 Structural System Requirement. The structure shall be economical, durable, and sustainable. All construction shall be designed and detailed to resist the lateral loads associated with the appropriate seismic and wind load criteria found in the current ASCE 7 - 2002. The construction of the building shall result in a system that provides a complete load path capable of transferring all loads from their point of origin through the load resisting element to the foundation. Design wind loads shall be for 144.8 kmh (90 mph) wind speeds.

6-1.2 Foundation. Slabs-on-grade, with thickened edge, or foundation walls and footings shall be provided. Floor slabs shall be designed in accordance with International Residential Code (IRC) One and Two Family Dwelling Unit and ACI-318. Underground utility pipes, except those associated with the unit, shall not be located under the slab. Place a 10 mil (0.01-inch) vapor barrier on top of the base course. A minimum of 10 cm (4 inches) of capillary fill shall be placed on top of the vapor barrier to separate the concrete slab from the base course. Ensure proper placement of slab-on-grade or foundation walls and footings is as recommended in the Contractor's Geotechnical Report. Provide control joints in slabs to prevent random cracking. Thickened edge of slab-on-grade or foundation walls and footings shall be designed per the Contractor's Geotechnical Report. A thermal break shall be maintained at the edge of the slab. Insulation shall extend downward from the top of the slab to the bottom of the thickened edge. Slabs shall not run continuous from heated to unheated areas. See conceptual wall section, which is Attachment 12 to this Statement of Work.

6-1.3 Design Load Criteria. Design load criteria for single family dwelling units. Design guidance for live load, dead load, roof live load, and wind and snow loads shall be taken from ASCE-7. Design wind load for the units shall be 144.8 kmh (90mph). Seismic load guidance shall be taken from FEMA 302 and ASCE-7. Necessary detailing shall be provided regardless of controlling load type.

6-1.4 Walls. All walls shall be anchored at their top and bottom to resist minimum lateral loads as specified in the criteria and codes listed. Design consideration shall be given to the use of steel studs instead of wood to enhance construction quality and provide greater sustainability. All welds of galvanized steel shall be touched up with either an alkyd-based or zinc-rich paint. All wood shall be of quality grade without checks, knots, warps, bows, cups, breaks, etc. Dimensional lumber shall be stamped Grade No. 2 or better. Stud spacing of 16 inches on center (o.c.) is required throughout the frame construction.

6-1.5 Load Bearing Walls and Shear Walls. Wood or steel stud construction shall be used for load bearing and shear walls. Shear wall wood sheathing shall be selected in accordance with the current IRC for One and Two Family Dwelling Units. Provide double 2 x top plates on all wood-stud walls. Provide 2 x pressure-treated sill typical. Dimensional lumber shall be stamped Grade No. 1 Dense or better. Plywood sheathing shall be Grade C-D or better. Lap all joint per IBC and structural engineer's requirements. Size all beams and headers per structural engineer's recommendations. Walls with structural cracks shall not be acceptable and must be removed and replaced at the Contractor's expenses.

6-1.6 Exterior Walls. Exterior walls with brick veneer shall be sized for a maximum deflection of  $L/600$ , as per criteria provided by the Brick Institute of America, under maximum design lateral loads where specified. L is the distance between wall supports.

6-1.7 Interior Partition Walls. Partition walls shall be adequately braced for lateral loading. Provide 20.3 cm (8 inches) thickened slab under interior partition slab typical or as recommended by the Structural Engineer of Record. Stud spacing of 16 inches on center (o.c.) is required throughout the interior wood frame construction.

6-1.8 Prefabricated Wood Truss Roof. Prefabricated wood truss roofs shall be provided. Design consideration shall be given to the use of light gauge, cold formed trusses for metal construction. If used, metal truss welds shall be touched up with either an alkyd-based or zinc-rich paint. A licensed professional engineer experienced in structural design shall design open web wood trusses in accordance with the applicable codes. Trusses shall be designed to meet all span and load requirements. A complete design analysis that establishes conformance to applicable codes and the suitability of the trusses for the support of the building against snow, wind and earthquake loads, shall be submitted along with shop fabrication drawings. Design consideration should be given to the use of alternative roofing systems (i.e., TJI, parallel chord or solid web joists, etc.). Contractor shall not mix steel and wood framing systems.

6-1.9 Wood Roof Sheathings. Wood roof sheathing, minimum of 15.8mm (5/8-inch) thickness – CDX Exterior Grade, Structural I, shall be selected in accordance with the current IRC for One-and Two- Family Dwelling Units. Stagger all plywood joints typical.

6-1.10 Masonry Crack Movement Joints. Spacing and location of movement joints shall be determined by a registered structural engineer. Movement joints shall be placed and spaced to divide walls or wythes into a series of rectangular panels. Movement joints shall be placed in areas of high stress concentrations. Minimum spacing and minimum required locations are noted below:

6-1.10.1 Required Movement Joint Spacing:

- a) When joint reinforcement is spaced at 40.6 cm (16 inches) on center: maximum ratio of panel length to wall height, (L/H) shall be three and spacing of joints shall not exceed 7.3 meters (24 feet).
- b) When joint reinforcement is spaced at a minimum of 20.3 cm (8 inches) on center: maximum ratio of panel length to wall height (L/H) shall not exceed 4 and spacing of control joints shall not exceed 9.1 meters (30 feet).

The above spacing as defined in (a) and (b) shall be reduced by at least 50% near masonry bonded corner or other similar conditions where one end of masonry panel is restricted.

(L/H) is defined as follows: "L" is the horizontal distance between control joints and "H" is the vertical distance between control joints.

6-1.10.2 Required Control Joint Locations:

- a) At regular intervals as noted above;
- b) At changes in wall height or thickness (this does not include pilasters);
- c) At other points of stress determined by the Structural Engineer of Record.

6-1.10.3 Locations and details of movement joints, bond beams, brick expansion joints and structural expansion joints shall be indicated on the contract construction drawings in both plan and elevation views.

6-2 Lateral Resistance. Walls used or required for lateral resistance to wind or earthquake, shall be considered bearing walls and shall have thickened footing under slab.

6-3 Embedded Steel. Nonstructural steel (handrails, etc.) embedded in concrete shall be galvanized or painted wrought iron. All damaged galvanized areas shall be repaired prior to embedment, e.g., galvanized fluid metal.

6-4 Wood Flooring Systems. Wood flooring systems shall be glued and screwed. Glue lines shall not be considered for stress transfer. Floor construction shall be recessed to accommodate the installation of 1x strip

sleepers. Hardwood flooring shall be 19 mm (¾-inch) thick, 57 mm (2-1/4 inch) wide tongue and groove hardwood flooring.

6-4.1 Subfloor. Plywood subfloor is required for all areas. Subfloor shall be rated for Exposure 1 or exterior use.

6-4.2 Underlayment: Cementitious backer board underlayment (cement board) is required for ceramic tile installed on the second floor of two-story units. Underlayment must be a minimum thickness of 8.7 mm (11/32-inch). Acceptable sanded face underlayment panels can be APA rated A-C, B-C, A-D, B-D, or C-C plugged. Underlayment shall be rated for Exposure 1 or exterior use. Underlayment shall be installed after interior finish work is complete to avoid damage to the underlayment.

6-5 Frost Penetration. Foundations and utilities shall be located below the depth of maximum frost penetration. Frost depth shall be verified by the Contractor's geotechnical report.

6-6 Concrete Construction Tolerances. Allowable variations from level, or specified slopes, shall be as follows:

6-6.1 For overall length, or surface of 3000mm (10 feet) or less: plus or minus 3mm (1/8-inch).

6-6.2 Up to 6100mm (20 feet): plus or minus 6mm (1/4-inch).

6-6.3 Up to 12 000mm (40 feet): plus or minus 9mm (3/8-inch).

6-6.4 No water shall be added to mix on site.

6-7 Concrete Reinforcement: Fiber reinforced concrete is prohibited. Provide reinforcing steel for shrinkage/temperature/cracking control in all concrete.

6-8 Tornado Protection Shelters. Not used, therefore deleted.

**7. UNIT DESIGN - THERMAL PERFORMANCE.**

7-1 Thermal Characteristics. See Table 7-1 for identification of appropriate weather region. Housing unit construction shall provide at least the minimum R values/maximum U values for external insulation and at most the maximum whole window U values for the appropriate weather region. Contractor's designer shall determine the R and U values based on ASHRAE calculations and standards.

**TABLE 7-1 - WEATHER REGION DEFINITIONS**

Weather Region	Cooling Degree Days	Heating Degree Days	
7	<1,111 (2,000)	> 4,616 (8,302)	</= 3,056 (5,500)

NOTES:

1. Include in the solicitation the correct weather data for the project site, taken from TM 5-785, Engineering Weather Data, and indicate the appropriate weather region on this table.
2. Heating Degree Days are formulated on a Range Base of 18C (65F)
3. Cooling Degree Days are formulated on a Range Base of 18C (65F)
4. Weather Regions 4, 5, 6, 7, 8, and 9 are determined by the Cooling Degree Days being less than 1,111 (2000) and then by the appropriate range bracket for the Heating Degree Days.

7-2 Thermal Insulation.

7-2.1 Characteristics. Thermal insulation shall have a flame-spread rating of 25 or less and a smoke-development rating of 50 or less, exclusive of the vapor barrier, when tested in accordance with ASTM E84. A vapor barrier shall be provided on the warm-in-winter side of exterior wall and ceiling insulation. Polyurethane is allowed as an insulation material for slabs and outside concrete or unit masonry walls. Polyurethane is prohibited as an injected insulation material in walls or floor cavities or within the building envelope. See Chapter 6 Unit Design - Structural, Paragraph 6-1.2, regarding insulation for slab-on-grade foundations.

7-3 Air Infiltration.

7-3.1 To limit air infiltration, buildings shall be sealed with an air infiltration barrier, installed in accordance with the manufacturer's recommendations. The building envelope shall be caulked, gasketed, weatherstripped or otherwise sealed: around window and door frames, between wall cavities and frames, between walls and ceiling and roof, between walls and floors, at access doors and panels, at utility penetrations through walls, floors, and roofs, and at any other exterior envelope joint which may be a source of air leakage. These steps, in combination with provision of a continuous vapor barrier and sealed ductwork as specified in Paragraph 10 shall constitute tight building construction.

7-3.2 A blower door test, performed in accordance with ASTM E 779, Measuring Air Leakage by the Pressurization Method, shall be performed on 15% of the project buildings, which have been randomly selected by the Contracting Officer. If buildings are to be turned over in phases, the blower door test shall be performed on 15% of the buildings completed in each phase (not to exceed 10 buildings per phase). No additional testing shall be required if ALL of the tested buildings pass the test requirements. If less than 100% of the tested buildings pass the test, an additional 10% of the project buildings (not to exceed 10 buildings) shall be tested. This process shall continue until 100% of the total number of tested buildings pass the blower door test. All proto-type units shall be included in the required blower door testing procedures. All completed prototype housing units shall have blower door tests performed in

accordance with ASTM E 779. See Paragraph 1-10 for description of prototype housing units.

7-3.2.1 Before beginning the test, all combustion devices shall be turned off, and all intentional openings in the building envelope (dryer vent, bathroom and kitchen exhausts, etc.) shall be sealed. All doors and windows shall be closed and latched.

7-3.2.2 To pass the blower door test, the building shall have an air tightness rating within the range of 3 to 4 ACH at 50 Pa (0.2 inch of water). The Contractor shall correct all housing units not found in compliance, and shall be responsible for all labor and materials required to reduce air leakage to within acceptable parameters. All testing shall be performed by a firm certified by the Associated Air Balance Council, the National Environment Balancing Bureau, or State licensed to perform such tests within the state where the project is being constructed.

7-3.2.3 Any measures taken to reduce the air leakage to acceptable values shall be permanent, and shall be implemented on all similar housing units.

## **8. UNIT DESIGN - PLUMBING.**

8-1 Plumbing system shall be designed and installed in accordance with the International Plumbing Code and any local regulations, codes or authorities. Inspection and testing of the plumbing system shall be performed as prescribed in the International Plumbing Code. Consideration should be given to systems which incorporate measures beyond the minimum requirements of this Statement of Work and RFP which are designed to increase energy conservation, ease of maintenance, or occupant comfort such as water filtration and purification, higher efficiency water heating systems, and higher grade plumbing fixture materials.

8-1.1 Seismic Protection. Seismic restraints shall be provided in accordance with ASHRAE and International Plumbing Code requirements.

8-2. Water Piping. Under slab supply piping shall be limited to housing unit service entrance only. Service line to each housing unit shall be no less than 25mm (1-inch) diameter. All water piping shall be sized in accordance with methods outlined in the International Plumbing Code, to limit water velocity in the pipe to 2440 mm/sec (8 ft/sec) unless a lower velocity is recommended by the plumbing fixture manufacturer(s). An isometric diagram of the water system shall be included in the design submittal. Allowable pipe materials are listed below:

8-2.1 Copper tubing. Water piping under concrete slabs shall be copper tubing, type K, annealed. Joints under the slabs are prohibited. Fittings for soft copper tubing shall conform to ANSI B16.26, Cast Copper Alloy Fittings for Flared Copper Tubes, and for hard-drawn to ANSI B16.22, Wrought Copper and Copper alloy Solder Joint Pressure Fittings.

8-2.2 Not used.

8-2.3 All underground domestic water and soil piping outside the building perimeter shall be installed with the top of pipe a minimum of 915mm (36 inches) below grade.

8-3 Soil, Waste, Vent, and Drain Piping. Soil, waste, vent, and drain piping may be cast iron, copper, steel, or plastic suitable for installation in a residential waste, soil, vent, and drain system. Each fixture and piece of equipment, except water closets, requiring connection to the drainage system, shall be provided with a trap. Provide deep seal trapped floor drain in the utility room and the laundry room. Soil, waste, and drain piping installed below floor slabs shall be service weight hub and spigot cast iron or plastic pipe. Building waste main lines shall be no less than 102mm (4-inch) diameter. All soil, waste, and drain piping shall be sized in accordance with the methods outlined in the International Plumbing Code. An isometric diagram of the sanitary sewer system shall be included in the design submittal.

8-4 Plumbing Fixtures. Fixtures shall be manufacturer's designer line, model and color and shall be approved by Contracting Officer. Fixtures shall be provided complete with fittings, and chromium plated, nickel-plated or Gold tone finish brass (polished bright or satin surface) trim. All fixtures, fittings, and trim in a project shall be from the same manufacturer and shall have the same finish.

8-4.1 Plumbing shall meet the following criteria:

8-4.1.1 Exposed traps shall be chromium-plated, adjustable-bent tube, 20-gauge brass. Concealed traps may be plastic (ABS).

8-4.1.2 Faucets shall be single-control type, with seals and seats combined in one replaceable cartridge designed to be interchangeable among lavatories, bathtubs and kitchen sinks, or having replaceable seals and seats removable either as a seat insert or as a part of a replaceable valve unit. Water flow shall be no more than 0.158 L/s (2.5 gpm) from any faucet.

8-4.1.3 Shower and bath combination shall be controlled by a diverter valve. Baths and shower and bath combinations shall be provided with waste fitting pop-up, concealed with all parts removable and renewable through

the overflow and outlet openings in the tub. Showers and shower and bath combinations shall be equipped with a combination valve and flow control device to limit the flow to 0.158 L/s (2.5 gpm) at pressures between 137.9 to 413.7 kPa (20 and 60 psi).

8-4.1.4 Piping shall be concealed. Individual shutoff or stop valves shall be provided on water supply lines to all plumbing fixtures except bathtubs and showers. Shutoff valves shall be provided for each bathtub and shower combination.

8-4.1.5 Fixtures shall be water conservation type, in accordance with the International Plumbing Code.

8-4.1.6 Vitreous china plumbing fixtures shall conform to ANSI A112.19.2, Vitreous China Plumbing Fixtures. Stainless steel fixtures shall be in accordance with ANSI A112.19.3, Stainless Steel Plumbing Fixtures (residential design). Enameled steel fixtures shall comply with ANSI A112.19.4. Plastic fixtures are prohibited.

8-4.1.7 Where tubs are installed in an end-to-end configuration in adjacent bathrooms the shower valve faucet end of the tubs shall not be back to back, but shall be located at opposite ends of the tubs to allow for maintenance and repair.

8-4.1.8 Backflow preventers shall be provided in accordance with International Plumbing Code. Provide backflow preventers for all housing unit potable water service lines. Provide backflow preventers for all make up water connections.

8-4.2 Water Closets. Water closets shall be one piece, manufacturer's designer line as specified in specification section 15400. Water closets shall have siphon jet flush, floor outlet with wax gasket, closed-front seat and cover, and an anti-siphon float valve. Water consumption shall be no more than 6 L (1.6 gal) per complete flushing cycle. Water closets with 3 L (0.8 gal) per flush cycle are prohibited. Water closet trim shall conform to ANSI A112.19.5, Trim for Water-Closet Bowls, Tanks, and Urinals (Dimensional Standards).

8-4.3 Lavatories. Lavatories shall be polymer solid surface counter top with integral bowl. Lavatories shall be manufacturer's designer line, model and color and shall be approved by the contracting officer. Lavatories shall be rectangular counter-top type, minimum 508 by 457mm (20 by 18 inches) in size or oval minimum 480 by 410mm (19 by 16 inches) in size. Lavatories shall have pop-up drains.

8-4.4 Bathtubs. Bathtubs shall be slip resistant and shall be constructed of porcelain enameled formed steel. Bathtubs shall have full height, polymer, solid surface tub surround. Premolded tubs and tub surrounds shall be prohibited.

8-4.5 Handicap Fixtures – All fixtures installed in handicap accessible housing units shall be in full compliance with the Americans with Disabilities Act and this RFP.

8-4.6 Kitchen Sinks. Kitchen sinks shall be Type 302 stainless steel, 18-gauge minimum, seamless drawn, and sound deadened. Sinks shall be double bowl, self-mounting without mounting rings. Sink shall have a single lever faucet with gooseneck spout and food spray down gun. Sinks shall be equipped with a garbage disposal.

8-4.7 Utility sink. Utility sinks shall be four-legged with integral backsplash guard. Utility sinks shall have minimum inside dimensions of 610 mm (24") width and 508 mm (20") depth. Plastic utility sinks are prohibited.

8-5 Clothes Washer Connections/Floor Drains. Drainage and hot and cold water supply shall be provided for automatic clothes washers. Washer connection, complete with 50mm (2-inch) drain, 20mm (3/4-inch) hose thread supplies shall be provided in standard manufactured recessed wall box with single-face plate. Boxes shall be constructed of plastic. Boxes shall be mounted a minimum of 865mm (2 feet-10 inches) above the finish floor. Electrical outlets for both washer and dryer shall also be provided. See Chapter 9 Unit Design – Electrical for additional information. Floor drains shall be provided in all laundry rooms.

8-6 Refrigerator Ice Maker Connection. Cold water supply shall be provided for GF refrigerator ice makers. Ice maker connection shall include an angle valve and a 1/4-inch hose thread supply, and shall be provided in standard manufactured recessed wall box with single-face plate (plastic or steel). Boxes shall be mounted a minimum 0.86m (2 feet-10 inches) above the finish floor.

8-7 Kitchen Appliances. Refrigerators and electric ranges shall be Government-furnished, Contractor-installed.

8.7.1 Dishwashers. Dishwashers shall conform to UL 749, Household Electric Dishwashers, and be UL listed, electric type, with air gap, racks, lift out utensil holder, spraying arms and detergent dispenser. Unit shall be listed as "Energy Star" compliant and shall bear the "Energy Star" label. The automatic controls shall cycle through the Wash, Rinse, Dry/Heat, and Stop phases, and shall be capable of rinse and hold cycle as well as a no heat drying feature. The unit shall contain instantaneous or in-line, water heater booster, with automatic thermostat set for 60 degrees C (140 degrees F). Rated energy use for standard capacity models shall not exceed 620 kWh/yr.

8-7.2 Range Hoods. Range hoods shall be stainless steel with length equal to range. The hood shall be equipped with NFPA approved wet chemical fire suppression system. The hood shall have separately switched light and exhaust fan and removable/washable filter. Kitchen range exhaust hoods shall be two-speed. Sound level shall not exceed 6 sones. Exhaust shall be ducted to the outside and shall have back draft protection and storm hood. The fan shall have a capacity of not less than 78.7L/s per linear meter of range hood (50 cubic feet per minute per linear foot of range hood).

8-7.3 Garbage Disposals. Garbage disposals shall conform to UL 430; Waste Disposers and ASSE 1008. Garbage disposals shall be continuous feed and shall have a minimum motor size of 370 watts (1/2 horsepower), stainless steel grinding elements, two 360-degree stainless steel swivel impellers, and manual motor reset. Sound level shall not exceed 10 sones. Strainer and plug shall be eliminated where garbage disposals are provided. Garbage disposal shall have switched receptacles. See Chapter 9 Unit Design – Electrical for additional information.

8-8 Hose Bibbs. Hose bibbs shall be provided at the front and rear of each unit, as a minimum requirement. Hose bibbs shall be frostproof, and shall be supplied with an integral vacuum breaker.

8-9 Piping Location. No water piping runs in exterior walls or the attic shall be allowed except for hose bibbs in exterior walls. All horizontal plumbing runs in two-story housing units shall be contained within an interstitial space between the first floor ceiling and the second floor structure of the units.

8-10 Cleanouts. Cleanouts shall be provided at each change in direction of sanitary sewer lines, at the intervals specified in the International Plumbing Code, and at the building service entrance. All cleanouts shall be permanently accessible. Ground cleanouts shall be installed in a 305mm by 305mm (12-inch by 12-inch) concrete pad, flush with grade.

8-11 Water Heaters. Water heaters shall have round, glass-lined tanks, and shall be installed with an integral insulating wrap with a minimum R value of 5. Access shall be provided in the wrap for service and maintenance openings. Storage water heaters that are not equipped with integral heat traps and having vertical pipe risers shall be installed with heat traps directly on both the inlet and outlet. Circulating systems need not have heat traps installed. Hot water piping for the first 3050 mm (10 ft) downstream of the water heater shall be insulated. The water heater relief drain shall be manufacturer approved, and shall be run to the outside and terminate so the discharge end is visible from the outside. Water heater shall be tied to heat pump de-superheater (refer to Chapter 10 of this STATEMENT OF WORK) for heat recovery during cooling season. Water heaters shall be sized in accordance with Table 8-1 for a 32 degrees C (90 degrees F) rise. Water heater energy factors shall meet or exceed the minimum requirements of 10 CFR 430. Additional consideration in the technical evaluation shall be given to designs that include water heaters that exceed the minimum energy efficiency requirements.

**TABLE 8-1 - WATER HEATER SIZING**

Requirements by Fuel Type	3 BR	4 BR	
	2 1/2 Bath	2 1/2 Bath	3 1/2 Bath
Electric:			
Storage (L (gal))	189(50)	189(50)	250 (66)
1 hour draw (L (gal))	273 (72)	273 (72)	333 (88)
Recovery (L/h (gph))	83 (22)	83 (22)	83 (22)

8-11.1 Electric water heaters shall comply with UL 174, Water Heaters, Household Electric Storage Tank Type, and shall have an Annual Energy Use (kWh) of 4,773 or less based on DOE test procedure 10 CFR430, Sub-Part B, Appendix E.

## 9. UNIT DESIGN - ELECTRICAL.

9-1 Conformance to Codes. The electrical system shall be designed in compliance with the rules and recommendations of the latest edition NFPA 70 (National Electrical Code (NEC) and applicable local codes, whichever is more stringent.

9-2 Service Entrances. Service entrances and exterior meters shall be enclosed or sight screened. Service feeders shall be underground with exterior meter bases. Load centers shall be painted galvanized steel and furnished with main breakers. Load center doors shall be flush one-piece fronts. Load centers may be surface or recessed mounted depending on their location. Offset back-to-back load centers a minimum of 400 mm (16 inches) horizontally. No recessed load centers are to be located in party walls and fire walls. Provide main circuit breaker in the load center for each housing unit, sized in accordance with the NEC. Minimum size of electrical service to the housing unit shall be 200 Amps at 240 Volts, 1 phase. Provide a separate electrical service and meter base for each housing unit. See Chapter 4 – Site Engineering for additional information. If portion of service conductors between meter base and load center, considered as “inside the building”, per NEC, is more than 1.83 m (6 feet) provide a separate exterior disconnect or a disconnect integral to the master base.

9-3 Load Center Locations. Housing unit load centers shall be located in the laundry room or attached garage.

9-4 Conductors. Conductors shall be copper. Minimum wire size shall be #12 AWG for all 20 amp branch circuits and #14 for all 15 amp branch circuits.

9-5 Outlet Circuits. Lighting and convenience outlets shall be on separate circuits. Convenience receptacle outlets and their circuits shall be 20 amps.

9-6 Exterior Lighting. The Contractor shall provide energy efficient high quality light fixtures that are aesthetically pleasing and durable for each housing unit. Light levels on the exterior of the housing units shall meet IESNA (Illuminating Engineering Society of North America) Handbook recommendations. The minimum efficiency standard for lighting is 50 lumens/watt. This efficiency can be achieved with fluorescent and compact fluorescent lighting. Lighting must also be color corrected with a Color Rendering Index (CRI) of 60 or better. Provide a minimum of one lighting fixture at each housing unit's entry, garage and patio area(s). Light fixtures at housing unit front entry and patio areas shall be provided with built-in photo cell and controlled by wall switch located inside the unit, adjacent to the nearest entry door. Lights at housing unit's entries and patio area shall be similar to WF Harris lighting #30-S-CP-BK-13PL-HPF-120-CW-WL-PC or approved equal. A security flood light with built-in motion sensor and photocell as specified in section 16510 2.5 shall be provided at the garage entry. Provide a security flood with built-in photocell only (similar in appearance to the one provided for garage entry) for the rear of the housing unit. This rear security flood light shall be controlled by a wall switch located inside the unit, adjacent to the nearest entry door. Exterior lights shall be mounted at no more than 3 meters (10 feet) above finished grade.

9-6.1 Design consideration should be given to providing all exterior light fixtures with the following qualities: enhanced aesthetics, increased durability, greater energy efficiency, longer warranty period, and better optical performance.

9-7 Interior Lighting and Switched Outlets.

9-7.1 Efficiency and Light Levels. Interior light levels shall meet IESNA Handbook recommendations. Interior lighting shall be both efficient and color corrected. Color Rendering Index (CRI) of 85 or better and a standard lighting color of 3500 K are required. Minimum efficiency standard for lighting are as follows:

9-7.1.1 Fluorescent tubes 1220mm (4 feet) and longer: 90 lumens/watt.

9-7.1.2 Compact fluorescent tubes less than 1220mm (4 feet): 80 lumens/watt.

9-7.1.3 Compact fluorescent and other lamps: 50 lumens/watt.

9-7.1.4 The Contractor shall provide energy efficient high quality light fixtures that are esthetically pleasing and durable for each housing unit.

9-7.1.4 Design consideration should be given to providing upgraded interior light fixtures with the following qualities: enhanced aesthetics, increased durability, greater energy efficiency, longer warranty period, and better optical performance.

9-7.2 Provide light fixtures operated by wall switches for all rooms. All light fixtures except for dining room fan/light combination shall be provided with compact fluorescent or linear fluorescent lamps. Provide one ceiling fan/light combination in living room, family room, all bedrooms and dining room. Ceiling fans shall be low profile 1050-1350mm (42-52 inch), four blade type. Motors shall be three speed reversible, with air volume range between 613 and 2832 LPs (1300 and 7000 CFM) and speeds between 75 and 225 rpm. Maximum power consumption shall be 80 watt.

Fan and Lights shall be provided with separate wall mounted controls. The dining room lights shall be controlled via full-range, on-off type dimmer switch. Dining room fan/light combination shall be designed for incandescent use and do not have to meet the 50 lumens/watt requirement. The living and family rooms shall have a convenience outlet, half controlled by a wall switch, located at the room entrance. Wall-switch operated ceiling mounted lights shall be provided in walk-in closets, laundry room, interior storage room, mechanical room, exterior bulk storage room, halls, and kitchen. Additional light fixtures shall be provided in rooms as required for adequate lighting. Wall-switch operated light fixtures recessed in walls shall be provided for stair lighting. These lights shall be provided with impact resistant lens and shall be easy to re-lamp. Wall-switch operated wall-mounted lights shall be provided in bathrooms and half baths located above the mirror over the lavatory. Provide residential type fixtures above mirrors. Fixtures with acrylic lens shall not be provided. A minimum of one lighting fixture, ceiling or wall mounted, as appropriate, shall be provided in the garage. Where exterior bulk storage is located within the enclosed walls of a garage, each space shall be lighted separately. Garage lights shall be controlled by a switch (switches) located at each door opening into the garage.

9-7.2.1 The general lighting intensity in kitchens shall be 320 to 540 Lux (30 to 50 foot-candles). Supplementary lighting shall be provided at the sink and under one of the wall cabinets for a work center to produce a composite lighting level of 210 Lx (75 foot-candles) using either down-lights, surface fluorescent fixtures surface-mounted under wall cabinets, as appropriate. Kitchen range hood shall be provided with a light, fan, and switches.

9-7.2.2 The ceiling light fixtures boxes in living and family rooms, dining room, and all bedrooms shall be provided with a metallic fixture box suitably supported from the ceiling structure to support ceiling fan/light combination.

9-8 Outlets. Outlets shall be provided in all rooms in accordance with NEC. Provide outlets for washer, microwave, refrigerator and garage door opener. If space for resident-owned freezer is provided in the laundry room as a design consideration, provide an outlet behind the freezer. All outlets shall be specification grade and provided with metal face plates. In addition to the outlets required by NEC, provide at least one outlet in each of the following areas:

- (a) Mechanical Room, Interior and Exterior Storage rooms.
- (b) Hallways outside bedrooms.
- (c) Garage, Patio and Housing unit entries: Outlets shall be weather proof and GFI type.
- (d) Special Outlets. Provide 240 V electric outlets for electric dryer and electric range.

9-9 Air-vapor barrier boxes. Provide LESSCO or approved equal air-vapor barrier boxes for all electrical boxes installed on exterior walls. Air-vapor barrier boxes shall be installed per manufacturer's recommendations.

9-10 Wiring. Maximum use shall be made of non-metallic sheathed cable (NM cable) for 15 and 20 amp branch circuit wiring. Provide service entrance cable (SE cable) for circuits 30 amps or higher. Provide conductors installed in conduits for electrical service entrance and at locations required by NEC. Wires shall be run neatly and studs shall not be excessively drilled out for wiring. Contractor shall use nail plates wherever required

9-11 Branch Circuits and Conductors. Branch circuit conductors and over current devices shall be as rated by

NEC. Provide minimum of 25% spares in the load center for each housing unit. Individual circuits shall be provided for the washer, dryer (with outlets located behind the washer and dryer), dishwasher, garbage disposal, refrigerator, electric range, microwave oven, each heat pump, attic ventilation fan, and water heater. If space for occupant owned freezer is provided in the laundry room as a design consideration, provide an outlet located behind the freezer and a separate branch circuit. Provide an individual circuit and a receptacle in the garage ceiling for an occupant provided garage door opener. Provide an individual circuit and rough-in for a future radon ventilation fan in the attic. Location to be determined by the design team of the design/build contractor. Two utility circuits (20 amp) shall be provided in the kitchen area for the convenience outlets for small appliances serving the kitchen and dining area. Provide a separate 20 amp circuit for each bathroom outlet. Connect a maximum of 8 convenience receptacles on a single branch circuit. Provide Ground Fault Circuit Interrupter protection and Arc Fault Circuit Interrupter protection for all outlets/circuits as required by NEC.

9-12 Smoke Detectors. Provide hard-wired smoke detectors on a separate circuit in each housing unit in accordance with NFPA 72 and NFPA 101. Provide smoke detectors in each sleeping room, outside of each separate sleeping area in the immediate vicinity of the sleeping rooms and on each level of the housing unit. All smoke detectors within the housing unit shall be interconnected so that when any detector is activated, all alarm sounders shall operate. Provide smoke detectors as specified in Specification Section 16415A, Paragraph 2.17.

9-13 Audible/Visible Alarm. Provide audible/visible alarms in handicapped adaptable housing units, in accordance with Uniform Federal Accessibility Standards (UFAS) and the American Disabilities Act Accessibility Guidelines (ADA-AG).

9-14 Carbon Monoxide Alarms: CO alarms shall be provided as follows:

9-14.1 One CO alarm shall be located on each level of the housing unit. A required alarm shall be located in vicinity of the bedrooms, such as in the hall outside of the bedrooms. CO alarms are not required in garages.

9-14.2 Provide CO detector as specified in Specification Section 16415A, Paragraph 2.18. CO alarms shall be wall-mounted at the same height as the thermostat, approximately 52 inches off the floor. Mounting CO alarms in dead air spaces such as corners shall be avoided. Units may be powered from circuits powering smoke detectors. In all cases, manufacturer's guidelines and recommendations shall be followed.

9-14.3 CO alarms shall be equipped with an audible alarm, continuous digital display, peak level memory, test button, and test reset button and shall be UL listed by passing standard test UL 2034.

9-15 Telephone. Pre-wire housing units in accordance with Bell South's requirements. Point of contact at Bell South is Mr. Bob Kohler. See Chapter 4 Site Engineering, Paragraph 4-10 for full contact information. Provide minimum of one duplex jack outlet in dining room, family room, living room and all bedrooms of each housing unit. Provide single jack outlet in kitchen. Eight position modular jack connectors shall be provided at all outlets. The jacks provided in the kitchen, dining and family areas shall be for a wall-mounted phone. Wiring methods shall comply with EIA/TIA Standard 570, Residential and Light Commercial Telecommunications Wiring Standard. Cable and jacks shall be Category 5 per TIA/EIA 568A, Commercial Building Telecommunications Cabling Standard. All wiring shall terminate in a surface-mounted, weatherproof, protected telephone terminal located on an outside wall adjacent to the building meter equipment ("Demarcation Box"). The protected telephone terminal cover shall be provided with means for padlocking, shall be accessible from the outside, and shall be permanently labeled, "Telephone". Only one protected telephone terminal shall be required for each separate dwelling unit. A single #10, CU, green equipment grounding conductor shall be run in 1/2-inch non-metallic conduit from the building metering equipment to the protected telephone terminal box. Number of pairs and type of cable, type of modular jacks, and specification and size of protected telephone terminals and outlet boxes shall be meet the requirements of Bell South.

9-16 Television.

9-16.1 Commercial Cable Television. Cable Access Television (CATV) outlets shall be located in the living room,

family room, kitchen and bedrooms. Units shall be prewired in conformance with Insight Communication's requirements. Point of contact for Insight Communications is Mr. Danny Campbell. See Chapter 4 Site Engineering for full contact information. All wiring shall terminate in a surface-mounted, weatherproof, protected television terminal ("Demarcation Box") located on an outside wall adjacent to the protected telephone terminal. The protected television terminal cover shall be provided with means for padlocking, shall be accessible from outside and shall be permanently labeled "Television". Only one protected television terminal shall be required for each house. A single #10, CU, green equipment grounding conductor shall be run in 1/2-inch non-metallic conduit from the building metering equipment to the protected television terminal box. Type of cable, type of tapoffs, specifications, and sizes of protected television terminals and outlet boxes, shall meet the requirements of Insight Communications.

9-17 Door Bell. The front entrance to each housing unit shall be provided with a low voltage bell or buzzer.

**10. UNIT DESIGN - HEATING, VENTILATING, AND AIR CONDITIONING.**

10-1 Design. Heat gain and loss calculations shall be, as a minimum, in accordance with the American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE) and International Mechanical Code Residential Cooling Load Calculation methodology. Computer-generated load calculations shall be provided, and shall include complete input and output summaries. Design shall be based on the weather data shown in Table 10-1.

**TABLE 10-1 – WEATHER DATA<sup>1</sup>**

Type of Design / Design Information		
Weather Region: 7	Metric	Inch-pound
Heating		
Indoor Design Temperature	21 °C	70 °F
Outdoor Design Temperature	-14 °C	6 °F
Annual Heating Degree <sup>2</sup> Days	>4,616	>8,302
Largest Number of Monthly Heating Degree Days <sup>2</sup>	</=5,000	</=9,000
Cooling		
Indoor Design Temperature	24 °C	75 °F
Outdoor Design Dry Bulb Temperature	35 °C	95 °F
Outdoor Design Wet Bulb Temperature	26 °C	78 °F

Note<sup>1</sup>: Weather data from TM 5-785, Engineering Weather Data.

Note<sup>2</sup>: Metric data are based on Celsius degree days to a base of 18 degrees C. Inch-pound data are based on degree days Fahrenheit to a base of 65 degrees F.

10-1.1 Load calculations. Computer generated load calculations shall be performed for each possible orientation up to four representative orientations for each building type included in the project. Room air flow requirements shall be computed based on the individual room load. However, the minimum acceptable air flow shall be 2.5 (L/s)/m<sup>2</sup> (0.5 cfm/ft<sup>2</sup>) for all spaces. The design for each individual housing unit shall be based on the heating and cooling loads as well as room airflow requirements computed for the building type and orientation that it most closely matches. Internal loads shall be included in the computerized load calculations in accordance with ASHRAE recommendations for residential analyses.

10-1.2 HVAC system sizes shall be calculated and based upon the 97.5% winter dry-bulb temperature, the 2.5% summer dry-bulb temperature and the 2.5% summer wet-bulb temperature for Fort Knox, Kentucky as given in the following criteria:

- ASHRAE Handbook, Fundamentals, 2001.
- The International Mechanical Code (2003 Edition).

10-1.3 Duct System Layout. For a given building type, a single duct layout may be used regardless of orientation,

provided that the system is sized to provide the required air flow for each room at its worst case orientation. Balancing dampers shall then be used to reduce air flow to the appropriate level as required. Permanent access to dampers shall be provided. Horizontal mechanical chases are prohibited. Horizontal mechanical duct work shall be contained within an interstitial space between the first floor ceiling and the second floor structure of the two-story housing units. HVAC supply and return air ductwork in the attic is prohibited in two-story housing units, but permitted in single story housing units.

10-1.4 Seismic Protection. Seismic restraints shall be provided in accordance with ASHRAE and International Mechanical Code requirements.

10-2 Equipment Safety and Efficiency. All materials and equipment shall be the standard cataloged product of manufacturer's regularly engaged in production of such materials and equipment, and shall be the manufacturer's latest standard design. Each major component of the heating and cooling systems shall have the manufacturer's information on a plate secured to the equipment.

10-2.1 All heating and cooling equipment proposed and installed in this contract shall bear the Energy Star Label.

10-2.2 Equipment shall comply with the requirements of American National Standards Institute (ANSI), Air Conditioning and Refrigeration Institute (ARI), American Society for Testing and Materials (ASTM), National Electric Manufacturers Association (NEMA), National Fire Protection Association (NFPA), Underwriters Laboratories, Inc. (UL) or other national trade associations, as applicable.

10-2.3 Equipment efficiencies as listed in Table 10-2 below are minimum acceptable levels. Energy conservation as it relates to equipment operating costs shall be considered in the evaluation process. Additional consideration in the technical evaluation shall be given to designs that include higher than minimum efficiency equipment.

**TABLE 10-2 – Minimum Equipment Efficiency**

	Electric heat pump (ground source)		Electric cooling equip (ground source)
	Size A <sup>1</sup>	Size B <sup>1</sup>	
HSPF	7.7	8.5	
SEER	17 <sup>2</sup>	17 <sup>2</sup>	17 <sup>2</sup>

Note<sup>1</sup>: Size A heat pumps have a capacity of 5.9 kW (20,000 Btu/hr) or less. Size B heat pumps have a capacity of 5.9 to 13.5 kW (20,000 to 46,000 Btu/hr).

Note<sup>2</sup>: Efficiency is based on DOE test procedure 10CFR430, Sub-Part B, Appendix M.

10-3 Heating and Cooling Systems. Each housing unit shall be provided with central heating and air conditioning systems. Systems shall be designed, installed, balanced, and adjusted to distribute heat and cooling to all habitable rooms, as well as bathrooms, interior storage and laundry room in proportion to the calculated load requirements of these spaces. Fans in air handlers shall be multi-speed, direct drive type. System installation shall conform to SMACNA Installation Standards for Residential Heating and Air Conditioning Systems except as altered by this document. Design consideration should be given to systems utilizing modular components, plugged power, additional space in the utility room, and other features which contribute to ease of system maintenance.

Consideration should also be given to designs that provide measures beyond the minimum requirements of this STATEMENT OF WORK and RFP to increase energy conservation or occupant comfort.

10-3.1 Equipment sizes selected for installation shall not be oversized more than 115% of the calculated loads. Equipment shall be selected in accordance with ACCA Manual S HVAC equipment sizing guidelines, or EPA equipment sizing recommendations at [http://yosemite.epa.gov/appd/eshomes/eshaware.nsf/attachments/lib/\\$file/RightSizedAC.pdf](http://yosemite.epa.gov/appd/eshomes/eshaware.nsf/attachments/lib/$file/RightSizedAC.pdf).

10-3.2 Utility Room. Utility room shall be provided to house all mechanical equipment and water heater. To avoid water leaks from second floor HVAC equipment, the utility space, water heater, and all HVAC equipment shall be located on ground level. All hydronic equipment shall have independent shut off valves. The utility room shall be separated from the house and garage and have restricted access. The utility room shall house the mechanical equipment and water heater. The mechanical equipment shall be arranged so that the filter can be changed by the occupant through an access wall panel without entering the utility room and so maintenance personnel can change the filter from within the utility room without disturbing the occupants. The arrangement of mechanical equipment shall allow access to three sides of all equipment and the manufacturer's recommended clearances for easy removal and replacement. Utility room shall not be accessible by the occupant(s) but configured so that the water shut-off is accessible to the occupants. Air conditioning/heating units shall be concrete pad-mounted. The utility room shall be provided with a light with wall switch, electrical receptacle, and floor drain.

10-3.3 Geothermal air conditioning/heat pump systems. All housing units at the Whole Neighborhood Renewal, Fort Knox, KY shall be served by geothermal air conditioning/heat pump systems. A separate heating and cooling unit shall be provided for each floor of two-story housing units; both heat pumps shall be located in the ground level utility room. Geothermal heat pump systems shall be provided in accordance with IGSHPA, (International Ground Source Heat Pump Association. Oklahoma State University, P.O. Box 1688, Stillwater, Oklahoma 74076-1688).

10-3.3.1 Geothermal air conditioning/heat pump system equipment shall consist of a water source air conditioning/heat pump unit with heat exchanger and evaporator/blower and ground source water loop. Refrigerants used shall have an Ozone Depletion Potential (ODP) of .05 or less. The water source air conditioning/heat pump unit shall contain, as a minimum, the features indicated in Table 10-3. Evaporator/blowers for water source air conditioner/heat pump units shall be provided complete with centrifugal fan, disposable filters, controls, and transformer. Fans shall be multi-speed, direct drive type. Each cooling/heating system shall provide conditioned outside air to the spaces served in accordance with ASHRAE 62.2P 2001. Outside air shall be ducted and connected to the return air duct upstream of the filter. Provisions shall be made to ensure no weather elements are drawn into the outside air intake. Equipment shall be sized to meet the total load determined by computer calculation. Equipment may be oversized to no more than 115% of the computer generated load

10.3.3.2 Ground Source Water Loop. The ground source water loop shall be provided complete with geothermal wells, redundant circulation pumps, reverse return under ground distribution piping, expansion tank, automatic air separator and automatic make-up water system. All underground ground source water loop piping outside the building perimeter shall be installed with the top of the pipe 1220mm (48 inches) below grade minimum. All underground distribution piping shall be traced with marker tape and tracer wire as specified in Paragraph 4-7. Provide heat trace for all piping subject to temperatures below 4.5 degrees C (40 degrees F). All geothermal well and ground source loop piping shall be hydrostatically tested in accordance with Specification Section 15741N. Contractor shall verify ground source water pumps operation and flow rates throughout the system. Contractor shall provide a logistics plan for the drilling of the geothermal walls.

10-3.3.3 The evaporator coil shall be provided with a liquid strainer, expansion device, pre-insulated housing, copper or aluminum coil, and insulated condensate drain pan. Coil face velocity shall be limited to 2.6 m/s (500 fpm).

10-3.3.4 Condensate drain piping from the evaporator coil shall be trapped in accordance with unit manufacturer's requirements and piped to the outside. Condensate drain pipe shall be 20mm (3/4-inch) type L copper tubing. Contractor shall provide insect screen at pipe discharge and make provisions to ensure that the condensate drains away from the housing unit and does not puddle.

10-3.3.5 The water source heat pump unit shall deliver a Seasonal Energy Efficiency Rating (SEER), consistent with the minimum requirements shown in Table 10-2.

10-3.3.6 Supplementary Electric Heat. Each water source air conditioning/heat pump unit shall be provided with supplementary electric resistance heat. Electric resistance heat shall be sized to provide 100% of the calculated heat loss of the particular housing unit. Electric resistance heaters in excess of 5 kw shall be staged by means of an indoor space thermostat. Indoor space thermostat shall be installed and operated in accordance with the water source air conditioning/heat pump unit manufacturer's instructions

10-3.3.7 Refrigerant Charge Verification. When water source air conditioning/heat pump systems are selected for installation, the Contractor shall check and calibrate refrigerant system following installation and start-up of the equipment. These tests shall be accomplished on the same 15% of the units that undergo blower door and duct tightness testing. If the tested units show a low or excessive refrigerant charge, all new systems shall be checked after start-up, but prior to acceptance by the Government.

**TABLE 10-3 – GEOTHERMAL AIR CONDITIONING/HEAT PUMP FEATURES**

High and low pressure compressor protection.
Filter-drier.
Hermetically sealed compressor with built-in overloads and locked rotor protection.
Electric crankcase heaters.
Start and run capacitors.
Anti-short-cycle timer. (factory installed)
Testing and charging refrigerant connections.
Compressor guaranteed for minimum service life of 5 years.
Accessory electric heat (as required).
Insulated casing.
Fan and coil guards.
Drain outlet.
Duct adapter as required for interface with supply and return ductwork.

10-3.4 Integrated Refrigerant De-Superheater and Hot Water Heating System. Manufacturer and Contracting Officer shall be consulted and agree that this type of system is acceptable. Units shall be provided with domestic hot water circulation loop with circulation pump, de-superheater , insulated piping and controls to interlock the system with the water source air conditioner. There shall be sufficient space to service and replace all controls and internal components from inside the utility room. The integral domestic water heating system shall be sized and installed in accordance with the water source air conditioning/heat pump unit manufacturer's requirements.

10-3.5 Unacceptable systems. Room unit heaters (see Note <sup>1</sup>); space heaters, room (window) air conditioning units; floor furnaces, gravity warm air systems, and electric resistance heaters (see Note <sup>2</sup>) are not permitted.

Note <sup>1</sup>: Room unit heaters shall be used where required by outdoor design conditions to maintain a minimum temperature of 4.5 degrees C (40 degrees F) in utility rooms.

Note <sup>2</sup>: Electric resistance heaters may be used for supplemental heat in heat pumps.

10-4 Air Distribution. Provide systems conforming to the recommendations of the ASHRAE Air Distribution Manual or the SMACNA Residential Comfort System Installation Standards Manual. Two-story housing units shall be provided with a separate heating and cooling unit and supply and return ducted system for each floor. Air conditioning/heating systems shall be designed with thorough air distribution and unrestricted return air flow paths.

10-4.1 Supply diffusers. Wall, ceiling, and/or baseboard supply diffusers shall be located to ensure that the air distribution shall completely cover all surfaces of exterior walls with a blanket of conditioned air or may be of a compact design so long as 'dead spots' within the units are avoided. At least one diffuser shall be provided in each habitable room. Registers shall have louvered faces with individually adjustable blades, and shall be provided with integral opposed blade damper. Diffusers shall be provided with air deflectors as required for proper air flow in the space. Plastic diffusers are prohibited. Core velocity shall be limited to 3 m/sec (600 fpm) maximum, with a maximum pressure drop of 0.82 Pa/m (0.1 inch water). Airflow from any single diffuser shall be limited to 94.4 L/s (200 cfm) maximum. Ceiling-mounted units shall have factory finish to match ceiling color, and be installed with rims tight against ceiling. Sponge-rubber gaskets shall be provided between ceiling or wall- and surface-mounted diffusers for air leakage control. Diffuser boots shall be sealed tight to the wall or ceiling they penetrate using duct mastic or caulking. Suitable trim shall be provided for flush-mounted diffusers. Duct collar connecting the duct to diffuser shall be airtight and shall not interfere with volume controller. Wall supply registers shall be installed at least 150 mm (6 inches) below the ceiling.

10-4.2 Return and exhaust grilles. Grilles shall be fixed horizontal or vertical louver type similar in appearance to the supply diffuser face. Plastic units are prohibited. Core velocity shall be limited to 2 m/sec (400 fpm) maximum, with a maximum pressure drop of 0.5 Pa/m (0.06 inch water). Grilles shall be provided with sponge-rubber gasket between flanges and wall or ceiling. Register/grille boots shall be sealed tight to the wall or ceiling they penetrate using duct mastic or caulking. Wall return grilles shall be located at least 150 mm (6 inches) above the floor. Return grilles shall be located in hallways or other normally unoccupied spaces to minimize the sound level in occupied spaces.

10-4.3 Ductwork. Ductwork shall be externally insulated sheet metal or flexible metal. Length of flexible duct shall be limited to 1.8 m (6 ft). Flexible ductwork shall not be spliced or joined and shall be a single continuous piece from diffuser boot to trunk/branch duct. Systems composed entirely of flexible ductwork with distribution boxes are prohibited. Sub-slab and intra-slab ductwork is also prohibited. Volume dampers shall be provided at each branch take-off. All ductwork shall be concealed. No portion of the building construction (such as joist space in a floor or ceiling, wall stud space, etc.) shall be used as a duct. The requirements for ductwork set forth below apply to all ductwork installed in the housing unit, supply systems, return systems, exhaust systems, ventilation systems, and outside air supply ductwork.

10-4.3.1 Maximum velocity in supply ducts shall be limited to 4.6 m/s (900 fpm) for mains and 3.1 m/s (600 fpm) for branches.

10-4.3.2 Ducts shall be airtight with no visible or audible leaks to ensure quiet, economical system performance. Ductwork in conditioned spaces shall be constructed for a 250 Pa (1 inch) static pressure construction class with seal class C, as described in the SMACNA HVAC Duct Construction Standard, unless a higher pressure class and/or seal class is required by actual, system operating conditions. Ductwork in unconditioned spaces shall be constructed for a 500-Pa (2-inch) static pressure construction class with seal class C, unless a higher pressure class and/or seal class is required by actual, system operating conditions. All duct seams and joints shall be sealed using duct mastic. Tape shall not be used as a means for sealing ductwork.

10-4.3.3 For flexible ductwork, the inner core shall be mechanically fastened to all fittings, preferably using drawbands installed directly over the inner core and beaded fitting. If beaded fittings are not used, then the inner core

shall be fastened to the fitting using #8 screws equally spaced around the diameter of the duct, and installed to capture the wire coil of the inner liner (3 screws for ducts up to 300mm (12 inches) in diameter and 5 screws for ducts over 300mm (12 inches) in diameter). The inner core must be sealed to the fitting using mastic or tape. Tape used for sealing the inner core shall be applied with at least 25mm (1 inch) of tape on the duct lining and 25mm (1 inch) of tape on the fitting, and shall be wrapped at least three times. The outer sleeve (vapor barrier) must be sealed at connections with a drawband and three wraps of approved tape. The vapor barrier must be complete without any holes or rips, and seams shall be sealed with mastic or approved tape. Pressure sensitive tapes used in conjunction with flexible duct connections shall be as recommended by the duct manufacturer and shall be UL 181A listed and so indicated with a UL 181A mark or aluminum-backed butyl adhesive tape (15-mil minimum). Drawbands shall be stainless steel worm drive hose clamps or UV resistant nylon duct ties.

10-4.3.4 Provide a minimum of 51mm (2-inch) thick mineral fiber insulation (or other listed insulation with an equivalent R value) on the exterior of all ducts in unconditioned spaces. Exhaust ductwork does not require insulation. Insulation shall be faced with a vapor barrier material having a performance rating not to exceed 1.0 perm. Insulation, vapor barrier, and closure systems shall be non-combustible as defined in NFPA 255, with a flame-spread rating of not more than 25, and a smoke development rating of not more than 50, as defined in ASTM E-84.

10-4.3.5 Return, exhaust, and ventilation air ductwork shall be sized for a maximum velocity of 4.6 m/sec (900 fpm). Short runs of return air duct (1525mm (5 feet) or less) which directly precede the air handler shall be acoustically lined to minimize noise. Indicated duct sizes shall be clear inside of duct lining.

10-4.3.6 Duct runs under stairways shall not compromise fire stop assemblies.

10-4.4 Filtration. Provide a pleated 25mm (1-inch) panel filter, installed in the return air system. The mechanical equipment shall be arranged so that the filter can be changed by the occupant through an access panel without entering the utility room and so maintenance personnel can change the filter from within the utility room without disturbing the occupants. Filters shall be sized and installed in accordance with UL 900. Filter shall be rated for 25% efficiency as determined by ASHRAE 52, Method of Testing Air Cleaning Devices used in General Ventilation for Removing Particulate Matter. All filters shall be easily accessible for changing and maintenance. Kitchen exhaust hoods shall be provided with aluminum grease filters sized to fit the exhaust duct.

10-5 Thermostats. Thermostats shall be located on interior partitions, approximately 1530mm (5 feet) above the finished floor. Locating a thermostat on the wall adjacent to a stairway, on an exterior wall, or where it is subject to unrepresentative temperatures is unacceptable. Each heat pump/air conditioning unit shall be served by an individual thermostat.

10-5.1 Heat pump/air conditioning systems shall be equipped with wall mounted industry standard thermostats. Thermostat shall be non-programmable and operate on 24V control circuit. Thermostat shall have switched heating-off-cooling and fan auto-on control. Thermostat shall have bimetal coil and mercury switch design.

10-5.2 Design consideration should be given to programmable thermostats. Programmable thermostats would be Energy Star labeled, microprocessor-based, with built-in key pads for scheduling of day and night temperature settings. When out of the scheduling mode, thermostats would have continuous display of time, with AM and PM indicator and of room temperature. In the programmable mode, the display shall be used for setting occupied and unoccupied temperature set points. The thermostat shall store two temperature set points for heating and two temperature set points for cooling. Thermostats shall have a replaceable battery to maintain the timing and maintain the schedule in memory for one year in the event of a power outage. Maximum differential would be  $\pm 1$  degree C ( $\pm 2$  degrees F). For a listing of Energy Star labeled thermostats see <http://www.epa.gov/appdstar/hvac/thermostats.html>.

10-6 Exhaust Fans. Exhaust fans shall be ducted to the outside. Exhaust fans shall not discharge near entry doors, patios or balconies, carports, or garages. All roof penetrations shall be located on the rear portion of the housing unit. Fans shall be tested and rated in accordance with AMCA 210, and shall operate with 120-volt, single-phase power supply. Exhaust fans shall be provided with backdraft damper and storm hood.

10-6.1 Bathroom Exhaust. Bathroom exhaust fans shall be ceiling mounted and shall be sized to provide not less than 10 air changes per hour in the space served. Bathroom exhaust fans shall be switch separately from the bathroom lights. Maximum allowable noise level for bathroom exhaust fans shall be 2 sones as installed.

10-6.2 Attic Exhaust. Attic exhaust fans shall be roof mounted, provide not less than 6 air changes of attic air per hour and have industry standard thermostatic control. All roof penetrations shall be located on the rear portion of the housing unit. Attic exhaust fans shall be provided with backdraft damper and storm hood. Maximum allowable noise level for attic exhaust fans shall be 6 sones as installed.

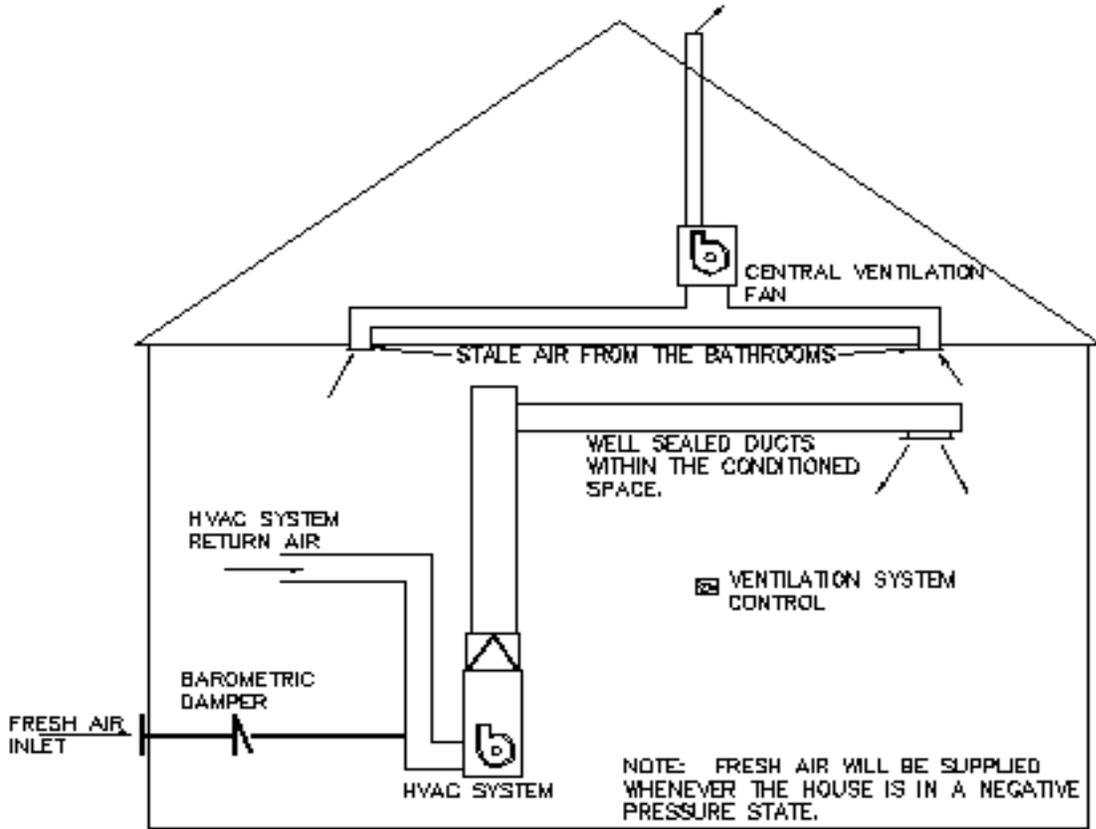
10-7 Dryer Vents. A 100mm (4-inch) diameter dryer vent shall discharge to the exterior, and provide connection to occupant-owned dryer (one dryer per vent). The vents shall be rigid aluminum with exterior wall cap and backdraft damper. Vent pipes shall be a maximum of 6100 m (20 feet) long, with no more than three right angle elbows (with minimum radius of 150mm (6 inches)), and have a maximum vertical run of 3660mm (12 feet). Dryer vents shall not exhaust near entry doors, patios or balconies, or garages. Dryer vents shall not run through non-accessible spaces or garages.

10-8 Piping Requirements. Air conditioner condensate drains, refrigerant suction, and exterior refrigerant liquid lines shall be insulated with 25mm (1- inch) (minimum) thick cellular glass or unicellular foam pipe insulation or as recommended by equipment manufacturer. Condensate drain lines shall be one size larger than the drain pan connection, be properly trapped, and run to unpaved outside grade. Discharged condensate shall drain away from housing unit. Condensate drain lines shall not be directly connected to a sanitary sewer system.

10-9 Ceiling Fans. Refer to Chapter 9 Unit Design – Electrical, Paragraph 9-7.2 for ceiling fan requirements.

10-10 Active Ventilation Engineered Indoor Air Quality (IAQ) Enhancement. The IAQ exhausts, within each unit, shall all be ducted together to a common exhaust plenum equipped with a single long-life exhaust fan. IAQ exhaust discharge shall not allow entry of weather elements. The IAQ exhaust registers shall be installed in the bathrooms and storage rooms of the housing unit. The IAQ exhaust system shall be independent of the switched bathroom exhausts and attic exhaust. The IAQ exhaust fan shall be interlocked to operate when either heat pump/air conditioning unit operates. The fan shall be sized to provide the required exhaust rate in each bathroom space when operated at low speed. Control for this fan shall be accomplished from a wall-mounted switch, located in the linen closet, labeled HI-LOW-OFF. The OFF position of the switch shall illuminate a “RED” LED to indicate the off condition of the ventilation system. The supply ventilation portion of the system shall consist of a small duct providing a connection for fresh (outdoor) air to the air handler return duct. This duct shall contain a barometrically-controlled vent that shall admit outdoor air to the unit whenever the housing unit is experiencing a negative pressure. ASHRAE 62.2P-2001, “Ventilation for Acceptable Indoor Air Quality” recommends ventilation air supply rate at a minimum of 0.35 air changes per hour (ACH) but not less than 15 cfm per person. This is supplied by either natural infiltration or a combination of natural infiltration plus active ventilation. The fresh air supply duct shall be sized to provide no less than this minimum 0.35 Air Changes per hour ventilation rate (but in no case shall the ventilation air introduced into the unit from the combination of natural infiltration and active ventilation be less than recommended by ASHRAE 62.2P-2001 with consideration for two (2) occupants per bedroom). This system is a recommended “Energy Star Homes” approach for improving indoor air quality in residential construction. The Active Ventilation Engineered IAQ Enhancement described in this Paragraph is considered to be a minimum level compliance item (See Diagram below.) in weather regions 5 through 11. Contractors are encouraged to present and propose other systems/methods which are enhancements/improvements to the system described and can ensure adequate fresh ventilation air (0.35 AC/Hr Min) is provided to the interior spaces of the housing units. Contractors are encouraged to review “Energy Star” materials and information available to them through the EPA and/or by visiting the Energy Star Web page. See, for example:

[http://yosemite.epa.gov/appd/eshomes/eshaware.nsf/attachments/lib/\\$file/BalancedVentSys.pdf](http://yosemite.epa.gov/appd/eshomes/eshaware.nsf/attachments/lib/$file/BalancedVentSys.pdf) and  
[http://yosemite.epa.gov/appd/eshomes/eshaware.nsf/attachments/lib/\\$file/SupplyVent.pdf](http://yosemite.epa.gov/appd/eshomes/eshaware.nsf/attachments/lib/$file/SupplyVent.pdf).



## ACTIVE VENTILATION SYSTEM SCHEMATIC

10-10.1 In-Use IAQ Management Plan. To insure the effective management of facility air quality during its life, the Contractor shall:

- Develop an air quality action plan to include scheduled HVAC system cleaning.
- Develop an air quality action plan to include education of occupants and facility managers on indoor pollutants and their roles in preventing them.
- Provide an action plan for periodic system maintenance, monitoring, occupant/manager training.

10-11 Testing, Adjusting, and Balancing. Adjusting and balancing of each housing unit shall be the Contractor's responsibility. Following adjusting and balancing, testing of air and water systems shall be performed on 10% of the project buildings (not to exceed 10 buildings), that have been randomly selected by the Contracting Officer. If buildings are to be turned over in phases, testing shall be performed on 10% of the buildings completed in each phase (not to exceed 10 buildings per phase). No additional testing shall be required if at least 90% of the tested buildings pass the test requirements. If less than 90% of the tested buildings pass the test, an additional 10% of the project buildings (not to exceed 10 buildings) shall be tested. This process shall continue until 90% of the total number of tested buildings pass. The Contractor shall correct all housing units not found in compliance, and shall be responsible for all labor and materials required for this effort. NEBB-01, SMACNA-07 or ASHRAE 111 shall be used as the standard for providing testing of air and water systems. The selected standard shall be used throughout the project. Instrumentation accuracy shall be in accordance with the standard selected. Testing shall be accomplished by a firm certified for testing by the Associated Air Balance Council (AABC) or National Environmental Balancing Bureau (NEBB). Prior to testing, adjusting, and balancing, the Contractor shall verify that the systems have been installed and are operating as specified. Where specific systems require special or additional procedures for testing, such procedures shall be in accordance with the standard selected. Approved detail drawings and all other data

required for each system and/or component to be tested shall be made available at the job site during the entire testing effort. Testing shall not commence until approved by the Contracting Officer. The housing unit shall be essentially complete with final ceiling, walls, windows, doors, and partitions in place. Doors and windows surrounding each area to be balanced shall be closed during testing and balancing operations. Air systems, hydronic systems, and exhaust fans shall be complete and operable. All data, including deficiencies encountered and corrective action taken, shall be recorded. Following final acceptance of certified reports by the Contracting Officer, the setting of all HVAC adjustment devices shall be permanently marked by the Contractor's balancing engineer so that adjustment can be restored if disturbed at any time.

10-12 Duct Tightness Testing Requirements. The installation of the supply and return ductwork within the units is an item of prime concern with respect to the energy efficient operation of the housing unit as a whole. With that consideration in mind, for heating and air conditioning designs which include ductwork outside of the conditioned envelope, the Contractor shall be required to test the proto-type units and all units which are blower door tested for tightness (see Paragraph 7.c.(2)) to ascertain the leakage levels from the ductwork in accordance with the following requirements.

10-12.1 Duct tightness testing shall ensure that the leakage rate from ductwork (where the ductwork system is not entirely within the conditioned envelop) shall not exceed  $0.15 \text{ (L/s)/m}^2$  ( $0.03 \text{ cfm/ft}^2$ ). If the units tested fail to meet this requirement, the ductwork installation shall be examined, corrections made, and the test redone until the installation passes this requirement. No ductwork systems may be installed in other units until the proto-type units ductwork systems have been validated. Several methods to accomplish this testing are acceptable.

10-12.1.1 Testing may be done in accordance with ASTM Standard E 1554-94, "Determining External Air Leakage of Air Distribution Systems by Fan Pressurization". This method describes the process and methodology required to accomplish basically a 'blower door subtraction' method of duct tightness testing.

10-12.1.2 Testing may also be accomplished utilizing "Duct Blaster" methodologies and pressurizing the ductwork to 25 Pascal (0.1 inch of water).

10-12.2 Commissioning. The Contractor shall implement all of the following best practice commissioning procedures:

- Engage a commissioning authority.
- Develop design intent and basis of design
- Include commissioning requirements in the construction documents.
- Develop and utilize a commissioning plan.
- Verify installation, functional performance, training and documentation.
- Complete a commissioning report.

10-12.3 The Contractor is advised that the EPA may test, or hire a consultant to test randomly selected housing units constructed in this project. These tests shall be completed without cost to the Contractor; however, the Contractor shall be required to coordinate access to the selected unit. If accomplished, this testing shall not interfere or delay the construction Contractor in any manner. Cooling season shading of glazed surfaces on the west and south elevations shall be considered.

10-12.4 Energy Optimization Model. The Contractor shall develop an energy optimization model for each type of housing unit. The model shall show reduction in design energy usage (DEU) compared to the energy use budget (EUB) in joules per square meter (Btu/square foot) per year for regulated energy components as described in the requirements of Chapter 11 of the TI 800-01 (Design Criteria), as demonstrated by a whole building simulation. One (1) Sustainability point shall be awarded for every reduction in design energy use of 2.5% for a maximum score of 20 points.

10-12.4.1 Sustainable Features. See Chapter 13 Sustainable Design Considerations for a list of items that contribute towards achieving a Gold SPiRiT rating.

**11. ENERGY CONSERVATION.**

11-1 Energy conservation techniques shall be considered as relative to site design, site engineering, unit design, and unit engineering. Techniques that conserve energy, improve livability, and are justified by life/cycle cost analysis, are encouraged. Integration of energy conservation systems such as from the inception of housing unit design, lighting, structure, mechanical systems, and aesthetics, is essential to facilitate livability and maximum energy savings. If an alternative energy generation method is intended for use as the project's primary energy source, documentation shall be submitted to the Contracting Officer, verifying the system's reliability and ability to meet the project's peak demand. The following paragraphs suggest energy conservation techniques that are considered desirable. The listing is not all inclusive, and the techniques suggested may not be cost effective for a given design.

Additional consideration in the technical evaluation shall be given to designs that incorporate valid energy conservation techniques.

11-2 Passive Solar Applications. Passive solar architectural applications shall routinely be considered as a part of all project designs. Unique applications, such as attached sun spaces, solar chimneys, solar dehumidifiers, and other innovations, may be considered. Operational controls, such as shading and venting mechanisms, which control the amount of heat admitted into the housing unit during the day, reduce the amount of heat escaping from the housing unit at night, and provide for thermal comfort of the occupants.

11-2.1 Additional South Glazing. If used as part of the solar energy system, glazing shall be commercially available off-the-shelf type and shall face within 15 degrees of solar south. The glazing shall be architecturally compatible with the housing unit and the environment, face directly into the living space so that the walls, floors, ceiling, and other massive objects can absorb the entering solar energy, and shall have a whole-window U value less than 1.6 square meter-kelvin (K)/watt (0.28 ft<sup>2</sup>-degrees F/BTUH). The optimum amounts of solar glazing that shall admit enough solar energy are shown below:

**TABLE 11-1 – GLAZING**

Average winter outdoor temperature	40° lat
<i>Temperate climates</i>	<i>GA/FA</i>
40°	0.14

Table: Sizing South facing Glazing, GA/FA = glazing area/floor area

Note: Window area on the other sides of the house should total no more than 5% of the floor area.

11-2.2 Storage Mass. If thermal performance calculations indicate a need for additional mass (beyond that provided by the housing unit structure) substantiating data shall be submitted. The storage mass shall be well integrated into the housing unit design. The thermal mass surface area in the space must be a minimum of three times the glazing area. Six to nine times the glazing area is recommended to control temperature swings. The surfaces to absorb solar energy shall not be more than 10% covered.

11-2.3 Shading. Movable window treatments are required. These can take the form of Venetian blinds to be drawn by the occupants at night and opened in the day. Cooling season shading of glazed surfaces on the west and south elevations shall be considered.

11-3 Geothermal. Geothermal energy sources such as ground coupled water loops are required. Each design utilizing geothermal sources shall address the project's environmental impact relating to noise emission, heat rejection, ground water contamination, land use, etc.

11-4 Condenser Heat Recovery. The installation of a heat exchanger to recover condenser heat and desuperheat for use in heating domestic water is required. A standard domestic water heater shall be provided in conjunction with this system to provide hot water during the heating season.

11-5 Energy Recovery Ventilator. Energy recovery ventilators shall be considered for use with systems designed to introduce outside ventilation air into the housing unit to address indoor air quality concerns. The increased cost and system complication associated with the introduction of outside air shall be carefully weighed against severity of indoor air quality deficiencies before the decision is made to supply outside air at the air handler. When utilized, energy recovery ventilators shall pre-condition outside air by permitting energy transfer from exhaust air. Units shall have easily accessible controls and filters.

11-6 Systems and techniques, which take advantage of the rebates and incentives offered by utility companies, are preferred.

## **12. CONTRACTOR PREPARED SPECIFICATIONS.**

12-1 The successful Offeror shall prepare a specification for all work included in the scope of work. The specification shall be tailored to this job. Inapplicable materials shall be deleted. Any reference, description, procedure or other matter required to develop a complete, accurate and concise specification shall be provided. The specification shall include but is not limited to:

12-1.1 A description of the technical requirements

12-1.2 Criteria for determining whether the requirements are met

12-1.3 Quality control requirements and procedures

12-1.4 Submittal requirements – all submittals recommended by the master specification system chosen by the Contractor shall be included and submitted to the Government. See Section 01331 SUBMITTAL PROCEDURES FOR DESIGN BUILD.

12-2 The specifications may be any one of the major, well-known master guide specifications sources such as MASTERSPEC from the American Institute of Architects, SPECTEXT from Construction Specifications Institute or the Government's Unified Facilities Guide Specifications as modified by the Louisville District Corps of Engineers. Use only one source for the project. If the design is based on a specific product, the specifications shall consist of the salient features of the product. The specification shall be detailed enough that a another product meeting the specification could be substituted without adversely affecting the project.

12-3 Specifications for features of the work shall be organized into divisions and sections in accordance with Construction Specifications Institute (CSI), Master List of Titles and Numbers for the Construction Industry, latest edition. Individual specification sections shall be in the format of CSI, Section Format, A Recommended Format for Construction Specification Sections, latest edition. Exceptions are:

12-3.1 Measurement Procedures and Payment Procedures shall only be used in those section(s) where rock excavation is specified. No other sections shall contain these subparagraphs of the paragraph SUMMARY.

12-3.2 Except as otherwise noted in this Paragraph, CONTRACTOR PREPARED SPECIFICATIONS, the paragraph SUMMARY shall not be used.

12-3.3 Design and Submittal requirements, submittal procedures and quality control procedures, and construction operations shall be those contained in the Sections 01021, 01312, 01320, 01331, 01356, 01410, 01453, 01500, 01525, 01670 and 01800 (see Attachment 1 to the Statement of Work). These specification sections shall be incorporated into the Contractor prepared specification packages without editing and shall be coordinated with all other specification sections prepared by the Contractor.

12-3.4 Section 09900, Painting; shall establish a minimum level of quality for paints, stains, and varnishes to be used in this project.

12-4 Contractor prepared specifications shall be reviewed by the Contracting Officer or his designated representatives during the design portion of the project. Contractor shall incorporate all required changes, including addition of submittals, after resolution of comments and prior to work initiation on the next phase of the project.

12-5 Division Zero and One specifications – The Division Zero (00xxx) and Division One (01xxx) Specifications included in this RFP shall be included in the Contractor's final specifications without revision, unless such revision is approved in writing by the Government. Additional Division One specifications may be added by the Contractor if required.

## 12-6 Technical Specifications

12-6.1 Some of the Division Two (02xxx) through Sixteen (16xxx) specifications in this RFP are provided in outline format. The Contractor's designers shall expand the outline specifications to provide comprehensive specifications in compliance with all requirements of this Paragraph 12, this Statement of Work and the RFP. All sections may not be used, and Contractor's designers shall provide additional sections if necessitated by their final design or RFP requirements. Requirements specifically included in the outline specifications shall be included in the final specifications.

12-6.2 Some of the Division Two (02xxx) through Sixteen (16xxx) specifications in this RFP are provided in prescriptive format. These represent the minimum requirements of the RFP and shall be used without revision, unless approved in writing by the Government. Such revisions will be allowed only if they reflect betterments or enhancements to the project. Contractor's designers shall take responsibility for the design and specification of the project, and shall satisfy themselves that the prescriptive specifications are complete and suitable for the final design.

### **13. SUSTAINABLE DESIGN CONSIDERATIONS.**

13-1 Sustainable design techniques shall be considered as they relate to site design, site engineering, unit design, and unit engineering. Techniques that conserve energy, improve livability, and can be justified by life cycle cost analysis as cost effective are encouraged. Integration of energy conservation systems with the housing unit's design (lighting, structure, mechanical systems, and aesthetics) is essential to facilitate livability and maximum energy savings. The following paragraphs define the goals and general objectives for inclusion of sustainable design considerations in this project. This information is taken from US Army Corps of Engineers, TL 1110-3-491. The listing is not all inclusive, and the techniques suggested may not be cost effective at a given location or site. Additional consideration in the technical evaluation will be given to designs that incorporate and identify Sustainable Design techniques included in the proposal.

The Government has identified this project as a "showcase project" for sustainable design. The Contractor shall design and construct the project to achieve a "gold" rating using the SPiRiT rating system of TL 1110-3-491. A sample SPiRiT rating tool for the project has been prepared by the Government (see Attachment 13 to this Statement of Work) to demonstrate possible project design and construction measures toward achieving the gold rating. A blank SPiRiT rating tool is provided as Attachment 14 for Contractor's use in developing his plan to achieve the rating.

#### 13-2 Goals and Objectives of Sustainable Design.

13-2.1 The overall USACE goal of Sustainable Design is to be environmentally responsible in the delivery of facilities. The key traditional elements for decision making in the facility delivery process are cost, quality and time. These elements need to be expanded to include the ecological and human health impacts of all decisions.

13-2.2 Each project generates its own set of goals. However, sustainable design goals should apply to all projects. The goals for improving the environmental performance of facilities include: (a) use resources efficiently and minimize raw material resource consumption, including energy, water, land and materials, both during the construction process and throughout the life of the facility, (b) maximize resource reuse, while maintaining financial stewardship, (c) move away from fossil fuels towards renewable energy sources, (d) create a healthy and productive work environment for all who use the facility, (e) build facilities of long-term value, and (f) protect and, where appropriate, restore the natural environment.

13-3 Sustainable Design and Construction of the Built Environment. Design and construction of sustainable buildings should be in accordance with the following concepts:

13-3.1 Site Work and Planning--Environmentally sensitive planning looks beyond the boundary of the project site to evaluate linkages to transportation and infrastructure, ecosystems and wildlife habitat and community identification. Site planning evaluates solar and wind orientation, local microclimate, drainage patterns, utilities and existing site features to develop optimal siting and appropriate low maintenance landscape plant material.

13-3.2 Building Layout and Design--Optimize building size, and maintain an appropriate building scale for the environment and context of the building or a building component. Layout the rooms of a building for energy performance and comfort, and design for standard sizes to minimize material waste. Pay careful attention to the location of exterior windows. Avoid structural over-design and the resultant waste. Design components of the building environment for durability and for waste recycling.

13-3.3 Energy--Building orientation and massing, natural ventilation, day-lighting, shading and other passive strategies, can all lower a building's energy demand and increase the quality of the interior environment and the comfort and productivity of occupants.

13-3.4 Building Materials--Environmentally preferable building materials are durable and low maintenance. Within the parameters of performance, cost, aesthetics and availability, careful selection and specification can limit impacts on the environment and occupant health.

13-3.5 Indoor Air Quality--Indoor air quality is most effectively controlled through close coordination of architecture, interiors and mechanical, plumbing, and electrical design strategies that limit sources of contamination before they enter the building. Construction procedures for IAQ and post-occupancy user guides also contribute to good long-term IAQ.

13-3.6 Water Usage-- Site design strategies that maximize natural filtration of rainwater are desirable. Water conservation is enhanced by the use of low flow plumbing fixtures and water appropriate landscaping.

13-3.7 Recycling and Waste Management--Waste and inefficiency can be limited during construction by sorting and recycling demolition and construction waste, reuse of on-site materials and monitoring of material use and packaging. Accommodating recycling into building design reduces waste while generating revenues. The Base has a post-recycling target of 40%.

13-3.8 Building Commissioning, Operations and Management--Effective building commissioning is essential to ensure proper and efficient functioning of systems. Facilities operations benefit from energy and water saving practices, waste reduction and environmentally sensitive maintenance and procurement policies.

13-3.9 Mechanical Sustainable Design Features. Design consideration should be given to using the following items.

1. Ground coupled geothermal heat pump system (attain SEER 17).
2. Hot water de-super heater on heat pump (free hot water during cooling months).
3. Programmable thermostat. (for automatic night set back)
4. Attic ventilation fan on thermostat (reduces ceiling heat gain)
5. "Energy Star" rated refrigerator, range and dishwasher (high efficiency).
6. Low flow water closets and shower heads (conserves water).
7. Outside air percentage and high efficiency filters (optimizes indoor air quality (IAQ))
8. The above items along with other measures (high efficiency lights and high "R" values for example) can be entered into the overall energy analysis as required above.

13-3.10 Architectural Sustainable Design Features. Design consideration should be given to using the following items:

- a. Forestry Stewardship Council wood and/or a rapidly renewable material such as bamboo may be used for flooring, as a sustainable design feature, in lieu of hardwood flooring. Design consideration should also be given to locally available hardwood flooring material.
- b. Better sealing windows with higher insulated glazing as well as Energy Star qualified windows.
- c. Providing a recycle bin area with the garbage area.
- d. Use of sustainable features such as solid polymer counter tops (cabinets and counters should contain low VOC emitting glues and stains).
- e. Privacy screening using reconstituted plastic screening instead of wood.