City of New York
Office of Emergency Management
Design Standards and Performance Specification
For Interim Housing Units
12/20/2012

Introduction:

"WHAT IF NEW YORK CITY WERE HIT BY A CATEGORY 3 HURRICANE..."

New York City's population density and geography make it particularly vulnerable to coastal storms. Over eight million people live on approximately 305 square miles of land that has 578 miles of waterfront. By 2030, the population is expected to reach nine million. At the same time, the risk of a severe storm hitting New York City is also growing, due to the more frequent, more intense and more northerly storms generated by global climate change. The city would face many challenges during and after such a storm, one of the most difficult is that hundreds of thousands of people could lose their homes.

The New York City Office of Emergency Management (OEM) is developing a Disaster Housing Plan (DHP) that describes and directs the range of activities required to recover housing following a natural or man-made disaster. Because of the city's high population density, lack of open space, and a mission to resettle as many residents as possible in their former neighborhoods, the DHP will outline a new paradigm that will provide living spaces at a density level significantly higher than conventionally provided through disaster relief operations. An approach to this problem is the rapid construction of interim housing that is multi-storey and multi-family, and able to be assembled in configurations that support the return of community life.

Following a catastrophic event, New York City will need to supply removable/reusable Interim Housing Units (IHU) at an unprecedented speed and scale. The IHU would be a critical bridge between emergency shelter and permanent housing. To do this New York City needs vendors who can design, manufacture and implement a system of removable and reusable housing delivered quickly and configured for densely populated urban areas.

To approach the problem that there is currently no Federal capacity to provide this kind of housing for cities, OEM hosted the "What if NYC…" post-disaster interim housing design competition in 2007. The "What if NYC…" mission was to collect ideas for rapidly deployable housing systems that could also achieve urban density and conform to a broad range of site conditions. An objective of the competition was to select modular systems for prototyping. In January of 2008, the competition jury selected ten winners out of 117 entries from 30 countries. After the winning designs were further developed, the committee evaluated the revised designs with special emphasis on issues of constructability, speed of fabrication, ease of transport and cost-effectiveness. Though the committee highlighted many of the projects strengths, the panel left OEM with a focus on two entries in particular (see www.whatifnyc.net), the Container Living Apparatus (CLA) that utilizes modified shipping containers in flexible and stackable units, and the Community Provisional Residence (CPR) that utilizes modular prefabricated panels.

Following that, NYC examined market capabilities in the region and determined that there are many existing modular housing systems that can serve as post-disaster housing with little or no modification to their current product. New York City needs vendors who can design, manufacture and implement a system of removable and reusable housing that can be delivered quickly and configured for densely populated urban areas, and this first iteration of a universal performance specification works toward a local solution to a national problem in that it creates a parameter for housing systems that allows as many manufacturers as possible to deliver housing that meets the standards not only of NYC but urban areas throughout the country. OEM recognizes that this temporary housing may also become permanent, and have developed this urban interim housing performance specification to deliver permanent-quality housing that meets the needs of displaced people as quickly as possible.

In an effort to determine whether there is sufficient market interest to proceed to a competitive bidding process, in June of 2009, the New York City Office of Emergency Management (OEM) and the New York City Department of Design and Construction (DDC) issued a Request for Expressions of Interest (RFEI) for the development and implementation of a post-disaster interim housing solution. Responses to the RFEI included submittals from eight manufacturers and vendors representing housing units fabricated from both modified shipping containers and pre-manufactured modular construction. The submitted solutions confirmed that there is a sufficient interest and industry resource to initiate a competitive Request for Proposal (RFP) for the design, manufacture and implementation of post-disaster housing units equivalent or superior to the CLA or CPR design concept (see www.whatifnyc.net), and conforming to the OEM Design Standard and Performance Specification for Interim Housing Units.

New York City Office of Emergency Management Design Standards and Performance Specification for Interim Housing Units	
	Design Standard and Performance Specification
General	This Design Standard and Performance Specification establish the minimum requirements for the design, construction and deployment of post-disaster Interim Housing Units (IHU) following a natural or man-made disaster in New York City. The Interim Housing Units (IHU) shall provide continuous high-density temporary housing for a minimum period of eighteen to twenty four months. In response to a disaster, the New York City Office of Emergency Management (OEM) needs to maximize the number of temporary housing units deployed to house displaced families and individuals. OEM estimates there could be a need to deploy a high volume of approximately 1000 IHU per week, within six to eight weeks after a disaster, in densities and configurations approximating 200 households per acre. In order to meet this need OEM may procure IHUs from multiple vendors depending on the capacity of each vender to produce, deliver and deploy the IHU. To accomplish this goal it is anticipated that the IHU will incorporate factory manufactured modular housing units of standardized design and construction adaptable to both temporary and permanent utilization. The IHU must be rapidly deployable, transportable by truck, rail and by cargo ship. The IHU must be able to be disassembled after continuous use, transported and stored off site for future reassembly and re-use.
Design Concept	In order to achieve the manufacture and rapid deployment of the IHU in the quantities and critical time schedule required, proposals submitted by the vender shall demonstrate a modular and standardized design and manufacturing process. The use and incorporation of pre-manufactured components, such as modular bathroom and kitchen pods, in order to facilitate and accelerate the production schedule is encouraged in addition to other factors and innovative production methods and techniques that demonstrate the vendor's capability to produce, transport and deploy a maximum number of units in a timely manner. This design concept focuses on the two proposed entries in the "What if NYC…" design competition (see www.whatifnyc.net) that utilize modified ISO shipping containers or shipping container technology and pre-manufactured modular construction methods. Other unit types including Factory Built Housing, Manufactured Housing (HUD-Code), Modular Housing, Panelized Housing and other alternative dwelling units that meet or exceed this OEM Design Standard and Performance Specification will be considered. This design standard adopts the concept of utilizing a standard, but flexible, design layout and construction methods that can accommodate a wide range of family dwelling sizes. This standard design concept envisions a basic **"Utility"** One Bedroom Dwelling Unit that accommodates a minimum of 2-4 adults and includes all basic central requirements such as kitchen, bathroom, living/dining/bedroom, electric power distribution, plumbing and mechanical distribution and equipment. In addition, a standard **"Bed Room"** unit that incorporates additional living/bed room space without utilities to accommodate an additional 4-6 adults, would be available. The "Bed Room" unit would connect to the "Utility" unit in various configurations to form a larger family dwelling unit as needed. Alternate design concepts that can accommodate a minimum of four (4) adults and meet this OEM Design Standard and Performance Specification will be considered.

New York City Office of Emergency Management Design Standards and Performance Specification for Interim Housing Units	
	Design Standard and Performance Specification
	Universal Design: In an effort to facilitate the development of a standard layout universally accessible to anyone, regardless of age, size, ability or infirmity, the vendor's design for all IHU dwelling units should incorporate the principal of Universal Design. All IHU dwelling unit design layouts would comply with the minimum requirements of the Uniform Federal Accessibility Standards (UFAS) without the need for adaptation or specialized design. Each dwelling unit can accommodate able-bodied individuals as well as people with disabilities or infirmities. In a stacked and clustered IHU arrangement, the lowest unit(s) at grade will be made available for use by individuals with accessibility needs, utilizing accessory entry ramps as needed to accommodate various grade and terrain conditions. Factory Pre-Finished: The IHU are to be factory pre-finished, transported, and installed with no or minimal field finishing work, including interior walls and partitions that require no or minimal on site finishing work. The IHU shall be deployed to the selected site ready for hook up to existing municipal utilities or temporary services to be provided by others. Transport and install units at the site fully furnished, including appliances and all utility hook-ups, accessories such as ramps and stair towers, installed and ready for habitation.
Code Compliance	The IHU constructed to this Design Standard and Performance Specification must comply with the following codes and standards in effect at time of contract award: 1. New York City Construction Codes that consist of: a. New York City Building Code (NYCBC) b. New York City Plumbing Code (NYCPC) c. New York City Mechanical Code (NYCMC) d. New York City Fuel Gas Code (NYCFGC) 2. New York City Electrical Code (NYCEC) 3. New York City Fire Code (NYCFC) 4. New York City Energy Conservation Code (NYCECC) 5. New York State Energy Conservation Construction Code (NYSECCC) 5. Uniform Federal Accessibility Standard (UFAS) 6. Americans with Disabilities Act (ADA) 7. New York City Department of Environmental Protection (DEP) 8. New York City Housing Maintenance Code (NYCHMC) 9. New York State Multiple Dwelling Law (NYSML) 10. National Fire Protection Association (NFPA) 11. National Sanitation Foundation (NSF) 12. American Architectural Manufacturers Association (AAMA) 13. Fair Housing Act 14. Section 504 of the Rehabilitation Act of 1973.
Modular Unit Size	The overall exterior dimensions of the vendor's proposed standard modular shall be within the maximum limits established for highway, rail and cargo ship transport.

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<tr><th colspan="2">New York City Office of Emergency Management
Design Standards and Performance Specification for Interim Housing Units</th></tr>
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<tr><td></td><td>Typical “Utility” dwelling units and “Bedroom” units overall exterior footprint range:
One Bed Room Utility Dwelling Unit: Individual one bedroom dwelling units range: 300 – 480 square feet.
Three Bed Room Dwelling Units: Combined Utility and Bedroom dwelling units range: 600 – 960 square feet.

Minimum clear interior unit room width shall be 8’-0” per Section BC1208.1.
Interior Finished Ceiling Height: 8’-0” minimum (8’-6” preferred) per Section BC1208.2.

IHU Units may be configured, either as a single unit, side by side in combination and stacked clusters of multiple dwelling complexes. Units may be placed in driveways, on streets or sidewalks, front or rear yards, parking lots, open fields or parkland as circumstances after a disaster may dictate.</td></tr>
<tr><td>Plan Layout: “Utility” One Bedroom Dwelling Unit and Features</td><td>1. <u>Kitchen</u>: Provide a complete all electric (no gas or propane appliances) adaptable kitchen in compliance with UFAS 4.34.6 and including the following features:
a) Overhead and under counter kitchen cabinets with countertops. Kitchen cabinets and countertops shall be constructed of metal or alternate acceptable durable materials resistant to moisture, mold, abuse, and delaminating.
b) Stainless steel double compartment sink with water saver faucet and hand held spray.
c) Refrigerator: 14.4 cu. Ft. frost free with freezer.100% of refrigerator and 50% of freezer must be Maximum of 54” above floor per UFAS 4.34.6.3
d) Microwave: Minimum 1.2 cu. ft. microwave or 2 cu. ft. convection microwave with child lock.
e) Range & Oven: Minimum 24” electric cooking range with thermostatically controlled self-cleaning oven. Provide one-piece construction lighted power-vented range hood.
f) Dish Washer: Not included.
g) Washer/Dryer: Not included.
h) All appliances to be Energy Star compliant as applicable.
i) All kitchen clear floor space, obstructions, heights and reach shall comply with UFAS. Provide a minimum 3 feet clear passageway between counter fronts and appliances and/or walls in compliance with Section BC 1208.1.

2. <u>Bathroom</u>:
a) Provide one full bathroom in each “Utility” One Bedroom Dwelling Unit. Connecting “Bedroom” Unit does not require an additional bathroom.
b) Bathroom designs shall be based on a Universal design layout to accommodate able-bodied and disabled individuals. Provide only a roll-in type shower (no bathtub) with shower curtain, curtain rod and curtain hooks, drop down seat and grab bars compliant with UFAS 4.21, fig 35b, wall hung lavatory and wall hung or floor mounted 1.28 gallon water saver water closet. Height of the water closet to comply with UFAS 4.16. A removable under lavatory vanity is acceptable to accommodate a dwelling unit assigned to individuals with disabilities or infirmities.
c) All interior plumbing must be assembled.
d) Recessed or surface wall mounted medicine cabinet with tilting shatterproof mirror.</td></tr>
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	Design Standard and Performance Specification
	e) Wall mounted grab bars, locations and size compliant with UFAS. f) Bathroom floor space, clearances, accessories shall comply with UFAS. g) Bathroom shall include an adequately sized exhaust fan capable of exhausting a minimum 50 CFM (for intermittent fan) or 20 CFM (for continuous fan) of air, vented and ducted to the outside in compliance with the NYCBC. Exhaust fan to be 1.5 sones or quieter and Energy Star compliant. 3. Storage: Provide ample storage and closet space with adjustable and removable storage shelving compliant with UFAS 4.25. 4. Living/Dining Room: a) Dining area shall include a table and seating to accommodate 4-6 adults and circulation space for accessory furniture. b) Living room area shall include a sofa bed and sufficient circulation space to accommodate typical living room furniture. Provide built-in or attached credenza and desk. c) Floor space and clearances shall comply with minimum requirements of UFAS. 5. Bedroom: Provide one bedroom large enough to accommodate one full sized bed or two twin sized beds with circulation, turning space and doors compliant with UFAS. Provide a closet or wardrobe. 6. Smoke Detector: Provide combination smoke and carbon monoxide detectors, with built-in audible and visual alarm compliant with NFPA 72, in each kitchen, living room and sleeping space in compliance with the NYCBC. Detectors shall be hard wired to electrical circuits with battery back up. 7. Fire Extinguisher: Each IHU shall be equipped with one 5lbs dry chemical A-B-C fire extinguisher compliant with or exceeding the requirements of NFPA Standard 10, to be easily accessible in the kitchen area. Utilities: Each IHU “Utility” One Bedroom Dwelling Unit module shall be designed and engineered to incorporate a common utility chase(s) or riser(s) for electrical, sewer, water and other common services that may be required. The chase or riser shall be located and arranged to align vertically and horizontally with other stacked “Utility” units, and attached “Bedroom” units, to permit easy and quick connection of services in stacked, side-by-side and clustered building complex arraignments. Provide access panels at the interior and/or exterior of each unit, as necessary to facilitate quick connection and maintenance of services. Access panels shall have locks and be vandal proof.

New York City Office of Emergency Management Design Standards and Performance Specification for Interim Housing Units	
	Design Standard and Performance Specification
Plan Layout: Bedroom Unit	IHU "Bedroom" Unit shall include two separate bedrooms. Each bedroom shall be large enough to accommodate one full-sized bed or two twin sized beds. Each bedroom shall have a closet or wardrobe. Provide an additional storage closet proximate to both bedrooms. Each bedroom shall contain turning space and doors compliant with UFAS 4.2.3.and 4.1.3. IHU "Bedroom" Unit is to be designed and engineered to connect with and be accessible internally to a "Utility" One Bedroom Dwelling Unit to form a larger Three Bedroom Dwelling Unit. The IHU "Bedroom" Unit does not require an additional bathroom and is to be accessible to the bathroom in the connected "Utility" Unit.
Dwelling Unit Arrangements	Single IHU Dwelling Unit: One "Utility" dwelling unit = One bedroom type dwelling unit to accommodate 2- 4 adult occupants. Large Dwelling Unit: Combination of one "Utility" One Bedroom Dwelling Unit plus one connected "Bedroom" Unit to form a larger three bedroom dwelling unit to accommodate 6-8 adult occupants. Building Complex Clusters: Vendor shall develop typical layouts to demonstrate a variety of arrangements of the IHU in multi-unit building complex clusters, including side-by-side and stacked, up to four stories maximum, in various densities. The building complex arrangements may consider and be sympathetic to typical attached and semi-attached townhouses common in New York City.
Occupancy Classification	Based on the New York City Building Code, Section BC310.1.2, the IHU building complex is classified as Residential Occupancy R2, which includes apartment type multiple dwellings and apartment hotels. The IHU may typically be arranged as a multiple dwelling complex, stacked 4 stories maximum. The total number of dwelling units in each IHU building complex will depend on the size and configuration of available sites and compliance with the NYCBC.
Fire District	The IHU may be installed / located at any site within the five boroughs of New York City. All portions of the boroughs of Manhattan, Bronx, Brooklyn, Queens and Staten Island shall be included in the Fire District (Refer to NYCBC Appendix D). Building construction limits noted in Table 503 and Table 603 as permitted outside of the Fire District shall not apply.

New York City Office of Emergency Management Design Standards and Performance Specification for Interim Housing Units	
	Design Standard and Performance Specification
Height and Area	The design of the IHU multiple dwelling complexes shall comply with the height and area limits prescribed in NYCBC Chapter 5, Table 503 for R2 occupancy group and Type IIA and IIIA construction. Type V construction is excluded. Building height increase permitted for automatic sprinkler systems per Section BC 504.2 shall not apply. Maximum stacked building complex height shall be four (4) stories. Elevators in building four (4) stories or less in height are not required. (Refer to Section BC 3002.4) Area increase permitted for frontage per Section BC 506.2 and for automatic sprinkler systems per Section BC 506.3 shall not apply. Unlimited area permitted for buildings of Type IIA and IIIA construction per Section BC 507.13 shall not apply.
Construction Classification	Construction classification for all elements of the IHU shall comply with NYCBC Table 601 and table 602 for Type IIA and Type IIIA construction. Fire resistance ratings for Type IIA and Type IIIA construction shall not be reduced as otherwise permitted by Table 601, footnote 'd' for automatic sprinkler systems. A 1 hour fire resistance rated fire barrier shall separate each IHU dwelling unit in compliance with Section BC 509.9. Construction of each individual IHU unit, walls, floor and roof/ceiling, shall be 1 hour fire resistance rated. Construction of all interior partitions shall be non-combustible. Interior finishes shall comply with NYCBC Chapter 8 and Table 803.5 for non-sprinkler occupancy R2. Any wood products used in the fabrication of interior amenities including shelving, counters etc. shall be flame retardant treated and formaldehyde free. Provide resilient floor covering throughout. Carpet floor covering shall not be permitted.
Distance Between Building Complexes	Distance between IHU building complexes on an individual site or between IHU units and existing buildings on an adjoining site shall comply with Table 602 for R2 occupancy and type of construction. Adherence to NYC Zoning regarding setback, yard and separation distances may likely be waived during a declared emergency and disaster recovery. A minimum separation of 20 feet shall be provided between an IHU building complex frontage and other IHU building complexes located on a common site in order to provide access for adequate light and ventilation and building access for Fire Department of New York (FDNY) emergency services.

	Design Standard and Performance Specification
Means of Egress	Required means of egress systems, including, but not limited to, number of exit stairs; maximum travel distance; egress components such as doors, clear width and height; minimum illumination; signage etc. shall comply with NYCBC Chapter 10. Travel Distance: Maximum length of exit access travel distance for a IHU building complex shall be 150 feet for a R2 occupancy without sprinkler system per NYCBC Table 1015.1 or as otherwise permitted travel distance increase for an exterior egress balcony per Section BC 1015.3. Exterior egress balconies or corridors shall be of non-combustible construction with solid floor constructed surfaces with no unprotected openings or open gratings.
IHU Exterior Finish and Weather Resistance	1. IHU exterior exposed surface materials shall be designed to present a uniform and aesthetically pleasant appearance. Exterior material and/or cladding shall be non-combustible, durable, moisture, mold and weather resistant, corrosion resistant and maintenance free. All fasteners shall be corrosion resistant and designed to resist wind, snow and rain. Vendor shall demonstrate a uniform aesthetic appearance for IHU in multi-family building complexes and clustered arrangements. 2. All exterior openings, such as windows, doors, drainpipes etc… shall be sealed and caulked to prevent air and moisture penetration. 3. Roof surfaces over individual and/or stacked IHU shall be covered in appropriate roofing material and secured to resist applicable wind uplift forces in compliance with the NYCBC. Roof surfaces shall be pitched to provide positive drainage to an integral drainage system, gutters or other acceptable drainage methods. Refer to “Storm Water Disposal” elsewhere in this document. 4. All exterior surfaces shall be sealed to resist the entrance of rodents.
IHU Windows and Doors	1. All primary windows and sliding glass doors shall be insulating type and shall comply with the latest edition of AAMA 1701.2, “Voluntary Standard Primary Window and Sliding Glass Door for Utilization in Manufactured Housing”. The exterior and interior pressure tests shall be conducted at the design wind loads required for New York City. 2. The design and construction of all swinging exterior passage doors shall meet or exceed the requirements of the latest edition of AAMA 1702.2, “Voluntary Standard Swinging Exterior Passage Door for Utilization in Manufactured Housing”. The exterior and interior pressure tests shall be conducted at the design wind loads required for New York City. 3. Safety glazing material where required shall meet ANSI Z97.1-1984, “Safety Performance Specifications and Methods of Test for Safety Glazing Materials Used in Buildings”. 4. Exterior doors shall have two independent locks with separate keys and be capable of being opened from the inside without a tool or key. The height of locks latches and other locking mechanisms on the inside of exterior and interior doors shall comply with UFAS 4.2.5 and 4.2.6. 5. All operable windows shall have latches and locking mechanisms that prevent the windows from being opened from the outside. The latches and locking mechanisms shall be capable of

	Design Standard and Performance Specification
	being manually opened from the inside without the use of a tool or key. 6. All operable windows shall be equipped with removable non-corrosive insect screens. 7. All windows shall be equipped with approved child resistant mini-blinds installed. 8. Provide child protective guards' at all operable windows above the first floor in compliance with NYC Code, Rules and Ordinances. 9. Master Keys: Supply and furnish three (3) sets of keys for all exterior entry doors for each IHU Dwelling Unit procured and installed. Master keys shall be provided and packaged separately, with an identification number on the key, bar code or VIN.
Noise Attenuation	Each IHU dwelling unit, including fenestration and exterior envelope assemblies, shall achieve a composite building sound attenuation value equal to or greater than 30 OITC based on a maximum indoor noise level of 45 dba.
IHU Structural	1.Stackable: a) Each IHU module shall be engineered and constructed to support vertical live and dead loads, wind and seismic forces prescribed by the NYCBC for IHU modules stacked up to four stories maximum with pre-engineered connections. b) Individual, stacked and combined dwelling unit arrangements shall be engineered to resist lateral forces including wind and seismic in addition to live and dead loads in compliance with the NYCBC. 2. Temporary Foundations: Excavation and construction of permanent foundation systems is not viable in a disaster recovery situation and will not be considered. Provide pre-engineered temporary foundation systems to support singular and stacked IHU dwelling units at various locations, terrain and surface conditions, such as asphalt paved parking fields, lawns, parkland, side-walks/street, etc. Temporary foundation systems may include, but not be limited to platforms, pre-cast grade beams, piles, sonotubes, anchors etc. The IHU shall be designed and pre-engineered to provide appropriate anchorage to the temporary foundations including tie-down of the IHU and temporary foundation required for securing to the ground. The soil conditions that may be encountered for the location of the IHU units may vary. The design for the pre-engineered temporary foundation systems should assume a conservative soil bearing capacity of 1 kips/sf. Vendor may propose different types of systems appropriate for various soil and bearing conditions. Vendor shall perform test borings as necessary at the selected site to confirm soil and bearing capacity and conditions. 3. Amenities: Provide pre-engineered and modular amenities, compliant with UFAS, such as stair towers, platforms and landings, ramps, decks, walkways, etc. Each is to be pre-assembled and engineered for quick deployment and installation in the field.

	Design Standard and Performance Specification
	4. Structural Integrity: Engineer and construct each pre-assembled IHU to remain structurally sound during transport and installation. IHU to be transportable to assure that interior finishes, partitions, doors and windows, fixtures and utilities are not damaged dislodged or deformed during transport and installation.
Potable Water, Sanitary and Storm Water Disposal	In a post-disaster environment municipal water, sanitary and storm water disposal may be adversely affected. Such services may not be available for a short or extended period, or available services may be limited. The vendor's proposal shall demonstrate the ability of the IHU to connect to permanent municipal services, when available, including water, sanitary and storm water disposal. If services are not available vendor shall also demonstrate the flexibility of the IHU, individually and in multi-dwelling complex arrangements, to connect to permanent and/or temporary portable water storage and purification systems, and wastewater collection and/or treatment systems provided by governing authorities. All system piping design and installation shall be protected from freezing. Provide appropriate insulation and/or heat trace as may be necessary. Temporary and permanent services shall incorporate the following: Domestic Water Supply: 1. An adequate potable water supply, acceptable and approved by the New York City Departments of Health and Environmental Protection, shall be provided to each IHU Dwelling Unit for drinking, cooking, and bathing purposes. 2. Domestic water shall be supplied from a city water main, on site water storage, water trucks or a combination thereof. Supplied potable water shall connect to a central, pre-assembled domestic water service for each building complex or series of complexes per site, with metering and backflow protection, for quick installation in the field in compliance with DEP Rules and Regulations. 3. Water supply shall be capable of delivering predetermined gallons of water per day/per person at a peak rate of two and one half times the average flow in gallons per minute. Sanitary Drainage Disposal: 1. Sanitary drainage shall be disposed of in an acceptable manner in compliance with the New York City Plumbing Code, New York City Department of Environmental Protection (DEP), and Authorities having jurisdiction. 2. Sanitary drainage from plumbing fixtures for each IHU dwelling unit shall be conveyed by gravity to a central point within each building housing complex, where it will then connect to the permanent municipal sewer line when available. If not available sanitary disposal shall be conveyed by approved alternative method provided by others, including but not limited to:

	Design Standard and Performance Specification
	a) A central or localized holding tank that can be pumped out by a sewage disposal service and disposed of as permitted by Federal, State or local authorities. b) Connection of sanitary system disposal from temporary systems to available permanent municipal disposal services shall be subject to approval by the New York City Department of Environmental Protection (DEP). The vendor shall provide technical sanitary system design information in their proposal including calculations. DEP will evaluate this information at the time for switch over from temporary to permanent services in order to assure that the municipal system will not be overtaxed. If sanitary disposal from the IHU cannot be conveyed by gravity, then a receiver tank with ejector pumps shall be utilized to convey the discharge into a gravity line. The discharge shall not be permitted to pressurize the street sewer. <u>Storm Water Disposal</u>: 1. Storm water drainage shall be disposed in an acceptable manner in compliance with the New York City Plumbing Code, NYC DEP and Authorities having jurisdiction. Drainage for the site shall be based on the layout of the IHUs so that there will be no flooding within the area. 2. Storm water drainage from the site shall be conveyed to the permanent municipal storm or combination storm/sanitary sewer line when available. If not available storm disposal shall be conveyed to approved alternative methods provided by the vendor, including but not limited to: a) Drywells where feasible. Perform percolation tests at the site prior to design and installation of the drywells. b) Central or localized holding tank that can be pumped out by a disposal service and disposed of as permitted by Federal, State or local Authorities. c) Storm water may discharge on unpaved areas such as lawns provided that storm water will flow away from buildings toward unpaved areas on the same site that will accommodate the rainfall. <u>Protection from Freezing</u>: 1. All above ground piping, water supply or sanitary disposal shall be protected from freezing by appropriate methods including insulation, heat tracing, etc. as necessary. Any bends in above ground piping require cleanouts with adequate maintenance space for snaking. 1. All above ground piping shall be protected from damage from vehicles, pedestrians and vandalism as required.

	Design Standard and Performance Specification
Water Heating	An independent supply of hot water shall be provided to each IHU capable of delivering an adequate supply of hot water to all plumbing fixtures and equipment as required. 1. Provide a self-contained hot water generation system using electric power for all plumbing fixtures and equipment requiring hot water. 2. Electric hot water heaters shall conform to the requirements of the New York City Plumbing Code and provisions of the New York City Electric Code. 3. In order to avoid the requirements of a re-circulation system to maintain the hot water temperature, avoid exceeding twenty (20) feet distance from the hot water heater to the farthest fixture as per the NYC Plumbing Code. 4. The hot water heater shall be suitable for the type of building structure and capable of providing the minimum total demand including recovery/storage requirements. 5. The use of electric instantaneous tank-less under counter or wall mounted water heaters is encouraged in an effort to reduce energy consumption and space. Single or multiple units can be used to supply kitchen and bathroom use.
Electrical	1. Electrical design shall comply with Article 550 of the NYC Electrical Code. 2. Utility service for IHU dwelling units is to be all-electric. (Gas service will not be available at the temporary housing sites. Use of propane is not allowed). Each “Utility” One Bedroom Dwelling Unit shall have an individual main panel board with 20% spare capacity plus one sub-panel in each attached “Bedroom” unit. 3. All wiring shall be concealed in flexible or rigid conduit. All wire shall be copper with a ground conductor. 4. The incorporation of concealed and vandal proof modular troughs for quick connect power and telecom distribution is acceptable. 5. All electrical hardware is to be vandal proof. 6. All receptacles and switches to be heavy-duty industrial type. All receptacles to be GFI. 7. Provide combination smoke and carbon monoxide detectors, with built-in audible and visual alarm compliant with NFPA 72, in each kitchen, living room and sleeping space in compliance with the NYCBC. Detectors shall be hard wired to electrical circuits with battery back up. 8. All interior and exterior lighting shall use fluorescent or compact fluorescent lamps. All outdoor lighting shall be controlled by photocell. All interior lighting fixtures shall be ceiling or wall mounted with shatterproof lenses.

	Design Standard and Performance Specification
	9. Electric service entrance connection at each IHU shall be located on the exterior in vandal proof, locked and weather proof junction boxes. 10. Lighting Control: height of lighting controls shall comply with UFAS 4.27.3. Provide means to control at least one source of bedroom light from one bedside location.
Phone and Data	Each IHU one and three bedroom units to be provided with telephone, data and cable connections to be located in each living room and bedroom. Service entrance connection shall be located on the exterior in vandal proof, locked and weather proof boxes.
Natural Light and Ventilation	1. Each dwelling unit shall provide a minimum of natural light equal to 10% of floor area and a minimum of natural ventilation equal to 5% of floor area in compliance with Chapter 12 of the NYCBC. Natural light and ventilation may be provided by operable glazed windows and doors or other means approved in the NYCBC. 2. Regardless of the minimum code requirements, the vendor should strive to design each IHU to be light and airy and maximize the area of operable glazed windows and doors to provide as much natural light and ventilation as possible.
Heating, Ventilation and Air-Conditioning	1. Each IHU shall be equipped with a HVAC system (with warranty) capable of maintaining living space winter conditions of maximum 72F (22C) and summer conditions of minimum 75F(24C) with 50-55% relative humidity. 2. All heating and cooling systems must meet Energy Star qualifications. 3. IHU shall have a minimum Air Exchange Rate per Hour (ACH) of .35 (35%) of outdoor air being introduced into the unit per hour. Ventilation shall be in addition to any natural ventilation from windows and/or doors. Documentation must be provided to show how all supply and return air is extracted, delivered and distributed. 4. Units shall be designed to meet industry minimum standards for residential ventilation and acceptable indoor air quality per the American Society of Heating, Refrigeration, and Air-Conditioning Section 62 (ASHRAE 62). 5. Electric baseboard radiation, and through wall heat pumps with electric resistance supplement as required, or a combination of both are acceptable for Heating, Ventilation and Air Conditioning services. Also acceptable are packaged HVAC units that require wall louvers for heat rejection. In all cases, adequate zoning for individual spaces is preferred and noise criteria shall be as recommended by ASHRAE or other recognized authority.

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2. Egress Windows: Each IHU dwelling unit shall provide emergency and escape outside window openings in each sleeping room or space (including living rooms with sofa beds), unless the space has an exit door, in compliance with Article BC 1025 of the NYCBC and with the NYC Fire Code.

3. Fire Extinguisher: Each IHU shall be equipped with one 5lbs dry chemical A-B-C fire extinguisher compliant with or exceeding the requirements of NFPA Standard 10, to be easily accessible in the kitchen area.</td></tr>
<tr><td>Fire Suppression</td><td>Fire Suppression System:
Article BC 903.2.7 of the NYCBC requires all Residential type occupancies, with the exception of one and two family detached dwellings not more than three stories in height, be provided with an automatic sprinkler system. In a post disaster environment a reliable Municipal source of water to support a sprinkler system, at locations where the IHU dwelling units may be located, may not be available or sufficient. The IHU Fire Suppression System shall be designed to integrate with available site municipal utilities and / or temporary water sources provided by others. Provide availability for fire pumps if necessary due to source water supply conditions.

Water Based Fire Suppression System:
• Design and provide water based automatic fire sprinkler system in compliance with NYCBC Section BC 903 for R2 occupancy. The provision of a sprinkler system shall not be considered for increase in permitted limits of building area, height, and egress and construction classification.
• Provide visual/audible device located on the exterior of the IHU, visible from a public way, providing alarm notification upon activation of the fire sprinkler system.
• Vendor shall submit system testing and independent listing agency documentation for approval and acceptance by the NYC Fire Department (FDNY) for this type of use.</td></tr>
<tr><td>Standpipe</td><td>Design and provide a standpipe system in compliance with NYCBC Section BC 905 as required for the proposed IHU building complex height and total floor area as prescribed in Section BC 905.3.1.</td></tr>
<tr><td>Air Quality</td><td>All materials, especially all particleboard and plywood products if used in building and/or furnishing the IHU must comply with the HUD code. Vendor must show compliance with 3280.308/309 of HUD’s Manufactured Housing Construction and Safety Standards. Products that use urea formaldehyde adhesive or resin are prohibited.

Vendor must use low or non-emitting materials for building and furnishing the IHU whenever feasible. Vendor must identify and document all known emitting materials that are used for the IHU, providing that they are indeed the lowest emitting materials in their class.

All IHU shall emit no or limited levels of formaldehyde. Once constructed, the IHU indoor</td></tr>
</table>

	Design Standard and Performance Specification
	formaldehyde level shall be less than 0.016 ppm (16 ppb) prior to OEM acceptance from the Manufacturer's plant. Units shall be tested according to the Indoor Air Quality Testing Procedures to confirm compliance. Proposals shall include documentation detailing Indoor Air Quality compliance in both unit design and unit testing.
Climate	1. Each IHU to be designed for summer and winter conditions for the New York City Climate Zone designated in the New York City Energy Conservation Code and New York State Energy Conservation and Construction code. Vender shall indicate in their proposal if the IHU design exceeds these minimum requirements and can be adaptable for other climate zones within the United States. 2. Summer design conditions to include adequate insulation values, heating ventilation and air-conditioning (HVAC) requirements, vapor barriers, and other protection against heat and humidity in compliance with the NYC Codes. Vendor shall provide in their proposal design information including calculations and details confirming compliance with such requirements. 3. Winter design conditions to include adequate insulation values, HVAC requirements, snow roof-load ratings, and other protection against cold weather hazards in compliance with the NYC Codes. Vendor shall provide in their proposal design information including calculations and details confirming compliance with such requirements.
QA / QC	The vendor's proposal shall include a fully documented Quality Assurance/Quality Control (QA/QC) Program with all relevant documentation, protocols, staff and procedures included within the proposal. QA/QC should be monitored by a independent third party inspection agency during both design phase and manufacturing process to ensure adherence to all relevant codes as well as the additional requirements detailed in this document. Third party QA/QC monitoring should be conducted on a daily basis by a recognized engineering firm with no conflicts of interest with the manufacturer and its contractors. QA/QC and in-plant production is also subject to the monitoring of OEM.
Installation	1. The IHU shall be capable to be delivered and installed by the vendor's personnel or by a third party contractor hired by the vendor. Proposals to include detailed installation plans and information regarding what unit-specific training is required. 2. The IHU shall be ready for hook-up to permanent municipal electric, sewage and water if available or temporary utility services as further described in this document. 3. Vendor shall indicate how IHU units will be deactivated and provide removal plans when no longer needed. The installation site is to be restored to original condition after removal.

New York City Office of Emergency Management Design Standards and Performance Specification for Interim Housing Units	
	Design Standard and Performance Specification
Reusability	1. The vendor shall demonstrate the IHU durability, transportability and storability (as well as any other additional design features) that permit and ensure cost effective reusability. OEM will assess how well the IHU can endure multiple installations and takedowns, can be easily and safely transported repeatedly, and be stored effectively without excessive maintenance or protection requirements. 2. Vendor shall describe how the IHU could be integrated into permanent housing in the community.
Permanency	The IHU shall be designed as a "temp-to-perm" solution. The vendor shall demonstrate and document design features that make it structurally feasible to install individual and/or stacked multiple dwelling units on to permanent foundation systems, connect to permanent municipal utilities, expand living and common spaces, and integrate the IHU into part of the larger permanent structure.
Warranty	Vendor's proposal shall indicate the terms of all warranties and all exclusions within that warranty. Warranty shall include the actual IHU and accessory appurtenances, Electrical Plumbing and Mechanical systems and all their components and accessories, Kitchen and Laundry appliances, Bathroom fixtures and furniture. The vendor shall be OEM's point-of-contact (POC) for all warranties. The vendor shall supply a POC for normal duty hours and after-hours. Non- emergency response and repair time shall be 48 hours and emergency response and repair time shall be 24 hours. The POC shall be dispatched during the time of delivery and installation to make necessary repairs.
Required Documentation	The following detailed documentation is to be submitted with vendor's proposal to demonstrate vendors ability to comply with this document prior to fabrication and deployment by the vendor of the housing complex to the selected site: 1. <u>Plans and Details</u>: Temporary and Permanent Foundation Systems. Temporary and Permanent Mechanical, Plumbing and Electrical Systems. Floor, Roof, Mechanical, Plumbing, and Electrical Plans, Elevations (four orientations), Building and Detail Sections ("key" structural components and assemblies), Details ("key" structural connections and architectural elements) and conceptual scale floor plans of the IHU including furniture (movable, attached and built-in) to be used and general room dimensions. Submit plans, details and specifications incorporating the requirements outlined in this document. Each set of plans and details shall demonstrate the ability of the IHU to be serviced by Permanent municipal utilities and services as described in this document and the ability to convert/transfer to temporary services thereafter. Submit sample site plans, on sample sites to be provided by OEM, for single unit and

	Design Standard and Performance Specification
	multiple stacked cluster unit applications. Proposed site plans shall include Fire protection, Fire Department access compliant with Article 503 of the NYC Fire Code, utility and service access locations, common community spaces, waste management plan, ADA access to ground floor units and general access and circulation to units above ground level. 2. Code Analysis: Provide code analysis to demonstrate compliance for the proposed building complex with the NYCBC for occupancy and construction classification; means of egress; maximum travel distance to egress; area and height limits; etc. 3. Analysis and Design: Calculations or Computer Modeling Results for Structural, HVAC, Electrical and Plumbing Systems including proposed temporary and alternate systems. 4. Inspection and Test Reports: Demonstrate compliance with any applicable design and code provisions noted herein. 5. Quality Assurance Manual: Include monitoring and inspection procedures, qualifications of QA personnel, and in-house training procedures. Relevant DAPIA and IPIA documentation should also be included confirming compliance to relevant codes and specifications noted within this document. 6. Field Assembly and Erection: Site requirements and limitations. Assembly and Erection Procedures, and Inspection Requirements. 7. Commissioning Specifications: Final Inspection and Field Functional Testing. 8. Occupant's Manual: Operational Instructions for all mechanical and electrical systems and appliances, and location of all safety and shut-off devices. Include maintenance and periodic testing and inspection requirements. 9. Cost Estimate: Submit cost estimates including a breakdown of manufacturing, transportation, installation and maintenance costs of the IHU for the proposed complex. Cost estimates shall consider installation and use of permanent municipal utilities, (power, water, sanitary) for a period of 18 to 24 months, disassembly and transport away from the site, and restoring the site to it's original condition.. Transfer to temporary utility services for prototype and evaluation purposes may occur during the period the temporary housing complex is in use.