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Memorandum

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Date February 22, 2019

Attention Mike Lisenbee – D.J. Powers & Assoc.

From D. Winn

Subject **CMI, Inc. – Energy Demand and Efficiency Measures Copies**

We have performed an evaluation of operational energy efficiency and design measures in accordance with City of San Jose General Plan Policy MS-2.8. The following provides a summary of design measures for energy efficiency, water use reduction, use of recycled materials, indoor environmental quality and other sustainability features.

The project is currently registered under the multiple building campus approach under USGBC LEED v4 BD+C NC and DC respectively:

1. 1000111381 China Mobile International
   a. 1000111391 China Mobile Master Site
      1) 1000111615 China Mobile Admin. Building
      2) 1000111616 China Mobile Data Building

The project is pursuing LEED v4 BD+C "Silver Rating" for both facilities on the CMI campus. See attached LEED Checklists. EQuest Energy models are currently in progress and LEED Fundamental Commissioning will be performed for each facility. The contractor credits have been implemented in the specifications including the mandate that the contractor hire a local LEED consultant to assist with the construction credits. See attached Div. 01 specifications.

Storage + Collection of Recyclables is designed with a campus intent by providing additional recycling storage containers at the trash enclosure on the site.

The innovation credits currently reflect innovations around Green Education, Construction Waste Management and Green Power. Please see the following section excerpted from the 018113.14 Sustainable Design Requirements:

Innovation in Design: Procurement for both the Admin. and Data Center Facility:

1000111615 China Mobile Admin. Building
1000111616 China Mobile Data Building

A. Green Education Innovation Point - Contractor to design/procure and mount (9) 5x7 3Form or Equal signs demonstrating sustainability narratives related to the construction credits received. Contractor to provide a one page color 8-1/2 x 11" Color document which will be used for guided tours (a script and tour stop/map description drawing) in accordance with the Green Education Credit. Contractor to provide a separate one page foldable 11"x17" color brochure describing the Construction Credits and benefits thereof.

B. Construction Waste Management Exemplary Performance Point - Contractor responsible for achieving the following LEED v4 LEED paths for the Data Center + Administrative facility (both Path 2 and Option 2) to achieve an innovation point:

Path 2. Divert 75% and Four Material Streams
Divert at least 75% of the total construction and demolition material; diverted materials must include at least four material streams.
and
OPTION 2. REDUCTION OF TOTAL WASTE MATERIAL
Do not generate more than 2.5 pounds of construction waste per square foot (12.2 kilograms of waste per square meter) of the building's floor area.

C Green Power and Carbon Offsets Exemplary Performance Point- Contractor responsible for purchasing a contract for qualified resources that have come online since January 1, 2005, for a minimum of five years, to be delivered at least annually. The contract must specify the provision of at least 100% of the project's energy from green power, carbon offsets, or renewable energy certificates (RECs).
Green power and RECs must be Green-e Energy certified or the equivalent. RECs can only be used to mitigate the effects of Scope 2, electricity use. Carbon offsets may be used to mitigate Scope 1 or Scope 2 emissions on a metric ton of carbon dioxide equivalent basis and must be Green-e Climate certified, or the equivalent.

3.2.2 Site Design: Energy Demand and Efficiency Measures

3.2.2.1 Maximum Load Demand

The projected maximum load demand for the proposed data center development at 6320 San Ignacio Ave, approximately 26 megawatts (MW) peak demand for the Data Center including the Office Areas. This load includes the power required to operate tenant information technology (IT) equipment as well as mechanical cooling systems, uninterruptible power systems (UPS) and general building lighting and power loads. The project applicant estimates the demand for maximum load anticipated with the proposed site improvements based on the occupancy of the data center building with data center uses supported by the proposed mechanical and electrical infrastructure.

3.2.2.2 Backup System Design

In data center designs, it is commonplace to build levels of systems and equipment redundancy into the overall electrical and mechanical infrastructure. The base number of systems that are required to serve the design load of the facility is referred to as "N". When redundant systems are added to the base quantity of systems, the number of redundant systems is referred to as "X", as in the representation "N+X". Most of the Data Center operation has "One" level of redundant systems is planned for this facility (i.e. X=1 or "N+1"). This level of redundancy allows operations to continue should a piece of major equipment (i.e. a generator, switchboard, UPS module) fail or need to be taken offline for maintenance. The balance of the Data Center Operation has 2 levels of redundant systems (i.e. X=2 or "N+2") associated with the UPS modules.

All standby generators, including redundant units, may be called into operation in the event of an interruption of the electric service from PGE. The output from the system during such operation would be limited to the maximum demand load of the buildings (approximately 26 MW).

3.2.2.2 Energy and Water Efficiency Measures

Due to heat generated by the data center IT equipment, cooling systems are one of the primary uses of energy in the buildings. To reduce greenhouse gas emissions and reduce the use of energy related to building operations, the project proposes to implement a number of efficiency measures related to selection and operation of electrical and mechanical equipment for building cooling. Table 3.2-2 lists the proposed efficiency measures related to mechanical and electrical systems. Table 3.2-3 lists additional energy efficiency measures associated with tenant improvements and water use reduction.

Table 3.2-2

Efficiency Features – Project Mechanical and Electrical Systems

Optimize Energy Performance	a. **Standards** CA Title 24 energy requirements will be exceeded. ASHRAE TC9-9 extended thermal envelope values will be utilized to allow economizer operation during greater periods of the year with A/C compressors operating only during peak load periods. b. **Measurement & Verification** Metering will be provided to validate conservation measures c. **Efficient Equipment** High efficiency (96%+) UPS, indirect evaporative cooling (IDEC) & variable refrigerant flow (VRF) cooling systems. d. **Enhanced Commissioning** Independent commissioning agent reviews system design and verifies the performance of the installed systems (CAPCOA Best Management Practice; Measure BE-3). e. **Cool Roof**: Reduce Heat Island effect, the roofing materials meet Solar Reflectance Index value (SRI) of at least 78 for low sloped roofs, as well as meeting the following regulations: 1. EnergyStar/Title 24 Requirements for Cool Roofing 2. LEED/Green Globe Requirements for Cool Roofing
Heating, Ventilation & Air Conditioning (HVAC)	a. **High-Efficiency Systems** Indirect Evaporative Cooling (IDEC) systems for data halls and Variable Refrigerant Flow (VRF) systems for office/support areas. Systems designed using ASHRAE TC9-9 extended thermal envelope values (max. 26.5 deg.C/79 deg. F) to allow economizer operation during greater periods of the year with A/C compressors operating only during peak load periods. Scalable cooling systems with only those units required to serve the

	actual load in operation to improve efficiency. b. **Waste Heat from data Center to Heat Office** A portion of 95-98F air from the data center will be utilized to satisfy all of the office area heating requirements. c. **Airflow Management** Hot aisle containment, separated ceiling plenum to provide physical separation of hot and cool air in data halls. Use of blanking panels and other measures to avoid bypass of cold air
Lighting	a. **LED Lighting** High-efficiency, low mercury content LED lamping used throughout b. **Lighting Controls** Automatic-off and occupancy based lighting control. Dimming control for all spaces with lighting loads >0.5 watts/sf. Automatic demand-limiting control of lighting per Title 24 requirements.
Electrical	a. High-efficiency (96%+) UPS systems. b. Separate metering of building mechanical and lighting loads to validate compliance and conservation measures.

Table 3.2-3

Efficiency Measures for Tenants and Water Use Reduction

Recycling Program	a. Implementation of LEED guidelines for the storage and collection of recyclables (LEED CS 2009 - Materials and Resources/ Prerequisite 1), intended to facilitate the reduction of waste generated by building occupants that is hauled to and disposed of in landfills. Additionally, the building Owner has implemented the following Exemplary Policies: 1. 30% Recycled Content (LEED CS 2009 – Innovation and Design Process/ Credit 1.4), a 10% increase over LEED CS 2009 - Materials and Resources Credits 4.2. 2. 95% Waste Recycling (LEED CS 2009 – Innovation and Design Process/ Credit 1.5), a 20% increase over LEED CS 2009 - Materials and Resources Credit 2.2.
Operation Practices	a. The building Owner has implemented the LEED policy for Green cleaning (LEED CS 2009 - Innovation & Design Process/ Credit 1.1), intended to reduce the exposure of building occupants and maintenance personnel to potentially hazardous chemical, biological and particulate contaminants, which adversely affect air quality, human health, building finishes, building systems and the environment.

IT Equipment	a. Install Energy Star equipment will be installed where applicable.
Electrical and Lighting	a. High-efficiency (96%+) UPS systems. b. Separate metering of building mechanical and lighting loads to validate compliance and conservation measures. c. High-efficiency, low mercury content LED lamping used throughout d. Automatic-off and occupancy based lighting control e. Dimming control for all spaces with lighting loads >0.5 watts/sf. f. Automatic demand-limiting control of lighting per Title 24 requirements.
Heating, Ventilation & Air Conditioning (HVAC)	a. Indirect Evaporative Cooling (IDEC) systems for data halls b. Systems designed using ASHRAE TC9-9 extended thermal envelope values (max. 26.5 deg.C/79 deg. F) to allow economizer operation during greater periods of the year with A/C compressors operating only during peak load periods. c. Scalable cooling systems with only those units required to serve the actual load in operation to improve efficiency. d. Utilization of data center waste heat to satisfy 100% of the office area ~ 57,000 SF e. Hot aisle containment, separated ceiling plenum to provide physical separation of hot and cool air in data halls. Use of blanking panels and other measures to avoid bypass of cold air into hot aisles.
Materials	a. LEED guidelines for the storage and collection of recyclables have been implemented (LEED CS 2009 - Materials and Resources/ Prerequisite 1), facilitating the reduction of waste generated by building occupants that is hauled to and disposed of in landfills. Additionally, the building Owner has implemented the following Exemplary Policies: 1. 30% Recycled Content (LEED CS 2009 – Innovation and Design Process/ Credit 1.4), a 10% increase over LEED CS 2009 - Materials and Resources Credits 4.2. 2. 95% Waste Recycling (LEED CS 2009 – Innovation and Design Process/ Credit 1.5), a 20% increase over LEED CS 2009 - Materials and Resources Credit 2.2. b. The building Owner has implemented the following LEED policies regarding Materials and Resources: 1. Regional Materials, 20% (LEED CS 2009 - Materials and Resources/ Credits 5.1 and 5.2), ensuring that all building materials or products have been extracted, harvested or recovered, as well as manufactured within a 500 mile (800 kilometer) radius of the project site. 2. Certified Wood (LEED CS 2009 - Materials and Resources/ Credit 6), ensuring that a minimum of 50% (based on cost) of

	wood-based materials and products that are certified in accordance with the Forest Stewardship Council's principles and criteria, for wood building components.
Indoor Environmental Quality	a. The building Owner has implemented the following LEED policies regarding Indoor Environmental Quality: 1. Outdoor Air Delivery Monitoring (LEED CS 2009 - Indoor Environmental Quality/ Credit 1), ensuring that CO2 concentrations are monitored within all densely occupied spaces. 2. Construction IAQ Management Plan (LEED CS 2009 - Indoor Environmental Quality/ Credit 3), implementing the following strategies: ▪ During construction, meet or exceed the recommended control measures of the Sheet Metal and Air Conditioning National Contractors Association (SMACNA) IAQ Guidelines For Occupied Buildings Under Construction, 2nd Edition 2007, ANSI/SMACNA 008-2008 (Chapter 3). ▪ Protect stored on-site and installed absorptive materials from moisture damage. ▪ Providing filtration media at the return air grille of air handlers utilizing filtration media with a Minimum Efficiency Reporting Value (MERV) of 8 as determined by ASHRAE Standard 52.2-1999. 3. Low Emitting Materials: ▪ Adhesives and Sealants (LEED CS 2009 - Indoor Environmental Quality/ Credit 4.1), ensuring that all adhesives and sealants used within the building's weatherproofing system meet the minimum VOC content as prescribed by LEED. ▪ Paints and Coatings (LEED CS 2009 - Indoor Environmental Quality/ Credit 4.2), ensuring that all paints and coatings used inside the building's moisture barrier meet the minimum VOC content as prescribed by LEED. ▪ Flooring Systems (LEED CS 2009 - Indoor Environmental Quality/ Credit 4.3), ensuring that the flooring systems meet the following criteria: o Carpet: Must meet the testing and product

	requirements of the CRI Green Label Plus program. o Cushion: Must meet the testing and product requirements of the CRI Green Label program. o Adhesive: Must meet the requirements of EQc4.1. o Hard surface flooring must be certified as compliant with the FloorScore standard. o Concrete, wood, bamboo and cork floor finishes such as sealer, stain and finish must meet the requirements of South Coast Air Quality o Management District (SCAQMD) Rule 1113, Architectural Coatings, rules in effect on January 1, 2004. o Tile setting adhesives and grout must meet South Coast Air Quality Management District (SCAQMD) Rule 1168. VOC limits correspond to an effective date of July 1, 2005 and rule amendment date of January 7, 2005. ▪ Composite Wood & Agrifiber Products (LEED CS 2009 - Indoor Environmental Quality/ Credit 4.4), ensuring that all composite wood and agrifiber products contain no add ureaformaldehyde. Additionally, all laminating adhesives used to fabricate on-site and shop applied composite wood and agrifiber assemblies must not contain added urea-formaldehyde. 5. Indoor Chemical and Pollutant Source Control (LEED CS 2009 - Indoor Environmental Quality/ Credit 5), ensuring that MERV filtration ratings of at least 13 are provided. 6. Thermal Comfort (LEED CS 2009 - Indoor Environmental Quality/ Credit 7), ensuring the heating, ventilating and air conditioning (HVAC) systems and the building envelope meet ASHRAE Standard 55-2004.
Water Use Reduction	a. Ultra low flow toilets and faucets will be used throughout b. Increasing the evaporative cooling water cycles of concentration to 12.

Power Usage Effectiveness During Operation

Power Usage Effectiveness (PUE) is a metric used to compare the operating efficiency of data center facilities. PUE is defined as the ratio of total power use of a facility to the power used strictly by the information technology (IT) equipment (e.g. PUE=Total Facility Power/IT Equipment Power). For example, with a PUE of 2.0 a data center would use (2) watts of total power for every (1) watt of power used by the IT equipment.

China Mobile International (USA), Inc. (CMI), the project applicant, builds and operates multi-tenant data centers. Their business model is to provide the infrastructure to house, power, cool and deliver data connectivity for critical IT equipment of their tenants. Computing equipment is provided by the tenants. Unlike an individual company-owned and operated enterprise data center, CMI does not control the specifications and operation of its tenants' IT equipment.

Conclusion

As described above, the project includes a variety of measures to minimize total power usage of the data center buildings and provide for sustainability in operation. It is projected that the energy efficiency measures will result in a facility PUE of approximately 1.273 on annualized basis and 1.40 under peak conditions of outdoor temperature/humidity. The operational efficiency of these facilities will exceed relevant requirements of building codes, Title 24 and LEED CS 2009 EA Prereq 1 and is projected to obtain at least 11 points in Credit 1 for Optimization of Energy Performance.

Please contact our office if you have questions or would like to discuss any items further.