ORIGINAL

BEFORE THE HAWAII COMMUNITY
DEVELOPMENT AUTHORITY

CCED KAK 2015-2

In the Petition of	)	DOCKET NO. _____
	)	
OLIVERMcMILLAN PACIFIC RIM, LLC,	)	
	)	
for waiver and suspension of § 15-217-55(k)(2) of the Mauka Area Rules as applied to the Symphony Honolulu Project.	)	
	)	

PETITION FOR WAIVER AND SUSPENSION OF § 15-217-55(k)(2) OF THE MAUKA AREA RULES

EXHIBITS "1" – "7"

AND

CERTIFICATE OF SERVICE

McCORRISTON MILLER MUKAI MacKINNON LLP
WILLIAM C. McCORRISTON
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Telephone: (808) 529-7300

Attorneys for Petitioner
OLIVERMcMILLAN PACIFIC RIM, LLC

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PETITION FOR WAIVER AND SUSPENSION OF § 15-217-55(k)(2) OF THE MAUKA AREA RULES

TO THE HAWAII COMMUNITY DEVELOPMENT AUTHORITY:

OLIVERMcMILLAN PACIFIC RIM, LLC (the "***Petitioner***"), by and through its attorneys, McCorriston Miller Mukai MacKinnon LLP, pursuant to Section 15-219-98 of the Hawaii Administrative Rules ("***HAR***") respectfully requests that the Hawaii Community Development Authority (the "***Authority***") waive and suspend the Authority's visible light transmission requirement established by Section 15-217-55(k)(2) of the Mauka Area Rules (the "***Glass Rule***"). The Glass Rule requires that the Symphony Honolulu Project's glass have a measured visible light transmission level ("***VLT***") of at least fifty percent (50%).[1] **Petitioner respectfully requests that the Authority (1) waive or permanently suspend the Glass Rule as to the Symphony Honolulu Project (Development Permit No. KAK 12-075), that such waiver or permanent suspension be retroactive from April 5, 2015, and (2) suspend the Glass Rule for the Kaka'ako Community Development District in general pending further review, analysis, and research prior to consideration of an appropriate modification and/or amendment to remove the conflict and negative impacts of the current Glass Rule on other**

[1] For purposes of this Petition, "VLT" is used to mean Visible Light Transmittance, which is the proper terminology.

Mauka Area Rules. Petitioner further requests that this matter be set for expedited review and determination as time is of the essence.

I.

Petitioner is the developer of the Symphony Honolulu Project situated at the corner of Ward Avenue and Kapiolani Boulevard (TMK No. (1) 2-1-044: 049, CPR Nos. 0001 thru 0389).

Correspondence and communications regarding the Petition should be addressed to:

OliverMcMillan Pacific Rim, LLC
c/o McCorriston Miller Mukai MacKinnon LLP
William C. McCorriston, Esq.
D. Scott MacKinnon, Esq.
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II.

The implementation of the Glass Rule has resulted in an unfortunate set of circumstances preventing development projects from satisfying Authority-mandated minimum energy savings under other Mauka Area Rules. The unintended consequences of the Glass Rule places it in a direct conflict with and contrary to the goals and requirements of the Mauka Area Rules' "Green Building" section, § 15-217-59, which mandates that projects meet at least the base Leadership in Energy and Environmental Design ("***LEED***") standards. Petitioner now seeks the Authority's retroactive waiver or permanent suspension of the Glass Rule as applied to the Symphony Honolulu Project and the Glass Rule's suspension as to the Kaka'ako Community Development District in general pending further review, analysis, and research and potential modification/or amendment, as (1) the Glass Rule makes it impossible for a project with a window-wall design, such as the Symphony Honolulu Project, to meet both the Glass Rule and the required LEED

minimums, and (2) a waiver and suspension of the Glass Rule will not result in any harm to the public.

Increasing the VLT Generally Increases a Glass' Solar Heat Gain Coefficient, Making the Building Less Environmentally Friendly

The purpose of the Mauka Area Rules' "Green Building" section is to provide "standards intended to result in a responsible development pattern that conserves natural resources and provides a healthy environment for inhabitants of the mauka area." Mauka Area Rules § 15-217-59(a). However, the Glass Rule creates the unintended consequence of increasing a project's drain on natural resources and producing an unhealthy environment for both consumers and the general public due to the direct correlation between a glass type's VLT and Solar Heat Gain Coefficient ("***SHGC***"), which significantly and negatively affects energy performance.

Glass with a high VLT (*i.e.*, a VLT of 40% or greater) is undeniably less energy efficient, resulting in higher electrical cooling needs for apartment units and higher electric bills for consumers. See Exhibit "1" (Architects Hawaii, Ltd. Letter); see also Exhibit "2" (JA Weir Associates Letter); Exhibit "3" (Notkin Hawaii, Inc. Letter). The SHGC, which measures the heat transmitted through the glass to a building's interior, increases as VLT increases. See Exhibit "1"; see also Exhibit "2." Logically, the higher the SHGC value, the less energy efficient the glass is. See Exhibit "1"; see also Exhibit "2."

Higher VLT requirements, and therefore less energy efficient glass, necessitates more costly mechanical systems to offset internal heat gains. See Exhibit "1." In turn, this "will directly affect sales prices making residential units less affordable to the local population of Hawaii." Id.; see also Exhibit "4" (Heyer & Associates LLC Letter). Increased electrical use also increases the pollutants entering the air we breathe, contributing to global warming and an environment that is overall detrimental to our health. Consequently, the Glass Rule has

unintentionally imposed an undesirable development pattern on Kaka'ako Community Development District projects, mandating the use of glass that is far less energy efficient than other readily available alternatives. This directly conflicts with the "Green Building" section of the Authority's rules, increasing every project's drain on our natural resources by raising the cooling costs for all buildings in the Kaka'ako Community Development District.

It is also important to note that the stated purpose of the Glass Rule is "to provide views out of and into the building." Makua Area Rules § 15-217-55(k)(2) (emphasis added). This is particularly discouraging to future residents looking to live in Kaka'ako as any planned buildings will be located in an area already occupied by other high-rise buildings. The ability of neighbors in adjacent buildings to look into a unit during the daylight hours will adversely and negatively affect the unit owner's privacy within their unit and thus the unit's desirability. See Exhibit "4." Appropriate consideration of an owner's privacy while in the unit during daylight hours should have been given more substantial deference when creating the Glass Rule. As currently composed, the Glass Rule will lead to a substantial number of unit owner's keeping blinds, drapes or other window coverings closed during the day to preserve individual privacy within the unit and to reduce heat transmission through the glass to assist with cooling within the unit. There is little or no visibility through the windows when the blinds, drapes or other window covering are down, which also increases the energy need for artificial lighting during daylight hours. See Exhibit "1."

There are only five glass options commercially available that both have a VLT of 50% or more and can be used in the Symphony Honolulu Project's window-wall design. See Exhibit "2." Of those five, the most energy efficient type has a SHGC of 0.22. See id; see also Exhibit "3." In comparison, the glass purchased for the Symphony Honolulu Project's tower has

a SHGC of 0.19, which results in a comparative energy savings of approximately 16%. See Exhibit "2." This glass, with its stated VLT of 28%, was approved for installation by the City and County of Honolulu on January 9, 2014. See Exhibit "5" (Superstructure Permit); see also Exhibit "6" at 10 (The Glazing Portion of OMPR's Superstructure Permit Application). Most energy efficient glass has an SHGC of less than 0.20. See Exhibit "2." Understandably, following the Glass Rule will require that development projects completely abandon the window-wall design for designs that use "significantly less glass, up to 50% solid walls, or a combination thereof." See Exhibit "1." As the Glass Rule's effects are an impediment to and run contrary to the Authority's purpose of encouraging sustainability and development, it should be waived and suspended.

The Glass Rule Prevents Projects With Window-Wall Designs From Meeting Minimum LEED Standards and Makes LEED Silver, Gold, or Platinum Certification Impossible for All Projects with a VLT of 50% or Higher

The "Green Building" section adopts LEED standards, requiring that projects "qualify for the applicable base LEED rating system." Makua Area Rules § 15-217-59(c)(1). To qualify for the applicable base LEED rating system a project must show 10% improvement and increased performance above the American Society of Heating, Refrigerating, and Air-Conditioning Engineers 90.1-2007 standards. See Exhibit "1." There is no commercially-available glass with a VLT of 50% of greater that meets the minimum increased performance required by LEED of 10% when used in a window wall design. See Exhibit "1"; see also Exhibit "3." The Symphony Honolulu Project's inability to meet the base LEED rating required by the "Green Building" section with any commercially available glass with a VLT of 50% or more demonstrates a very serious problem that will ultimately become a district-wide problem if left unaddressed.

Both the Hawaii Legislature and the Authority make energy efficiency a priority in development and construction, as evidenced by the Authority's stated purpose in Section 206E-1 of the Hawaii Revised Statutes and by the passage of the "Green Building" section in the Mauka Area Rules. The emphasis on LEED standards and encouragement for projects to reach for LEED silver, gold, and platinum further evidences the importance of energy efficiency in upcoming and future projects in Kaka'ako. See Exhibit "1." However, Petitioner's consultants have opined that LEED standards are completely unreachable under the current Glass Rule for any window design. See id.; see also Exhibit "3."

Notably, there is already pre-established precedent for VLTs lower than 30% in the greater Honolulu area. Petitioner's research failed to find a single high-rise tower in Honolulu that has a VLT close to 50%. See Exhibit "1." Architects Hawaii, Ltd.'s list in Exhibit "1," attached hereto, indicates that local designers, who go through an in-depth research and planning process using experts and consultants to plan their projects in Honolulu, have unanimously agreed that glass with a VLT of 20% to 30% is the best option to balance the desires of both consumer and government, while accounting for the sunny local environment. The importance of energy efficiency and the impediment and conflict between the Glass Rule and the goals set by both LEED and the "Green Building" section of the Mauka Area Rules support Petitioner's request for a waiver from and the suspension of the Glass Rule. In considering the relative importance of these two rules, the Hawaii Legislature and the Authority point clearly to the "Green Building" section of the Mauka Area Rules being paramount and controlling.

The Guidance Provided to the Authority by its Consultant Evidences the Need for Waiver and Suspension of the Glass Rule

The advice from the Authority's code/rule consultant, Torti Gallas and Partners ("***Torti Gallas***"), provided in the drafting and codifying of the Glass Rule, supports Petitioner's position

that the Glass Rule, as it stands today, should be waived or permanently suspended as to the Symphony Honolulu Project and suspended indefinitely to research ways to amend or modify it to meet its intended scope without substantially impeding or conflicting with a project's ability to meeting the requirements and standards imposed by the "Green Building" section of the Mauka Area Rules. Torti Gallas, which the Authority hired to provide form-based code consulting for the Mauka Area Rules, suggested to the Authority that VLT requirements are "typically applied to ground floor conditions and not necessarily for upper floor tower glass." See Exhibit "7" (Torti Gallas Letter). While Torti Gallas did suggest a possible VLT standard of 50% or greater in order to increase the visibility "in and out" of buildings, it was not asked to evaluate such a visibility-based VLT rule in relation to (a) energy calculations using Hawaii sun conditions to achieve LEED or other energy goals set forth in § 15-217-59 of the Mauka Area Rules, or (b) the number of glass products meeting that criteria that are commercially available with a low SHGC to facilitate energy efficiency and savings. Id.

Conclusion

Although the current VLT standard is 50% or higher, Petitioner can provide specific reasons as to why it chose the glass currently being installed in the Symphony Honolulu Project. The characteristics of the glass chosen for the Symphony Honolulu Project (*e.g.*, the reflectivity, VLT, SHGC, color, etc.) composes a beautifully designed and iconic tower in the Honolulu skyline and does not create any public nuisance or harm. Conversely, there are no compelling reasons why the Symphony Honolulu Project's glass has to have a VLT of at least 50%, as no harm to the public will result if the Glass Rule is waived and suspended. Petitioner has found no evidence that a lower VLT, like that of the Symphony Honolulu Project's, impairs the daytime visibility out of a unit or creates more glare or reflectivity. On the contrary a lower VLT

provides good visibility out of a unit, while enhancing the ability of an owner to leave the blinds, drapes or other window coverings open during daylight hours, and contributes significantly to achieving the mandated energy savings goals under § 15-217-59 of the Mauka Area Rules. When forced to choose between the two rules, Symphony chose to satisfy the "Green Building" section's LEED requirements over the Glass Rule. Petitioner submits that the Authority should not maintain a rule that substantially impairs or prevents projects in the Kaka'ako Community Development District from meeting the minimum LEED standards and the requirements of the "Green Building" section.

Finally, as time is of the essence at this point in the Symphony Honolulu Project's construction and development, Petitioner respectfully requests that the Authority set this Petition for expedited review and decision. Any delay in the resolution of this Petition will certainly irreparably harm Petitioner and the timeliness of the promised delivery to its third-party purchasers of the residential units in the Symphony Honolulu Project.

III.

WHEREFORE, Petitioner requests, in the public interest and as Petitioner's request will not endanger the health, safety, or welfare of the Kaka'ako Community Development District, that the Authority:

1. Waive or permanently suspend the Symphony Honolulu Project's compliance with the Glass Rule, codified in Section 15-217-55(k)(2) of the Mauka Area Rules;
2. Specify that the Symphony Honolulu Project's waiver or permanent suspension is retroactive as of April 5, 2015;

3. Suspend the Glass Rule for the Kaka'ako Community Development District pending further review, analysis, and research prior to consideration of an appropriate modification and/or amendment to remove the conflict and negative impacts of the current Glass Rule on other Mauka Area Rules; and

4. Set this matter for expedited review and determination.

Petitioners also request such other and further relief as may be just and equitable.

DATED: Honolulu, Hawaii, May 28, 2015.

WILLIAM C. McCORRISTON
D. SCOTT MacKINNON

Attorneys for Petitioner
OLIVERMcMILLAN PACIFIC RIM, LLC

March 19, 2015

Mr. Dan Nishikawa
President
Oliver McMillan Pacific Rim, LLC.
733 8th Avenue
San Diego, Ca 92101

Subject:
Symphony Honolulu
HCDA 15-217-55(k)(2) – 50% VLT Rule

Dear Dan,

As you have requested, we hereby offer our summary of recent discussions, findings, and professional opinion on Symphony Honolulu's design as regarding HCDA Chapter 217 Mauka Area Rules Section 15-217-55(k)(2) and its windows rule of 50% Visual Light Transmittance (VLT) for glazing above the ground floor level. To note, Symphony Honolulu's predominantly glass tower façade encloses 288 market rate apartments and 100 reserved apartments, providing high quality living environments for its residents.

HCDA's 50% VLT or greater rule as it relates to urban high-rise development creates a significant challenge and difficulty on design and engineering. This is because it is in direct conflict with both the State Energy Code and Basic LEED criteria required by HCDA Rules. State of Hawaii HCDA Mauka Area Rules 15-217-59(c)(1) reference Basic LEED minimum criteria of Energy and Atmosphere (EA) prerequisite which requires 10% improvement and increased performance above the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) 90.1-2007 standards. AHL and our specialist glazing and mechanical engineers have found no glazing product that can achieve both HCDA 50% VLT Rule and HCDA Basic LEED EA prerequisite of 10% increased energy performance requirements. Please know that this 10% minimum increase to energy performance is only a prerequisite of Basic LEED certification. Higher glazing performance requirements for LEED Silver, Gold, and Platinum would be needed to achieve EA credit 1 which, due to its significance in reduced energy consumption, offers the single highest total of points (19) among all other LEED credits.

While HCDA 15-217-59(c)(1) rule requires minimal Basic LEED Certification criteria, the consensus intent of professionals and goal of the public, community authorities, and governments worldwide is to achieve LEED rated certification levels of Silver, Gold, and Platinum certification. High-rise condominium projects similar to Symphony Honolulu would need to target energy savings for Silver at 30% increased performance, Gold would be in the range of 30%-48%, and Platinum would be 48% to a net zero building. Through our research, the limited available glazing products which meet HCDA's 50% VLT or higher Rule create significant hardship in the designing to HCDA's Basic LEED prerequisite . Additionally we find it not possible to pursue the desirable and highly recommended higher LEED Silver, Gold, or Platinum ratings with the current VLT Rule.

ARCHITECTS HAWAII
LIMITED

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EXHIBIT "1"

We believe in today's urban high-rise condominium environment that the enhanced views and open space quality that larger areas of glass provide creates the best possible living environments for residents and should be encouraged in planning rules.

HCDA's 50% VLT Rule not only presents difficulty and hardship for designers and engineers, but also for residents, developers, and Honolulu's economy overall. To meet both HCDA 50 % VLT and energy performance rules, buildings would need to be designed with significantly less glass, up to 50% solid walls, or a combination thereof. These designs would significantly reduce LEED goals and suggested credits for daylight and views to the outside; resulting in reduced overall quality of life for residents.

Planning rules which support energy conservation should do so through coordinated technical requirements. The data submitted herein verifies that basically higher VLT equates to less energy efficient glazing. This in turn translates to more costly mechanical systems needed to offset heat gain within the units and ultimately effects residents through higher monthly energy costs. More costly mechanical systems directly affect sales prices making residential units less affordable to the local population of Hawaii.

We have compiled the attached which to the best of our knowledge is a comparative spreadsheet of high-rise condominium projects under HCDA and City and County of Honolulu zoned ordinances; showing their associated tower glazing VLT and Solar Heat Gain Coefficient (SHGC) values. SHGC is the measurement of heat gain through the glazing and into the interior of the unit which in Hawaii requires mechanical cooling to offset. In general the higher the SHGC value the lower efficiency in energy performance. It is important to note a few general findings:

a. SHGC increases as the value of VLT increases.
b. No project on this list would comply to HCDA's 50% VLT Rule (nearest is 40% VLT).
c. Symphony's VLT value is above average amongst the group and offers on average a higher energy performing SHGC value.

Through our research, leading glazing manufacturers and experts recommend glazing VLT values are within 20-40% for balance of light quality, interior comfort, and energy conservation. An increase of VLT value above 40% will present undesirable heat gain, glare, and also cast heavy shadows off furnishings and other items within the building interior space. In these cases, building occupants were found to lower and keep window shade treatments closed during daylight hours which removes the views suggested by LEED and required additional energy for artificial light to balance the shaded natural light.

ARCHITECTS HAWAII
LIMITED

In conclusion, we believe that the 50% VLT or greater requirement within HCDA Mauka Area Rules 15-217-55(k) (2) should be reconsidered for future HCDA projects and should not apply to Symphony Honolulu. We further believe that should these 2 actions take place there would be no adverse effects on the community at large and in fact Symphony Honolulu's residents would benefit greatly.

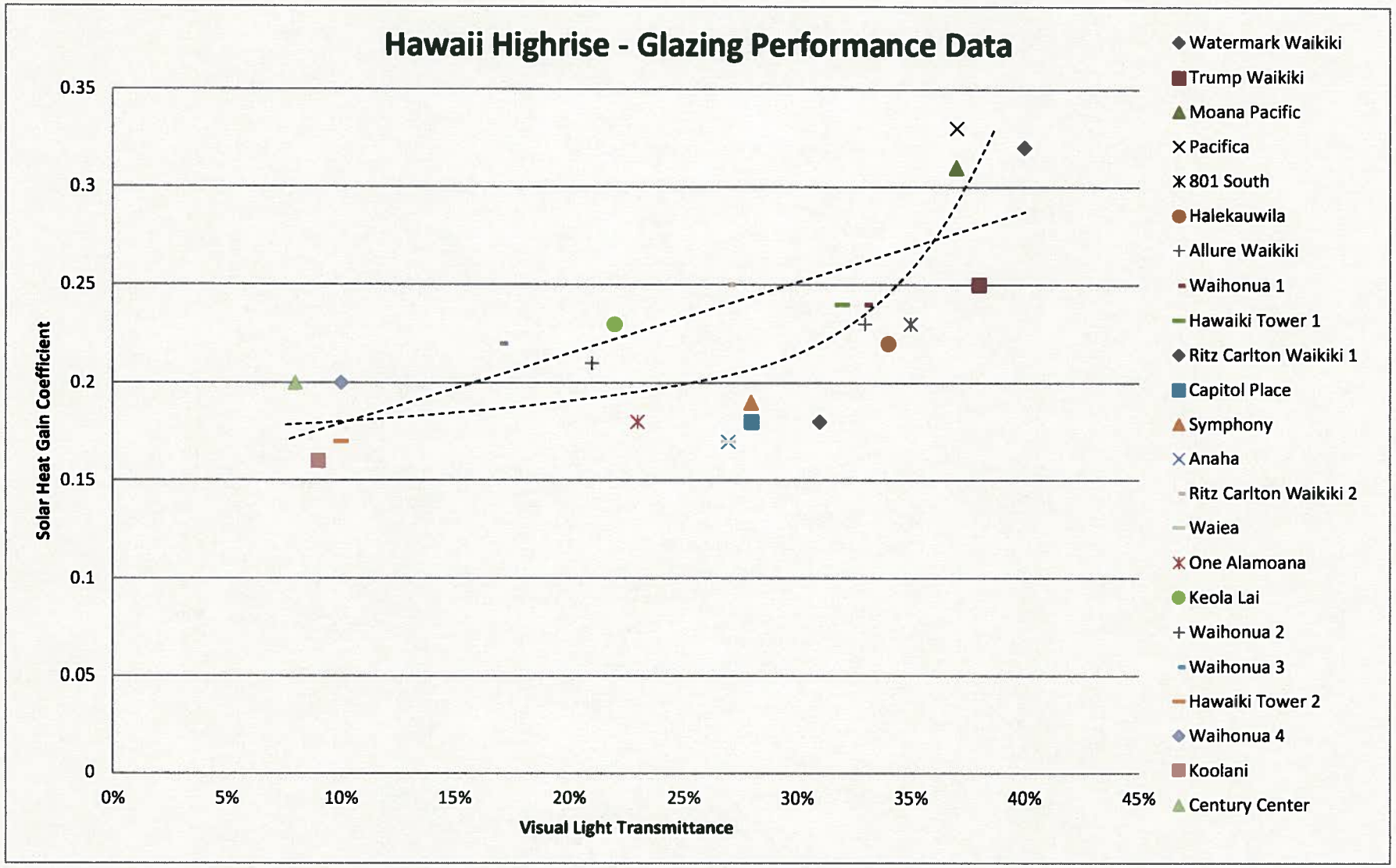
Sincerely,

David Miller, AIA
Chairman and Principal
Architects Hawaii, Ltd.

cc: Serge Krivatsy, OM; Daniel Moats, AHL

Hawaii Highrise - Glazing Performance Data
March 12, 2015

Project	Zoning	Visual Light Transmittance (VLT)	Solar Heat Gain Coefficient (SHGC)	Manufacturer - Product
Watermark Waikiki	C&C of Honolulu	40%	0.32	Guardian - SunGuard LE 40
Trump Waikiki	C&C of Honolulu	38%	0.25	
Moana Pacific	HCDA	37%	0.31	Viracon VE1-42
Pacifica	HCDA	37%	0.33	Shanghai Pilkington
801 South	HCDA	35%	0.23	Shanghai Pilkington YBE-0140
Halekauwila	HCDA	34%	0.22	
Allure Waikiki	C&C of Honolulu	33%	0.23	China Southern CER 65-46
Waihonua 1	HCDA	33%	0.24	Shanghai Pilkington
Hawaiki Tower 1	HCDA	32%	0.24	Viracon VE2-40
Ritz Carlton Waikiki 1	C&C of Honolulu	31%	0.18	Viracon VUE1-30
Capitol Place	C&C of Honolulu	28%	0.18	Viracon VRE7-38
Symphony	HCDA	28%	0.19	Viracon VRE1-30
Anaha	HCDA	27%	0.17	Guardian-SNR43
Ritz Carlton Waikiki 2	C&C of Honolulu	27%	0.25	Viracon VE19-42
Waiea	HCDA	27%	0.17	Guardian-SNR43
One Alamoana	HCDA	23%	0.18	Viracon VRE26-38
Keola Lai	HCDA	22%	0.23	Viracon VE4-42
Waihonua 2	HCDA	21%	0.21	Shanghai Pilkington
Waihonua 3	HCDA	17%	0.22	Shanghai Pilkington
Hawaiki Tower 2	C&C of Honolulu	10%	0.17	Viracon VS2-14
Waihonua 4	HCDA	10%	0.20	Shanghai Pilkington
Koolani	HCDA	9%	0.16	Viracon VS8-14
Century Center	C&C of Honolulu	8%	0.20	Viracon VS1-08


Hawaii Highrise - Glazing Performance Data
Solar Heat Gain Coefficient
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
0%
5%
10%
15%
20%
25%
30%
35%
40%
45%
Visual Light Transmittance
Watermark Waikiki
Trump Waikiki
Moana Pacific
Pacifica
801 South
Halekauwila
Allure Waikiki
Waihonua 1
Hawaiki Tower 1
Ritz Carlton Waikiki 1
Capitol Place
Symphony
Anaha
Ritz Carlton Waikiki 2
Waiea
One Alamoana
Keola Lai
Waihonua 2
Waihonua 3
Hawaiki Tower 2
Waihonua 4
Koolani
Century Center

JA WEIR ASSOCIATES

13 March 2015

Oliver McMillan
Bishop Square | Pauahi Tower
1003 Bishop Street, #2288
Honolulu, Hawaii 96813

Attention: Kris Hui **via E Mail**

Dear Kris:

Symphony Honolulu
Exterior Wall Design and Construction
Discussion on High Performance Glass

We have carried out various discussions with you and the team in recent days with regards to properties of glass specific to high performance coated units. Kindly allow us to recap these discussions as follows.

The use for glass in commercial buildings has evolved from the original purpose of allowing light into a space to becoming an integral part of the environmental system of the building. As a part of the environmental system, glass technology has had to adapt to include integrated solar control as a part of the product. This is especially true in the tropical and subtropical regions of the world where sunlight is predominant. What started as clear glass changed into the reflective coatings of the 1970's and 80's and then into the Low Emissivity coatings of the 1990's and 2000's. In order to provide the next level of performance in today's market, glass coatings have again evolved this time to become quite complex in makeup and now offer the combined benefits of many of the products that had come before. These new coatings are known as hybrids and may be made of up to fifteen layers of metallic film.

When studying or comparing the characteristics of glazing products, the terms typically used are Visible Light Transmittance (VLT) and Solar Heat Gain Coefficient (SHGC). Visible Light Transmittance can be best defined as the amount of light that passes through a pane of glass. The Solar Heat Gain Coefficient is a measurement for the amount of heat generated by the light (visible or infrared) that has passed through the glass (long wave conduction of heat due to glass absorption is not included in this measurement). Therefore, a simple means of understanding glass performance with these terms is that the more light that comes through a pane of glass (i.e., the higher the VLT), the worse the SHGC is which results in more heat buildup on the interior. In sunny climates such as Honolulu and Waikiki, the more heat that enters the building, the more energy it takes to neutralize this heat.

Chapter 15-217 of the Hawaii Administrative Rules (dated September 14, 2011) discusses the "visible light transmission level" of tower and ground floor glass on page 50, (k)(2) and stipulates a minimum level of 50% for the tower (70% for the ground floor). This clause is confusing as it uses the term "transmission" (level) which does not have a definition in the commercial glazing industry as transmission is an action and glass does not transmit anything. Assuming that this is a misnomer and that transmittance was meant to be used (the property of glass to allow light through), these rules require that all glass used in a new tower façade in the Mauka district have a VLT of 50% or greater.

EXHIBIT "2"

Sunlight or, more accurately the solar spectrum, is essentially comprised of 47% visible light, 51% shortwave infrared radiation (heat) and 2% ultraviolet light. Historically, in order to reduce heat, it was necessary to reduce visible light. With advancements in spectrally selective Low E technology, solar heat could be reduced significantly with far less impact on visible light. After searching through a database for just about every coated piece of glass manufactured in the world with a VLT of 50% or greater, the best performing product on the market today has a corresponding SHGC of 0.22. This roughly translates into 22% of the total solar radiation on the facade ending up as heat inside the building that must now be neutralized by the cooling system. Conversely, the glass in use on Symphony provides a SHGC of 0.19 so three percentage points below the 0.22 value; representing substantial energy savings (~16%). This value was also required to meet the energy model necessary for Code compliance. Even with today's advancements in spectrally selective Low E coatings, reducing the incident of solar radiation any further requires the reduction of the visible light transmittance. At this time, among the major suppliers we have researched throughout the world, we can find no high performance glass which can meet our necessary SHGC and the 50% VLT required in 15-217. This includes thousands of glass types as manufactured by Asahi, Cardinal, China Southern, Interpane, Guardian, NSG, Pilkington, PPG, Shanghai Pilkington, Saint Gobain and Viracon. In fact, we found only five comparable products with a VLT of 50% or greater and none of these came any closer than 16% of our required SHGC performance. We believe the absence of an available product identifies a flaw in the Rule as it stands today for the Rule is simply an over-requirement of current glazing and coating technology.

Hawaii is not alone in the attempt to accommodate tenant comfort and limit energy consumption in this manner. California also has such provision in its Title 24 section of the current Code. The difference is that California's is an approach limiting U Value, Relative SHGC and VT, or visible transmittance, which is defined as the rating for overall daylight transmittance of product including frame. The key here is that there is an understanding that VLT (or VT) cannot be regulated alone but only as a part of three interrelated factors affecting performance of exterior wall systems. In fact, we are unaware of any municipalities in the US that regulate glass selection by VLT.

It is also important to understand that visible light transmittance is not a performance attribute of glass but an aesthetic one. It is the indicator of how much light travels through the glass. The solar heat gain coefficient is the performance indicator. It defines how the solar radiation traveling through the glass is controlled. For high sunlight areas such as the Mauka District of Honolulu, this SHGC needs to be low to control energy consumption and allow tenant comfort. While every project is different, aiming for a low SHGC (such as we did in going for less than 0.20) would save both energy and assist in reducing the overall cost of cooling for the residents.

Looking at the projects presently under construction in the various Honolulu districts, one characteristic is clear; none of these projects is using glass with a 50% VLT. All of the glass products in use in commercial developments today provide a much lower percentage of VLT. This is due to the emphasis on performance (most notably SHGC) in the design. It is also important to note that a reduction in VLT from 50% to 30% does not noticeably alter one's ability to see through the glass.

We would welcome the opportunity to form a team of professionals to assist HDCA and any other interested Area Boards in working out a set of guidelines for glazing that would continue the focus on energy conservation while keeping in mind current technology as well as the tenant comfort and experience issues important to a locale such as Hawaii. The key to this would be to bring a balance to the requirements asked of the glazing while limiting the attributes unacceptable to district design.

Regards,

Jon Weir
JA Weir Associates

cc. D. Moats, AHL

March 19, 2015

NOTKIN HAWAII INC.
Consulting Mechanical Engineers

Mr. Daniel Moats
Associate
ARCHITECTS HAWAII LTD.
733 Bishop Street, Suite 3100
Honolulu, Hawaii 96813

Project: Symphony Honolulu, Glazing Performance Review

Dear Mr. Moats:

As you know, we reviewed the energy performance with various glass types for the Symphony Honolulu high-rise residential tower. We find that there is a direct correlation between visible light transmittance (VLT), solar heat gain coefficient (SHGC) and energy performance of various glazing systems. We used the Carrier Hourly Analysis Program (version 4.6 HAP) which models annual energy usage in a LEED ® compliant method. As you know, a prerequisite requirement of LEED ® EA is to use at least 10% less energy compared to a code minimum baseline. The following table summarizes our findings of Symphony specified glazing and the highest energy performing glazing available from the two leading glazing manufacturers which have a VLT value of 50 percent or greater:

Glass Specification	Viracon (Symphony) VRE1-30	Guardian SNX 62/72+IS20	Viracon VNE2-63
VLT	0.28	0.51	0.53
SHGC	0.19	0.22	0.26
Overall U-Value	0.27	0.23	0.26
Baseline Energy Use (kWh/yr)	13,790,378	13,790,378	13,790,378
Proposed Energy Use (kWh/yr)	12,374,144	12,448,840	12,576,237
Minimum 10% Savings Required per LEED® EA	10.3%	9.7%	8.8%

In conclusion from the table above, the type and quality of glass has a major impact on energy consumption in a high-rise building in Honolulu. Further, the U-value of glass doesn't have a significant effect on energy consumption as compared to the solar heat gain coefficient (SHGC) of glass which is the main contributing factor.

Sincerely,

NOTKIN HAWAII INC.

EXHIBIT "3"

P:\6101.000 OM-JN Symphony\0100 Correspondence\0101 Owner - Architect\150319 OM - VLT\AHL_Symphony_glazing.docx

Keith M. Chan, PE

HEYER
&ASSOCIATES LLC

March 20, 2015

Mr. Daniel Nishikawa
OliverMcMillan Pacific Rim
1003 Bishop Street, Suite 2288
Honolulu, HI 96813

Dear Mr. Nishikawa:

This letter is in response to your request regarding the importance of glass systems used in buildings. Over the past 25 years, the principals of Heyer & Associates LLC have been directly involved in the sales and marketing of high rise condominiums in the Kakaako Redevelopment Area and Honolulu Urban Core consisting of approximately 3,569 residential condominium units. These buildings include the following:

Nauru Towers, 304 residential units
1133 Waimanu, 282 residential units
Hawaiki Tower, 417 residential units
Hokua at 1288 Ala Moana, 247 residential units
Capitol Place, 397 residential units
Vanguard Lofts, 36 residential units
Pacifica Honolulu, 489 residential units
Waihonua at Kewalo, 341 residential units
One Ala Moana, 206 residential units
Symphony Honolulu, 388 residential units
The Collection Honolulu, 462 residential units

During the sales process of each of these buildings, buyers have consistently expressed concerns over heat transmission, privacy (during the day time) and exterior sound transmission. The concerns were risen to the point where Heyer & Associates LLC, as the project broker, have had to request from the developer, a summary provided by their glass consultant with information on shading and light transmission for privacy, shading coefficient for energy and heat transmission and sound attenuation from exterior elements. This information has increasingly become more of an integral part of the buyer's decision to purchase.

High-rise condominium buildings with floor to ceiling window walls are highly desired to capture views and have become a standard requirement. Heat transmission through the glass has become such an important part of a buyer's decision to purchase, to the extent where a unit facing the east can command more in price than the same reverse unit type facing the west because of its perception of heat gain into the unit, thus requiring the air conditioning to run longer at a lower temperature set point to sufficiently cool the unit and keep it cool.

In conclusion, today's high rise condominium buyers are more sophisticated, knowledgeable and conscious of the glass systems used in buildings and items such as shading coefficient, transparency and exterior sound transmission are extremely critical to their purchasing decision as it has a direct impact on their lifestyle with high utility costs, lack of privacy and interference from outside noises if the glass does not meet certain requirements.

Should you have any questions, please feel free to contact us at 808-692-0060.

Sincerely,

Heyer & Associates, LLC

Karl Heyer, IV, Managing Member

Jeanne Murata, Principal Broker

EXHIBIT "4"

1288 Ala Moana Blvd. Suite 206 • Honolulu, HI 96814 • Phone:(808) 692-0060 • Fax: (808) 692-0061

DEPARTMENT OF PLANNING AND PERMITTING

CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET * HONOLULU, HAWAII 96813
Phone: (808) 768-8220 * Fax: (808) 768-6111

PAID
JAN 29 2014
Ck. 1101
City and County of Honolulu
Dept. of BFS, Division of Treasury

BUILDING PERMIT

FOR THE PERFORMANCE OF WORK UNDER THE
BUILDING ELECTRICAL, PLUMBING, AND SIDEWALK CODES
CHAPTERS 16, 17, 19, AND 20, RESPECTIVELY, AND UNDER CHAPTER 18
(FEES AND PERMITS) OF THE REVISED ORDINANCES OF
THE CITY AND COUNTY OF HONOLULU

LOCATION

Zone	Section	Plat	Parcel		
2	1	044	001	736 WARD AVE Honolulu / Downtown 96813	18,455 Sq. Ft.
2	1	044	032	850 KAPIOLANI BLVD Honolulu / Downtown 96813	32,599 Sq. Ft.
2	1	044	048		20,145 Sq. Ft.
*	1	312	20		33,248 Sq. Ft.
*	1	311	37		6,226 Sq. Ft.
*	1	309	88		9,432 Sq. Ft.
*	1	308	98		4,716 Sq. Ft.

Site Address (If other than primary):

$157,595.00
PERMIT FEE
Type of Payment(s)
Cash
Check X
Charge

PROJECT: Accepted Value of Work: $38,420,000

(BP #742035) [TMK: 21044001, 21044032, 21044048, *131220 , *131137 , *130988 , *130898] SYMPHONY - Superstructure for new 45-story building [THIRD PARTY REVIEW]

TYPE OF WORK

Electrical Work Y | Fire Alarm Y | Plumbing Work Y
Fire Sprinkler Y | Air Conditioning Y | Pool Y
Other superstructure

RIGHT OF WAY WORK

Driveway: New: Existing: Private:
Sidewalk Types: Curbing Types: Driveway Types:
Linear Ft. of Sidewalk: Linear Ft. of Curbing: Linear Ft. of Driveway:

Please notify the Building Inspector listed below at least 24 hours before starting work in the Right-Of-Way.

GENERAL CONTRACTOR

NORDIC PCL CONSTRUCTION, INC
Contact Info: 541-9108
Lic. No.: CT17

NOTES

DATE ISSUED: **01/29/2014**
Location Permit Issued: **FMB**
Location Application Created: **FMB**

Permission is hereby given to do above work according to conditions hereon and according to approved plans and specifications pertaining thereto, subject to compliance with ordinances and laws of the City and County of Honolulu and State of Hawaii.

APPLICATION NO.: **A2013-11-1151**
JobID: **50978660**
PERMIT NO.: **742035**

Initial Print Date: Wednesday January 29, 2014 3:53 pm
ExternalID: **050089331-005**

EXHIBIT "5"

DEPARTMENT OF PLANNING AND PERMITTING

CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET * HONOLULU, HAWAII 96813
Phone: (808) 768-8220 * Fax: (808) 768-6111

BUILDING PERMIT

FOR THE PERFORMANCE OF WORK UNDER THE
BUILDING ELECTRICAL, PLUMBING, AND SIDEWALK CODES
CHAPTERS 16, 17, 19, AND 20, RESPECTIVELY, AND UNDER CHAPTER 18
(FEES AND PERMITS) OF THE REVISED ORDINANCES OF
THE CITY AND COUNTY OF HONOLULU

Location Application Created: FMB

FOR DIRECTOR OF DEPARTMENT OF PLANNING AND PERMITTING

THIS PERMIT MUST BE POSTED IN A CONSPICUOUS PLACE ON THE SITE DURING THE PROGRESS OF WORK. THIS PERMIT MAY BE REVOKED IF WORK IS NOT STARTED WITHIN 180 DAYS OF DATE OF ISSUANCE OR IF WORK IS SUSPENDED OR ABANDONED FOR 120 DAYS.

ELECTRICAL AND PLUMBING WORK TO BE DONE BY LICENSED PERSONS AS REQUIRED UNDER CHAPTER 448 E, HAWAII REVISED STATUTES.

NOTICE TO HOMEOWNERS: This is to inform all homeowners that improvements to your home may require approval by your Homeowners Association or authorized representative prior to the commencement of construction.

Approval by the Department of Planning and Permitting does not certify compliance with the Covenants, Conditions and Restrictions or other design restrictions administered and enforced by your Homeowners Association.

ALL CONSTRUCTION UNDER THIS BUILDING PERMIT IS SUBJECT TO INSPECTION BY THE BUILDING OFFICIAL. IT SHALL BE THE DUTY OF THE PERSON DOING THE WORK AUTHORIZED BY THIS PERMIT TO NOTIFY THE BUILDING OFFICIAL THAT THE WORK IS READY FOR INSPECTION.

THE FOLLOWING ARE THE INSPECTORS ASSIGNED TO INSPECT THE CONSTRUCTION UNDER THIS PERMIT AND THEIR TELEPHONE NUMBERS:

	Building Inspector	Electrical Inspector	Plumbing Inspector
Name:	DOUGLAS OSHIRO	LUKE BECHARD, DEREC	JOSEPH MURAMOTO, EI
Phone No.:	(808) 768-8144	(808) 768-8173	(808) 768-8191

DEPARTMENT OF PLANNING AND PERMITTING

CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET * HONOLULU, HAWAII 96813
Phone: (808) 768-8220 * Fax: (808) 768-6111

BUILDING PERMIT APPLICATION

A2013-11-1151 (Third Party Review) **050978338-002**

LOCATION Contact Info: **NANCY KAYA 927-0090**

Zone	Section	Plat	Parcel	
2	1	044	001	736 WARD AVE Honolulu / Downtown 9(18,455 Sq. Ft.
2	1	044	032	850 KAPIOLANI BLVD Honolulu / Downt 32,599 Sq. Ft.
2	1	044	048	20,145 Sq. Ft.
*	1	312	20	33,248 Sq. Ft.
*	1	311	37	6,226 Sq. Ft.
*	1	309	88	9,432 Sq. Ft.
*	1	308	98	4,716 Sq. Ft.

Site Address (if other than primary):

PROJECT: **[TMK: 21044001, 21044032, 21044048, *131220 , *131137 , *130988 , *130898]**
SYMPHONY - Super structure for new 45-story building [THIRD PARTY REVIEW]

Proposed Use: **apartment** Floor Level: **1** Estimated Value of Work: **$38,420,000.00**

APPLICANT
Kaya's Permit Processors
(Attn: Nancy Kaya)
Contact Info: **Phone: (808) 927-0090 Email: MIYASATON001@HAWAII.RR.(**

OWNER:
OLIVER MCMILLIAN PACIFIC RIM, LLC
Contact Info: **(619) 321-1111**

PLAN MAKER
MILLER DAVID A
Contact Info: **523-9636**
Lic. No.: **AR3047**

GENERAL CONTRACTOR
NORDIC PCL CONSTRUCTION, INC
Contact Info: **Phone: (808) 541-9108**
Lic. No.: **CT17**

ELECTRICAL CONTRACTOR
HONOLULU PAINTING CO
Contact Info: **Phone: (808) 836-5760**
Lic. No.: **CT8**

PLUMBING CONTRACTOR
LEIS DORVIN D CO INC
Contact Info: **Phone: (808) 877-3902 Email: ROBERTOR@LEISINC.COM**
Lic. No.: **CT4747**

TYPE OF WORK
Electrical Work Y
Fire Sprinkler Y
Other superstructure
Fire Alarm Y
Air Conditioning Y
Plumbing Work Y
Pool Y
Electrical Phases:
Plumbing Phases:

RIGHT OF WAY WORK Driveway: New: Existing: Private:
Sidewalk Types: Curbing Types: Driveway Types:
Linear Ft. of Sidewalk: Linear Ft. of Curbing: Linear Ft. of Driveway:

SEWAGE Sewage Disposal Type: Sewage Disposal Method:

RETROFIT Showers to be replaced: Faucets to be Replaced: Urinals to be Replaced: Toilets to be Replaced:
Major Occupancy Group: Commercial: Hotel: Industrial: Residential:

Type of Construction	No. of Stories	Flood Hazard Dist.	Floor Area (Sq. Ft.)
Minimum:	Existing: 0		Existing:
Actual:	Final: 45	Exempt:	New:
		Complied:	Total:

Require Special Inspection: C.O. Required:
Require Called Inspection: Restrictive Covenant required:
Affidavit required:

WORK WILL	ADD	DELETE
Residential Units	370	
Hotel Rooms		

Remarks:

ZONING AND LUO DATA

TMK: -1-308: 98
Development Plan Areas: Primary Urban Center
Flood Zones: X - Beyond 500 Year Flood Plain
Historic Site Register: None
Lot Restriction: None
Slide Area: None
SMA / Shoreline: Not in SMA
Special Districts: Not in Special District
State Land Use: Urban District

APPLICATION NO.: **A2013-11-1151** JobID: **50978660** ExternalID: **050978338-002**

DEPARTMENT OF PLANNING AND PERMITTING
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET * HONOLULU, HAWAII 96813
Phone: (808) 768-8220 * Fax: (808) 768-6111

BUILDING PERMIT APPLICATION

A2013-11-1151 (Third Party Review) **050978338-002**

TMK: -1-308: 98
Street Setback: NONE
Zoning (LUO): State Jurisdiction: Kakaako Comm. Dev. Dist. (HCDA)

TMK: -1-309: 88
Development Plan Areas: Primary Urban Center
Flood Zones: X - Beyond 500 Year Flood Plain
Historic Site Register: None
Lot Restriction: None
Slide Area: None
SMA / Shoreline: Not in SMA
Special Districts: Not in Special District
State Land Use: Urban District
Street Setback: NONE
Zoning (LUO): State Jurisdiction: Kakaako Comm. Dev. Dist. (HCDA)

TMK: -1-311: 37
Development Plan Areas: Primary Urban Center
Flood Zones: X - Beyond 500 Year Flood Plain
Historic Site Register: None
Lot Restriction: None
Slide Area: None
SMA / Shoreline: Not in SMA
Special Districts: Not in Special District
State Land Use: Urban District
Street Setback: NONE
Zoning (LUO): State Jurisdiction: Kakaako Comm. Dev. Dist. (HCDA)

TMK: -1-312: 20
Development Plan Areas: Primary Urban Center
Flood Zones: X - Beyond 500 Year Flood Plain
Historic Site Register: None
Lot Restriction: None
Slide Area: None
SMA / Shoreline: Not in SMA
Special Districts: Not in Special District
State Land Use: Urban District
Street Setback: NONE
Zoning (LUO): State Jurisdiction: Kakaako Comm. Dev. Dist. (HCDA)

TMK: 2-1-044: 001
Development Plan Areas: Primary Urban Center
Flood Zones: X - Beyond 500 Year Flood Plain
Historic Site Register: None
Lot Restriction: None
Slide Area: None
SMA / Shoreline: Not in SMA
Special Districts: Not in Special District
State Land Use: Urban District
Street Setback: NONE
Zoning (LUO): State Jurisdiction: Kakaako Comm. Dev. Dist. (HCDA)

TMK: 2-1-044: 032
Development Plan Areas: Primary Urban Center
Flood Zones: X - Beyond 500 Year Flood Plain
Historic Site Register: None
Lot Restriction: None
Slide Area: None
SMA / Shoreline: Not in SMA
Special Districts: Not in Special District
State Land Use: Urban District
Street Setback: NONE
Zoning (LUO): State Jurisdiction: Kakaako Comm. Dev. Dist. (HCDA)

TMK: 2-1-044: 048
Development Plan Areas: Primary Urban Center
Flood Zones: X - Beyond 500 Year Flood Plain
Historic Site Register: None
Lot Restriction: None
Slide Area: None
SMA / Shoreline: Not in SMA
Special Districts: Not in Special District
State Land Use: Urban District
Street Setback: NONE
Zoning (LUO): State Jurisdiction: Kakaako Comm. Dev. Dist. (HCDA)

NOTES

APPROVALS REQUIRED FROM: BWS Engineering Traffic Wastewater

Other Agencies:	Approved by:	Date:
State - Hawaii Community Dev. Auth.		
State-Health (A/C Ventilation)		
State-Health (Sanitation)		

Please visit DPP's website at: http://dppweb.honolulu.gov for permit information and status

NOTICE TO HOMEOWNERS: This is to inform all homeowners that improvements to your home may require approval by your Homeowners Association or authorized representative prior to the commencement of construction.

Approval by the Department of Planning and Permitting does not certify compliance with the Covenants, Conditions and Restrictions or other design restrictions administered and enforced by your Homeowners Association.

Electrical and Plumbing work to be done by licensed persons and required under Chapter 448 E, Hawaii Revised Statutes.

This permit may be revoked if work is not started within 180 days of date of issuance or if work is suspended or abandoned for 120 days.

DATE CREATED: **11/15/2013** **FMB** Staff Assignment: **Third Party Reviewer**

APPLICATION NO.: **A2013-11-1151** JobID: **50978660** ExternalID: **050978338-002**

APPLICATION FOR A SUPPLEMENT TO THE FOUNDATION PERMIT

Director
Department of Planning and Permitting
City and County of Honolulu
Honolulu, Hawaii 96813

Project Name: Symphony

Address: 850 Kapiolani Blvd., Honolulu, HI 96813

Tax Map Key No.: 2-1-044:032

Foundation Building Permit No.: 736924 Date: 1-29-14

In accordance with Section 18-5.1(c) ROH 1990, as amended, request is hereby made for a supplement to the foundation permit for the subject project in order to enable us to proceed with the supplement to the foundation work at the earliest possible date.

As owner (or authorized agent) for the project, we hereby certify that:

1. The loading for which the foundation has been designed will not be exceeded.

2. The superstructure will conform with all building regulations and requirements and requirements of the other governmental agencies concerned.

3. Plumbing and/or Electrical Work (select one):

   ☐ No plumbing or electrical work will be performed until a building permit is obtained for the entire superstructure.

   ☒ Plumbing and/or electrical work included under this supplement to the foundation permit are shown on plans submitted and limited only to work required in conjunction with the supplement to the foundation construction. We certify that the sizes for such plumbing and/or electrical lines are adequate and in compliance with the applicable codes.

4. The foundation work will not conflict with or otherwise affect any existing utilities.

We understand that the issuance of the supplement to the foundation permit does not obligate the City in any way, and that we are proceeding at our own risk without assurance that the permit for the entire building or structure will be granted.

We also understand that the issuance of the supplement to the foundation permit does not relieve us from complying with all other applicable codes, rules, regulations, and/or permit procedures including, but not limited to:

- Section 14-21 of the Revised Ordinances of the City and County of Honolulu, as amended (Ordinance 2412)
- Grading permits
- Trenching permits
- Construction over City easements
- Land use permits

OLIVERMCMILLAN PACIFIC RIM LLC [illegible]
Print Name of Owner/Authorized Agent

[signature]
Signature of Owner/Authorized Agent

733 8th Avenue, San Diego, CA 92109
Address

619-321-1111
Telephone Number

NOTE:

1. Three sets of the supplement to the foundation plans and specifications must be submitted with application.
2. Where piles are used and the design load per pile exceeds 40 tons, a static load test shall be made and the report shall be submitted to the Building Division.

DPP-BD-200.126S (4/03)

BP 742035 1/29/14

SECTION 088000 - EXTERIOR GLASS AND GLAZING

PART 1 - GENERAL

1.1 SUMMARY

A. Comply with all of the contract documents.

B. The Contractor shall provide all Glass indicated on drawings or specified herein, including all labor, materials, equipment, and services necessary to complete the Glass and glazing, including, but not limited to, the following:

1. Glass and glazing for visual mock-up.
2. Glass and glazing for performance mock up (if required).
3. Glazing of the Aluminum Entrances and Storefronts.
4. Glazing of the Glazed Aluminum Systems.

C. Related Work Specified Elsewhere

1. Section 014500 – Façade Testing and Quality Assurance
2. Section 018316 – Exterior Cladding Design Criteria
3. Section 072213 – Façade Insulation and Safing
4. Section 079213 – Exterior Façade Sealants
5. Section 084413 – Glazed Aluminum Systems
6. Section 084426 – Glazed Aluminum Podium Systems
7. Section 089350 – Structural Glass Handrail System

1.2 REFERENCES

A. Abbreviations and Acronyms

1.	AAMA	American Architectural Manufacturers Association
2.	ANSI	American National Standards Institute
3.	ASTM	Formerly the American Society for Testing and Materials
4.	CPSC	Consumer Products Safety Commission
5.	FT	Fully Tempered
6.	GANA	Glass Association of North America
7.	HS	Heat-strengthened
8.	ICC	International Code Council
9.	IGCC	Insulating Glass Certification Council
10.	IGMA	Insulating Glass Manufacturers Alliance
11.	LBNL	Lawrence Berkeley National Laboratories
12.	LEED	Leadership in Energy & Environmental Design
13.	Low-E	Low emissivity
14.	LSG	Light to Solar Gain
15.	NFRC	National Fenestration Rating Council
16.	SHGC	Solar Heat Gain Coefficient
17.	SC	Shading Coefficient
18.	USGBC	The U.S. Green Building Council
19.	VLT	Visible Light Transmittance

1.3 QUALITY ASSURANCE

A. Conform to the requirements of Section 014500, Façade Testing and Quality Assurance.

B. Source Limitations:

1. Glass: Obtain the following through one source from a single manufacturer for each glass type: clear float glass, coated float glass, laminated glass and insulating glass.

EXHIBIT "6"

2. Glass Coated with High Performance Coatings: Where primary glass manufacturer has established a certified fabricator program, obtain fabricated product from a manufacturer that is certified and on that list.
3. Glazing Accessories: Obtain glazing accessories through one source from a single manufacturer for each product and installation method.

C. The Contractor shall assume undivided responsibility for the glass and glazing and coordination with the components of related work.
1. This firm must demonstrate not less than 5 years successful experience at work similar to the work of this project.
2. Provide at least one person who shall be thoroughly trained and experienced in the skills required, who shall be completely familiar with the referenced standards and the requirements of this work, and who shall personally direct all installation performed under this Section of these specifications.

D. Code and Standard Compliance:
1. Comply with all building, fire, and safety codes relating to the work and the standards cited in Section 018316, Exterior Cladding Design Criteria. Provide certification that the glazing used conforms to the referenced standards.
2. Use tempered for safety glazing unless shown otherwise. Safety glazing shall conform to the requirements of CPSC 16 CFR Part 1201 "Safety Standards for Architectural Glazing Materials" and ANSI Z97.1.
3. Submit manufacturer's certified identification, showing strength, grade, thickness, type and quality for each type of glass used. Mark tempered, heat strengthened and laminated glass with permanent identification labels.

E. Each glass type is to match the approved samples, be uniform in appearance, free from irregularities and differences in appearance when viewed from exterior as judged by the Architect in conjunction with the agreed upon guidelines for viewing various glass installations. Glass not complying with these requirements to be replaced with conforming glass at no additional cost to Owner.

1.4 PLANS AND SPECIFICATIONS

A. In order to meet the requirements by Code for the exterior, this Section is intended to provide a performance type specification for the design, fabrication and installation of the glass and glazing. The Contractor is responsible for the engineering and design of all components and materials as well as the fabrication, installation and performance of the glass and glazing.

B. Architectural drawings are diagrammatic. The details shown are intended as a guide for the aesthetic and interfacing requirements of the glass and glazing to and with other work. The requirements shown by the details are intended to establish basic dimensions, locations of glass panels and locations of different glass types. The Contractor is responsible for the design and engineering of the glass and glazing within these aesthetic parameters. The drawings are not to be construed as engineering design, or adequate to meet the engineering design requirements.

C. It is recognized that the architectural design details do not cover some conditions or modifications, which may be required. It is, however, intended that conditions not detailed shall be developed through the shop drawings to the same level of aesthetics and in compliance with performance criteria as indicated for detailed areas and as stipulated in these specifications. The Contractor, by accepting a contract for the work, acknowledges this and agrees that the Architect shall have the final say as to all matters whether detailed or not on the architectural design details.

D. If conflicts exist between this section of the specification and the glass framing specifications, the more stringent specification shall apply.

1.5 CODES AND REFERENCES

A. The glass and glazing work, except as otherwise shown or specified shall comply with the minimum requirements of the latest edition of the codes, specifications, guidelines and standards cited in Section 018316, Exterior Cladding Design Criteria. Where conflicting requirements arise, follow the more stringent.

1.6 SUBMITTALS

A. Conform to the requirements of Section 013300, Submittals and 018316, Exterior Cladding Design Criteria.

1.7 PERFORMANCE REQUIREMENTS

A. Conform to all requirements of Section 018316, Exterior Cladding Design Criteria.

B. General: Provide glazing systems capable of withstanding normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following:
   1. defective manufacture
   2. fabrication
   3. installation

C. Glass Design:
   1. Glass Strength: Analysis shall comply with ASTM E 1300 Determining Load Resistance of Glass in Buildings. Provide glass products in the thickness and strengths (annealed or heat- treated) required to meet or exceed the following criteria based on project loads and in-service conditions.
   2. Minimum thickness of annealed or heat-treated glass products to be selected so the worst case probability of failure does not exceed the following:
      a. 8 breaks per 1000 for glass installed vertically or not 15 degrees or more from the vertical plane and under wind action.
      b. 1 break per 1000 for glass installed 15 degrees or more from the vertical plane and under action of wind and/or snow
   3. Deflection must be limited to prevent disengagement from the frame and be less than or equal to 1" unless otherwise approved by the design team.

D. Acoustic Performance
   1. Code minimum.

E. Spandrel Applications
   1. All back pans shall be painted aluminum and vented to prevent excessive heat buildup. This vent must be protected during construction and opened prior to hand over.
   2. Ceramic Coated Glass Products:
      a. Shall comply with ASTM C 1048 Standard Specification for Heat-Treated Flat Glass – Kind HS, Kind FT Coated and Uncoated, Condition B
      b. Silk-screen pattern should be no more than 0.0625" (1.59 mm) off parallel from locating glass edge and no more than 0.0125" (3.18 mm) from edges other than locating glass edge.
      c. There shall be a maximum of a 0.03125" (0.79 mm) variation in dot, hole or line location.
      d. Digital print should be no more than 0.0625" (1.59mm) off parallel from locating glass edge and no more than 0.125" (3.18mm) from edges other tan locating glass edge.
      e. Digital print shall have a maximum of a 0.03125" (0.79mm) variation in dot, hole or line location.
      f. Digital print may have an indefinite border of up to 0.03125" (0.79mm).

F. Thermal and Optical Performance Properties: Provide glass with performance properties specified based on manufacturer's published test data, as determined according to procedures indicated below:
   1. For monolithic glass lites, properties are based on units with lites ¼" (6mm) thick.
   2. For laminated glass lites, properties are based on products of construction indicated.
   3. For insulating glass units, properties are based on units with lites ¼" (6mm) thick and a nominal ½" (~12mm) wide air space.
   4. Center of glass U Values: NFRC 100 methodology using LBL-35298 WINDOW 5.2 computer program, expressed in Btu/sq. ft. x h x deg.F.
   5. Center of glass Solar Heat Gain Coefficient: NFRC 200 methodology using LBL-35298 WINDOW 5 computer program.
   6. Solar Optical Properties: NFRC 300.

G. Heat Treatment of Float Glass:
   1. Heat processed glass shall be produced in compliance with the conditions set forth in ASTM standard C1048 as herein qualified:
      a. All glass shall be horizontally processed with furnace rolls parallel to the width (sill) dimension of the lite unless the glass size prevents such orientation.
      b. Peak to valley roller wave distortion
         i) Measurement device shall be LiteSentry measurement system or approved equal.
         ii) Maximum shall be 0.003" in the central areas and 0.008" within 10.5" of the leading and trailing edge as measured in accordance with ASTM C1651.
         iii) Millidiopter Criteria: (95% surface) Maximum +/- 125mD overall or the highest overall measurement from the approved visual mockup that is less than +/- 125mD overall, whichever is less.
      c. Bow and warp tolerance shall be one half of criteria stated in ASTM C1048 for bow and warp
      d. Heat treatment must be conducted prior to the application of any coating
   2. The manufacturer shall certify that the surface compression of all heat strengthened glass with thickness of ¼" or less shall be 4,000 to 7,000psi. Surface compression of $^{5}/_{16}$" to $^{3}/_{8}$" glass shall be 5,000 to 8,000psi. For fully tempered glass, the surface compression shall be a minimum of 10,000psi.
   3. Tempered glass shall comply with criteria set forth in safety standards ANSI Z97.1 and CPSC 16 CFR 1201. Quality assurance and testing shall be conducted in compliance with protocols prescribed by GANA and SGCC.
   4. The glass manufacturer shall provide a QC program to detect and discard any lites which exceed the specified edge quality tolerances.
   5. Heat treatment on any "post temperable" coating products:
      a. Heat treatment shall be undertaken only by fabricators fully certified by the base glass manufacturer. This certification must be submitted for review and approval.
      b. Heat treatment must be conducted in full conformance with the written guidelines of the base glass manufacturer which must be submitted for review at the time of glass sample submission.
   6. The intent on this project is to use fully tempered glass for the following purposes only. This glass shall not be subject to the heat soak testing requirements.
      a. Code compliance
   7. All lites tempered for reasons other than Code compliance shall be subject to heat soak requirements as stipulated in Section 014500, Façade Testing and Quality Assurance.
      a. To waive this heat soaking requirement, the Contractor and glass manufacturer are required to provide the labor, equipment and materials necessary to replace all

spontaneous glass breakages for a period of five (5) years after completion of installation.

1.8 PRECONSTRUCTION TESTING

A. Preconstruction Adhesion and Compatibility Testing: Test each glazing material type, tape sealant, gasket, glazing accessory, and glass-framing member for adhesion to and compatibility with elastomeric glazing sealants.
   1. Testing will not be required if data are submitted based on previous testing of current sealant products and glazing materials matching those submitted.
   2. Use ASTM C1087 to determine whether priming and other specific joint-preparation techniques are required to obtain rapid, optimum adhesion of glazing sealants to glass, tape sealants, gaskets, and glazing channel substrates.
   3. Test no fewer than [eight] <Insert number> Samples of each type of material, including joint substrates, shims, sealant backings, secondary seals, and miscellaneous materials.
   4. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
   5. For materials failing tests, submit sealant manufacturer's written instructions for corrective measures including the use of specially formulated primers.

B. Distortion Tolerance Testing
   1. Criteria shall be in accordance with "Heat Treatment of Float Glass" in Section 1.6 above.
   2. Measure each pane of monolithic uncoated or coated heat-treated of 6 mm thickness or more used in the Project, including glass used in visual mock-ups.
   3. Documentation:
      a. Document and record results for each pane.
      b. Tag each pane of glass that falls outside of the maximum distortion limits and certify that these non-conforming glass panes will not be fabricated and supplied to the Project.
      c. Provide written documentation of the Roll Wave and Millidiopter measurements of the glass used in visual mock-ups before the mock-ups are reviewed by the Owner and Architect for approval.
      d. Provide additional written documentation upon request by the Owner or Architect.
   4. Bow/Warp Tolerance
      a. Maximum ½ of ASTM Specification C1048.
      b. Measure every hour on a vertical plane with an aluminum straight edge.
      c. Provide recorded written documentation upon request

1.9 JOB CONDITIONS

A. Prior to beginning of installation, meet with the Architect, Glass Manufacturer, Curtain Wall Contractor and other trades affected by glass installation. Review all material selections, handling, storage, sealant work, glass pocket alignment tolerances, bedding of gaskets, protection, weather conditions under which glazing can be performed, and cleaning.
B. Do not perform work under adverse weather or job conditions.
C. Install liquid sealants when temperatures are within lower or middle third of temperature range recommended by manufacturer.

1.10 DELIVERY AND STORAGE

A. Deliver glass to site with manufacturer's labels showing thickness, quality and type, floor location, and/or other denotations which identify where glass is to be used.
B. Deliver glazing sealants and other glazing items to site in manufacturer's original unopened packages or containers.
C. Remove from the job site and replace with acceptable material all cracked, broken, chipped or otherwise damaged glass, and all glazing and sealing materials unfit for use.

D. Store glass in dry, well-vented location at a temperature maintained above dew point. Minimize the handling of glass and protect from soiling, atmospheric condensation and other moisture.

E. All delivered items, whether F.O.B. job site for unloading and installation by others, or whether fabricated and installed by the Contractor shall be properly crated. Crates shall be marked with installation location and fabrication/piece numbers, shop drawing references, etc... as applicable.

1.11 EXTRA MATERIALS

A. Crate and provide to the owner all glass units originally ordered for breakage which were not used in the initial construction.

B. Deliver this material to a location within the building designated by the owner.

1.12 WARRANTY

A. The manufacturer of the specified glass product shall warrant and guarantee direct to the Owner each glass unit installed for ten (10) years as follows:
   1. Insulating Glass Units (IGU)
      a. Shall be free from material obstructions of vision as a result of dust or film formation on the internal glass surfaces due to improper manufacture or failure of the hermetic seal (anything other than glass breakage)
      b. Shall be free of foreign objects within the air space such as desiccant, dirt, metal objects, etc. due to improper manufacture.
      c. Shall be free of migrating spacers that "walk up" into the cavity between the glass lites into the vision area of the lite.
      d. Shall not experience anything more than incidental migration of the primary seal into the vision area of the lite in accordance with IGMA TM-3100-09, *Voluntary Guidelines for the Identification of Visual Obstructions of the Air Space of Insulating Glass Units.*
   2. Coated Glass
      a. Shall be free from discoloration, mottling or deteriorating of the coating regardless of loss of insulating glass seal.
      b. Shall be free from pin hole and coating scratch defects as visible when viewed from a 10' distance unless otherwise agreed upon at time of contract.

B. The manufacturer of the specified glass product shall warrant and guarantee direct to the Owner each glass unit installed for five (5) years as follows:
   1. Heat Soaked Tempered Glass Units
      a. Shall not break spontaneously as a result of Nickel Sulfide (NiS) inclusions at a rate exceeding 0.5% (5 lites per 1000).
      b. Warranty covers material, shipping (FOB site) and reasonable labor to replace.
   2. Laminated Glass Units
      a. Shall be free from any type of delamination
      b. Shall be free from impurities or other defects in the unit visible from 10' away
      c. Shall meet the aforementioned guidelines if a coated unit

C. All warranties shall agree to replace the glass F.O.B. project site, including labor to unload and store, at no cost to the Owner, provided:
   1. The manufacturer's instructions for protection and maintenance have been adhered to during the warranty period
   2. The failure is not due to vandalism or graffiti
   3. Glass breakage caused by external projectiles or internal abuse by tenants

D. All warranties shall cover failure due to incorrectly installed glass as this is not the responsibility of the Owner.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Conditions within the project will be subject to Sound Transmission Control (STC) requirements set forth by local Code. Those conditions are indicated for each window in the architectural drawings. The Exterior Glass and Glazing, together with all components and sub-assemblies, shall be designed, engineered, produced and installed in such a manner to satisfy those requirements.

B. Each glass type, coated or uncoated, shall be supplied by a single manufacturer for the duration of the project.

2.2 GLASS MANUFACTURE

A. Acceptable manufacturers of raw float glass:
   1. China Southern Glass
   2. Guardian Industries
   3. PPG Industries
   4. Pilkington/LOF
   5. Shanghai Pilkington

B. Fabricators pre-approved for use on this project as long as they meet all criteria specified herein:
   1. China Southern Glass
   2. Northwest Industries
   3. Oldcastle (PPG Skyline Certified only)
   4. Pilkington/LOF
   5. Shanghai Pilkington
   6. Viracon

2.3 COMPONENTS

A. Float Glass
   1. All raw glass materials used in the fabrication of finished products must comply with ASTM C1036, Type 1, Class 1 (clear) or Class 2 (Tinted, Heat-Absorbing and Light Reducing), Quality q3.
   2. Ultra-Clear (Low Iron) Float Glass: Class 1 (clear) with a minimum of 91 percent visible light transmission and a minimum solar heat gain coefficient of 0.87.
      a. Products
         i) AFG Industries, Inc.: Krystal Klear
         ii) Pilkington Building Products North America: Optiwhite
         iii) PPG Industries, Inc.: Starphire
         iv) Schott Corporation: Amiran
   3. ASTM C 1048 Heat Treated Flat Glass, Kind HS or FT (remove ASTM Standard C 1048 if annealed glass), Condition A (uncoated), B (spandrel glass, one surface coated), or C (other coated glass.
      a. Heat Treated Flat Glass to be by horizontal (roller hearth) process with inherent roller wave distortion parallel to the bottom edge of the glass as installed.
      b. Provide Kind HS float glass in place of annealed float glass where needed to resist thermal stresses induced by differential shading of individual glass lites and to comply with glass design requirements specified in Part 1 "*Performance Requirements*" article.
      c. For uncoated glass, comply with requirements of Condition A.
      d. For coated vision glass, comply with requirements for Condition C.
      e. Provide Kind FT float glass in place of annealed or heat-strengthened float glass where safety glass is indicated.

f. All tempered architectural safety glass shall conform to ANSI Z97.1 and CPSC 16 CFR 1201.

4. Ceramic Coated Vision Glass: Float glass with ceramic enamel applied by silk screening process and complying with ASTM C1048, Condition C, Type 1, Quality Q3, Specification No. 95-1-31 in GANA Tempering Division "*Engineering Standards Manual*" and other requirements specified.
5. Ceramic Coated Spandrel Glass: Float glass with ceramic enamel applied by silk screening or other method and complying with ASTM C1048, Condition B, Type 1, Quality Q3 and complying with other requirements specified.
   a. Fallout Resistance: Provide spandrel units identical to those passing the fallout resistance test for spandrel glass specified in ASTM C1048.
6. Sputter Coated Glass: Float glass with metallic oxide or nitride coating deposited by vacuum deposition process after manufacture complying with ASTM C1376 and other requirements specified.
7. Coated Spandrel Glass: Float glass complying with other requirements specified with manufacturer's standard opacifier to coated second surface of lite with resulting product complying with Specification No. 89-1-6 in GANA Tempering Division "*Engineering Standards Manual*".

2.4 FABRICATIONS

A. Insulating Glass

1. Insulating glass products shall comply with the standards prescribed by the Insulating Certification Council (IGCC) using specification defined in ASTM standard E2190. Manufacturer's insulating glass must meet and IGCC Level CBA for its products using Low E and reflective coatings as well as uncoated glass compositions.
2. The lites comprising insulating glass units shall be annealed, heat strengthened, or fully tempered, as specified, required, or as recommended by the glass manufacturer to ensure against heat breakage; adequate glass performance at the specified design pressures; and adequate performance under test conditions specified under the performance criteria specified in the respective glass framing specification sections.
3. The overall thickness of a standard (nominal) 1" insulating unit shall be in conformance with the accepted industry standard deviance of $+^{1}/_{32}$" / $-^{1}/_{16}$". Units constructed with glass thicknesses other than 6mm shall have a standard deviance of $+^{1}/_{16}$" / $-^{1}/_{16}$". The average thickness of a 1" insulating unit with 6mm glass and a ½" air space is 0.986". Any deviation from this must be clearly stipulated by the glass manufacturer at the time of quote, coordinated with the system manufacturer for gasket design and subsequently called out in the shop drawings.
4. The construction of insulating glass units shall be double glazed, dual sealed units with hermetically sealed air space and utilize:
   a. Two lites of float glass in compliance with Section 2.4.A. specified herein. The exterior lite shall be fabricated from the same thickness material throughout the project in order to maintain visual uniformity.
   b. Continuous aluminum spacer with all corners bent (mitered, spliced or keyed will not be accepted) and joined with and invisible, butyl key at seam.
      i) Spacers shall be extruded aluminum; color to be selected by Architect (black).
      ii) Spacers shall be filled with desiccant on a minimum of two sides.
      iii) The seam shall be located at the head of the lite typically. Lites with more than one seam due to their size will be identified and the seams located in agreement with the Architect.
      iv) The date of manufacture shall be discretely identified.

c. Primary seal of polyisobutylene (PIB) between the aluminum spacer and inside face of glass on both sides. Color to be as selected by Architect (grey or black).
d. Secondary seal of two-part structural silicone designed to accept the specified wind loads. Color to be selected by Architect (grey or black).
e. Unit composition and seals shall be designed to utilize load sharing between the two lites.

5. Capillary Tubes
a. All insulating glass units shipped or installed in regions 5,000 foot or more above sea level must be fabricated with capillary tubes in the spacers.
b. Tubes shall be manufactured of a non-ferrous material which will not degrade over time.
c. Tubes shall be left open until such time as the glass arrives on site ready for installation.
d. Capillary tubes for insulating glass units above the 30th floor shall be crimped only when the unit reaches the floor it is to be installed on.
e. Crimping and sealing of capillary tubes shall be in accordance with the manufacturer's written direction.

B. Laminated Glass
1. Comply with, as a minimum, ASTM C1172, ANSI Z97.1 and CPSC 16 CFR 1201 for kinds of laminated glass indicated and other requirements specified.
2. Laminators must be trained and authorized by the interlayer manufacturer in best practices and in accordance with the approved manufacturers specified herein.
3. Interlayer: 0.060 inch (1.5-mm) thick interlayer material as indicated below with a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after laminating glass lites and installation.
a. Basis of Design: DuPont SentryGlas Plus.
b. Color: Clear.
4. Laminated glass shall be cut to size, heat treated (as required) and fabricated with autoclaved edges on all four sides.
5. Clamping or other restraint to hold the edges of the glass together during the autoclave process is prohibited.
6. When heat strengthened glass is used, laminated units shall be fabricated from lites supplied and heat strengthened by the same manufacturer.

2.5 FABRICATED GLASS TYPES
A. General
1. Glass types are for basis of design only and can be substituted by an equal product which is submitted for and approved at the time of bid. Assumed matches or value engineering options not submitted for prior approval to the Architect shall not be permitted.
2. Heat Treatment:
a. Annealed or heat strengthened as required for thermal and structural performance
b. Tempered only for Code compliance
3. Edgework for laminated glass:
a. Exposed Edges: Flat edge (cut edge of glass is flat and surface edges are slightly arrised) with polished finish.
b. Butt Edges: Flat edge (cut edge of glass is flat and surface edges are slightly arrised) with ground finish.
c. Exposed Fin Edges: Round edge (cut edge of glass is slightly curved to form an arc of a circle to glass fabricator's standard radius) with polished finish.
d. Corner Edges: 45 degree Miter Bevel with polished finish.

B. Table of glass types:

Type (GL)	Construction					Product	VLT %	UVW	UVS	SHGC	Lam
	Out	*Out*	*A/S*	*In*	*In*						
GL-1	¼"	-	½"	¼"	-	VRE1-30	28	0.30	0.27	0.19	-
GL-2	¼"	-	½"	¼"	-	VE1-85	76	0.31	0.29	0.54	-
GL-2L	¼"	-	½"	¼"	¼"	VE1-85	72	0.31	0.28	0.53	X
GL-2A (P)	¼"	-	½"	¼"	-	VE1-2M	70	0.29	0.26	0.38	-
GL-2AL	¼"	-	½"	¼"	¼"	VE1-2M	67	0.29	0.26	0.37	X
GL-2 Alt (P)	¼"	-	½"	-	¼"	VE29-2M	49	0.29	0.26	0.30	-
GL-3	¼"	¼" *GB	-	-	-	VLE-39	-	-	-	-	X
GL-4 (P)	¼"	-	-	-	-	-	-	-	-	-	-
*GB	*...denotes Graphite Blue™ substrate glass*										
(P)	*...denotes Podium Glazing and Alternates*										

2.6 GLASS DESIGN

A. The glass products specified herein have been chosen for their visual attributes as well as their performance characteristics. Heat treatment, insulating or laminating these products cannot alter the visual uniformity of the glass product. To this end, the following criteria apply:
   1. Roller wave distortion must be parallel to the sill dimension of every lite. Any lites of a size or orientation where this cannot occur must be identified and brought to the attention of the Architect for specific approval.
   2. Fully tempered glass may only be used for compliance with Code. Any other instances where tempering will be used must be identified and brought to the attention of the Architect for specific approval. These instances will require heat soaking in accordance with Section 014500.
   3. While it is understood that laminated glass will have some visible distortion at the edge due to light transmission, this distortion cannot encroach into the lite more than ½" from any edge.
   4. When the edges of laminated glass will be exposed, each lite must be inspected and cleared for use. Unacceptable characteristics include:
      a. Receding or withdrawn areas of the interlayer on any exposed edge.
      b. Optical distortion which encroaches into the daylight opening more than ½" from any edge.
      c. Dirt, dust or any debris left on the edge prior to sealant application.
      d. Visible anomalies within the laminated interlayer or on the glass edges themselves.

B. Glass thicknesses indicated are minimums and are for detailing only. Confirm actual project glass thicknesses by analyzing specified loads and in service conditions. Select minimum thickness and heat treatment to comply with ASTM E1300, according to the performance criteria derived from ASCE 7-05 and listed in Section 018316, Exterior Cladding Design Criteria or ¼", whichever is greater.

C. Edge Preparation: Conform to manufacturer's printed standards, the latest standards of GANA and as specified herein.

D. All glass for use in sloped glazing conditions (15° or more from vertical) shall be in accordance with the type specified and in conformance with GANA glazing manual guidelines.

2.7 GLAZING OPTIONS

A. Structural Silicone Glazing

1. General
   a. All structural silicone must be factory applied.
   b. Structural silicone shall not be used for primary dead load support.

2. Material
   a. Structural silicone shall be in conformance with Section 079213, Exterior Façade Sealants, high modulus structural silicone sealant (2 part). Quality assurance testing shall be in conformance with criteria set forth in Section 014500, Façade Testing and Quality Assurance.
   b. Exterior weather seal shall be medium to low modulus silicone sealant or high modulus structural silicone sealant applied after acceptable cure time for internal structural silicone bead but in no less than one day. A 2:1 minimum width to depth ratio with a 3/8" maximum sealant thickness at the center of the joint shall be followed.

3. Structural silicone design:
   a. Bite shall be calculated using the appropriate formula by the sealant manufacturer providing a minimum cavity width of $^{5}/_{16}$" by a depth determined by the wind loading. Increase cavity width per recommendations by sealant manufacturer. Keyhole or gasket raceways cannot be included in the minimum bite area.
   b. Glue line ratio between 1:1 and 3:1 must be maintained
   c. Joint shall be of the configuration and dimension necessary to provide the following allowable stress and attendant safety factors when the silicone is subject to the requirements set forth in section 018316, Exterior Cladding Design Criteria.

4. Substrate
   a. The non-glass substrate to which the silicone is adhering to must be a protected surface (paint, conversion coat, anodizing, etc.) or the material must have inherent corrosion resistant properties, such as stainless steel.
   b. All substrates must be tested for adhesion and compatibility by the sealant manufacturer as a part of the design process.

2.8 GLAZING ACCESSORIES

A. Gaskets:

1. All gaskets, weatherstripping and spacers shall have a continuous mechanical engagement to framing members and factory molded corners where silicone glazing is not utilized.
2. All gasket corners, whether molded or not, shall be bed in an elastomeric sealant compatible with glazing gaskets.
3. When in direct contact with silicone sealants, all gaskets, spacers and setting blocks shall be heat cured silicone rubber based material which is chemically compatible with the silicone sealant and with sufficient hardness for the specific purpose intended. Compatibility testing by the silicone sealant supplier/manufacturer shall be required.
4. As an alternate to extruded silicone gaskets for the gaskets used at structural silicone joints, Norton V2100 tape may be used as long as proper detailing is provided.
5. Interior and exterior gasket profiles shall be designed to produce a glass edge pressure of 7 pounds per lineal foot (plf) +/-3plf unless otherwise recommended by the glass manufacturer.

B. Sealants

1. Where a wet seal is required, use a one part non-acidic moisture-curing, neutral curing silicone sealant complying with F.S. TT-S-001543, Class A in accordance with Section 07 9213, Exterior Façade Sealants.

2. All structural seals shall be in accordance with Section 07 9213, Exterior Façade Sealants.
3. Compressible Filler Rod shall be closed-cell or waterproof-jacketed rod stock of synthetic rubber or plastic foam, proven to be compatible with sealants used. Rod is not to be used in the glazing rabbet.
4. Cleaners, Primers and Sealers shall be type as recommended by manufacturers of sealant or gasket.

C. Setting Blocks
1. Shall be silicone with a hardness of 85 ±5 Durometer Shore A. Non silicone setting blocks would need to be tested for compatibility with the silicone secondary seal of the insulating unit and approved for use by the glass manufacturer.
2. Shall have a minimum length calculated as 0.1" per square foot of glass area as required by GANA guidelines with a minimum length of 4" (100mm).
3. Minimum width shall correspond to the glass thickness and retaining member but, in no case, shall be less than the glass thickness at point of contact.
4. Shall be located at quarter points, or in accordance with GANA glazing guidelines.
5. Shall be secured against migration.
6. Shims used in conjunction with setting blocks must be of the same material, hardness, length and width as the setting blocks.

D. Side Blocks
1. Shall be silicone with a hardness of 65 ±5 Durometer Shore A.
2. Locate side blocks where required within the upper half of each jamb for each light.
3. Install block with $^1/_8$" (3mm) clearance between block and glass bearing surface.
4. Block shall be sufficient length to prevent point loading on the glass.
5. Side blocks are not required where an individual glass light is continuously sealed with silicone at two or more edges, when the sealant is installed immediately following the setting of the glass.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine the areas and conditions where glass and glazing are to be installed and notify in writing the Architect and General Contractor of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Architect.

B. Examine each lite of glass in conformance with the written recommendations of the approved glass manufacturer for the project. Do not install any glass which does not fully meet the criteria.

3.2 STANDARDS AND PERFORMANCE

A. Method of installation must be in accordance with the manufacturer's published literature, as well as the latest standards of the GANA and IGMA.

B. Comply with combined recommendations and technical reports by manufacturers of glass and glazing products as used in each glazing system and with recommendations of Glass Association of North America "Glazing Manual" except where more stringent requirements are indicated by the specifications, or the framing systems.

C. Install insulating glass units to comply with recommendations by Insulating Glass Manufacturers Association, except as otherwise specifically indicated or recommended by glass manufacturer. Insulating glass units shall be installed in such a manner as to adequately drain the glazing rabbet as approved in writing by the Insulating Glass manufacturer and in accordance with GANA glazing recommendations.

D. Watertight and airtight installation of each glass product is required. Each installation must withstand specified temperature changes, wind loading, and impact loading for operating sash and

doors, without failure including loss or breakage of glass, failure of sealants or gaskets to remain watertight and airtight, deterioration of glazing materials and other defects in the work.

E. Protect glass from edge damage during handling and installation, and subsequent operation of glazed components of the work. During installation, discard units with significant edge damage or other imperfections.

F. Glazing channel dimensions as shown on shop drawings for the glazing systems are intended to provide for necessary bite on glass, minimum edge clearance, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by job conditions at a time of installation, but stay within the minimum bites as stipulated by the glass framing shop drawings, the specifications, and the GANA guidelines.

3.3 PREPARATION

A. Thoroughly clean all joints, gutters and glass pockets, removing all foreign matter such as dirt, oil, grease, fireproofing, surface dust, foreign debris and frost.

B. Loose particles present or resulting from cleaning shall be removed by blowing out joints with oil free compressed air, or by vacuuming joints. Remove protective coatings or fabrication oils and residue on metallic surfaces with solvents that leave no residue. Do not allow solvent to air dry without wiping. Use only clean lint free towels for wiping of surfaces.

C. Do not glaze when the ambient temperature and weather conditions cause frost or moisture/condensation on framing members, or during damp weather unless approved measures to eliminate these conditions are used.

D. Cut all glass accurately to sizes required to the openings and in such a way that edges are smooth and straight. Clean glass free from dust, oil, etc., and wipe clean immediately before installation.

E. Set, remove and later reset glazing stops so as to avoid marking or defacing any portion of the frames, stops, settings, etc. Prime surfaces of openings properly where recommended by the sealant manufacturer.

F. All glazed openings shall be checked prior to glazing to make certain that the openings are square, plumb, and secure in order that uniform face and edge clearances are maintained. Inspect all framing joint intersections to insure that the offset in the joinery will not inflect undue edge pressure on the glass in accordance with GANA Guidelines.

G. Maintain minimum face distances on both sides of glass as per GANA Guidelines.

3.4 INSTALLATION AND APPLICATION

A. Cut glass at factory to exact size with proper edge clearance so that glass will not contact frame at any point. Do not nip or seam the edges except where required for a heat treating process.

B. Set all glass in a true plane, tight and straight, with proper and adequate clearance, firmly anchored to prevent rattling and looseness, with all edges cleanly cut.

C. Install glass in accordance with instructions contained in the Flat Glass Jobber's Glazing Manual and GANA guidelines. Use workmen specialized in the application of glass and sealants. Apply glazing compound or gaskets in accordance with manufacturer's recommendations.

D. Install setting blocks at quarter points or at location as recommended by GANA or glass manufacturer.

1. In no case shall edge of block be closer than 6" to the vertical edge of the glass unless specifically approved otherwise in writing by the glass manufacturer.
2. Setting blocks shall be restricted from lateral movement.
3. Setting blocks at insulating glass units and laminated glass must support both lites of glass.

E. Apply glazing sealants under pressure with hand or power actuated gun or other appropriate means. Use gun with a nozzle of proper size and provide sufficient pressure to completely fill joint. Neatly point or tool all joint surfaces to provide the proper contour.

F. Do not mark installed glass with an "X", or other symbol, or with any material whatsoever. Tapes or banners may be fastened to the frame head and suspended over the glass.

G. Apply masking tape, where required by glazing operation, in continuous strips in alignment with joint edge. Remove tape immediately after joints have been sealed and tooled. Dry tool joints. Do not use water-wet tool or tooling solution.
H. Follow sealant manufacturer's instructions regarding mixing, surface preparation, priming, application procedure.
I. Any stickers, separators or glass identification markings applied to the glass must be on the inboard surface. No stickers or separators shall be on the exterior (number one surface) when glass is installed.
J. Fabricate and install all glass so roller marks from heat strengthening process are to be aligned with the sill (horizontal). If this cannot be accomplished due to the size of the lite, notify the Architect in this regard and identify each lite where the distortion will be vertical.
K. Use of temporary wedge gaskets or dutchmans shall be in accordance with GANA and glass manufacturers' recommendation.
L. Factory molded corners on gaskets must be set in a wet compatible no-curing sealant or compatible wet silicone.

3.5 PROTECTION
A. The Glazing Contractor shall exercise extreme caution and care to protect exposed non-coated surfaces from scratching or abrading until Owner occupies the building.
B. Any and all scratched, abraded or otherwise damaged glass shall be removed and replaced with new damage-free glass by the Contractor, at no expense or cost to the Owner.
C. Protect all glass from weld splatter. Any glass with weld splatter or burns shall be removed and replaced at no expense or cost to the Owner.

3.6 CLEANING
A. Prior to date of substantial completion, wash glass on interior and exterior of buildings to remove paint, soil prints and foreign matter. Remove adhered matter and excess glazing materials. Clean glass only with a mild detergent and water recommended by the glass manufacturer. Do not use abrasive materials. Use professional window washers.
B. Glass scratched or otherwise damaged during cleaning shall be removed and replaced at no additional cost to the Owner. Dispose of excess materials, containers and debris from site.

3.7 CLEAN UP
A. Immediately upon completion of this work, remove from site all debris and scrap material and clean up all dust and dirt resulting from this work, including caulk, sealant, glazing compound, daubs, smears and droppings.

END OF SECTION 088000

TORTI GALLAS AND PARTNERS

Architects *of* Sustainable Community

March 12, 2015

Dan Nishikawa
OliverMcMillan Pacific Rim
1003 Bishop Street. #2288
Honolulu, HI

Re: Clarification on Form Based Rules, Kaka'ako, Mauka side, Honolulu, HI

Dear Dan:

Torti Gallas and Partners was retained to provide form based code consulting for the HCDA new Mauka Rules. It has come to my attention, that there might be confusion as to what was intended in the code regarding glazing and this note aims to provide clarification.

As part of that process of developing the code, Torti Gallas provided HCDA staff with general information on glazing. As part of that work, we suggested a standard requiring glazing to have a minimum Visible Light Transmission (VLT) of 50% or greater in order increase the visibility "in and out" of buildings. VLT requirements are typically applied to ground floor conditions, not necessarily for upper floor tower glass. We were not asked evaluate the VLT rule based on (1) energy calculations using Hawaii sun conditions to achieve LEED and energy goals, or (2) the number of glass products that are commercially available.

On a related manner, we should clarify that that opaque glass and window grilles are reasonable items to be part of window wall systems. Their prohibition was meant to apply to the ground floor, only, where storefronts are required.

I trust this explanation provides clarity to your deliberations. If necessary, Torti Gallas is available to assist HCDA with amending the rules based on reasonable and appropriate Hawaii considerations.

Sincerely,

Neal I. Payton, FAIA, LEED-AP, Principal
Torti Gallas and Partners

EXHIBIT "7"

BEFORE THE HAWAII COMMUNITY
DEVELOPMENT AUTHORITY

In the Petition of	)	DOCKET NO. _____
	)	
OLIVERMcMILLAN PACIFIC RIM, LLC,	)	
	)	
for waiver and suspension of § 15-217-55(k)(2) of the Mauka Area Rules as applied to the Symphony Honolulu Project.	)	
	)	

CERTIFICATE OF SERVICE

THE UNDERSIGNED HEREBY CERTIFIES that a true and correct copy of the foregoing document was duly served upon the following parties via hand-delivery, addressed as follows:

HAWAII COMMUNITY DEVELOPMENT
AUTHORITY
547 Queen Street
Honolulu, Hawaii 96813

Attention: Anthony J. H. Ching
Executive Director

DATED: Honolulu, Hawaii, May 28, 2015.

WILLIAM C. McCORRISTON
D. SCOTT MacKINNON

Attorneys for Petitioner
OLIVERMcMILLAN PACIFIC RIM, LLC