

## General Project Information

Is this application a result of a violation notice?
No Zoning Enforcement Case ID \#

No

Is this a contributing building or structure?
Yes
Is this proposed work visible from the street? Yes
\(\left.$$
\begin{array}{ll}\begin{array}{ll}\text { New Construction/Addition } \\
\text { Yes }\end{array} & \begin{array}{l}\text { Exterior Alteration } \\
\text { Yes }\end{array}
$$ <br>
Demolition \& Signage <br>

Yes \& Y e s ~\end{array}\right]\)| Solar Panel |
| :--- |
| No |
| Other |
| - |
| Does this project include a demolition? |
| Yes |

If a demolition request, what alternatives have you sought? Demolition of the late 20th century CMU additions at the rear of the property. Because these were modern additions to the mill,alternative solutions were not required by the State Historic Preservation Office.

Exterior Alterations

| Windows | Doors |
| :--- | :--- |
| $\underline{V}$ | $\underline{V}$ |
| Porches/Walkways | Siding |
|  |  |
| Roofs | Mechanical Appurtenances |
| $\underline{V}$ | $\underline{V}$ |

Other
-

## Describe the existing conditions and materials

Windows - Most of the Main Block windows consist of aluminum replacement sash. Those along the west elevation are comprised of pairs of hung, six-over-six units positioned beneath 12-light fixed sash. The north, south, and east elevation windows are simpler, and typically feature pairs of one-over-one windows beneath a glazed transom. A limited assortment of historic wood sash remains throughout, including eight-over-eight, 10-over-10, and 20-over-20 hung units. A pair of nine-over-nine wood windows in rectangular openings flank the main entrance at the façade/west elevation. Along the second floor of the east elevation, many units were partially replaced; the lower halves contain sliding aluminum inserts positioned beneath the original 20-light wood sash. The historic wood was covered with metal panels, likely in an attempt to reduce exposure to the elements and continued deterioration.

Doors - The Underwood Computing Machine Company complex has a total of 15 exterior entrances; seven of these doors access the Main Block. Stair towers A and B have pairs of original, halflight, raised panel doors within round arch masonryopenings. The north leaf of each pair and both transoms are covered/infilled with plywood. Access is provided by concrete walkways and brownstone or granite stairs.

At the center of the façade is the main entrance. Accessed by a concrete walkway and stair with flanking knee walls, the entrance is comprised of an aluminum storefront system with glazed a transom and sidelights.

Additional flush metal doors or aluminum storefront systems are located on the south and east elevations. Two at the east elevation are capped by canvas canopies anchored to the exterior masonry by steel rods.

A pair of paneled doors accesses the Boiler Room on its east elevation, and a modern rolling overhead garage door accesses the Coal Storage Addition on its south elevation.

The Polishing \& Plating Department's CMU Addition has two entrances at its east elevation. The main entrance to the RAW space is comprised of steel doors and a glazed transom accessed by a former concrete loading dock. The entrance is capped by a standing seam shed roof supported by square metal posts. The secondary entrance at the south end of the elevation is a flush metal door and concrete stair surrounded by a modern metal enclosure.

Roofs - The Main Block has a tar and gravel roof pierced by various vents and mechanical equipment surrounded by a masonry_parapet. The stair towers and rear water tower have hipped roofs clad in asphalt shingles. A copper vent hood caps the water tower. Signage is mounted to the roof's northeast corner.

The Boiler Room has a tar and gravel roof, and the Coal Storage Addition has a flat membrane with modern aluminum gutters and downspouts.

The Hardening Department has flat tar and gravel roof and masonry_parapet.

The Polishing \& Plating Department has a flat membrane roof and masonry_parapet, with condensing units mounted at its north and south ends. The CMU Addition has a flat membrane roof.

The Cafeteria has a flat membrane flat pierced by nine pyramidal skylights. The Addition has a flat membrane roof with mechanical units. A metal safety_guardrail is mounted to the CMU north, south, and east masonry walls around the roof.

The Hyphen has a flat membrane roof pierced by a single skylight and masonry_parapet walls. The roof and skylight remain in poor condition, due to continual water incursion and ponding around the opening

Mechanicals - The mechanical and life safety systems have been altered over the years and are outdated, including boilers, hot water heaters, the heating distribution system, and fire alarm systems.
Describe the proposed materials
Windows - Most of the Main Block aluminum replacement windows will be retained and repaired, as needed.

Masonry-infilled openings will be retained.

Security_grilles will be removed and will not be replaced.

The pair of nine-over-nine wood sash flanking the main entrance will be restored.

All remaining wood sash and frames in the Main Block and Polishing \& Plating Department, as well as the partially-replaced sash at the Main Block's east elevation, will be completely removed and replaced with new Low-E, double-glazed, fixed over awning aluminum windows with spacer bars, exterior applied muntins and interior screens within the existing window openings. Extant original windows will be used to replicate the size, configuration, and profiles of the original windows as closely as possible. Custom aluminum brick molds will be fabricated to closely approximate the existing. Windows and brick molds will be green to match the historic color

Doors - Most of the existing exterior entrances will be retained and repaired as needed.

The Main Block's historic stair tower doors will be restored, per details provided on Sheets AX52 and A52. The existing_plywood will be removed, and the north leaves and transoms fit with new glass. Original/deteriorated hardware will be replaced with codecompliant handles and locks.

The fabric canopies capping the secondary entrances at the Main Block and Hyphen will be replaced with new aluminum canopies that are more compatible with the industrial character of the complex. Please see the Mapes Super Lumideck Flat Soffit Canopy_product specification for additional information.

Addition will be removed. The proposed Addition will have four fully_glazed aluminum storefront systems at the east and south elevations.

Roofs - All existing roofs will be removed. New roofs will have rigid insulation above the decking and new TPO systems installed. The stair tower asphalt shingles will be replaced with new architectural asphalt shingles. New mechanical equipment will replace the existing in most locations.

The signage mounted to the Main Block's northeast corner will be retained and restored.

An equipment screen will be integrated into the existing_guardrail system on the CMU Addition.

The Hyphen skylight will be infilled to ensure the existing. electrical equipment in this space remains weatherproof and intact.

New mechanical equipment is proposed on the Addition roof.

Mechanicals - New or updated mechanical, plumbing, electrical
and fire protection systems will be installed in the Main Block. All new or updated systems will comply with current building code requirements and will be sized appropriately. Existing rooftop mechanicals will be replaced in-kind approximately in their existing locations and new equipment added.

Hardships and Reason for Hardships

Is this an owner-occupied principal residence?
No

Is this a non-owner occupied residential building containing six (6) or fewer dwelling units?
No

Is this a commercial and industrial building?
Yes

Is this a request for demolition where there is no feasible and prudent alternative to demolition? Yes

Other Payment Required

| Green Infrastructure Fund | Amount |
| :--- | :--- |
|  | - |
| City Tree Fund | Amount |
| Complete Street Fund | Amount |

## Describe Reason for Payments

- 


## Reason for Request

## Reason for Request

- 


## Recommendation

## Recommendation

- 


## Adverse Impacts on Neighboring Lands Suitability as Presently Zoned

Consistency with POCD
-

This is a dynamic label.
PLNG_COA_DIGEPLAN
Enhanced Doc List -

Reason for Hardship
Cost of historic preservation recommendations: Economic circumstances of the applicant:Lack of availa
Impact of the historic preservation recommendations on the district as a whole and on property value

| Dates and Notices |  |  |
| :---: | :---: | :---: |
| Application Received | Open Hearing Deadline | Close Hearing Deadline |
| - | - |  |
| Decision Deadline | Extensions Requested? | If yes, describe how the dates abc |
| - |  | - |
| Notice sent to NRZ/CRCOG | Legal Ad \#1 | Legal Ad \#2 |
| - | - | - |
| Sign Affidavit Received | Certificate of Mailings Returned | Notice of Decision Published |
| - | - | - |
| Recordation Date | Approval Expiration Date | Sign Deposit Check \# |
|  | - | - |
| Sign Deposit Date Received | Sign Deposit Check Amount | Public Hearing Date |
| - | - | - |
| Public Hearing Time | Meeting Link or Location | Document Link |
| - | - | - |
| Certificate of Compliance |  |  |
| As-Built Drawing Date | Type of Bond | Escrow Account \# |
| - | - | - |
| Bonding Company Name | Bonding Contact Name | Bonding Primary Phone \# |
| - | - | - |
| Bonding Email | Drawings Number of Sheets | Drawings Last Revised |
| - | - | - |

Prior Approvals
Type of Permit/Authorization Issued By Issued Date Expiration Date
Other State Permit State Historic Preservation Office 08/23/2023

Resolution Clauses
Type Comment

| Workflow Status: | Task | Assigned To | Status | Status Date | Action By |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  | Application Intake | Alexander Castro |  |  |  |
|  | Planning and Zoning Re... |  |  |  |  |
|  | Public Notice |  |  |  |  |
|  | Historic Commission |  |  |  |  |
|  | Notice of Decision |  |  |  |  |
|  | Appeal Period |  |  |  |  |
|  | Permit Issuance |  |  |  |  |
|  | Permit Status |  |  |  |  |
|  | Certificate of Plannin... |  |  |  |  |
|  | Case Complete |  |  |  |  |
| Condition Status: | Name | Short Comments | Status | Apply Date | Severity Action By |
| pplication Comments: | View ID Comment |  |  | Date |  |
| Initiated by Product: | ACA |  |  |  |  |
| /Pending Inspections: | Inspection Type | Scheduled Date | Inspector | Status | Comments |
| Resulted Inspections: | Inspection Type | Inspection Date | Inspector | Status | Comments |

## 56 ARBOR STREET

## HISTORIC TAX CREDIT APPLICATION EXISTING CONDITIONS



DRAWING LIST

## AX00 COVER SHEET

AX10 EXISTING SITE PLAN
AX20 EXISTING BOILER ROOM PLAN
AX21A
AX21A
AX21B
AX22A
EXISTING SECOND FLOOR PLAN
EXISTING THIRD FLOOR PLAN
OR PLAN
AX24 XISTING FOURTH FLOOR PLAN ExISITING ROOF PLAN XISTING ROOF PLAN
EX30
AX31 EXISTING ELEVATIONS
AX32 EXISTING ELEVATIONS AX32 EXISTING ELEVATIONS AX33 EXISTING ELEVATIONS AX50 EXISTING WINDOW DETAILS
AX51 EXISTING STAIR DETAILS AX52 EXISTING HISTORIC FEATURES

DBVW
ARCHITECTS

| M1C CHESTNUT STREET |
| :---: |
| PROVIDENCE R RO2003 |

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www dbuw con

56 ARBOR LIC
56 ARBOR STREET HARTFORD, CT 06106
WILL K. WILKINS \& TRICIA HAGGERTY WENZ
SCALE:
DRAWN: AA, BB, KG
OB NO: 2126

REAL ART WAYS
COVER SHEET
ISSUED FOR: Historic Tax Credits
DATE ISSUED: 07.05.22
REVIIION DATE: 01.13.23, 07.05.23
EXISTING SITE PLAN
$1^{\prime \prime}=40^{\prime}-0{ }^{\prime \prime}$
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DRAWN: BB, KG
JOB NO: $\quad 2126$
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EXISTING ROOF PLAN - 56 ARBOR - SOUTH
$1 / 16^{\prime \prime}=1^{\prime}-0 "$

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| T11 CHESTNUT STREET |
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| PROVIDENCE RIVO203 |

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SCALE: $\quad 1 / 16^{\prime \prime}=1^{\prime}-0^{\prime \prime}$
DRAWN: BB, KG
Job NO: 2126

REAL ART WAYS
EXISTING ROOF PLAN - 56 ARBOR - NORTH $1 / 16^{\prime \prime}=1^{1}-0^{\prime \prime}$



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SCALE: $\quad 1 / 16^{\prime \prime}=1^{\prime}-0^{\prime \prime}$

| DRAWN: | BB, KG |
| :--- | :--- |
| JOB NO: | 2126 |

JOB NO: $\quad 2126$

REAL ART WAYS 56 ARBOR STREET HARTFORD, CT 06106
EXISTING ROOF PLAN
ISSUED FOR: Historic Tax Credits DATE ISSUED: 07.05.22 REVIIION DATE: 01.13.23, 07.05.23


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DRAWN: $\quad$ BB, KG
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EXISTING ROOF PLAN

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CALE: $\quad 3 / 64^{\prime \prime}=1^{1}-0$

| DRAWN: | BB, KG |
| :--- | :--- |
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REAL ART WAYS 56 ARBOR STREET HARTFORD, CT 06106 EXISTING ELEVATIONS ISSUED FOR: Historic Tax Credits DATE ISSUED: 07.05.22 REVIIION DATE: 01.13.23, 07.05.23

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NOTE: ALL WORK SHOWN ON THIS
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PHASE II, UNLESS OTHERWISE NOTED
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EXISTING SOUTH ELEV $3 / 64 "=1^{\prime}-0^{\prime \prime} \quad$ (POLISHING AND PLATING DEPT)

LEXIGLASS OR OTHER WINDOW TO BE REMOVED, TYP OF (3) (PHASE I)
EXISTING EAST ELEVATION
(HARDENING DEPT) (POLISHING AND PLATING DEPT) (LATE 20TH CENTURY CMU ADDITION)


ROOF RAILING TO REMAIN

GUTTER AND DOWNSPOUTS TO BE REPLACED, TYP (PHASEI)

EXISTING NORTH ELEVATION
3/64" $=1$ '-0" (LATE 20TH CENTURY CMU ADDITION) (CAFETERIA)


## $D B W$ W <br> ARCHITECTS


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SCALE: $\quad 3 / 64^{\prime \prime}=1^{\prime}-0$

| DRAWN: | BB, KG |
| :--- | :--- |
| JB NO: | 2126 |

JOB NO: $\quad 2126$

REAL ART WAYS 56 ARBOR STREET HARTFORD, CT 06106 EXISTING ELEVATIONS ISSUED FOR: Historic Tax Credits DATE ISSUED: 07.05.22 REVIIION DATE: 01.13.23, 07.05.23

1) DOUBLE HUNG WINDOW - EXTERIOR ELEV $1 / 2^{\prime \prime}=1^{\prime}-0$ "


DOUBLE HUNG WINDOW - JAMB DETAIL $11 / 2^{\prime \prime}=1^{\prime}-0{ }^{\prime \prime}$
(6)

HISTORIC WOOD WINDOW - HEAD DETAIL $11 / 2^{\prime \prime}=1^{\prime}-0 "$DOUBLE HUNG WINDOW - MUNTIN DETAIL $11 / 2^{\prime \prime}=1^{\prime}-0 "$
(4)

DOUBLE HUNG WINDOW - MEETING RAIL DETAIL

(3) $\frac{\text { DOUBLE }}{11 / 2^{\prime \prime}}=11^{-0} \mathbf{H}^{\prime \prime}$ UNG WINDOW - SILL DETAIL

$\frac{11 / 2^{\prime \prime}=1^{\prime}-0 "}{}$

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SCALE: As indicated
DRAWN: AA, BB, KG
JOB NO: $\quad 2126$


REAL ART WAYS
56 ARBOR STREET HARTFORD, CT 06106
EXISTING WINDOW DETAILS
ISSUED FOR: Historic Tax Credits DATE ISSUED: 07.05.22
REVIIION DATE: 01.13.23, 07.05

(2)

HISTORIC STAIR DOOR
$1 / 2^{\prime \prime}=1$ '-0"


## DBVW <br> architects


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SCALE: $\quad 1 / 2^{\prime \prime}=1^{1}-0^{\prime \prime}$

| ORAWN: | BB,KG |
| :---: | :---: |
| OB NO: | 2126 |

REAL ART WAYS

(1) PROPOSED SITE PLAN
$\int$ PROJECT NORTH $1^{\prime \prime}=40^{\prime}-0{ }^{\prime \prime}$

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| SCALE: | $1 "=40$ |
| :--- | :--- |
| DRAWN: | BB, KG |

JOB NO: 2126

REAL ART WAYS 56 ARBOR STREET HARTFORD, CT 06106 PROPOSED SITE PLAN
PROPOSED ROOF PLAN - 56 ARBOR - SOUTH
$1 / 16^{\prime \prime}=1^{\prime}-0 "$


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56 ARBOR STREET HARTFORD, CT 06106
WILL K. WILKINS \& TRICIA HAGGERTY WENZ
SCALE: $\quad 1 / 16^{\prime \prime}=1^{\prime}-0 "$
DRAWN: BB, KG
JOB NO: $\quad 2126$
REAL ART WAYS

REVISION DATE: 01.13.23, 07.05.23
$\frac{\text { PROPOSED ROOF PLAN - } 56 \text { ARBOR - NORTH }}{1 / 16^{\prime \prime}=1^{\prime}-0 "}$ $1 / 16^{\prime \prime}=1^{\prime}-0 "$



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REAL ART WAYS 56 ARBOR STREET HARTFORD, CT 06106

SCALE: $\quad 1 / 16^{\prime \prime}=1^{\prime}-0^{\prime \prime}$
DRAWN: BB,KG PROPOSED ROOF PLAN

REVIIION DATE: 01.13.23, 07.05.23
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JOB NO: 2126

REAL ART WAYS 56 ARBOR STREET HARTFORD, CT 06106 PROPOSED ROOF PLAN ISSUED FOR: Historic Tax Credits DATE ISSUED: 07.05.22 REVIIION DATE: 01.13.23, 07.05.23



NOTE: ALL WORK SHOWN ON THIS
SHEET SHALL BE COMPLETED IN PHASE II, UNLESS OTHERWISE NOTED

(1) $\frac{\text { PROPOSED NORTHEAST ELEVATION }}{3 / 64^{\prime \prime}=1^{\prime}-0 " 1}$ $3 / 64$ " $=1$ 1'0"
(MAIN BLOCK)
3/64" = 1 '-0" (COAL STORAGE ADDITION) (HARDENING DEPT)
(NEW ADDITION - PHASE I)

## DBVW

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SCALE: $\quad 3 / 64^{\prime \prime}=1^{\prime}-0^{\prime \prime}$
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JOB NO: 2126

REAL ART WAYS 56 ARBOR STREET HARTFORD, CT 06106 PROPOSED ELEVATIONS ISSUED FOR: Historic Tax Credits DATE ISSUED: 07.05.22 REVIIION DATE: 01.13.23, 07.05.23


MECHANICAL SCREEN TO BE ADDED TO EXTG RAILING (PHASEI) EXISTING NON-HISTORIC CMU ADDITION TO BE PAINTED (PHASE I)
NEW WINDOW (PHASEI) DOORS TO BE REPLACED (PHASE I)

PROPOSED SOUTH ELEV $3 / 64^{\prime \prime}=1$ '-0" (POLISHING AND PLATING DEPT)

PROPOSED EAST ELEVATION
$3 / 64$ " $=1^{\prime}-0 "$


- NEW EGRESS VESTIBULE (PHASE I)

REPOINTED AS REQUIRED, TYPPROPOSED NORTH ELEVATION
3/64" = 1'-0" (NEW ADDITION) (LATE 20TH CENTURY CMU ADDITION) (CAFETERIA)


NON-ORIGINAL DOOR TO BE REPAIRED AND PAINTED (PHASE I)

MASONRY TO BE REPAIRED / REPOINTED AS REQUIRED, TYP
(3) PROPOSED WEST ELEVATION
$3 / 64^{\prime \prime}=1^{\prime}-0 "$ (CAFETERIA) (POLISHING AND PLATING DEPARTMENT)

## $D B W$ W <br> ARCHITECTS



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SCALE: $\quad 3 / 64^{\prime \prime}=1^{\prime}-0$
DRAWN: BB, KG
JOB NO: $\quad 2126$
$\frac{\text { Job }}{} \mathrm{NO}$ : $\quad 2126$

REAL ART WAYS 56 ARBOR STREET HARTFORD, CT 06106 PROPOSED ELEVATIONS ISSUED FOR: Historic Tax Credits DATE ISSUED: 07.05.22 REVIIION DATE: 01.13.23, 07.05.23


(1)

PROPOSED AWNING WINDOW - EXTERIOR ELEV $1 / 2^{\prime \prime}=1^{1}-0 "$

NOTE: ALL WORK SHOWN ON THIS SHEET SHALL BE COMPLETED IN PHASE II, UNLESS OTHERWISE NOTED


6
PROPOSED AWNING WINDOW - HEAD DETAIL $11 / 2^{\prime \prime}=1^{\prime}-0^{\prime \prime}$

(4)

PROPOSED AWNING WINDOW - MEETING RAIL DETAIL


EXTERIOR
0.062" METAL SILL

SEALANT AND SEALANT AND
BACKER ROD STONE SILL PT BLOCKING
AS REQUIRED

3 PROPSOED AWNING WINDOW - SILL DETAIL
2 PROPOSED AWNING WINDOW - JAMB DETAIL $11 / 2^{\prime \prime}=1^{\prime}-0 "$ $11 / 2^{\prime \prime}=1^{\prime}-0^{\prime \prime}$
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ARCHITECTS

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WILL K. WILKINS \& TRICIA HAGGERTY WENZ
SCALE: As indicated

| DRAWN: | BB, KG |
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| JOB NO: | 2126 |



REAL ART WAYS
56 ARBOR STREET HARTFORD, CT 06106 PROPOSED WINDOW DETAILS ISSUED FOR: Historic Tax Credits DATE ISSUED: 07.05.22 REVIIION DATE: 01.13.23, 07.05.23

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| :--- |
| PROVIDENCE RIO2003 |

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HISTORIC STAIR DOOR-PROPOSED $1 / 2^{\prime \prime}=1^{\prime}-0 "$
HISTORIC CORRIDOR SECTION-PROPOSED
$1 / 2^{\prime \prime}=1^{\prime}-0^{\prime \prime}$
}

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WILL K. WILKINS \& TRICIA HAGGERTY WENZ
SCALE: DRAWN: $\quad \mathrm{BB}, \mathrm{KG}$ DB NO: 2126

REAL ART WAYS


## REAL ART WAYS



## SOLID STATE LIGHTING

## FIXTURE TYPE:

## RAZAR BOLLARD-LED

S P E C I F I C A T I O N S

OPTICAL HOUSING
Heavy cast low copper aluminum (A356 alloy: <0.2\% copper) assembly with integral cooling fins. The Optical Panel mounting surface is milled flat (surface variance $< \pm .003$ ") to facilitate thermal transfer of heat to housing and cooling fins. Minimum wall thickness is .188".

SHAFT \& BASE
Extruded aluminum (6061-T6 alloy) riser welded to heavy cast aluminum (A356 alloy: $<0.2 \%$ copper) base. Riser has minimum wall thickness of .188". Electrical assembly including LED mains driver, LED Emergency driver (optional LED-EM) with batteries, and quick connectors suspended inside riser. Concealed bolts attach the Optical Housing bolts to Riser.

ANCHOR BOLTS
Four 3/8" $\times 10^{\prime \prime} \times 2^{\prime \prime}$ galvanized anchor bolts with couplings, leveling nuts, washers, template, and stainless bolts.

## PLED"' OPTICAL MODULES

Emitters (LED's) are arrayed on a metal core PCB panel with each emitter located on a copper thermal transfer pad and enclosed by an LED refractor. The asymmetric distributions have a micro-reflector inside the refractor that re-directs the house side emitter output towards the street side and functions as a house side shielding element. Refractors are injection molded H12 acrylic. Each LED refractor is sealed to the PCB over an emitter and all refractors are retained by an aluminum frame. All refractors in a Panel have the same optical pattern. LED refractors produce standard site/area distributions - Type II, and Type IV. Panels are field replaceable and field rotatable in $90^{\circ}$ increments.

## LED DRIVER(S)

Constant current electronic with a power factor of $>.90$ and a minimum operating temperature of $-40^{\circ} \mathrm{F} /-40^{\circ} \mathrm{C}$. Driver(s) is/are UL and cUL recognized and mounted directly against the Electrical Housing to facilitate thermal transfer, held down by universal clamps to facilitate easy removal. In-line terminal blocks facilitate wiring between the driver and optical arrays. Drivers accept an input of $120-277 \mathrm{~V}, 50 / 60 \mathrm{~Hz}$ or $347 \mathrm{~V}-480 \mathrm{~V}$, $50,60 \mathrm{~Hz}$. ( $0-10 \mathrm{~V}$ dimmable driver is standard. Driver has a minimum of 3 KV internal surge protection. Luminaire supplied with 20 KV surge protector for field accessible installation.)

## LED EMITTERS

High output LED's are utilized with drive currents ranging from 175 mA to 350 mA . 70 CRI Minimum. LED's are available in standard Neutral White (4000K), or optional Cool White (5000K) or Warm White (3000K). Consult Factory for other LED options.

## AMBER LED's

PCA (Phosphor Converted Amber) LED's utilize phosphors to create color output similar to LPS lamps and have a slight output in the blue spectral bandwidth. TRA (True Amber) LED's utilize material that emits light in the amber spectral bandwidth only without the use of phosphors.

## FINISH

Electrostatically applied TGIC Polyester Powder Coat on substrate prepared with 20 PSI power wash at $140^{\circ}$. Four step media blast and iron phosphate pretreatment for protection and paint adhesion. $400^{\circ} \mathrm{F}$ bake for maximum hardness and durability.


## RAZAR BOLLARD SERIES - LED



Spec/Order Example: RZRB1/PLED-IV/20LED-350mA/CW/277/RAL-8019-S/DF


| $\begin{aligned} & \text { LED } \\ & \text { COUNT } \end{aligned}$ | $\begin{aligned} & \text { SOURCE } \\ & \text { TYPE } \end{aligned}$ | SOURCE | INITIAL LUMENS 4000K | INITIAL LUMENS 3000K | INITIAL LUMENS 5000K | L70 GREATER THAN (HR) | STARTING TEMP. | SYSTEM WATTS | VOLTS | MAX INPUT AMPS |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 20 | LED | 20 PLED Optical Module-175mA | $\begin{aligned} & 1,401- \\ & 1,404 \end{aligned}$ | $\begin{aligned} & 1,226- \\ & 1,229 \end{aligned}$ | $\begin{aligned} & 1,434- \\ & 1,438 \end{aligned}$ | 60,000+ | $-20^{\circ} \mathrm{F}$ | 12 | $\begin{aligned} & 120 \\ & 277 \end{aligned}$ | $\begin{aligned} & 0.24 \\ & 0.10 \end{aligned}$ |
| 20 | LED | 20 PLED Optical Module - 350 mA | $\begin{aligned} & 2,501- \\ & 2,508 \end{aligned}$ | $\begin{aligned} & 2,190- \\ & 2,196 \end{aligned}$ | $\begin{aligned} & 2,561- \\ & 2,568 \end{aligned}$ | 60,000+ | $-20^{\circ} \mathrm{F}$ | 22 | $\begin{aligned} & 120 \\ & 277 \end{aligned}$ | $\begin{aligned} & 0.34 \\ & 0.15 \end{aligned}$ |
| 40 | LED | 40 PLED Optical Module - 175mA | $\begin{aligned} & 2,801- \\ & 2,808 \end{aligned}$ | $\begin{aligned} & 2,452- \\ & 2,459 \end{aligned}$ | $\begin{aligned} & 2,561- \\ & 2,568 \end{aligned}$ | 60,000+ | $-20^{\circ} \mathrm{F}$ | 22 | $\begin{aligned} & 120 \\ & 277 \end{aligned}$ | $\begin{aligned} & 0.38 \\ & 0.17 \end{aligned}$ |
| 40 | LED | 40 PLED Optical Module - 350 mA | $\begin{aligned} & 5,002- \\ & 5,015 \end{aligned}$ | $\begin{aligned} & 4,379- \\ & 4,391 \end{aligned}$ | $\begin{aligned} & 5,122- \\ & 5,136 \end{aligned}$ | 60,000+ | $-20^{\circ} \mathrm{F}$ | 44 | $\begin{aligned} & 120 \\ & 277 \end{aligned}$ | $\begin{aligned} & 0.38 \\ & 0.17 \end{aligned}$ |

## NOTES:

1. Max Input Amps is the highest of starting, operating, or open circuit currents
2. Lumen values for LED Modules vary according to the distribution type
3. System Watts includes the source watts and all driver components.
4. Fuse value should be sufficient to protect all wiring components. For electronic driver and LED component protection, use 10KV-20KV surge suppressors.
5. L70(10K) - TM-21 $6 x$ rule applied

WARNING: All fixtures must be installed in accordance with local codes or the National Electrical Code. Failure to do so may result in serious personal injury.
U.S. ARCHITECTURAL LIGHTING

## AREA \& ROADWAY LIGHTING

 RAZAR SERIES - LED LOW PROFILE AREA LUMINAIRE
## Optical Housing

Heavy cast, low copper aluminum assembly (A356 alloy, <.2\% copper) minimum wall thickness . 188". LED Module mounting area is machined to within a 0.002 " surface flatness variance for maximum surface contact and thermal conductivity from the LED modules to the radiating fins. Passive radiating fins above the LED Optics provide superior thermal management and long LED life. The optical and electrical compartments are integrated with the support arm to create one assembly. Cast and hinged driver compartment cover allows access to the drivers and wiring.

## Electrical Housing w/ Integrated Arm

Heavy cast low copper aluminum (A356 alloy; <0.2\% copper) assembly with integral cooling ribs surrounding the electrical compartment and a flat surface on the top of the arm to accommodate a photocell receptacle. Solid barrier wall separates optical and electrical compartments. The optical compartment and electrical compartment with the integrated support arm combine to create one assembly. Minimum wall thickness is .188". Cast and hinged driver assembly cover is integrated with wiring compartment cover.

## PLED ${ }^{\text {m }}$ Optics

Emitters (LED's) are arrayed on a metal core PCB panel with each emitter located on a copper thermal transfer pad and enclosed by an LED refractor. LED optics completely seal each individual emitter to meet an IP66 rating. In asymmetric distributions, a micro-reflector inside the refractor re-directs the house side emitter output towards the street side and functions as a house side shielding element. Refractors are injection molded H12 acrylic. Each LED refractor is sealed to the PCB over an emitter and all refractors are retained by an aluminum frame. Any one Panel, or group of Panels in a luminaire, have the same optical pattern. LED refractors produce standard site/area distributions. Panels are field replaceable and field rotatable in $90^{\circ}$ increments.

## LED Driver(s)

Constant current electronic with a power factor of $>.90$ and a minimum operating temperature of $-40^{\circ} \mathrm{F} /-40^{\circ} \mathrm{C}$. Driver(s) is/are UL and CUL recognized and mounted directly against the Electrical Housing to facilitate thermal transfer, held down by universal clamps to facilitate easy removal. In-line terminal blocks facilitate wiring between the driver and optical arrays. Drivers accept an input of $120-277 \mathrm{~V}, 50 / 60 \mathrm{~Hz}$ or $347 \mathrm{~V}-480 \mathrm{~V}$, $50,60 \mathrm{~Hz}$. ( $0-10 \mathrm{~V}$ dimmable driver is standard. Driver has a minimum of 3 KV internal surge protection. Luminaire supplied with 20KV surge protector for field accessible installation.)

## LED Emitters

High output LED's are utilized with drive currents ranging from 350 mA to 1050mA. 70CRI Minimum. LED's are available in standard Neutral White (4000K), or optional Cool White (5000K) or Warm White (3000K). Consult Factory for other LED options.

## Amber LED's

TRA (True Amber) LED's utilize material that emits light in the amber spectral bandwidth only without the use of phosphors.

## Finish

Electrostatically applied TGIC Polyester Powder Coat on substrate prepared with 20 PSI power wash at $140^{\circ}$. Four step media blast and iron phosphate pretreatment for protection and paint adhesion. $400^{\circ} \mathrm{F}$ bake for maximum hardness and durability.

## Mast Arm Fitter/Electrical Housing

Replaces standard Electrical Housing. Fits standard 2 3/8"O.D. horizontal tenon. Two (2) straps with two (2) bolts each encircle the lower half of the tenon. Upper half of the tenon rests on self-centering steps that position the angle of the luminaire at $0^{\circ},+1.5^{\circ},+1.5$ or $+3^{\circ}$ up from the horizontal. All hardware is stainless steel.

## PROJECT TYPE:



| FIXTURE | A | B | C | D |
| :---: | :---: | :---: | :---: | :---: |
| RZR-G | $\begin{gathered} 15^{\prime \prime} \\ 381 \mathrm{~mm} \end{gathered}$ | $\begin{aligned} & 36.5^{\prime \prime} \\ & 927 \mathrm{~mm} \end{aligned}$ | $\begin{gathered} \mathbf{3 "} \\ 76 \mathrm{~mm} \end{gathered}$ | $\begin{gathered} 7 " \\ 187 \mathrm{~mm} \end{gathered}$ |
| RZR | $14.75^{\prime \prime}$ | $\begin{aligned} & 28.25 " \\ & 718 \mathrm{~mm} \\ & \hline \end{aligned}$ | $2.75{ }^{\prime \prime}$ | $\begin{gathered} \mathbf{6 . 5 "} \\ 165 \mathrm{~mm} \\ \hline \end{gathered}$ |
| RZRM | $\begin{aligned} & 11.5^{\prime \prime} \\ & 292 \mathrm{~mm} \end{aligned}$ | $\begin{gathered} \mathbf{2 2 "} \\ 559 \mathrm{~mm} \end{gathered}$ | $\begin{aligned} & 2.5^{\prime \prime} \\ & 64 \mathrm{~mm} \end{aligned}$ | $\begin{aligned} & 5.25 " \\ & 133 \mathrm{~mm} \end{aligned}$ |
| RZR-MAF | $\begin{gathered} \hline 15^{\prime \prime} \\ 381 \mathrm{~mm} \end{gathered}$ | $\begin{aligned} & \hline \mathbf{2 8 . 2 5 "} \\ & 724 \mathrm{~mm} \end{aligned}$ | $2.5 "$ | $\begin{gathered} 4^{\prime \prime} \\ 102 \mathrm{~mm} \end{gathered}$ |

## SPECIFICATIONS

POLE DRILLING TEMPLATE



PLED ${ }^{m}$ MODULES


80 LED Module


48 LED Module


40 LED Module


ORDERING INFORMATION


## OPTIONS



## High Low Dimming For Switches (HLSW)

The HLSW is a Small Electronic Switch which Provides High Low Dimming Control Through the LED Driver's 0-10V Control. Switching is Done by Adding a Seconday AC Switched Hot Trigger Line to the HLSW in Addition to the Normal AC Power Line. When the Secondary Trigger Line is Powered, the Fixture will go to $100 \%$ Dimming. With no Power to the Trigger, the Fixture will operate at $50 \%$ or $25 \%$ Dimming. Switches for the Trigger Line can be a Normal AC Switch/Breaker or Timed Switch/Breaker.

## Wireless and Other Fixture Controls

Contact Factory for Wireless and Other Fixture Controls and Recomendations. Most Controls Can be Integrated and Factory Installed.

## EXTERNAL GLARE SHIELDS



EGS4-4 Sided Shield
Minimum Cutoff $=12^{\circ}$
Average Cutoff $=23^{\circ}$


EGS3W-3 Sided Shield
Minimum Rear Cutoff $=12^{\circ}$
Average Rear Cutoff $=23^{\circ}$
Minimum Side Cutoff $=4^{\circ}$
Average Side Cutoff $=16^{\circ}$

Glare Shields are rotatable on RZR and RZRM. Consult factory for custom applications.

INSTALLATION DETAIL


RZR-MAF Installation


RZR-WM Installation

## PHOTOMETRIC DATA GUIDE - LM-80 LUMEN MAINTENANCE

| LED Life / Operating Hours | Lumen <br> Depreciation | Lumen Depreciation <br> Scale Factor |
| :---: | :---: | :---: |
| 60,000 (10x Test Time Calculated) | L94 | 0.94 x |
| 100,000 (Theoretical Calculated) | L92 | 0.92 x |
| 150,000 (Theoretical Calcualted) | L89 | 0.89 x |

Lumen Depreciation Calculations Done in Accordance With IESNA TM-21 \& LM-80 ( $25^{\circ} \mathrm{C}$ Ambient) TM-21 6x Test Time Dicatates that $194 \mathbf{~} \mathbf{6 0 , 0 0 0}$ Hours.

## ELECTRICAL DATA GUIDE - AMPERAGE CHARTS

| \# of <br> LEDs | $\mathbf{m A}$ | System <br> Watts | $\mathbf{1 2 0 V}$ | $\mathbf{2 0 8 V}$ | $\mathbf{2 7 7 V}$ | $\mathbf{3 4 7 V}$ | $\mathbf{4 8 0 V}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 24 | 350 | 28 | 0.24 | 0.14 | 0.10 | 0.08 | 0.06 |
| 24 | 525 | 42 | 0.35 | 0.20 | 0.15 | 0.12 | 0.09 |
| 24 | 700 | 56 | 0.47 | 0.27 | 0.20 | 0.16 | 0.12 |
| 24 | 875 | 68 | 0.57 | 0.33 | 0.24 | 0.20 | 0.14 |
| 24 | 1050 | 82 | 0.68 | 0.39 | 0.30 | 0.24 | 0.17 |
| 48 | 350 | 53 | 0.44 | 0.25 | 0.19 | 0.15 | 0.11 |
| 48 | 525 | 79 | 0.66 | 0.38 | 0.29 | 0.23 | 0.16 |
| 48 | 700 | 105 | 0.88 | 0.51 | 0.38 | 0.30 | 0.22 |
| 48 | 875 | 132 | 1.10 | 0.63 | 0.48 | 0.38 | 0.27 |
| 48 | 1050 | 160 | 1.33 | 0.77 | 0.58 | 0.46 | 0.33 |
| 40 | 350 | 43 | 0.36 | 0.21 | 0.15 | 0.12 | 0.09 |
| 40 | 525 | 65 | 0.54 | 0.31 | 0.23 | 0.19 | 0.13 |
| 40 | 700 | 87 | 0.72 | 0.42 | 0.31 | 0.25 | 0.18 |
| 40 | 875 | 108 | 0.90 | 0.52 | 0.39 | 0.31 | 0.23 |
| 40 | 1050 | 128 | 1.07 | 0.62 | 0.46 | 0.37 | 0.27 |
| 80 | 350 | 85 | 0.71 | 0.41 | 0.31 | 0.25 | 0.18 |
| 80 | 525 | 129 | 1.08 | 0.62 | 0.47 | 0.37 | 0.27 |
| 80 | 700 | 174 | 1.45 | 0.83 | 0.63 | 0.50 | 0.36 |
| 80 | 875 | 216 | 1.80 | 1.04 | 0.78 | 0.62 | 0.45 |
| 80 | 1050 | 256 | 2.14 | 1.23 | 0.93 | 0.74 | 0.53 |
| 120 | 350 | 130 | 1.08 | 0.63 | 0.47 | 0.37 | 0.27 |
| 120 | 525 | 192 | 1.60 | 0.92 | 0.69 | 0.55 | 0.40 |
| 120 | 700 | 260 | 2.17 | 1.25 | 0.94 | 0.75 | 0.54 |
| 120 | 875 | 329 | 2.74 | 1.58 | 1.19 | 0.95 | 0.69 |
| 120 | 1050 | 398 | 3.32 | 1.91 | 1.44 | 1.15 | 0.83 |

## RZR SERIES - LED <br> PHOTOMETRIC DATA GUIDE - ISOFOOTCANDLE PLOTS

RZRM-PLED-48LED-700mA-40K - 18' Pole Height

MH DISTANCE (18')


MH DISTANCE (18')


MH DISTANCE (18')


MH DISTANCE (18')


MH DISTANCE (18')


MH DISTANCE (18')


MH DISTANCE (18')


MH DISTANCE (18')

$\qquad$

MH DISTANCE (18)


MH DISTANCE (18)


MH DISTANCE (18')


IES File downloads for this product can be found at www.usaltg.com/downloads/asr.html

## RZR SERIES - LED

## PHOTOMETRIC DATA GUIDE - ISOFOOTCANDLE PLOTS

RZR-PLED-80LED-700mA-40K - 25' Pole Height


## IES File downloads for this product can be found at www.usaltg.com/downloads/asr.html

## RZR SERIES - LED

## PHOTOMETRIC DATA GUIDE - ISOFOOTCANDLE PLOTS

RZRG-PLED-120LED-700mA-40K 30' Pole Height


IES File downloads for this product can be found at www.usaltg.com/downloads/asr.html

## PHOTOMETRIC DATA GUIDE - LUMEN TABLES (RZRM-PLED)

| RZR-M-PLED |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| LED Count | Drive Current (mA) | System Watts | Dist'n Type | 27K (2700K - 70CRI) |  |  | 30K (3000K-70CRI) |  |  | 40K (4000K - 70CRI) |  |  | 50K (5000K-70CRI) |  |  | System Watts | TRA ( 590 nm ) |  |  |
|  |  |  |  | LUMENS | LPW | BUG RATING | LUMENS | LPW | BUG RATING | LUMENS | LPW | BUG RATING | LUMENS | LPW | BUG RATING |  | LUMENS | LPW | BUG RATING |
| 24 | 350 | 28.2 | II | 3436 | 122 | B1-U0-G1 | 3709 | 132 | B1-U0-G1 | 3904 | 138 | B1-U0-G1 | 4100 | 145 | B1-U0-G1 | 20.0 | 1363 | 68 | B1-U0-G1 |
|  |  |  | II-FR | 3459 | 123 | B1-U0-G1 | 3734 | 132 | B1-U0-G1 | 3930 | 139 | B1-U0-G1 | 4127 | 146 | B1-U0-G1 |  | 1372 | 69 | B1-U0-G0 |
|  |  |  | I-ML | 3436 | 122 | B2-U0-G2 | 3709 | 132 | B2-U0-G2 | 3905 | 138 | B2-U0-G2 | 4100 | 145 | B2-U0-G2 |  | 1363 | 68 | B1-U0-G1 |
|  |  |  | III-M | 3496 | 124 | B1-U0-G1 | 3775 | 134 | B1-U0-G1 | 3973 | 141 | B1-U0-G1 | 4172 | 148 | B1-U0-G1 |  | 1387 | 69 | B1-U0-G0 |
|  |  |  | III-W | 3246 | 115 | B1-U0-G1 | 3505 | 124 | B1-U0-G1 | 3689 | 131 | B1-U0-G1 | 3873 | 137 | B1-U0-G1 |  | 1289 | 64 | B0-U0-G1 |
|  |  |  | IV | 3469 | 123 | B1-U0-G1 | 3746 | 133 | B1-U0-G1 | 3943 | 140 | B1-U0-G1 | 4140 | 147 | B1-U0-G1 |  | 1377 | 69 | B1-U0-G1 |
|  |  |  | IV-FT | 3161 | 112 | B1-U0-G1 | 3412 | 121 | B1-U0-G1 | 3592 | 127 | B1-U0-G1 | 3771 | 134 | B1-U0-G1 |  | 1254 | 63 | BO-U0-G1 |
|  |  |  | VSQ-N | 3627 | 129 | B2-U0-G0 | 3915 | 139 | B2-U0-G0 | 4121 | 146 | B2-U0-G0 | 4327 | 153 | B2-U0-G1 |  | 1439 | 72 | B1-U0-G0 |
|  |  |  | VSQ-M | 3556 | 126 | B2-U0-G1 | 3838 | 136 | B2-U0-G1 | 4041 | 143 | B2-U0-G1 | 4242 | 150 | B3-U0-G1 |  | 1410 | 71 | B1-U0-G0 |
|  |  |  | VSQ-W | 3471 | 123 | B3-U0-G1 | 3748 | 133 | B3-U0-G1 | 3945 | 140 | B3-U0-G1 | 4142 | 147 | B3-U0-G1 |  | 1377 | 69 | B1-U0-G1 |
|  |  |  | II-HS | 2513 | 89 | B0-U0-G1 | 2713 | 96 | B0-U0-G1 | 2856 | 101 | B0-U0-G1 | 2998 | 106 | B0-U0-G1 |  | 997 | 50 | BO-U0-G0 |
|  |  |  | II-FR-HS | 2556 | 91 | BO-U0-G0 | 2759 | 98 | BO-U0-G0 | 2905 | 103 | BO-U0-G0 | 3050 | 108 | BO-U0-G0 |  | 1014 | 51 | BO-U0-G0 |
|  |  |  | III-M-HS | 2543 | 90 | B0-U0-G1 | 2745 | 97 | BO-U0-G1 | 2889 | 102 | BO-U0-G1 | 3034 | 108 | BO-U0-G1 |  | 1008 | 50 | BO-U0-G0 |
|  |  |  | III-W-HS | 2488 | 88 | B0-U0-G1 | 2686 | 95 | B0-U0-G1 | 2827 | 100 | B0-U0-G1 | 2969 | 105 | B0-U0-G1 |  | 987 | 49 | B0-U0-G1 |
|  |  |  | IV-HS | 2626 | 93 | B0-U0-G1 | 2835 | 101 | B0-U0-G1 | 2984 | 106 | B0-U0-G1 | 3133 | 111 | BO-U0-G1 |  | 1042 | 52 | BO-U0-G0 |
|  |  |  | IV-FT-HS | 2481 | 88 | B0-U0-G1 | 2679 | 95 | B0-U0-G1 | 2820 | 100 | B0-U0-G1 | 2961 | 105 | B0-U0-G1 |  | 985 | 49 | BO-U0-G1 |
| 24 | 525 | 41.5 | 11 | 4908 | 118 | B1-U0-G1 | 5298 | 128 | B1-U0-G1 | 5577 | 134 | B1-U0-G1 | 5856 | 141 | B2-U0-G1 | 31.0 | 1586 | 51 | B1-U0-G1 |
|  |  |  | II-FR | 4941 | 119 | B1-U0-G1 | 5334 | 129 | B1-U0-G1 | 5614 | 135 | B2-U0-G1 | 5895 | 142 | B2-U0-G1 |  | 1598 | 52 | B1-U0-G0 |
|  |  |  | II-ML | 4908 | 118 | B2-U0-G2 | 5299 | 128 | B2-U0-G2 | 5578 | 134 | B2-U0-G2 | 5856 | 141 | B3-U0-G3 |  | 1587 | 51 | B1-U0-G1 |
|  |  |  | III-M | 4994 | 120 | B1-U0-G1 | 5392 | 130 | B1-U0-G1 | 5675 | 137 | B1-U0-G1 | 5959 | 144 | B1-U0-G2 |  | 1615 | 52 | B1-U0-G0 |
|  |  |  | III-W | 4637 | 112 | B1-U0-G2 | 5005 | 121 | B1-U0-G2 | 5269 | 127 | B1-U0-G2 | 5533 | 133 | B1-U0-G2 |  | 1500 | 48 | BO-U0-G1 |
|  |  |  | IV | 4956 | 119 | B1-U0-G1 | 5350 | 129 | B1-U0-G1 | 5632 | 136 | B1-U0-G1 | 5913 | 142 | B1-U0-G2 |  | 1602 | 52 | B1-U0-G1 |
|  |  |  | IV-FT | 4515 | 109 | B1-U0-G2 | 4875 | 117 | B1-U0-G2 | 5131 | 124 | B1-U0-G2 | 5388 | 130 | B1-U0-G2 |  | 1460 | 47 | BO-U0-G1 |
|  |  |  | VSQ-N | 5180 | 125 | B2-U0-G1 | 5592 | 135 | B2-U0-G1 | 5886 | 142 | B2-U0-G1 | 6181 | 149 | B2-U0-G1 |  | 1676 | 54 | B1-U0-G0 |
|  |  |  | VSQ-M | 5080 | 122 | B3-U0-G1 | 5484 | 132 | B3-U0-G1 | 5772 | 139 | B3-U0-G1 | 6061 | 146 | B3-U0-G1 |  | 1643 | 53 | B1-U0-G0 |
|  |  |  | VSQ-W | 4959 | 119 | B3-U0-G2 | 5353 | 129 | B3-U0-G2 | 5635 | 136 | B3-U0-G2 | 5917 | 143 | B3-U0-G2 |  | 1603 | 52 | B1-U0-G1 |
|  |  |  | 11-HS | 3589 | 86 | B0-U0-G1 | 3875 | 93 | B0-U0-G1 | 4079 | 98 | B0-U0-G1 | 4282 | 103 | B0-U0-G1 |  | 1161 | 37 | BO-U0-G0 |
|  |  |  | II-FR-HS | 3652 | 88 | B0-U0-G1 | 3942 | 95 | B0-U0-G1 | 4150 | 100 | B0-U0-G1 | 4357 | 105 | BO-U0-G1 |  | 1181 | 38 | BO-U0-G0 |
|  |  |  | III-M-HS | 3631 | 88 | B0-U0-G1 | 3920 | 94 | B0-U0-G1 | 4127 | 99 | B0-U0-G1 | 4333 | 104 | BO-U0-G2 |  | 1174 | 38 | BO-U0-G0 |
|  |  |  | III-W-HS | 3555 | 86 | BO-U0-G2 | 3838 | 92 | BO-U0-G2 | 4040 | 97 | BO-U0-G2 | 4242 | 102 | BO-U0-G2 |  | 1150 | 37 | BO-U0-G1 |
|  |  |  | IV-HS | 3751 | 90 | B0-U0-G1 | 4050 | 98 | BO-U0-G1 | 4263 | 103 | B0-U0-G1 | 4476 | 108 | B0-U0-G1 |  | 1213 | 39 | BO-U0-G0 |
|  |  |  | IV-FT-HS | 3545 | 85 | BO-U0-G2 | 3827 | 92 | BO-U0-G2 | 4029 | 97 | BO-U0-G2 | 4230 | 102 | BO-U0-G2 |  | 1146 | 37 | B0-U0-G1 |
| 24 | 700 | 55.9 | II | 6275 | 112 | B2-U0-G1 | 6774 | 121 | B2-U0-G2 | 7130 | 128 | B2-U0-G2 | 7487 | 134 | B2-U0-G2 | N/A | N/A |  |  |
|  |  |  | II-FR | 6317 | 113 | B2-U0-G1 | 6819 | 122 | B2-U0-G1 | 7178 | 128 | B2-U0-G1 | 7537 | 135 | B2-U0-G1 |  |  |  |  |
|  |  |  | II-ML | 6275 | 112 | B3-U0-G3 | 6774 | 121 | B3-U0-G3 | 7130 | 128 | B3-U0-G3 | 7487 | 134 | B3-U0-G3 |  |  |  |  |
|  |  |  | III-M | 6385 | 114 | B2-U0-G2 | 6893 | 123 | B2-U0-G2 | 7256 | 130 | B2-U0-G2 | 7618 | 136 | B2-U0-G2 |  |  |  |  |
|  |  |  | III-W | 5928 | 106 | B1-U0-G2 | 6399 | 114 | B1-U0-G2 | 6736 | 121 | B1-U0-G2 | 7073 | 127 | B1-U0-G2 |  |  |  |  |
|  |  |  | IV | 6337 | 113 | B2-U0-G2 | 6841 | 122 | B2-U0-G2 | 7201 | 129 | B2-U0-G2 | 7561 | 135 | B2-U0-G2 |  |  |  |  |
|  |  |  | IV-FT | 5772 | 103 | B1-U0-G2 | 6231 | 111 | B1-U0-G2 | 6559 | 117 | B1-U0-G2 | 6887 | 123 | B1-U0-G2 |  |  |  |  |
|  |  |  | VSQ-N | 6624 | 118 | B2-U0-G1 | 7151 | 128 | B2-U0-G1 | 7527 | 135 | B2-U0-G1 | 7903 | 141 | B3-U0-G1 |  |  |  |  |
|  |  |  | VSQ-M | 6494 | 116 | B3-U0-G1 | 7011 | 125 | B3-U0-G1 | 7380 | 132 | B3-U0-G1 | 7749 | 139 | B3-U0-G2 |  |  |  |  |
|  |  |  | VSQ-W | 6340 | 113 | B3-U0-G2 | 6844 | 122 | B3-U0-G2 | 7204 | 129 | B3-U0-G2 | 7565 | 135 | B3-U0-G2 |  |  |  |  |
|  |  |  | II-HS | 4589 | 82 | B1-U0-G1 | 4954 | 89 | B1-U0-G2 | 5215 | 93 | B1-U0-G2 | 5475 | 98 | B1-U0-G2 |  |  |  |  |
|  |  |  | III-RR-HS | 4668 | 84 | BO-U0-G1 | 5040 | 90 | B0-U0-G1 | 5305 | 95 | B0-U0-G1 | 5570 | 100 | B0-U0-G1 |  |  |  |  |
|  |  |  | III-M-HS | 4643 | 83 | BO-U0-G2 | 5012 | 90 | BO-U0-G2 | 5276 | 94 | BO-U0-G2 | 5539 | 99 | BO-U0-G2 |  |  |  |  |
|  |  |  | III-W-HS | 4544 | 81 | BO-U0-G2 | 4906 | 88 | BO-U0-G2 | 5164 | 92 | BO-U0-G2 | 5422 | 97 | BO-U0-G2 |  |  |  |  |
|  |  |  | IV-HS | 4796 | 86 | BO-U0-G2 | 5177 | 93 | BO-U0-G2 | 5450 | 97 | BO-U0-G2 | 5722 | 102 | BO-U0-G2 |  |  |  |  |
|  |  |  | IV-FT-HS | 4532 | 81 | BO-U0-G2 | 4893 | 88 | BO-U0-G2 | 5150 | 92 | BO-U0-G2 | 5408 | 97 | B0-U0-G2 |  |  |  |  |
| 24 | 875 | 67.8 | II | 7406 | 109 | B2-U0-G2 | 7995 | 118 | B2-U0-G2 | 8416 | 124 | B2-U0-G2 | 8837 | 130 | B2-U0-G2 | N/A | N/A |  |  |
|  |  |  | II-FR | 7456 | 110 | B2-U0-G1 | 8049 | 119 | B2-U0-G1 | 8473 | 125 | B2-U0-G1 | 8896 | 131 | B2-U0-G1 |  |  |  |  |
|  |  |  | 11-ML | 7406 | 109 | B3-U0-G3 | 7995 | 118 | B3-U0-G3 | 8416 | 124 | B3-U0-G3 | 8837 | 130 | B3-U0-G3 |  |  |  |  |
|  |  |  | III-M | 7536 | 111 | B2-U0-G2 | 8135 | 120 | B2-U0-G2 | 8563 | 126 | B2-U0-G2 | 8992 | 133 | B2-U0-G2 |  |  |  |  |
|  |  |  | III-W | 6997 | 103 | B1-U0-G2 | 7553 | 111 | B1-U0-G2 | 7951 | 117 | B2-U0-G2 | 8348 | 123 | B2-U0-G2 |  |  |  |  |
|  |  |  | IV | 7479 | 110 | B2-U0-G2 | 8073 | 119 | B2-U0-G2 | 8498 | 125 | B2-U0-G2 | 8923 | 132 | B2-U0-G2 |  |  |  |  |
|  |  |  | IV-FT | 6813 | 100 | B1-U0-G2 | 7355 | 108 | B2-U0-G2 | 7742 | 114 | B2-U0-G2 | 8129 | 120 | B2-U0-G2 |  |  |  |  |
|  |  |  | VSQ-N <br> VSQ | 7817 | 115 | B2-U0-G1 | 8439 | 124 | B3-U0-G1 | 8883 | 131 | B3-U0-G1 | 9327 | 138 | B3-U0-G1 |  |  |  |  |
|  |  |  | VSSQ-M | 7665 | 113 | B3-U0-G2 | 8275 | 122 | B3-U0-G2 | 8711 | 128 | B3-U0-G2 | 9146 | 135 | B3-U0-G2 |  |  |  |  |
|  |  |  | VSQ-W | 7482 | 110 | B3-U0-G2 | 8078 | 119 | B3-U0-G2 | 8503 | 125 | B4-U0-G2 | 8928 | 132 | B4-U0-G2 |  |  |  |  |
|  |  |  | II-HS | 5417 | 80 | B1-U0-G2 | 5847 | 86 | B1-U0-G2 | 6155 | 91 | B1-U0-G2 | 6463 | 95 | B1-U0-G2 |  |  |  |  |
|  |  |  | II-FR-HS | 5510 | 81 | B0-U0-G1 | 5948 | 88 | B1-U0-G1 | 6261 | 92 | B1-U0-G1 | 6574 | 97 | B1-U0-G1 |  |  |  |  |
|  |  |  | III-M-HS | 5480 | 81 | BO-U0-G2 | 5916 | 87 | BO-U0-G2 | 6227 | 92 | BO-U0-G2 | 6538 | 96 | BO-U0-G2 |  |  |  |  |
|  |  |  | III-W-HS | 5363 | 79 | BO-U0-G2 | 5790 | 85 | BO-U0-G2 | 6095 | 90 | BO-U0-G2 | 6399 | 94 | BO-U0-G2 |  |  |  |  |
|  |  |  | IV-HS | 5660 | 83 | BO-U0-G2 | 6110 | 90 | BO-U0-G2 | 6432 | 95 | BO-U0-G2 | 6753 | 100 | BO-U0-G2 |  |  |  |  |
|  |  |  | IV-FT-HS | 5349 | 79 | BO-U0-G2 | 5775 | 85 | BO-U0-G2 | 6078 | 90 | BO-U0-G2 | 6382 | 94 | BO-U0-G2 |  |  |  |  |
| 24 | 1050 | 82.0 | II | 8513 | 104 | B2-U0-G2 | 9190 | 112 | B2-U0-G2 | 9674 | 118 | B2-U0-G2 | 10157 | 124 | B2-U0-G2 | N/A | N/A |  |  |
|  |  |  | II-FR | 8570 | 105 | B2-U0-G1 | 9252 | 113 | B2-U0-G1 | 9739 | 119 | B2-U0-G1 | 10225 | 125 | B2-U0-G1 |  |  |  |  |
|  |  |  | 11-ML | 8513 | 104 | B3-U0-G3 | 9190 | 112 | B3-U0-G3 | 9674 | 118 | B3-U0-G3 | 10157 | 124 | B3-U0-G3 |  |  |  |  |
|  |  |  | III-M | 8662 | 106 | B2-U0-G2 | 9351 | 114 | B2-U0-G2 | 9843 | 120 | B2-U0-G2 | 10335 | 126 | B2-U0-G2 |  |  |  |  |
|  |  |  | III-W | 8042 | 98 | B2-U0-G2 | 8682 | 106 | B2-U0-G2 | 9139 | 111 | B2-U0-G3 | 9595 | 117 | B2-U0-G3 |  |  |  |  |
|  |  |  | IV | 8596 | 105 | B2-U0-G2 | 9280 | 113 | B2-U0-G2 | 9768 | 119 | B2-U0-G2 | 10256 | 125 | B2-U0-G2 |  |  |  |  |
|  |  |  | IV-FT | 7831 | 95 | B2-U0-G2 | 8454 | 103 | B2-U0-G2 | 8899 | 109 | B2-U0-G3 | 9344 | 114 | B2-U0-G3 |  |  |  |  |
|  |  |  | VSQ-N | 8985 | 110 | B3-U0-G1 | 9700 | 118 | B3-U0-G1 | 10210 | 125 | B3-U0-G1 | 10721 | 131 | B3-U0-G1 |  |  |  |  |
|  |  |  | VSQ-M | 8811 | 107 | B3-U0-G2 | 9512 | 116 | B3-U0-G2 | 10012 | 122 | B3-U0-G2 | 10513 | 128 | B3-U0-G2 |  |  |  |  |
|  |  |  | VSQ-W | 8601 | 105 | B4-U0-G2 | 9285 | 113 | B4-U0-G2 | 9773 | 119 | B4-U0-G3 | 10262 | 125 | B4-U0-G3 |  |  |  |  |
|  |  |  | 11-HS | 6226 | 76 | B1-U0-G2 | 6721 | 82 | B1-U0-G2 | 7075 | 86 | B1-U0-G2 | 7429 | 91 | B1-U0-G2 |  |  |  |  |
|  |  |  | II-FR-HS | 6333 | 77 | B1-U0-G1 | 6837 | 83 | B1-U0-G1 | 7197 | 88 | B1-U0-G1 | 7557 | 92 | B1-U0-G1 |  |  |  |  |
|  |  |  | III-M-HS | 6299 | 77 | BO-U0-G2 | 6799 | 83 | B0-U0-G2 | 7158 | 87 | BO-U0-G2 | 7515 | 92 | B1-U0-G2 |  |  |  |  |
|  |  |  | III-W-HS | 6165 | 75 | BO-U0-G2 | 6655 | 81 | BO-U0-G2 | 7005 | 85 | BO-U0-G2 | 7356 | 90 | BO-U0-G2 |  |  |  |  |
|  |  |  | IV-HS | 6506 | 79 | BO-U0-G2 | 7023 | 86 | BO-U0-G2 | 7393 | 90 | B1-U0-G2 | 7762 | 95 | B1-U0-G2 |  |  |  |  |
|  |  |  | \|V-FT-HS | 6148 | 75 | B0-U0-G2 | 6637 | 81 | BO-U0-G2 | 6986 | 85 | B1-U0-G3 | 7336 | 89 | B1-U0-G3 |  |  |  |  |

IES File downloads for this product can be found at www.usaltg.com/downloads/asr.html

PHOTOMETRIC DATA GUIDE - LUMEN TABLES (RZRM-PLED)

| RZR-M-PLED |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\begin{aligned} & \text { LED } \\ & \text { Count } \end{aligned}$ | Drive Current (mA) | System Watts | Dist'n Type | 27K (2700K - 70CRI) |  |  | 30K (3000K-70CRI) |  |  | 40K (4000K-70CRI) |  |  | 50K (5000K-70CRI) |  |  | System Watts | TRA ( 590 nm ) |  |  |
|  |  |  |  | LUMENS | LPW | BUG RATING | LUMENS | LPW | BUG RATING | LUMENS | LPW | BUG RATING | LUMENS | LPW | bug rating |  | LUMENS | LPW | bug rating |
| 48 | 350 | 52.5 | II | 6836 | 130 | B2-U0-G2 | 7380 | 141 | B2-U0-G2 | 7769 | 148 | B2-U0-G2 | 8157 | 155 | B2-U0-G2 | 41.0 | 2713 | 66 | BT-U0-G1 |
|  |  |  | II-FR | 6882 | 131 | B2-U0-G1 | 7430 | 142 | B2-U0-G1 | 7821 | 149 | B2-U0-G1 | 8212 | 156 | B2-U0-G1 |  | 2731 | 67 | B1-U0-G1 |
|  |  |  | 11-ML | 6837 | 130 | B3-U0-G3 | 7380 | 141 | B3-U0-G3 | 7769 | 148 | B3-U0-G3 | 8157 | 155 | B3-U0-G3 |  | 2713 | 66 | B1-U0-G1 |
|  |  |  | III-M | 6956 | 132 | B2-U0-G2 | 7509 | 143 | B2-U0-G2 | 7905 | 151 | B2-U0-G2 | 8300 | 158 | B2-U0-G2 |  | 2760 | 67 | B1-U0-G1 |
|  |  |  | III-W | 6459 | 123 | B1-U0-G2 | 6972 | 133 | B1-U0-G2 | 7339 | 140 | B1-U0-G2 | 7706 | 147 | B1-U0-G2 |  | 2563 | 63 | B1-U0-G1 |
|  |  |  | IV | 6903 | 131 | B2-U0-G2 | 7453 | 142 | B2-U0-G2 | 7845 | 149 | B2-U0-G2 | 8237 | 157 | B2-U0-G2 |  | 2740 | 67 | B1-U0-G1 |
|  |  |  | IV-FT | 6289 | 120 | B1-U0-G2 | 6789 | 129 | B1-U0-G2 | 7146 | 136 | B1-U0-G2 | 7503 | 143 | B2-U0-G2 |  | 2496 | 61 | B1-U0-G1 |
|  |  |  | VSQ-N | 7216 | 137 | B2-U0-G1 | 7790 | 148 | B2-U0-G1 | 8200 | 156 | B3-U0-G1 | 8610 | 164 | B3-U0-G1 |  | 2864 | 70 | B1-U0-G0 |
|  |  |  | VSQ-M | 7076 | 135 | B3-U0-G1 | 7639 | 146 | B3-U0-G2 | 8041 | 153 | B3-U0-G2 | 8443 | 161 | B3-U0-G2 |  | 2808 | 68 | B2-U0-G1 |
|  |  |  | VSQ-W | 6907 | 132 | B3-U0-G2 | 7456 | 142 | B3-U0-G2 | 7849 | 150 | B3-U0-G2 | 8242 | 157 | B3-U0-G2 |  | 2741 | 67 | B2-U0-G1 |
|  |  |  | II-HS | 5000 | 95 | B1-U0-G2 | 5398 | 103 | B1-U0-G2 | 5682 | 108 | B1-U0-G2 | 5966 | 114 | B1-U0-G2 |  | 1984 | 48 | B0-U0-G1 |
|  |  |  | II-RR-HS | 5087 | 97 | BO-U0-G1 | 5491 | 105 | BO-U0-G1 | 5780 | 110 | B1-U0-G1 | 6069 | 116 | B1-U0-G1 |  | 2018 | 49 | BO-U0-G0 |
|  |  |  | III-M-HS | 5059 | 96 | BO-U0-G2 | 5461 | 104 | BO-U0-G2 | 5748 | 109 | BO-U0-G2 | 6036 | 115 | BO-U0-G2 |  | 2007 | 49 | B0-U0-G1 |
|  |  |  | ${ }^{\text {III-W-HS }}$ | 4952 | 94 | BO-U0-G2 | 5345 | 102 | BO-U0-G2 | 5627 | 107 | BO-U0-G2 | 5908 | 113 | BO-U0-G2 |  | 1965 | 48 | B0-U0-G1 |
|  |  |  | IV-HS | 5224 | 100 | B0-U0-G2 | 5640 | 107 | BO-U0-G2 | 5937 | 113 | BO-U0-G2 | 6234 | 119 | BO-U0-G2 |  | 2074 | 51 | BO-U0-G1 |
|  |  |  | IV-FT-HS | 4938 | 94 | BO-U0-G2 | 5330 | 102 | BO-U0-G2 | 5611 | 107 | BO-U0-G2 | 5892 | 112 | BO-U0-G2 |  | 1960 | 48 | BO-U0-G1 |
| 48 | 525 | 79.0 | I | 9720 | 123 | B2-U0-G2 | 10493 | 133 | B2-U0-G2 | 11046 | 140 | B2-U0-G2 | 11598 | 147 | B2-U0-G2 | 62.0 | 3143 | 51 | B1-U0-G1 |
|  |  |  | II-FR | 9785 | 124 | B2-U0-G1 | 10564 | 134 | B2-U0-G1 | 11120 | 141 | B2-U0-G1 | 11676 | 148 | B3-U0-G1 |  | 3164 | 51 | B1-U0-G1 |
|  |  |  | II-ML | 9720 | 123 | B3-U0-G3 | 10494 | 133 | B3-U0-G3 | 11046 | 140 | B3-U0-G3 | 11598 | 147 | B3-U0-G3 |  | 3143 | 51 | B2-U0-G2 |
|  |  |  | III-M | 9891 | 125 | B2-U0-G2 | 10677 | 135 | B2-U0-G2 | 11240 | 142 | B2-U0-G2 | 11801 | 149 | B2-U0-G2 |  | 3198 | 52 | B1-U0-G1 |
|  |  |  | III-W | 9183 | 116 | B2-U0-G3 | 9914 | 125 | B2-U0-G3 | 10436 | 132 | B2-U0-G3 | 10958 | 139 | B2-U0-G3 |  | 2969 | 48 | B1-U0-G1 |
|  |  |  | IV | 9816 | 124 | B2-U0-G2 | 10597 | 134 | B2-U0-G2 | 11155 | 141 | B2-U0-G2 | 11712 | 148 | B2-U0-G2 |  | 3174 | 51 | B1-U0-G1 |
|  |  |  | IV-FT | 8942 | 113 | B2-U0-G2 | 9653 | 122 | B2-U0-G3 | 10161 | 129 | B2-U0-G3 | 10669 | 135 | B2-U0-G3 |  | 2892 | 47 | B1-U0-G1 |
|  |  |  | VSQ-N | 10260 | 130 | B3-U0-G1 | 11075 | 140 | B3-U0-G1 | 11659 | 148 | B3-U0-G1 | 12242 | 155 | B3-U0-G1 |  | 3317 | 54 | B2-U0-G0 |
|  |  |  | VSQ-M | 10060 | 127 | B3-U0-G2 | 10861 | 137 | B4-U0-G2 | 11432 | 145 | B4-U0-G2 | 12004 | 152 | B4-U0-G2 |  | 3253 | 52 | B2-U0-G1 |
|  |  |  | VSQ-W | 9821 | 124 | B4-U0-G3 | 10602 | 134 | B4-U0-G3 | 11160 | 141 | B4-U0-G3 | 11718 | 148 | B4-U0-G3 |  | 3175 | 51 | B2-U0-G1 |
|  |  |  | II-HS | 7110 | 90 | B1-U0-G2 | 7675 | 97 | B1-U0-G2 | 8079 | 102 | B1-U0-G2 | 8483 | 107 | B1-U0-G2 |  | 2298 | 37 | B0-U0-G1 |
|  |  |  | III-R-HS | 7231 | 92 | B1-U0-G1 | 7806 | 99 | B1-U0-G1 | 8217 | 104 | B1-U0-G1 | 8628 | 109 | B1-U0-G1 |  | 2339 | 38 | BO-U0-G0 |
|  |  |  | III-M-HS | 7192 | 91 | BO-U0-G2 | 7764 | 98 | B1-U0-G2 | 8173 | 103 | B1-U0-G2 | 8581 | 109 | B1-U0-G2 |  | 2325 | 38 | B0-U0-G1 |
|  |  |  | III-W-HS | 7040 | 89 | BO-U0-G2 | 7600 | 96 | BO-U0-G2 | 8000 | 101 | B1-U0-G2 | 8400 | 106 | B1-U0-G2 |  | 2276 | 37 | BO-U0-G1 |
|  |  |  | IV-HS | 7429 | 94 | B1-U0-G2 | 8020 | 102 | B1-U0-G2 | 8442 | 107 | B1-U0-G2 | 8864 | 112 | B1-U0-G2 |  | 2402 | 39 | B0-U0-G1 |
|  |  |  | IV-FT-HS | 7020 | 89 | B1-U0-G3 | 7579 | 96 | B1-U0-G3 | 7978 | 101 | B1-U0-G3 | 8377 | 106 | B1-U0-G3 |  | 2270 | 37 | BO-U0-G1 |
| 48 | 700 | 105.1 | II | 12226 | 116 | B2-U0-G2 | 13199 | 126 | B2-U0-G2 | 13894 | 132 | B2-U0-G2 | 14588 | 139 | B3-U0-G2 | N/A | N/A |  |  |
|  |  |  | II-FR | 12308 | 117 | B3-U0-G1 | 13287 | 126 | B3-U0-G1 | 13986 | 133 | B3-U0-G1 | 14686 | 140 | B3-U0-G1 |  |  |  |  |
|  |  |  | II-ML | 12227 | 116 | B3-U0-G3 | 13200 | 126 | B3-U0-G3 | 13894 | 132 | B3-U0-G3 | 14589 | 139 | B4-U0-G4 |  |  |  |  |
|  |  |  | III-M | 12440 | 118 | B2-U0-G2 | 13430 | 128 | B2-U0-G2 | 14137 | 135 | B2-U0-G2 | 14843 | 141 | B2-U0-G2 |  |  |  |  |
|  |  |  | III-W | 11550 | 110 | B2-U0-G3 | 12468 | 119 | B2-U0-G3 | 13125 | 125 | B2-U0-G3 | 13781 | 131 | B2-U0-G3 |  |  |  |  |
|  |  |  | IV | 12346 | 117 | B2-U0-G2 | 13329 | 127 | B2-U0-G2 | 14030 | 133 | B2-U0-G2 | 14731 | 140 | B2-U0-G2 |  |  |  |  |
|  |  |  | IV-FT | 11247 | 107 | B2-U0-G3 | 12141 | 116 | B2-U0-G3 | 12780 | 122 | B2-U0-G3 | 13419 | 128 | B2-U0-G3 |  |  |  |  |
|  |  |  | VSQ-N | 12904 | 123 | B3-U0-G1 | 13931 | 133 | B3-U0-G1 | 14663 | 140 | B3-U0-G1 | 15397 | 146 | B3-U0-G1 |  |  |  |  |
|  |  |  | VSQ-M | 12654 | 120 | B4-U0-G2 | 13660 | 130 | B4-U0-G2 | 14379 | 137 | B4-U0-G2 | 15099 | 144 | B4-U0-G2 |  |  |  |  |
|  |  |  | VSQ-W | 12352 | 118 | B4-U0-G3 | 13334 | 127 | B4-U0-G3 | 14036 | 134 | B4-U0-G3 | 14738 | 140 | B4-U0-G3 |  |  |  |  |
|  |  |  | II-HS | 8942 | 85 | B1-U0-G2 | 9653 | 92 | B1-U0-G2 | 10161 | 97 | B1-U0-G2 | 10669 | 102 | B1-U0-G2 |  |  |  |  |
|  |  |  | II-FR-HS | 9095 | 87 | B1-U0-G1 | 9819 | 93 | B1-U0-G1 | 10336 | 98 | B1-U0-G1 | 10852 | 103 | B1-U0-G1 |  |  |  |  |
|  |  |  | III-M-HS | 9045 | 86 | B1-U0-G2 | 9765 | 93 | B1-U0-G2 | 10279 | 98 | B1-U0-G2 | 10793 | 103 | B1-U0-G2 |  |  |  |  |
|  |  |  | III-W-HS | 8854 | 84 | B1-U0-G2 | 9558 | 91 | B1-U0-G3 | 10062 | 96 | B1-U0-G3 | 10565 | 101 | B1-U0-G3 |  |  |  |  |
|  |  |  | IV-HS | 9344 | 89 | B1-U0-G2 | 10087 | 96 | B1-U0-G2 | 10618 | 101 | B1-U0-G2 | 11149 | 106 | B1-U0-G2 |  |  |  |  |
|  |  |  | IV-FT-HS | 8831 | 84 | B1-U0-G3 | 9533 | 91 | B1-U0-G3 | 10035 | 95 | B1-U0-G3 | 10537 | 100 | B1-U0-G3 |  |  |  |  |
| 48 | 875 | 131.8 | II | 14829 | 113 | B3-U0-G2 | 16008 | 121 | B3-U0-G3 | 16851 | 128 | B3-U0-G3 | 17693 | 134 | B3-U0-G3 | N/A | N/A |  |  |
|  |  |  | II-FR | 14928 | 113 | B3-U0-G2 | 16115 | 122 | B3-U0-G2 | 16964 | 129 | B3-U0-G2 | 17812 | 135 | B3-U0-G2 |  |  |  |  |
|  |  |  | $11-\mathrm{ML}$ | 14829 | 113 | B4-U0-G4 | 16009 | 121 | B4-U0-G4 | 16851 | 128 | B4-U0-G4 | 17694 | 134 | B4-U0-G4 |  |  |  |  |
|  |  |  | III-M | 15088 | 114 | B2-U0-G2 | 16288 | 124 | B3-U0-G3 | 17145 | 130 | B3-U0-G3 | 18003 | 137 | B3-U0-G3 |  |  |  |  |
|  |  |  | III-W | 14009 | 106 | B2-U0-G3 | 15123 | 115 | B2-U0-G3 | 15919 | 121 | B3-U0-G3 | 16715 | 127 | B3-U0-G3 |  |  |  |  |
|  |  |  | IV | 14975 | 114 | B2-U0-G2 | 16166 | 123 | B3-U0-G2 | 17017 | 129 | B3-U0-G3 | 17867 | 136 | B3-U0-G3 |  |  |  |  |
|  |  |  | IV-FT | 13641 | 103 | B2-U0-G3 | 14726 | 112 | B3-U0-G3 | 15501 | 118 | B3-U0-G3 | 16276 | 123 | B3-U0-G3 |  |  |  |  |
|  |  |  | VSQ-N | 15652 | 119 | B3-U0-G1 | 16897 | 128 | B4-U0-G2 | 17786 | 135 | B4-U0-G2 | 18675 | 142 | B4-U0-G2 |  |  |  |  |
|  |  |  | VSQ-M | 15348 | 116 | B4-U0-G2 | 16568 | 126 | B4-U0-G2 | 17440 | 132 | B4-U0-G2 | 18312 | 139 | B4-U0-G2 |  |  |  |  |
|  |  |  | VSQ-W | 14981 | 114 | B4-U0-G3 | 16173 | 123 | B4-U0-G3 | 17024 | 129 | B5-U0-G3 | 17876 | 136 | B5-U0-G3 |  |  |  |  |
|  |  |  | II-HS | 10845 | 82 | B1-U0-G2 | 11707 | 89 | B1-U0-G2 | 12324 | 94 | B1-U0-G2 | 12940 | 98 | B1-U0-G2 |  |  |  |  |
|  |  |  | II-RR-HS | 11032 | 84 | B1-U0-G1 | 11909 | 90 | B1-U0-G2 | 12536 | 95 | B1-U0-G2 | 13162 | 100 | B1-U0-G2 |  |  |  |  |
|  |  |  | III-M-HS | 10971 | 83 | B1-U0-G2 | 11844 | 90 | B1-U0-G3 | 12467 | 95 | B1-U0-G3 | 13091 | 99 | B1-U0-G3 |  |  |  |  |
|  |  |  | III-W-HS | 10739 | 81 | B1-U0-G3 | 11594 | 88 | B1-U0-G3 | 12204 | 93 | B1-U0-G3 | 12814 | 97 | B1-U0-G3 |  |  |  |  |
|  |  |  | IV-HS | 11333 | 86 | B1-U0-G2 | 12234 | 93 | B1-U0-G2 | 12878 | 98 | B1-U0-G3 | 13522 | 103 | B1-U0-G3 |  |  |  |  |
|  |  |  | IV-FT-HS | 10711 | 81 | B1-U0-G3 | 11562 | 88 | B1-U0-G3 | 12171 | 92 | B1-U0-G3 | 12779 | 97 | B1-U0-G3 |  |  |  |  |
| 48 | 1050 | 159.6 | II | 17044 | 107 | B3-U0-G3 | 18400 | 115 | B3-U0-G3 | 19369 | 121 | B3-U0-G3 | 20337 | 127 | B3-U0-G3 | N/A | N/A |  |  |
|  |  |  | II-FR | 17159 | 108 | B3-U0-G2 | 18523 | 116 | B3-U0-G2 | 19498 | 122 | B3-U0-G2 | 20473 | 128 | B3-U0-G2 |  |  |  |  |
|  |  |  | II-ML | 17045 | 107 | B4-U0-G4 | 18401 | 115 | B4-U0-G4 | 19369 | 121 | B4-U0-G4 | 20338 | 127 | B4-U0-G4 |  |  |  |  |
|  |  |  | III-M | 17342 | 109 | B3-U0-G3 | 18722 | 117 | B3-U0-G3 | 19707 | 123 | B3-U0-G3 | 20692 | 130 | B3-U0-G3 |  |  |  |  |
|  |  |  | III-W | 16102 | 101 | B3-U0-G3 | 17383 | 109 | B3-U0-G3 | 18298 | 115 | B3-U0-G3 | 19213 | 120 | B3-U0-G4 |  |  |  |  |
|  |  |  | IV | 17212 | 108 | B3-U0-G3 | 18582 | 116 | B3-U0-G3 | 19559 | 123 | B3-U0-G3 | 20537 | 129 | B3-U0-G3 |  |  |  |  |
|  |  |  | IV-FT | 15680 | 98 | B3-U0-G3 | 16927 | 106 | B3-U0-G3 | 17818 | 112 | B3-U0-G3 | 18708 | 117 | B3-U0-G4 |  |  |  |  |
|  |  |  | VSQ-N | 17990 | 113 | B4-U0-G2 | 19421 | 122 | B4-U0-G2 | 20443 | 128 | B4-U0-G2 | 21466 | 134 | B4-U0-G2 |  |  |  |  |
|  |  |  | VSQ-M | 17641 | 111 | B4-U0-G2 | 19044 | 119 | B4-U0-G2 | 20046 | 126 | B4-U0-G2 | 21048 | 132 | B4-U0-G2 |  |  |  |  |
|  |  |  | VSQ-W | 17220 | 108 | B5-U0-G3 | 18590 | 116 | B5-U0-G3 | 19568 | 123 | B5-U0-G3 | 20546 | 129 | B5-U0-G3 |  |  |  |  |
|  |  |  | II-HS | 12465 | 78 | B1-U0-G2 | 13457 | 84 | B1-U0-G3 | 14165 | 89 | B1-U0-G3 | 14873 | 93 | B1-U0-G3 |  |  |  |  |
|  |  |  | III-R-HS | 12680 | 79 | B1-U0-G2 | 13688 | 86 | B1-U0-G2 | 14409 | 90 | B1-U0-G2 | 15129 | 95 | B1-U0-G2 |  |  |  |  |
|  |  |  | III-M-HS | 12611 | 79 | B1-U0-G3 | 13614 | 85 | B1-U0-G3 | 14330 | 90 | B1-U0-G3 | 15047 | 94 | B1-U0-G3 |  |  |  |  |
|  |  |  | III-W-HS | 12344 | 77 | B1-U0-G3 | 13326 | 83 | B1-U0-G3 | 14027 | 88 | B1-U0-G3 | 14728 | 92 | B1-U0-G4 |  |  |  |  |
|  |  |  | IV-HS | 13026 | 82 | B1-U0-G3 | 14062 | 88 | B1-U0-G3 | 14802 | 93 | B1-U0-G3 | 15542 | 97 | B1-U0-G3 |  |  |  |  |
|  |  |  | IV-FT-HS | 12311 | 77 | B1-U0-G3 | 13290 | 83 | B1-U0-G3 | 13989 | 88 | B1-U0-G4 | 14689 | 92 | B1-U0-G4 |  |  |  |  |

IES File downloads for this product can be found at www.usaltg.com/downloads/asr.htm

PHOTOMETRIC DATA GUIDE - LUMEN TABLES (RZR-PLED)

| RZR-PLED |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | DriveCurren (mA) | $\begin{gathered} \text { System } \\ \text { Watts } \end{gathered}$ | $\begin{aligned} & \text { Dist'n } \\ & \text { Type } \end{aligned}$ | 27K (2700K - 70CRI) |  |  | 30K (3000 - 70CRI) |  |  | 40K (4000k - 70CRI) |  |  | 50K (5000K - 70CRI) |  |  | System | TRA (590nm) |  |  |
|  |  |  |  | LUMENS | LPW | bug rating | LUMENS | LPW | bug rating | LUMENS | LPW | bug rating | LUMENS | LPW | bug rating |  | LUMENS | LPW | bug rating |
| 40 | 350 | 42.7 | II | 5819 | 136 | B2-U0-G1 | 6281 | 147 | B2-U0-G1 | 6612 | 155 | B2-U0-G2 | 6943 | 163 | B2-U0-G2 | 33.0 | 2309 | 70 | B1-U0-G1 |
|  |  |  | IIFR | 5858 | 137 | B2-00-G1 | 6324 | 148 | B2-U0-61 | 6657 | 156 | B2-U0-G1 | 6990 | 164 | B2-U0-G1 |  | 2325 | 70 | B1-U0-G0 |
|  |  |  | IIML | 5819 | 136 | B3-00-63 | 6282 | 147 | B3-00-63 | 6612 | 155 | B3-00-63 | 6943 | 163 | B3-00-63 |  | 2309 | 70 | B1-U0-G1 |
|  |  |  | III-M | 5921 | 139 | B1-U0-G2 | 6392 | 150 | B2-00-62 | 6728 | 158 | B2-U0-62 | 7065 | 165 | B2-U0-62 |  | 2349 | 71 | B1-U0-G1 |
|  |  |  | IIT-W | 5497 | 129 | B1-U0-G2 | 5935 | 139 | B1-U0-G2 | 6247 | 146 | B1-U0-G2 | 6559 | 154 | B1-U0-62 |  | 2182 | 66 | B1-U0-G1 |
|  |  |  | IV | 5876 | 138 | B1-U0-G2 | 6344 | 149 | B2-U0-G2 | 6677 | 156 | B2-U0-G2 | 7011 | 164 | B2-U0-G2 |  | 2332 | 71 | B1-U0-G1 |
|  |  |  | IV-FT | 5353 | 125 | B1-U0-62 | 5778 | 135 | B1-U0-G2 | 6083 | 142 | B1-U0-62 | 6387 | 150 | B1-U0-62 |  | 2124 | 64 | B1-U0-61 |
|  |  |  | VSQ-N | 6141 | 144 | B2-00-G1 | 6630 | 155 | B2-00-G1 | 6979 | 163 | B2-U0-G1 | 7328 | 172 | B2-U0-G1 |  | 2438 | 74 | B1-U0-G0 |
|  |  |  | VSQ-M | 6023 | 141 | B3-00-61 | 6502 | 152 | B3-00-61 | 6844 | 160 | B3-00-61 | 7186 | 168 | B3-00-61 |  | 2390 | 72 | B2-U0-61 |
|  |  |  | VSQ-W | 5879 | 138 | B3-00-62 | 6346 | 149 | B3-00-62 | 6680 | 156 | B3-00-62 | 7015 | 164 | B3-00-62 |  | 2333 | 71 | B2-U0-G1 |
|  |  |  | IIHS | 4256 | 100 | B0-U0-G1 | 4594 | 108 | B1-U0-G1 | 4836 | 113 | B1-U0-G2 | 5077 | 119 | B1-U0-G2 |  | 1689 | 51 | BO-UO-G0 |
|  |  |  | $11-\mathrm{R}$-HS | 4329 | 101 | B0-00-G1 | 4673 | 109 | B0-00-G1 | 4919 | 115 | BO-VO-G1 | 5165 | 121 | BO-U0-G1 |  | 1718 | 52 | Bo-U0-G0 |
|  |  |  | III-M-HS | 4305 | 101 | BO-UO-G2 | 4647 | 109 | BO-UO-G2 | 4892 | 115 | BO-UO-G2 | 5137 | 120 | BO-U0-G2 |  | 1708 | 52 | BO-UO-G1 |
|  |  |  | III-W-HS | 4214 | 99 | BO-UO-G2 | 4550 | 107 | BO-UO-G2 | 4789 | 112 | BO-U0-G2 | 5028 | 118 | BO-UO-G2 |  | 1673 | 51 | BO-U0-G1 |
|  |  |  | IV-HS | 4447 | 104 | B0-U0-G1 | 4801 | 112 | Bo-VO-G2 | 5054 | 118 | Bo-U0-G2 | 5306 | 124 | BO-U0-G2 |  | 1764 | 53 | Bo-VO-G1 |
|  |  |  | IV-T-HS | 4203 | 98 | BO-U0-G2 | 4537 | 106 | BO-U0-G2 | 4776 | 112 | BO-UO-G2 | 5015 | 117 | BO-U0-G2 |  | 1668 | 51 | BO-U0-G1 |
| 40 | 525 | 64.7 | " | 8396 | 130 | B2-U0-G2 | 9064 | 140 | B2-U0-G2 | 9541 | 147 | B2-U0-G2 | 10017 | 155 | B2-U0-G2 | 51.0 | 2715 | 53 | B1-U0-G1 |
|  |  |  | IIFR | 8452 | 131 | B2-U0-G1 | 9125 | 141 | B2-U0-61 | 9605 | 148 | B2-U0-G1 | 10085 | 156 | B2-U0-G1 |  | 2733 | 54 | B1-U0-G1 |
|  |  |  | IT-ML | 8396 | 130 | B3-00-63 | 9064 | 140 | B3-00-63 | 9541 | 147 | B3-U0-63 | 10018 | 155 | B3-00-63 |  | 2715 | 53 | B1-U0-G1 |
|  |  |  | III-M | 8543 | 132 | B2-U0-62 | 9223 | 143 | B2-U0-62 | 9708 | 150 | B2-U0-62 | 10194 | 158 | B2-U0-62 |  | 2762 | 54 | B1-U0-G1 |
|  |  |  | II-W | 7932 | 123 | B2-U0-G2 | 8563 | 132 | B2-U0-G2 | 9013 | 139 | B2-U0-G3 | 9464 | 146 | B2-U0-G3 |  | 2565 | 50 | B1-00-G1 |
|  |  |  | IV | 8478 | 131 | B2-U0-62 | 9152 | 141 | B2-U0-62 | 9634 | 149 | B2-U0-G2 | 10176 | 156 | B2-U0-62 |  | 2742 | 54 | B1-U0-G1 |
|  |  |  | IV-FT | 7724 | 119 | B2-U0-63 | 8338 | 129 | B2-U0-G3 | 8777 | 136 | B2-U0-G3 | 9216 | 142 | B2-U0-63 |  | 2497 | 49 | B1-U0-G1 |
|  |  |  | VSQ-N | 8861 | 137 | B3-00-G1 | 9566 | 148 | B3-00-61 | 10070 | 156 | B3-00-G1 | 10574 | 163 | B3-00-G1 |  | 2866 | 56 | B1-U0-G0 |
|  |  |  | VSQ-M | 8690 | 134 | B3-U0-G2 | 9381 | 145 | B3-00-62 | 9875 | 153 | B3-00-62 | 10369 | 160 | B3-00-G2 |  | 2809 | 55 | B2-U0-G1 |
|  |  |  | VSQ-W | 8483 | 131 | B4-U0-62 | 9157 | 142 | B4-U0-62 | 9640 | 149 | B4-U0-G3 | 10122 | 156 | B4-U0-63 |  | 2743 | 54 | B2-U0-G1 |
|  |  |  | II-HS | 6141 | 95 | B1-U0-G2 | 6629 | 102 | B1-U0-G2 | 6978 | 108 | B1-U0-G2 | 7327 | 113 | B1-U0-G2 |  | 1985 | 39 | BO-VO-G1 |
|  |  |  | II-FR-HS | 6246 | 97 | B1-U0-G1 | 6743 | 104 | B1-U0-G1 | 7098 | 110 | B1-U0-G1 | 7453 | 115 | B1-U0-G1 |  | 2020 | 40 | Bo-U0-G0 |
|  |  |  | IIT-M-HS | 6212 | 96 | BO-U0-G2 | 6706 | 104 | BO-U0-G2 | 7060 | 109 | BO-UO-G2 | 7412 | 115 | BO-U0-G2 |  | 2009 | 39 | BO-UO-G1 |
|  |  |  | IIT-W-HS | 6081 | 94 | BO-VO-G2 | 6564 | 101 | BO-U0-G2 | 6910 | 107 | B0-U0-G2 | 7255 | 112 | B0-U0-G2 |  | 1966 | 39 | Bo-U0-G1 |
|  |  |  | IV-HS | 6417 | 99 | Bo-U0-62 | 6927 | 107 | B0-U0-G2 | 7292 | 113 | B0-U0-G2 | 7656 | 118 | B1-U0-G2 |  | 2075 | 41 | Bo-V0-G1 |
|  |  |  | IV-F-HS | 6064 | 94 | B0-U0-G2 | 6546 | 101 | Bo-U0-G2 | 6891 | 107 | B1-U0-G2 | 7235 | 112 | B1-U0-63 |  | 1960 | 38 | Bo-U0-G1 |
| 40 | 700 | 86.8 | " | 10669 | 123 | B2-U0-G2 | 11518 | 133 | B2-U0-G2 | 12124 | 140 | B2-U0-G2 | 12730 | 147 | B2-U0-G2 | N/A | N/A |  |  |
|  |  |  | IIFR | 10740 | 124 | B2-U0-G1 | 11594 | 134 | B3-U0-G1 | 12205 | 141 | B3-00-G1 | 12815 | 148 | B3-U0-G1 |  |  |  |  |
|  |  |  | I-ML | 10669 | 123 | в3-00-63 | 11518 | 133 | в3-00-63 | 12124 | 140 | B3-00-63 | 12731 | 147 | B3-00-63 |  |  |  |  |
|  |  |  | III-M | 10856 | 125 | B2-U0-62 | 11719 | 135 | B2-U0-62 | 12336 | 142 | B2-U0-62 | 12953 | 149 | B2-U0-G2 |  |  |  |  |
|  |  |  | II-W | 10079 | 116 | B2-U0-G3 | 10880 | 125 | B2-U0-G3 | 11453 | 132 | B2-U0-63 | 12026 | 139 | B2-U0-63 |  |  |  |  |
|  |  |  | IV | 10774 | 124 | B2-U0-G2 | 11630 | 134 | B2-U0-G2 | 12243 | 141 | B2-U0-62 | 12855 | 148 | B2-U0-G2 |  |  |  |  |
|  |  |  | \|V-FT | 9814 | 113 | B2-U0-G3 | 10595 | 122 | B2-U0-G3 | 11153 | 128 | B2-U0-G3 | 11710 | 135 | B2-U0-G3 |  |  |  |  |
|  |  |  | VSQ-N | 11260 | 130 | B3-U0-61 | 12156 | 140 | B3-U0-G1 | 12796 | 147 | B3-U0-Gl | 13435 | 155 | B3-U0-G1 |  |  |  |  |
|  |  |  | VSS-M | 11042 | 127 | B4-00-G2 | 11920 | 137 | ${ }^{\text {B4-U0-G2 }}$ | 12548 | 145 | B4-U0-G2 | 13175 | ${ }^{152}$ | B4-U0-G2 |  |  |  |  |
|  |  |  | VSQ-W | 10778 | 124 | B4-U0.G3 | 11636 | 134 | B4-U0-63 | 12248 | 141 | B4-U0.G3 | 12860 | 148 | B4-U0-G3 |  |  |  |  |
|  |  |  | 1 IHS | 7803 | 90 | B1-U0-G2 | 8423 | 97 | B1-U0-G2 | 8866 | 102 | B1-U0-G2 | 9310 | 107 | B1-U0-G2 |  |  |  |  |
|  |  |  | II-FR-HS | 7937 | 91 | B1-U0-G1 | 8568 | 99 | B1-U0-G1 | 9019 | 104 | B1-U0-G1 | 9470 | 109 | B1-U0-G1 |  |  |  |  |
|  |  |  | IITM-HS | 7893 | 91 | B1-U0-G2 | 8521 | 98 | B1-U0-G2 | 8970 | 103 | B1-U0-G2 | 9418 | 109 | B1-U0-G2 |  |  |  |  |
|  |  |  | IITW-HS | 7726 | 89 | B0-U0-G2 | 8341 | 96 | B1-U0-62 | 8780 | 101 | B1-U0-62 | 9218 | 106 | B1-U0-62 |  |  |  |  |
|  |  |  | IV-HS | 8153 | 94 | B1-U0-G2 | 8802 | 101 | B1-U0-G2 | 9265 | 107 | B1-U0-G2 | 9728 | 112 | B1-U0-G2 |  |  |  |  |
|  |  |  | IV-FT-HS | 7705 | 89 | B1-U0-G3 | 8318 | 96 | B1-U0-63 | 8756 | 101 | B1-U0-G3 | 9194 | 106 | B1-U0-G3 |  |  |  |  |
| 40 | 875 | 108.0 | ${ }^{\prime \prime}$ | 12366 | 114 | B2-U0-G2 | 13349 | 124 | B2-U0-G2 | 14052 | 130 | B2-U0.-92 | 14754 | 137 | B3-U0-62 | N/A | N/A |  |  |
|  |  |  | II-FR | 12448 | 115 | B3-00-G1 | 13439 | 124 | B3-00-G1 | 14146 | 131 | B3-00-G1 | 14853 | 138 | B3-00-G2 |  |  |  |  |
|  |  |  | I-ML | 12366 | 115 | B3-00-63 | 13349 | 124 | B3-00-63 | 14052 | 130 | B3-00.-93 | 14755 | 137 | B4-U0-64 |  |  |  |  |
|  |  |  | IIT-M | 12581 | 116 | B2-U0-62 | 13582 | 126 | B2-U0-62 | 14297 | 132 | B2-U0-G2 | 15012 | 139 | B2-U0-G2 |  |  |  |  |
|  |  |  | II-W | 11682 | 108 | B2-U0-63 | 12611 | 117 | B2-U0-63 | 13275 | 123 | B2-U0-63 | 13939 | 129 | B2-U0-63 |  |  |  |  |
|  |  |  | IV | 12487 | 116 | B2-U0-G2 | 13480 | 125 | B2-U0-G2 | 14189 | 131 | B2-U0-G2 | 14899 | 138 | B2-U0-G2 |  |  |  |  |
|  |  |  | \|V-FT | 11375 | 105 | B2-U0-G3 | 12280 | 114 | B2-U0-G3 | 12926 | 120 | B2-U0-63 | 13573 | 126 | B2-U0-63 |  |  |  |  |
|  |  |  | VSQ-N | ${ }_{1}^{13051}$ | 121 | B3-00-61 | 14089 | 130 | B3-00-G1 | 14830 | ${ }^{137}$ | B3-00.-61 | 15572 | 144 | B3-00-G1 |  |  |  |  |
|  |  |  | VSQ-M | 12798 | 1118 | $\frac{84-00-62}{}$ | $\stackrel{13816}{13186}$ | 128 | B4-U0-62 <br> $84-10-63$ | 14543 | ${ }_{1}^{135}$ |  | $\frac{15270}{14005}$ | $\stackrel{141}{138}$ | B4-0-62 |  |  |  |  |
|  |  |  | VSQ-W | ${ }_{9}^{12492}$ | 116 | B4-U0-63 | ${ }_{9}^{13486}$ | 125 | B4-U-G3 | 14196 | ${ }_{1}^{131}$ | B4-U0-63 | ${ }^{14905}$ | $\frac{138}{100}$ | B44-U-G3 |  |  |  |  |
|  |  |  | II-FR-HS | 9199 | 85 | B1-U0-G1 | 9930 | 92 | B1-U0-G1 | 10453 | 97 | B1-U0-G1 | 10976 | 102 | B1-U0-G1 |  |  |  |  |
|  |  |  | III-M-HS | 9149 | 85 | B1-U0-G2 | 9876 | 91 | B1-U0-G2 | 10396 | 96 | B1-U0-G2 | 10916 | 101 | B1-U0-G2 |  |  |  |  |
|  |  |  | IITW-HS | 8955 | 83 | B1-U0-G2 | 9667 | 90 | B1-00-G3 | 10176 | 94 | B1-U0.-93 | 10685 | 99 | B1-U0-G3 |  |  |  |  |
|  |  |  | IV-HS | 9450 | 87 | B1-U0-G2 | 10201 | 94 | B1-U0-G2 | 10738 | 99 | B1-U0-G2 | 11275 | 104 | B1-U0-G2 |  |  |  |  |
|  |  |  | IV-T-HS | 8931 | 83 | B1-U0-G3 | 9641 | 89 | B1-U0-63 | 10149 | 94 | B1-U0-G3 | 10656 | 99 | B1-U0-G3 |  |  |  |  |
| 40 | 1050 | 128.2 | \\| | 14213 | 111 | B2-U0-G2 | 15344 | 120 | B3-U0-62 | 16151 | 126 | B3-U0-G3 | 16959 | 132 | B3-00-G3 | N/A | N/A |  |  |
|  |  |  | IIFR | 14308 | 112 | B3-U0-G1 | 15446 | 120 | B3-00-62 | 16259 | 127 | B3-00-62 | 17072 | 133 | B3-U0-62 |  |  |  |  |
|  |  |  | II-ML | 14214 | 111 | B3-00-G3 | 15344 | 120 | B4-U0-64 | 16152 | 126 | B4-U0.G4 | 16959 | 132 | B4-U0-64 |  |  |  |  |
|  |  |  | IITM | 14461 | 1113 | B2-U0-G2 | 15612 | 122 | B3-00-G2 | 16433 | 128 | B3-U0-63 | 17255 | 135 | B3-U0-63 |  |  |  |  |
|  |  |  | IIT-W | 13427 | 105 | B2-U0-63 | 14495 | 113 | B2-U0-63 | 15258 | 119 | B2-U0-63 | 16021 | 125 | B3-00-63 |  |  |  |  |
|  |  |  | IV | 14352 | 112 | B2-U0-G2 | 15494 | 121 | B3-U0-62 | 16309 | 127 | B3-00-63 | 17125 | 134 | B3-00-63 |  |  |  |  |
|  |  |  | V-FT | ${ }^{13075}$ | $\stackrel{102}{117}$ | B2-U0-G3 | $\frac{14175}{16194}$ | $\frac{110}{126}$ | $\frac{B 2-U 0-63}{\text { B4-U0-G1 }}$ | ${ }^{14858} 17046$ | $\stackrel{116}{133}$ | $\frac{B 3-00-G 3}{\text { B4 -00-G2 }}$ | 17601 | $\frac{122}{140}$ | B33-U-G3 <br> $8400-102$ |  |  |  |  |
|  |  |  | VSQ-N | 15001 | 117 | - ${ }^{\text {B3-U0-G1 }}$ | 16194 15880 | 126 | B4-U0-G1 B4-U0-G2 | 17046 | 133 <br> 130 | B4-U0-G2 B4-00-62 | 17899 | 140 | B4-U0-G2 B4-00-62 |  |  |  |  |
|  |  |  | VSQ-W | 14359 | 112 | B4-00-63 | 15501 | 121 | B4-00-G3 | 16317 | 127 | B44-00-G3 | 17132 | 134 | B45-0-G3 |  |  |  |  |
|  |  |  | 11 HS | 10395 | 81 | B1-U0-G2 | 11222 | 88 | B1-U0-G2 | 11813 | 92 | B1-U0-G2 | 12403 | 97 | B1-U0-G2 |  |  |  |  |
|  |  |  | IIF-R.HS | 10573 | 82 | B1-U0-G1 | 11414 | 89 | B1-U0-G2 | 12015 | 94 | B1-U0-62 | 12616 | 98 | B1-U0-G2 |  |  |  |  |
|  |  |  | III-M-HS | 10516 | 82 | B1-U0-G2 | 11352 | 89 | B1-U0-G2 | 11949 | 93 | B1-U0-G3 | 12547 | 98 | B1-U0-63 |  |  |  |  |
|  |  |  | III-W-Hs | 10293 | 80 | B1-U0-G3 | 11712 | 87 | B1-U0-G3 | 11696 | 91 | B1-U0-G3 | 12281 | 96 | B1-00-63 |  |  |  |  |
|  |  |  | $\left\lvert\, \frac{\mathrm{N}-\mathrm{HS}}{\mid \mathrm{V}-\mathrm{F}-\mathrm{HS}}\right.$ | 10862 | 85 | $\frac{B 1-00-62}{81-00-G 3}$ | $\frac{11726}{11082}$ | $\frac{91}{86}$ | $\frac{\mathrm{Bl}}{\mathrm{Bl}-\mathrm{OO}-\mathrm{G} 2}$ | $\frac{12343}{11665}$ | 96 | $\frac{\text { B1-U0-G2 }}{\text { B1-U0.G3 }}$ | $\frac{12960}{12248}$ | 101 | $\frac{\text { B1-U0-G3 }}{\text { B1-00-63 }}$ |  |  |  |  |

IES File downloads for this product can be found at www.usaltg.com/downloads/asr.html U.S. ARCHITECTURAL
LIGHTING

## PHOTOMETRIC DATA GUIDE - LUMEN TABLES (RZR-PLED)

| RZR-PLED |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\begin{array}{\|l\|} \text { LED } \\ \text { Count } \end{array}$ | Drive Curren (mA) | System Watts | Dist'n Type | 27K (2700K - 70CRI) |  |  | 30K (3000K - 70CRI) |  |  | 40K (4000K - 70CRI) |  |  | 50K (5000K-70CRI) |  |  | System Watts | TRA ( 590 nm ) |  |  |
|  |  |  |  | LUMENS | LPW | BUG RATING | LUMENS | LPW | bug rating | LUMENS | LPW | bug rating | LUMENS | LPW | bug rating |  | LUMENS | LPW | BUG RATING |
| 80 | 350 | 85.4 | \\| | 11277 | 132 | B2-U0-G2 | 12174 | 143 | B2-U0-G2 | 12814 | 150 | B2-U0-G2 | 13455 | 158 | B2-U0-G2 | 67.0 | 4475 | 67 | B1-U0-G1 |
|  |  |  | II-FR | 11352 | 133 | B3-U0-G1 | 12256 | 144 | B3-U0-G1 | 12901 | 151 | B3-U0-G1 | 13546 | 159 | B3-U0-G1 |  | 4504 | 67 | B1-U0-G1 |
|  |  |  | II-ML | 11277 | 132 | B3-U0-G3 | 12175 | 143 | B3-U0-G3 | 12815 | 150 | B3-U0-G3 | 13456 | 158 | B3-U0-G3 |  | 4475 | 67 | B2-U0-G2 |
|  |  |  | III-M | 11474 | 134 | B2-U0-G2 | 12387 | 145 | B2-U0-G2 | 13039 | 153 | B2-U0-G2 | 13691 | 160 | B2-U0-G2 |  | 4553 | 68 | B1-U0-G1 |
|  |  |  | III-W | 10654 | 125 | B2-U0-G3 | 11501 | 135 | B2-U0-G3 | 12106 | 142 | B2-U0-G3 | 12712 | 149 | B2-U0-G3 |  | 4228 | 63 | B1-U0-G2 |
|  |  |  | IV | 11388 | 133 | B2-U0-G2 | 12294 | 144 | B2-U0-G2 | 12941 | 152 | B2-U0-G2 | 13588 | 159 | B2-U0-G2 |  | 4518 | 67 | B1-U0-G1 |
|  |  |  | IV-FT | 10374 | 121 | B2-U0-G3 | 11199 | 131 | B2-U0-G3 | 11788 | 138 | B2-U0-G3 | 12377 | 145 | B2-U0-G3 |  | 4117 | 61 | B1-U0-G1 |
|  |  |  | VSQ-N | 11902 | 139 | B3-U0-G1 | 12849 | 150 | B3-U0-G1 | 13525 | 158 | B3-U0-G1 | 14202 | 166 | B3-U0-G1 |  | 4723 | 70 | B2-U0-G1 |
|  |  |  | VSQ-M | 11671 | 137 | B4-U0-G2 | 12600 | 148 | B4-U0-G2 | 13263 | 155 | B4-U0-G2 | 13927 | 163 | B4-U0-G2 |  | 4631 | 69 | B3-U0-G1 |
|  |  |  | VSQ-W | 11392 | 133 | B4-U0-G3 | 12299 | 144 | B4-U0-G3 | 12946 | 152 | B4-U0-G3 | 13593 | 159 | B4-U0-G3 |  | 4520 | 67 | B3-U0-G2 |
|  |  |  | II-HS | 8247 | 97 | B1-U0-G2 | 8903 | 104 | B1-U0-G2 | 9372 | 110 | B1-U0-G2 | 9840 | 115 | B1-U0-G2 |  | 3273 | 49 | B0-U0-G1 |
|  |  |  | II-RR-HS | 8389 | 98 | B1-U0-G1 | 9056 | 106 | B1-U0-G1 | 9533 | 112 | B1-U0-G1 | 10009 | 117 | B1-U0-G1 |  | 3329 | 50 | BO-U0-G1 |
|  |  |  | III-M-HS | 8344 | 98 | B1-U0-G2 | 9007 | 105 | B1-U0-G2 | 9482 | 111 | B1-U0-G2 | 9956 | 117 | B1-U0-G2 |  | 3311 | 49 | B0-U0-G1 |
|  |  |  | III-W-HS | 8167 | 96 | B1-U0-G2 | 8817 | 103 | B1-U0-G2 | 9281 | 109 | B1-U0-G2 | 9745 | 114 | B1-U0-G3 |  | 3240 | 48 | B0-U0-G1 |
|  |  |  | IV-HS | 8618 | 101 | B1-U0-G2 | 9304 | 109 | B1-U0-G2 | 9793 | 115 | B1-U0-G2 | 10283 | 120 | B1-U0-G2 |  | 3420 | 51 | BO-U0-G1 |
|  |  |  | IV-FT-HS | 8144 | 95 | B1-U0-G3 | 8792 | 103 | B1-U0-G3 | 9255 | 108 | B1-U0-G3 | 9718 | 114 | B1-U0-G3 |  | 3232 | 48 | B0-U0-G2 |
| 80 | 525 | 129.4 | II | 16239 | 125 | B3-U0-G3 | 17531 | 135 | B3-U0-G3 | 18454 | 143 | B3-U0-G3 | 19377 | 150 | B3-U0-G3 | 101.0 | 5251 | 52 | B1-U0-G1 |
|  |  |  | II-FR | 16348 | 126 | B3-U0-G2 | 17648 | 136 | B3-U0-G2 | 18577 | 144 | B3-U0-G2 | 19506 | 151 | B3-U0-G2 |  | 5286 | 52 | B1-U0-G1 |
|  |  |  | II-ML | 16240 | 126 | B4-U0-G4 | 17532 | 135 | B4-U0-G4 | 18454 | 143 | B4-U0-G4 | 19377 | 150 | B4-U0-G4 |  | 5251 | 52 | B2-U0-G2 |
|  |  |  | III-M | 16523 | 128 | B3-U0-G3 | 17837 | 138 | B3-U0-G3 | 18776 | 145 | B3-U0-G3 | 19715 | 152 | B3-U0-G3 |  | 5343 | 53 | B1-U0-G2 |
|  |  |  | III-W | 15341 | 119 | B2-U0-G3 | 16562 | 128 | B3-U0-G3 | 17433 | 135 | B3-U0-G3 | 18305 | 141 | B3-U0-G3 |  | 4961 | 49 | B1-U0-G2 |
|  |  |  | IV | 16398 | 127 | B3-U0-G3 | 17703 | 137 | B3-U0-G3 | 18635 | 144 | B3-U0-G3 | 19566 | 151 | B3-U0-G3 |  | 5302 | 52 | B1-U0-G1 |
|  |  |  | IV-FT | 14938 | 115 | B3-U0-G3 | 16127 | 125 | B3-U0-G4 | 16976 | 131 | B3-U0-G4 | 17824 | 138 | B3-U0-G4 |  | 4830 | 48 | B1-U0-G2 |
|  |  |  | VSQ-N | 17140 | 132 | B4-U0-G2 | 18504 | 143 | B4-U0-G2 | 19477 | 151 | B4-U0-G2 | 20451 | 158 | B4-U0-G2 |  | 5542 | 55 | B2-U0-G1 |
|  |  |  | VSQ-M | 16807 | 130 | B4-U0-G2 | 18144 | 140 | B4-U0-G2 | 19099 | 148 | B4-U0-G2 | 20053 | 155 | B4-U0-G2 |  | 5434 | 54 | B3-U0-G1 |
|  |  |  | VSQ-W | 16406 | 127 | B4-U0-G3 | 17711 | 137 | B5-U0-G3 | 18643 | 144 | B5-U0-G3 | 19575 | 151 | B5-U0-G3 |  | 5304 | 53 | B3-U0-G2 |
|  |  |  | II-HS | 11877 | 92 | B1-U0-G2 | 12821 | 99 | B1-U0-G2 | 13496 | 104 | B1-U0-G3 | 14171 | 110 | B1-U0-G3 |  | 3841 | 38 | B0-U0-G1 |
|  |  |  | II-FR-HS | 12081 | 93 | B1-U0-G2 | 13042 | 101 | B1-U0-G2 | 13728 | 106 | B1-U0-G2 | 14414 | 111 | B1-U0-G2 |  | 3906 | 39 | B0-U0-G1 |
|  |  |  | III-M-HS | 12016 | 93 | B1-U0-G3 | 12971 | 100 | B1-U0-G3 | 13654 | 106 | B1-U0-G3 | 14337 | 111 | B1-U0-G3 |  | 3885 | 38 | BO-U0-G1 |
|  |  |  | III-W-HS | 11760 | 91 | B1-U0-G3 | 12696 | 98 | B1-U0-G3 | 13364 | 103 | B1-U0-G3 | 14032 | 108 | B1-U0-G3 |  | 3803 | 38 | BO-U0-G2 |
|  |  |  | IV-HS | 12411 | 96 | B1-U0-G2 | 13398 | 104 | B1-U0-G3 | 14103 | 109 | B1-U0-G3 | 14808 | 114 | B1-U0-G3 |  | 4013 | 40 | B0-U0-G1 |
|  |  |  | IV-FT-HS | 11729 | 91 | B1-U0-G3 | 12662 | 98 | B1-U0-G3 | 13328 | 103 | B1-U0-G3 | 13995 | 108 | B1-U0-G4 |  | 3792 | 38 | BO-U0-G2 |
| 80 | 700 | 173.6 | I | 20595 | 119 | B3-U0-G3 | 22232 | 128 | B3-U0-G3 | 23403 | 135 | B3-U0-G3 | 24573 | 142 | B3-U0-G3 | N/A | N/A |  |  |
|  |  |  | II-FR | 20732 | 119 | B3-U0-G2 | 22381 | 129 | B3-U0-G2 | 23559 | 136 | B3-U0-G2 | 24736 | 142 | B3-U0-G2 |  |  |  |  |
|  |  |  | II-ML | 20595 | 119 | B4-U0-G4 | 22233 | 128 | B4-U0-G4 | 23403 | 135 | B4-U0-G4 | 24573 | 142 | B4-U0-G4 |  |  |  |  |
|  |  |  | III-M | 20954 | 121 | B3-U0-G3 | 22621 | 130 | B3-U0-G3 | 23812 | 137 | B3-U0-G4 | 25003 | 144 | B3-U0-G4 |  |  |  |  |
|  |  |  | III-W | 19456 | 112 | B3-U0-G4 | 21003 | 121 | B3-U0-G4 | 22109 | 127 | B3-U0-G4 | 23214 | 134 | B3-U0-G4 |  |  |  |  |
|  |  |  | IV | 20797 | 120 | B3-U0-G3 | 22451 | 129 | B3-U0-G3 | 23633 | 136 | B3-U0-G3 | 24814 | 143 | B3-U0-G4 |  |  |  |  |
|  |  |  | IV-FT | 18945 | 109 | B3-U0-G4 | 20452 | 118 | B3-U0-G4 | 21528 | 124 | B3-U0-G4 | 22604 | 130 | B3-U0-G4 |  |  |  |  |
|  |  |  | VSQ-N | 21737 | 125 | B4-U0-G2 | 23466 | 135 | B4-U0-G2 | 24701 | 142 | B4-U0-G2 | 25936 | 149 | B4-U0-G2 |  |  |  |  |
|  |  |  | VSQ-M | 21314 | 123 | B5-U0-G3 | 23010 | 133 | B5-U0-G3 | 24221 | 140 | B5-U0-G3 | 25432 | 146 | B5-U0-G3 |  |  |  |  |
|  |  |  | VSQ-W | 20806 | 120 | B5-U0-G3 | 22461 | 129 | B5-U0-G4 | 23643 | 136 | B5-U0-G4 | 24825 | 143 | B5-U0-G4 |  |  |  |  |
|  |  |  | II-HS | 15062 | 87 | B1-U0-G3 | 16260 | 94 | B1-U0-G3 | 17115 | 99 | B1-U0-G3 | 17971 | 104 | B1-U0-G3 |  |  |  |  |
|  |  |  | 11-FR-HS | 15321 | 88 | B1-U0-G2 | 16539 | 95 | B1-U0-G2 | 17410 | 100 | B1-U0-G2 | 18280 | 105 | B1-U0-G2 |  |  |  |  |
|  |  |  | III-M-HS | 15238 | 88 | B1-U0-G3 | 16450 | 95 | B1-U0-G3 | 17315 | 100 | B1-U0-G3 | 18181 | 105 | B1-U0-G4 |  |  |  |  |
|  |  |  | III-W-HS | 14915 | 86 | B1-U0-G4 | 16101 | 93 | B1-U0-G4 | 16948 | 98 | B1-U0-G4 | 17796 | 103 | B1-U0-G4 |  |  |  |  |
|  |  |  | IV-HS | 15739 | 91 | B1-U0-G3 | 16991 | 98 | B1-U0-G3 | 17885 | 103 | B1-U0-G3 | 18780 | 108 | B1-U0-G3 |  |  |  |  |
|  |  |  | IV-FT-HS | 14874 | 86 | B1-U0-G4 | 16058 | 92 | B1-U0-G4 | 16903 | 97 | B1-U0-G4 | 17748 | 102 | B1-U0-G4 |  |  |  |  |
| 80 | 875 | 215.9 | II | 23798 | 110 | B3-U0-G3 | 25691 | 119 | B3-U0-G3 | 27043 | 125 | B3-U0-G4 | 28395 | 132 | B3-U0-G4 | N/A | N/A |  |  |
|  |  |  | II-FR | 23957 | 111 | B3-U0-G2 | 25862 | 120 | B3-U0-G2 | 27223 | 126 | B3-U0-G2 | 28585 | 132 | B4-U0-G2 |  |  |  |  |
|  |  |  | II-ML | 23799 | 110 | B4-U0-G4 | 25692 | 119 | B4-U0-G4 | 27044 | 125 | B4-U0-G4 | 28396 | 132 | B4-U0-G4 |  |  |  |  |
|  |  |  | III-M | 24214 | 112 | B3-U0-G4 | 26140 | 121 | B3-U0-G4 | 27516 | 127 | B3-U0-G4 | 28892 | 134 | B3-U0-G4 |  |  |  |  |
|  |  |  | III-W | 22482 | 104 | B3-U0-G4 | 24270 | 112 | B3-U0-G4 | 25548 | 118 | B3-U0-G4 | 26825 | 124 | B3-U0-G4 |  |  |  |  |
|  |  |  | IV | 24032 | 111 | B3-U0-G3 | 25943 | 120 | B3-U0-G4 | 27309 | 126 | B3-U0-G4 | 28674 | 133 | B3-U0-G4 |  |  |  |  |
|  |  |  | IV-FT | 21892 | 101 | B3-U0-G4 | 23634 | 109 | B3-U0-G5 | 24877 | 115 | B3-U0-G5 | 26121 | 121 | B3-U0-G5 |  |  |  |  |
|  |  |  | VSQ-N | 25118 | 116 | B4-U0-G2 | 27116 | 126 | B5-U0-G2 | 28543 | 132 | B5-U0-G2 | 29970 | 139 | B5-U0-G2 |  |  |  |  |
|  |  |  | VSQ-M | 24630 | 114 | B5-U0-G3 | 26589 | 123 | B5-U0-G3 | 27988 | 130 | B5-U0-G3 | 29387 | 136 | B5-U0-G3 |  |  |  |  |
|  |  |  | VSQ-W | 24042 | 111 | B5-U0-G4 | 25954 | 120 | B5-U0-G4 | 27321 | 127 | B5-U0-G4 | 28686 | 133 | B5-U0-G4 |  |  |  |  |
|  |  |  | II-HS | 17405 | 81 | B1-U0-G3 | 18789 | 87 | B1-U0-G3 | 19778 | 92 | B1-U0-G4 | 20766 | 96 | B2-U0-G4 |  |  |  |  |
|  |  |  | II-FR-HS | 17704 | 82 | B1-U0-G2 | 19112 | 89 | B1-U0-G2 | 20118 | 93 | B1-U0-G2 | 21124 | 98 | B1-U0-G2 |  |  |  |  |
|  |  |  | III-M-HS | 17608 | 82 | B1-U0-G4 | 19008 | 88 | B1-U0-G4 | 20009 | 93 | B1-U0-G4 | 21009 | 97 | B1-U0-G4 |  |  |  |  |
|  |  |  | III-W-HS | 17234 | 80 | B1-U0-G4 | 18605 | 86 | B1-U0-G4 | 19584 | 91 | B1-U0-G4 | 20564 | 95 | B1-U0-G4 |  |  |  |  |
|  |  |  | IV-HS | 18187 | 84 | B1-U0-G3 | 19634 | 91 | B1-U0-G4 | 20667 | 96 | B1-U0-G4 | 21701 | 101 | B1-U0-G4 |  |  |  |  |
|  |  |  | IV-FT-HS | 17188 | 80 | B1-U0-G4 | 18555 | 86 | B1-U0-G4 | 19532 | 90 | B1-U0-G4 | 20509 | 95 | B1-U0-G4 |  |  |  |  |
| 80 | 1050 | 256.4 | II | 27354 | 107 | B3-U0-G4 | 29530 | 115 | B4-U0-G4 | 31084 | 121 | B4-U0-G4 | 32638 | 127 | B4-U0-G4 | N/A | N/A |  |  |
|  |  |  | II-FR | 27536 | 107 | B3-U0-G2 | 29727 | 116 | B4-U0-G2 | 31291 | 122 | B4-U0-G2 | 32856 | 128 | B4-U0-G2 |  |  |  |  |
|  |  |  | 11-ML | 27355 | 107 | B4-U0-G4 | 29531 | 115 | B5-U0-G5 | 31085 | 121 | B5-U0-G5 | 32639 | 127 | B5-U0-G5 |  |  |  |  |
|  |  |  | III-M | 27832 | 109 | B3-U0-G4 | 30046 | 117 | B3-U0-G4 | 31627 | 123 | B4-U0-G4 | 33209 | 130 | B4-U0-G4 |  |  |  |  |
|  |  |  | III-W | 25841 | 101 | B3-U0-G4 | 27897 | 109 | B3-U0-G4 | 29365 | 115 | B3-U0-G5 | 30834 | 120 | B3-U0-G5 |  |  |  |  |
|  |  |  | IV | 27622 | 108 | B3-U0-G4 | 29820 | 116 | B3-U0-G4 | 31389 | 122 | B4-U0-G4 | 32959 | 129 | B4-U0-G4 |  |  |  |  |
|  |  |  | IV-FT | 25163 | 98 | B3-U0-G5 | 27165 | 106 | B3-U0-G5 | 28595 | 112 | B3-U0-G5 | 30024 | 117 | B3-U0-G5 |  |  |  |  |
|  |  |  | VSQ-N | 28871 | 113 | B5-U0-G2 | 31168 | 122 | B5-U0-G2 | 32808 | 128 | B5-U0-G2 | 34448 | 134 | B5-U0-G2 |  |  |  |  |
|  |  |  | VSQ-M | 28310 | 110 | B5-U0-G3 | 30561 | 119 | B5-U0-G3 | 32170 | 125 | B5-U0-G4 | 33779 | 132 | B5-U0-G4 |  |  |  |  |
|  |  |  | VSQ-W | 27634 | 108 | B5-U0-G4 | 29833 | 116 | B5-U0-G4 | 31403 | 122 | B5-U0-G5 | 32973 | 129 | B5-U0-G5 |  |  |  |  |
|  |  |  | II-HS | 20005 | 78 | B1-U0-G4 | 21596 | 84 | B2-U0-G4 | 22733 | 89 | B2-U0-G4 | 23870 | 93 | B2-U0-G4 |  |  |  |  |
|  |  |  | II-FR-HS | 20349 | 79 | B1-U0-G2 | 21968 | 86 | B1-U0-G2 | 23124 | 90 | B1-U0-G2 | 24280 | 95 | B1-U0-G2 |  |  |  |  |
|  |  |  | III-M-HS | 20239 | 79 | B1-U0-G4 | 21848 | 85 | B1-U0-G4 | 22998 | 90 | B1-U0-G4 | 24148 | 94 | B1-U0-G4 |  |  |  |  |
|  |  |  | III-W-HS | 19809 | 77 | B1-U0-G4 | 21385 | 83 | B1-U0-G4 | 22511 | 88 | B1-U0-G4 | 23636 | 92 | B1-U0-G5 |  |  |  |  |
|  |  |  | IV-HS | 20905 | 82 | B1-U0-G4 | 22568 | 88 | B1-U0-G4 | 23756 | 93 | B1-U0-G4 | 24943 | 97 | B1-U0-G4 |  |  |  |  |
|  |  |  | IV-FT-HS | 19756 | 77 | B1-U0-G4 | 21328 | 83 | B1-U0-G4 | 22451 | 88 | B1-U0-G5 | 23573 | 92 | B1-U0-G5 |  |  |  |  |

## PHOTOMETRIC DATA GUIDE - LUMEN TABLES (RZRG-PLED)

| RZR-G-PLED |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\begin{aligned} & \text { LED } \\ & \text { Count } \end{aligned}$ | Drive Current (mA) | System Watts | Dist'n Type | 27K (2700K-70CRI) |  |  | 30K (3000K-70CRI) |  |  | 40K (4000K-70CRI) |  |  | 50K (5000K - 70CRI) |  |  | System Watts | TRA ( 590 nm ) |  |  |
|  |  |  |  | LUMENS | LPW | BUG RATING | LUMENS | LPW | bug rating | LUMENS | LPW | BUG RATING | LUMENS | LPW | bug rating |  | LUMENS | LPW | BUG RATING |
| 80 | 350 | 87.0 | II | 11409 | 131 | B2-U0-G2 | 12317 | 142 | B2-U0-G2 | 12965 | 149 | B2-U0-G2 | 13613 | 156 | B2-U0-G2 | 67.0 | 4528 | 68 | B1-U0-G1 |
|  |  |  | II-FR | 11485 | 132 | B3-U0-G1 | 12398 | 143 | B3-U0-G1 | 13051 | 150 | B3-U0-G1 | 13703 | 158 | B3-U0-G1 |  | 4558 | 68 | B1-U0-G1 |
|  |  |  | II-ML | 11409 | 131 | B3-U0-G3 | 12317 | 142 | B3-U0-G3 | 12965 | 149 | B3-U0-G3 | 13613 | 156 | B3-U0-G3 |  | 4528 | 68 | B2-U0-G2 |
|  |  |  | III-M | 11608 | 133 | B2-U0-G2 | 12531 | 144 | B2-U0-G2 | 13191 | 152 | B2-U0-G2 | 13850 | 159 | B2-U0-G2 |  | 4553 | 68 | B1-U0-G1 |
|  |  |  | III-W | 10778 | 124 | B2-U0-G3 | 11635 | 134 | B2-U0-G3 | 12248 | 141 | B2-U0-G3 | 12860 | 148 | B2-U0-G3 |  | 4276 | 64 | B1-U0-G2 |
|  |  |  | IV | 11520 | 132 | B2-U0-G2 | 12437 | 143 | B2-U0-G2 | 13091 | 150 | B2-U0-G2 | 13746 | 158 | B2-U0-G2 |  | 4572 | 68 | B1-U0-G1 |
|  |  |  | IV-FT | 10494 | 121 | B2-U0-G3 | 11330 | 130 | B2-U0-G3 | 11926 | 137 | B2-U0-G3 | 12522 | 144 | B2-U0-G3 |  | 4165 | 62 | B1-U0-G1 |
|  |  |  | VSQ-N | 12041 | 138 | B3-U0-G1 | 12999 | 149 | B3-U0-G1 | 13683 | 157 | B3-U0-G1 | 14367 | 165 | B3-U0-G1 |  | 4779 | 71 | B2-U0-G1 |
|  |  |  | VSQ-M | 11808 | 136 | B4-U0-G2 | 12747 | 147 | B4-U0-G2 | 13418 | 154 | B4-U0-G2 | 14089 | 162 | B4-U0-G2 |  | 4686 | 70 | B3-U0-G1 |
|  |  |  | VSQ-W | 11526 | 132 | B4-U0-G3 | 12443 | 143 | B4-U0-G3 | 13097 | 151 | B4-U0-G3 | 13752 | 158 | B4-U0-G3 |  | 4574 | 68 | B3-U0-G2 |
|  |  |  | II-HS | 8464 | 97 | B1-U0-G2 | 9138 | 105 | B1-U0-G2 | 9618 | 111 | B1-U0-G2 | 10099 | 116 | B1-U0-G2 |  | 3359 | 50 | B0-U0-G1 |
|  |  |  | III-R-HS | 8609 | 99 | B1-U0-G1 | 9294 | 107 | B1-U0-G1 | 9783 | 112 | B1-U0-G1 | 10274 | 118 | B1-U0-G1 |  | 3417 | 51 | BO-U0-G1 |
|  |  |  | III-M-HS | 8563 | 98 | B1-U0-G2 | 9244 | 106 | B1-U0-G2 | 9731 | 112 | B1-U0-G2 | 10217 | 117 | B1-U0-G2 |  | 3398 | 51 | B0-U0-G1 |
|  |  |  | III-W-HS | 8382 | 96 | B1-U0-G2 | 9048 | 104 | B1-U0-G2 | 9525 | 109 | B1-U0-G3 | 10001 | 115 | B1-U0-G3 |  | 3326 | 50 | B0-U0-G1 |
|  |  |  | IV-HS | 8845 | 102 | B1-U0-G2 | 9548 | 110 | B1-U0-G2 | 10051 | 116 | B1-U0-G2 | 10553 | 121 | B1-U0-G2 |  | 3510 | 52 | BO-U0-G1 |
|  |  |  | IV-FT-HS | 8359 | 96 | B1-U0-G3 | 9024 | 104 | B1-U0-G3 | 9499 | 109 | B1-U0-G3 | 9974 | 115 | B1-U0-G3 |  | 3317 | 50 | B0-U0-G2 |
| 80 | 525 | 129.0 | 11 | 16394 | 127 | B3-U0-G3 | 17698 | 137 | B3-U0-G3 | 18629 | 144 | B3-U0-G3 | 19560 | 152 | B3-U0-G3 | 101.0 | 5301 | 52 | B1-U0-G1 |
|  |  |  | II-FR | 16503 | 128 | B3-U0-G2 | 17816 | 138 | B3-U0-G2 | 18753 | 145 | B3-U0-G2 | 19691 | 153 | B3-U0-G2 |  | 5336 | 53 | B1-U0-G1 |
|  |  |  | II-ML | 16394 | 127 | B4-U0-G4 | 17698 | 137 | B4-U0-G4 | 18630 | 144 | B4-U0-G4 | 19561 | 152 | B4-U0-G4 |  | 5302 | 52 | B2-U0-G2 |
|  |  |  | III-M | 16680 | 129 | B3-U0-G3 | 14740 | 114 | B2-U0-G2 | 18955 | 147 | B3-U0-G3 | 19902 | 154 | B3-U0-G3 |  | 5343 | 53 | B1-U0-G2 |
|  |  |  | \|III-W | 15488 | 120 | B2-U0-G3 | 16720 | 130 | B3-U0-G3 | 17600 | 136 | B3-U0-G3 | 18479 | 143 | B3-U0-G4 |  | 5008 | 50 | B1-U0-G2 |
|  |  |  | IV | 16555 | 128 | B3-U0-G3 | 17871 | 139 | B3-U0-G3 | 18812 | 146 | B3-U0-G3 | 19753 | 153 | B3-U0-G3 |  | 5353 | 53 | B1-U0-G1 |
|  |  |  | IV-FT | 15081 | 117 | B3-U0-G3 | 16280 | 126 | B3-U0-G3 | 17137 | 133 | B3-U0-G3 | 17994 | 139 | B3-U0-G3 |  | 4877 | 48 | B1-U0-G2 |
|  |  |  | \|VSQ-N | 17303 | 134 | B4-U0-G2 | 18679 | 145 | B4-U0-G2 | 19663 | 152 | B4-U0-G2 | 20646 | 160 | B4-U0-G2 |  | 5595 | 55 | B2-U0-G1 |
|  |  |  | VSQ-M | 16967 | 132 | B4-U0-G2 | 18317 | 142 | B4-U0-G2 | 19281 | 149 | B4-U0-G2 | 20245 | 157 | B4-U0-G2 |  | 5486 | 54 | B3-U0-G1 |
|  |  |  | VVS-W | 16562 | 128 | B4-U0-G3 | 17880 | 139 | B5-U0-G3 | 18821 | 146 | B5-U0-G3 | 19762 | 153 | B5-U0-G3 |  | 5355 | 53 | B3-U0-G2 |
|  |  |  | II-HS | 12089 | 94 | B1-U0-G2 | 13052 | 101 | B1-U0-G3 | 13738 | 106 | B1-U0-G3 | 14425 | 112 | B1-U0-G3 |  | 3909 | 39 | B0-U0-G1 |
|  |  |  | III-R-HS | 12298 | 95 | B1-U0-G2 | 13276 | 103 | B1-U0-G2 | 13975 | 108 | B1-U0-G2 | 14674 | 114 | B1-U0-G2 |  | 3977 | 39 | B0-U0-G1 |
|  |  |  | III-M-HS | 12231 | 95 | B1-U0-G3 | 13204 | 102 | B1-U0-G3 | 13899 | 108 | B1-U0-G3 | 14594 | 113 | B1-U0-G3 |  | 3954 | 39 | B0-U0-G1 |
|  |  |  | III-W-HS | 11971 | 93 | B1-U0-G3 | 12924 | 100 | B1-U0-G3 | 13604 | 105 | B1-U0-G3 | 14284 | 111 | B1-U0-G3 |  | 3871 | 38 | B0-U0-G2 |
|  |  |  | IV-HS | 12633 | 98 | B1-U0-G2 | 13638 | 106 | B1-U0-G3 | 14356 | 111 | B1-U0-G3 | 15074 | 117 | B1-U0-G3 |  | 4085 | 40 | BO-U0-G1 |
|  |  |  | IV-FT-HS | 11940 | 93 | B1-U0-G3 | 12889 | 100 | B1-U0-G3 | 13568 | 105 | B1-U0-G3 | 14246 | 110 | B1-U0-G4 |  | 3861 | 38 | B0-U0-G2 |
| 80 | 700 | 174.0 | II | 20914 | 120 | B3-U0-G3 | 22578 | 130 | B3-U0-G3 | 23766 | 137 | B3-U0-G3 | 24955 | 143 | B3-U0-G3 | N/A | N/A |  |  |
|  |  |  | II-FR | 21054 | 121 | B3-U0-G2 | 22729 | 131 | B3-U0-G2 | 23924 | 137 | B3-U0-G2 | 25121 | 144 | B3-U0-G2 |  |  |  |  |
|  |  |  | II-ML | 20915 | 120 | B4-U0-G4 | 22579 | 130 | B4-U0-G4 | 23767 | 137 | B4-U0-G4 | 24955 | 143 | B4-U0-G4 |  |  |  |  |
|  |  |  | III-M | 21280 | 122 | B3-U0-G3 | 22972 | 132 | B3-U0-G3 | 24182 | 139 | B3-U0-G4 | 25391 | 146 | B3-U0-G4 |  |  |  |  |
|  |  |  | III-W | 19759 | 114 | B3-U0-G4 | 21330 | 123 | B3-U0-G4 | 22453 | 129 | B3-U0-G4 | 23575 | 135 | B3-U0-G4 |  |  |  |  |
|  |  |  | IV | 21120 | 121 | B3-U0-G3 | 22800 | 131 | B3-U0-G3 | 24000 | 138 | B3-U0-G3 | 25200 | 145 | B3-U0-G4 |  |  |  |  |
|  |  |  | IV-FT | 19239 | 111 | B3-U0-G4 | 20770 | 119 | B3-U0-G4 | 21862 | 126 | B3-U0-G4 | 22956 | 132 | B3-U0-G4 |  |  |  |  |
|  |  |  | VSQ-N | 22074 | 127 | B4-U0-G2 | 23831 | 137 | B4-U0-G2 | 25084 | 144 | B4-U0-G2 | 26339 | 151 | B4-U0-G2 |  |  |  |  |
|  |  |  | VSQ-M | 21646 | 124 | B5-U0-G3 | 23367 | 134 | B5-U0-G3 | 24598 | 141 | B5-U0-G3 | 25827 | 148 | B5-U0-G3 |  |  |  |  |
|  |  |  | VSQ-W | 21129 | 121 | B5-U0-G4 | 22810 | 131 | B5-U0-G4 | 24010 | 138 | B5-U0-G4 | 25212 | 145 | B5-U0-G4 |  |  |  |  |
|  |  |  | II-HS | 15363 | 88 | B1-U0-G3 | 16586 | 95 | B1-U0-G3 | 17458 | 100 | B1-U0-G3 | 18332 | 105 | B1-U0-G3 |  |  |  |  |
|  |  |  | II-RR-HS | 15628 | 90 | B1-U0-G2 | 16872 | 97 | B1-U0-G2 | 17759 | 102 | B1-U0-G2 | 18647 | 107 | B1-U0-G2 |  |  |  |  |
|  |  |  | III-M-HS | 15542 | 89 | B1-U0-G3 | 16778 | 96 | B1-U0-G3 | 17662 | 102 | B1-U0-G4 | 18545 | 107 | B1-U0-G4 |  |  |  |  |
|  |  |  | III-W-HS | 15213 | 87 | B1-U0-G4 | 16423 | 94 | B1-U0-G4 | 17288 | 99 | B1-U0-G4 | 18152 | 104 | B1-U0-G4 |  |  |  |  |
|  |  |  | IV-HS | 16055 | 92 | B1-U0-G3 | 17331 | 100 | B1-U0-G3 | 18244 | 105 | B1-U0-G3 | 19155 | 110 | B1-U0-G3 |  |  |  |  |
|  |  |  | IV-FT-HS | 15172 | 87 | B1-U0-G4 | 16380 | 94 | B1-U0-G4 | 17242 | 99 | B1-U0-G4 | 18104 | 104 | B1-U0-G4 |  |  |  |  |
| 80 | 875 | 219.7 | II | 25063 | 114 | B3-U0-G3 | 27057 | 123 | B3-U0-G4 | 28481 | 130 | B3-U0-G4 | 29905 | 136 | B4-U0-G4 | N/A | N/A |  |  |
|  |  |  | II-FR | 25230 | 115 | B3-U0-G2 | 27237 | 124 | B3-U0-G2 | 28670 | 130 | B4-U0-G2 | 30104 | 137 | B4-U0-G2 |  |  |  |  |
|  |  |  | II-ML | 25064 | 114 | B4-U0-G4 | 27057 | 123 | B4-U0-G4 | 28481 | 130 | B4-U0-G4 | 29906 | 136 | B5-U0-G5 |  |  |  |  |
|  |  |  | III-M | 25501 | 116 | B3-U0-G4 | 27529 | 125 | B3-U0-G4 | 28978 | 132 | B3-U0-G4 | 30427 | 138 | B3-U0-G4 |  |  |  |  |
|  |  |  | III-W | 23677 | 108 | B3-U0-G4 | 25560 | 116 | B3-U0-G4 | 26906 | 122 | B3-U0-G4 | 28251 | 129 | B3-U0-G4 |  |  |  |  |
|  |  |  | IV | 25309 | 115 | B3-U0-G4 | 27322 | 124 | B3-U0-G4 | 28760 | 131 | B3-U0-G4 | 30198 | 137 | B3-U0-G4 |  |  |  |  |
|  |  |  | IV-FT | 23056 | 105 | B3-U0-G4 | 24889 | 113 | B3-U0-G4 | 26200 | 119 | B3-U0-G4 | 27509 | 125 | B3-U0-G4 |  |  |  |  |
|  |  |  | VSQ-N | 26453 | 120 | B4-U0-G2 | 28557 | 130 | B5-U0-G2 | 30060 | 137 | B5-U0-G2 | 31563 | 144 | B5-U0-G2 |  |  |  |  |
|  |  |  | \| VSQ-M | 25939 | 118 | B5-U0-G3 | 28002 | 127 | B5-U0-G3 | 29476 | 134 | B5-U0-G3 | 30950 | 141 | B5-U0-G3 |  |  |  |  |
|  |  |  | VSQ-W | 25320 | 115 | B5-U0-G4 | 27335 | 124 | B5-U0-G4 | 28773 | 131 | B5-U0-G4 | 30212 | 138 | B5-U0-G4 |  |  |  |  |
|  |  |  | II-HS | 18330 | 83 | B1-U0-G3 | 19788 | 90 | B1-U0-G4 | 20830 | 95 | B2-U0-G4 | 21871 | 100 | B2-U0-G4 |  |  |  |  |
|  |  |  | II-FR-HS | 18645 | 85 | B1-U0-G2 | 20128 | 92 | B1-U0-G2 | 21188 | 96 | B1-U0-G2 | 22247 | 101 | B1-U0-G2 |  |  |  |  |
|  |  |  | III-M-HS | 18543 | 84 | B1-U0-G4 | 20018 | 91 | B1-U0-G4 | 21072 | 96 | B1-U0-G4 | 22125 | 101 | B1-U0-G4 |  |  |  |  |
|  |  |  | III-W-HS | 18151 | 83 | B1-U0-G4 | 19594 | 89 | B1-U0-G4 | 20626 | 94 | B1-U0-G4 | 21657 | 99 | B1-U0-G4 |  |  |  |  |
|  |  |  | IV-HS | 19154 | 87 | B1-U0-G3 | 20677 | 94 | B1-U0-G4 | 21766 | 99 | B1-U0-G4 | 22854 | 104 | B1-U0-G4 |  |  |  |  |
|  |  |  | IV-FT-HS | 18102 | 82 | B1-U0-G4 | 19541 | 89 | B1-U0-G4 | 20571 | 94 | B1-U0-G4 | 21599 | 98 | B1-U0-G4 |  |  |  |  |
| 80 | 1050 | 266.0 | II | 28808 | 108 | B4-U0-G4 | 31099 | 117 | B4-U0-G4 | 32736 | 123 | B4-U0-G4 | 34373 | 129 | B4-U0-G4 | N/A | N/A |  |  |
|  |  |  | II-FR | 29000 | 109 | B4-U0-G2 | 31306 | 118 | B4-U0-G2 | 32954 | 124 | B4-U0-G2 | 34602 | 130 | B4-U0-G2 |  |  |  |  |
|  |  |  | II-ML | 28809 | 108 | B5-U0-G5 | 31100 | 117 | B5-U0-G5 | 32737 | 123 | B5-U0-G5 | 34374 | 129 | B5-U0-G5 |  |  |  |  |
|  |  |  | III-M | 29311 | 110 | B3-U0-G4 | 31643 | 119 | B4-U0-G4 | 33308 | 125 | B4-U0-G4 | 34974 | 131 | B4-U0-G4 |  |  |  |  |
|  |  |  | III-W | 27215 | 102 | B3-U0-G4 | 29380 | 110 | B3-U0-G5 | 30926 | 116 | B3-U0-G5 | 32473 | 122 | B3-U0-G5 |  |  |  |  |
|  |  |  | IV | 29091 | 109 | B3-U0-G4 | 31404 | 118 | B4-U0-G4 | 33058 | 124 | B4-U0-G4 | 34710 | 130 | B4-U0-G4 |  |  |  |  |
|  |  |  | IV-FT | 26501 | 100 | B3-U0-G4 | 28608 | 108 | B3-U0-G4 | 30114 | 113 | B3-U0-G5 | 31620 | 119 | B3-U0-G5 |  |  |  |  |
|  |  |  | VSQ-N | 30405 | 114 | B5-U0-G2 | 32824 | 123 | B5-U0-G2 | 34551 | 130 | B5-U0-G2 | 36279 | 136 | B5-U0-G2 |  |  |  |  |
|  |  |  | VSQ-M | 29815 | 112 | B5-U0-G3 | 32186 | 121 | B5-U0-G4 | 33880 | 127 | B5-U0-G4 | 35575 | 134 | B5-U0-G4 |  |  |  |  |
|  |  |  | V VS-W | 29104 | 109 | B5-U0-G4 | 31419 | 118 | B5-U0-G5 | 33073 | 124 | B5-U0-G5 | 34726 | 131 | B5-U0-G5 |  |  |  |  |
|  |  |  | II-HS | 21069 | 79 | B2-U0-G4 | 22745 | 86 | B2-U0-G4 | 23942 | 90 | B2-U0-G4 | 25139 | 95 | B2-U0-G4 |  |  |  |  |
|  |  |  | III-R-HS | 21432 | 81 | B1-U0-G2 | 23136 | 87 | B1-U0-G2 | 24354 | 92 | B1-U0-G2 | 25571 | 96 | B2-U0-G2 |  |  |  |  |
|  |  |  | III-M-HS | 21314 | 80 | B1-U0-G4 | 23009 | 87 | B1-U0-G4 | 24220 | 91 | B1-U0-G4 | 25431 | 96 | B1-U0-G4 |  |  |  |  |
|  |  |  | III-W-HS | 20862 | 78 | B1-U0-G4 | 22521 | 85 | B1-U0-G4 | 23708 | 89 | B1-U0-G5 | 24893 | 94 | B1-U0-G5 |  |  |  |  |
|  |  |  | IV-HS | 22016 | 83 | B1-U0-G4 | 23766 | 89 | B1-U0-G4 | 25018 | 94 | B1-U0-G4 | 26268 | 99 | B1-U0-G4 |  |  |  |  |
|  |  |  | IV-FT-HS | 20807 | 78 | B1-U0-G4 | 22467 | 84 | B1-U0-G5 | 23644 | 89 | B1-U0-G5 | 24826 | 93 | B1-U0-G5 |  |  |  |  |

IES File downloads for this product can be found at www.usaltg.com/downloads/asr.html

## PHOTOMETRIC DATA GUIDE - LUMEN TABLES (RZRG-PLED)

| RZR-G-PLED |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\begin{aligned} & \text { LED } \\ & \text { Count } \end{aligned}$ | DriveCurrent$(\mathrm{mA})$ | System Watts | Dist'nType | 27K (2700K - 70CRI) |  |  | 30K (3000K-70CRI) |  |  | 40K (4000K-70CRI) |  |  | 50K (5000K-70CRI) |  |  | System Watts | TRA ( 590 nm ) |  |  |
|  |  |  |  | LUMENS | LPW | bug rating | LUMENS | LPW | bug rating | LUMENS | LPW | bug rating | LUMENS | LPW | bug rating |  | LUMENS | LPW | BUG RATING |
| 120 | 350 | 130.0 | II | 16889 | 130 | B3-U0-G3 | 18233 | 140 | B3-U0-G3 | 19192 | 148 | B3-U0-G3 | 20152 | 155 | B3-U0-G3 | 100.0 | 6702 | 67 | B2-U0-G2 |
|  |  |  | II-FR | 17001 | 131 | B3-U0-G2 | 18354 | 141 | B3-U0-G2 | 19320 | 149 | B3-U0-G2 | 20286 | 156 | B3-U0-G2 |  | 6747 | 67 | B2-U0-G1 |
|  |  |  | II-ML | 16890 | 130 | B4-U0-G4 | 18233 | 140 | B4-U0-G4 | 19193 | 148 | B4-U0-G4 | 20152 | 155 | B4-U0-G4 |  | 6703 | 67 | B3-U0-G3 |
|  |  |  | III-M | 17184 | 132 | B3-U0-G3 | 18552 | 143 | B3-U0-G3 | 19527 | 150 | B3-U0-G3 | 20504 | 158 | B3-U0-G3 |  | 6818 | 68 | B2-U0-G2 |
|  |  |  | III-W | 15956 | 123 | B3-U0-G3 | 17224 | 132 | B3-U0-G3 | 18131 | 139 | B3-U0-G3 | 19037 | 146 | B3-U0-G4 |  | 6331 | 63 | B1-U0-G2 |
|  |  |  | IV | 17055 | 131 | B3-U0-G3 | 18411 | 142 | B3-U0-G3 | 19381 | 149 | B3-U0-G3 | 20349 | 157 | B3-U0-G3 |  | 6768 | 68 | B2-U0-G2 |
|  |  |  | IV-FT | 15537 | 120 | B3-U0-G3 | 16772 | 129 | B3-U0-G3 | 17655 | 136 | B3-U0-G3 | 18538 | 143 | B3-U0-G4 |  | 6165 | 62 | B1-U0-G2 |
|  |  |  | VSQ-N | 17825 | 137 | B4-U0-G2 | 19243 | 148 | B4-U0-G2 | 20256 | 156 | B4-U0-G2 | 21269 | 164 | B4-U0-G2 |  | 7073 | 71 | B2-U0-G1 |
|  |  |  | \| VSQ-M | 17480 | 134 | B4-U0-G2 | 18870 | 145 | B4-U0-G2 | 19863 | 153 | B4-U0-G2 | 20857 | 160 | B4-U0-G2 |  | 6936 | 69 | B3-U0-G1 |
|  |  |  | VSQ-W | 17062 | 131 | B5-U0-G3 | 18420 | 142 | B5-U0-G3 | 19389 | 149 | B5-U0-G3 | 20358 | 157 | B5-U0-G3 |  | 6771 | 68 | B3-U0-G2 |
|  |  |  | II-HS | 12352 | 95 | B1-U0-G2 | 13334 | 103 | B1-U0-G3 | 14036 | 108 | B1-U0-G3 | 14738 | 113 | B1-U0-G3 |  | 4901 | 49 | B1-U0-G2 |
|  |  |  | II-FR-HS | 12564 | 97 | B1-U0-G2 | 13564 | 104 | B1-U0-G2 | 14277 | 110 | B1-U0-G2 | 14992 | 115 | B1-U0-G2 |  | 4986 | 50 | BO-U0-G1 |
|  |  |  | III-M-HS | 12496 | 96 | B1-U0-G3 | 13490 | 104 | B1-U0-G3 | 14199 | 109 | B1-U0-G3 | 14910 | 115 | B1-U0-G3 |  | 4959 | 50 | BO-U0-G2 |
|  |  |  | III-W-HS | 12231 | 94 | B1-U0-G3 | 13204 | 102 | B1-U0-G3 | 13899 | 107 | B1-U0-G3 | 14594 | 112 | B1-U0-G3 |  | 4853 | 49 | BO-U0-G2 |
|  |  |  | IV-HS | 12907 | 99 | B1-U0-G3 | 13934 | 107 | B1-U0-G3 | 14667 | 113 | B1-U0-G3 | 15400 | 118 | B1-U0-G3 |  | 5122 | 51 | BO-U0-G2 |
|  |  |  | IV-FT-HS | 12198 | 94 | B1-U0-G3 | 13168 | 101 | B1-U0-G3 | 13862 | 107 | B1-U0-G4 | 14555 | 112 | B1-U0-G4 |  | 4840 | 48 | BO-U0-G2 |
| 120 | 525 | 192.0 | 1 | 24123 | 126 | B3-U0-G3 | 26042 | 136 | B3-U0-G3 | 27413 | 143 | B3-U0-G4 | 28783 | 150 | B4-U0-G4 | 152.0 | 7800 | 51 | B2-U0-G2 |
|  |  |  | II-FR | 24284 | 126 | B3-U0-G2 | 26216 | 137 | B3-U0-G2 | 27596 | 144 | B3-U0-G2 | 28975 | 151 | B4-U0-G2 |  | 7853 | 52 | B2-U0-G1 |
|  |  |  | II-ML | 24124 | 126 | B4-U0-G4 | 26042 | 136 | B4-U0-G4 | 27414 | 143 | B4-U0-G4 | 28784 | 150 | B5-U0-G5 |  | 7800 | 51 | B3-U0-G3 |
|  |  |  | III-M | 24545 | 128 | B3-U0-G4 | 26498 | 138 | B3-U0-G4 | 27892 | 145 | B3-U0-G4 | 29287 | 153 | B3-U0-G4 |  | 7937 | 52 | B2-U0-G2 |
|  |  |  | III-W | 22789 | 119 | B3-U0-G4 | 24603 | 128 | B3-U0-G4 | 25897 | 135 | B3-U0-G4 | 27192 | 142 | B3-U0-G4 |  | 7368 | 48 | B1-U0-G2 |
|  |  |  | IV | 24360 | 127 | B3-U0-G4 | 26298 | 137 | B3-U0-G4 | 27682 | 144 | B3-U0-G4 | 29066 | 151 | B3-U0-G4 |  | 7876 | 52 | B2-U0-G2 |
|  |  |  | IV-FT | 22191 | 116 | B3-U0-G4 | 23956 | 125 | B3-U0-G4 | 25217 | 131 | B3-U0-G4 | 26478 | 138 | B3-U0-G4 |  | 7176 | 47 | B1-U0-G2 |
|  |  |  | VSQ-N | 25461 | 133 | B4-U0-G2 | 27486 | 143 | B5-U0-G2 | 28933 | 151 | B5-U0-G2 | 30379 | 158 | B5-U0-G2 |  | 8233 | 54 | B3-U0-G1 |
|  |  |  | VSQ-M | 24967 | 130 | B5-U0-G3 | 26952 | 140 | B5-U0-G3 | 28371 | 148 | B5-U0-G3 | 29789 | 155 | B5-U0-G3 |  | 8073 | 53 | B3-U0-G2 |
|  |  |  | VSQ-W | 24371 | 127 | B5-U0-G4 | 26309 | 137 | B5-U0-G4 | 27695 | 144 | B5-U0-G4 | 29079 | 151 | B5-U0-G4 |  | 7881 | 52 | B3-U0-G2 |
|  |  |  | II-HS | 17642 | 92 | B1-U0-G3 | 19046 | 99 | B1-U0-G3 | 20048 | 104 | B1-U0-G4 | 21050 | 110 | B2-U0-G4 |  | 5704 | 38 | B1-U0-G2 |
|  |  |  | II-FR-HS | 17946 | 93 | B1-U0-G2 | 19373 | 101 | B1-U0-G2 | 20393 | 106 | B1-U0-G2 | 21413 | 112 | B1-U0-G2 |  | 5803 | 38 | B1-U0-G1 |
|  |  |  | III-M-HS | 17848 | 93 | B1-U0-G4 | 19268 | 100 | B1-U0-G4 | 20282 | 106 | B1-U0-G4 | 21296 | 111 | B1-U0-G4 |  | 5772 | 38 | B0-U0-G2 |
|  |  |  | III-W-HS | 17470 | 91 | B1-U0-G4 | 18860 | 98 | B1-U0-G4 | 19852 | 103 | B1-U0-G4 | 20844 | 109 | B1-U0-G4 |  | 5649 | 37 | BO-U0-G2 |
|  |  |  | IV-HS | 18435 | 96 | B1-U0-G3 | 19902 | 104 | B1-U0-G4 | 20949 | 109 | B1-U0-G4 | 21997 | 115 | B1-U0-G4 |  | 5961 | 39 | BO-U0-G2 |
|  |  |  | IV-FT-HS | 17423 | 91 | B1-U0-G4 | 18809 | 98 | B1-U0-G4 | 19799 | 103 | B1-U0-G4 | 20789 | 108 | B1-U0-G4 |  | 5633 | 37 | BO-U0-G2 |
| 120 | 700 | 260.0 | II | 30656 | 118 | B4-U0-G4 | 33094 | 127 | B4-U0-G4 | 34836 | 134 | B4-U0-G4 | 36578 | 141 | B4-U0-G4 | N/A | N/A |  |  |
|  |  |  | II-FR | 30860 | 119 | B4-U0-G2 | 33315 | 128 | B4-U0-G2 | 35068 | 135 | B4-U0-G2 | 36822 | 142 | B4-U0-G2 |  |  |  |  |
|  |  |  | II-ML | 30657 | 118 | B5-U0-G5 | 33095 | 127 | B5-U0-G5 | 34837 | 134 | B5-U0-G5 | 36579 | 141 | B5-U0-G5 |  |  |  |  |
|  |  |  | III-M | 31191 | 120 | B4-U0-G4 | 33673 | 130 | B4-U0-G4 | 35445 | 136 | B4-U0-G4 | 37217 | 143 | B4-U0-G4 |  |  |  |  |
|  |  |  | III-W | 28960 | 111 | B3-U0-G4 | 31265 | 120 | B3-U0-G5 | 32909 | 127 | B3-U0-G5 | 34555 | 133 | B3-U0-G5 |  |  |  |  |
|  |  |  | IV | 30956 | 119 | B4-U0-G4 | 33418 | 129 | B4-U0-G4 | 35177 | 135 | B4-U0-G4 | 36936 | 142 | B4-U0-G4 |  |  |  |  |
|  |  |  | IV-FT | 28200 | 108 | B3-U0-G4 | 30444 | 117 | B3-U0-G5 | 32046 | 123 | B3-U0-G5 | 33648 | 129 | B3-U0-G5 |  |  |  |  |
|  |  |  | VSQ-N | 32356 | 124 | B5-U0-G2 | 34929 | 134 | B5-U0-G2 | 36768 | 141 | B5-U0-G2 | 38606 | 148 | B5-U0-G2 |  |  |  |  |
|  |  |  | VSQ-M | 31727 | 122 | B5-U0-G4 | 34250 | 132 | B5-U0-G4 | 36054 | 139 | B5-U0-G4 | 37856 | 146 | B5-U0-G4 |  |  |  |  |
|  |  |  | VSQ-W | 30971 | 119 | B5-U0-G4 | 33434 | 129 | B5-U0-G5 | 35194 | 135 | B5-U0-G5 | 36953 | 142 | B5-U0-G5 |  |  |  |  |
|  |  |  | II-HS | 22420 | 86 | B2-U0-G4 | 24203 | 93 | B2-U0-G4 | 25478 | 98 | B2-U0-G4 | 26751 | 103 | B2-U0-G4 |  |  |  |  |
|  |  |  | III-R-HS | 22806 | 88 | B1-U0-G2 | 24619 | 95 | B1-U0-G2 | 25916 | 100 | B2-U0-G2 | 27212 | 105 | B2-U0-G2 |  |  |  |  |
|  |  |  | III-M-HS | 22682 | 87 | B1-U0-G4 | 24485 | 94 | B1-U0-G4 | 25774 | 99 | B1-U0-G4 | 27063 | 104 | B1-U0-G4 |  |  |  |  |
|  |  |  | III-W-HS | 22201 | 85 | B1-U0-G4 | 23967 | 92 | B1-U0-G5 | 25228 | 97 | B1-U0-G5 | 26489 | 102 | B1-U0-G5 |  |  |  |  |
|  |  |  | IV-HS | 23428 | 90 | B1-U0-G4 | 25291 | 97 | B1-U0-G4 | 26622 | 102 | B1-U0-G4 | 27953 | 108 | B1-U0-G4 |  |  |  |  |
|  |  |  | IV-FT-HS | 22141 | 85 | B1-U0-G5 | 23902 | 92 | B1-U0-G5 | 25160 | 97 | B1-U0-G5 | 26418 | 102 | B1-U0-G5 |  |  |  |  |
| 120 | 875 | 329.0 | 1 | 36574 | 111 | B4-U0-G4 | 39483 | 120 | B4-U0-G4 | 41561 | 126 | B4-U0-G4 | 43639 | 133 | B4-U0-G5 | N/A | N/A |  |  |
|  |  |  | II-FR | 36818 | 112 | B4-U0-G2 | 39746 | 121 | B4-U0-G2 | 41838 | 127 | B4-U0-G3 | 43930 | 134 | B4-U0-G3 |  |  |  |  |
|  |  |  | II-ML | 36575 | 111 | B5-U0-G5 | 39485 | 120 | B5-U0-G5 | 41562 | 126 | B5-U0-G5 | 43640 | 133 | B5-U0-G5 |  |  |  |  |
|  |  |  | III-M | 37213 | 113 | B4-U0-G4 | 40174 | 122 | B4-U0-G5 | 42288 | 129 | B4-U0-G5 | 44402 | 135 | B4-U0-G5 |  |  |  |  |
|  |  |  | III-W | 34552 | 105 | B3-U0-G5 | 37300 | 113 | B3-U0-G5 | 39263 | 119 | B4-U0-G5 | 41226 | 125 | B4-U0-G5 |  |  |  |  |
|  |  |  | IV | 36932 | 112 | B4-U0-G4 | 39870 | 121 | B4-U0-G5 | 41969 | 128 | B4-U0-G5 | 44067 | 134 | B4-U0-G5 |  |  |  |  |
|  |  |  | IV-FT | 33644 | 102 | B3-U0-G5 | 36321 | 110 | B3-U0-G5 | 38232 | 116 | B4-U0-G5 | 40144 | 122 | B4-U0-G5 |  |  |  |  |
|  |  |  | VSQ-N | 38602 | 117 | B5-U0-G2 | 41673 | 127 | B5-U0-G2 | 43866 | 133 | B5-U0-G2 | 46060 | 140 | B5-U0-G2 |  |  |  |  |
|  |  |  | VSQ-M | 37852 | 115 | B5-U0-G4 | 40863 | 124 | B5-U0-G4 | 43014 | 131 | B5-U0-G4 | 45165 | 137 | B5-U0-G4 |  |  |  |  |
|  |  |  | VSQ-W | 36950 | 112 | B5-U0-G5 | 39888 | 121 | B5-U0-G5 | 41988 | 128 | B5-U0-G5 | 44088 | 134 | B5-U0-G5 |  |  |  |  |
|  |  |  | II-HS | 26748 | 81 | B2-U0-G4 | 28876 | 88 | B2-U0-G4 | 30395 | 92 | B2-U0-G4 | 31916 | 97 | B2-U0-G5 |  |  |  |  |
|  |  |  | III-R-HS | 27209 | 83 | B2-U0-G2 | 29373 | 89 | B2-U0-G2 | 30919 | 94 | B2-U0-G2 | 32465 | 99 | B2-U0-G3 |  |  |  |  |
|  |  |  | III-M-HS | 27060 | 82 | B1-U0-G4 | 29213 | 89 | B1-U0-G5 | 30750 | 93 | B1-U0-G5 | 32287 | 98 | B1-U0-G5 |  |  |  |  |
|  |  |  | III-W-HS | 26487 | 81 | B1-U0-G5 | 28593 | 87 | B1-U0-G5 | 30098 | 91 | B1-U0-G5 | 31603 | 96 | B1-U0-G5 |  |  |  |  |
|  |  |  | IV-HS | 27951 | 85 | B1-U0-G4 | 30174 | 92 | B1-U0-G4 | 31762 | 97 | B1-U0-G5 | 33350 | 101 | B1-U0-G5 |  |  |  |  |
|  |  |  | IV-FT-HS | 26416 | 80 | B1-U0-G5 | 28517 | 87 | B1-U0-G5 | 30018 | 91 | B1-U0-G5 | 31519 | 96 | B2-U0-G5 |  |  |  |  |
| 120 | 1050 | 398.0 | II | 42039 | 106 | B4-U0-G5 | 45383 | 114 | B4-U0-G5 | 47771 | 120 | B4-U0-G5 | 50160 | 126 | B5-U0-G5 | N/A | N/A |  |  |
|  |  |  | II-FR | 42319 | 106 | B4-U0-G3 | 45685 | 115 | B4-U0-G3 | 48089 | 121 | B4-U0-G3 | 50494 | 127 | B4-U0-G3 |  |  |  |  |
|  |  |  | II-ML | 42040 | 106 | B5-U0-G5 | 45384 | 114 | B5-U0-G5 | 47773 | 120 | B5-U0-G5 | 50161 | 126 | B5-U0-G5 |  |  |  |  |
|  |  |  | III-M | 42774 | 107 | B4-U0-G5 | 46177 | 116 | B4-U0-G5 | 48606 | 122 | B4-U0-G5 | 51037 | 128 | B4-U0-G5 |  |  |  |  |
|  |  |  | III-W | 39714 | 100 | B4-U0-G5 | 42873 | 108 | B4-U0-G5 | 45130 | 113 | B4-U0-G5 | 47387 | 119 | B4-U0-G5 |  |  |  |  |
|  |  |  | IV | 42451 | 107 | B4-U0-G5 | 45828 | 115 | B4-U0-G5 | 48240 | 121 | B4-U0-G5 | 50652 | 127 | B4-U0-G5 |  |  |  |  |
|  |  |  | IV-FT | 38671 | 97 | B4-U0-G5 | 41748 | 105 | B4-U0-G5 | 43945 | 110 | B4-U0-G5 | 46143 | 116 | B4-U0-G5 |  |  |  |  |
|  |  |  | VSQ-N | 44370 | 111 | B5-U0-G2 | 47899 | 120 | B5-U0-G3 | 50421 | 127 | B5-U0-G3 | 52942 | 133 | B5-U0-G3 |  |  |  |  |
|  |  |  | VSQ-M | 43508 | 109 | B5-U0-G4 | 46969 | 118 | B5-U0-G4 | 49441 | 124 | B5-U0-G4 | 51914 | 130 | B5-U0-G5 |  |  |  |  |
|  |  |  | VVQ-W | 42471 | 107 | B5-U0-G5 | 45849 | 115 | B5-U0-G5 | 48262 | 121 | B5-U0-G5 | 50676 | 127 | B5-U0-G5 |  |  |  |  |
|  |  |  | II-HS | 30745 | 77 | B2-U0-G4 | 33191 | 83 | B2-U0-G5 | 34938 | 88 | B2-U0-G5 | 36685 | 92 | B2-U0-G5 |  |  |  |  |
|  |  |  | II-FR-HS | 31274 | 79 | B2-U0-G3 | 33761 | 85 | B2-U0-G3 | 35539 | 89 | B2-U0-G3 | 37315 | 94 | B2-U0-G3 |  |  |  |  |
|  |  |  | III-M-HS | 31104 | 78 | B1-U0-G5 | 33578 | 84 | B1-U0-G5 | 35345 | 89 | B2-U0-G5 | 37112 | 93 | B2-U0-G5 |  |  |  |  |
|  |  |  | III-W-HS | 30444 | 76 | B1-U0-G5 | 32866 | 83 | B1-U0-G5 | 34596 | 87 | B1-U0-G5 | 36325 | 91 | B2-U0-G5 |  |  |  |  |
|  |  |  | IV-HS | 32127 | 81 | B1-U0-G5 | 34683 | 87 | B2-U0-G5 | 36508 | 92 | B2-U0-G5 | 38333 | 96 | B2-U0-G5 |  |  |  |  |
|  |  |  | IV-FT-HS | 30363 | 76 | B1-U0-G5 | 32777 | 82 | B2-U0-G5 | 34504 | 87 | B2-U0-G5 | 36229 | 91 | B2-U0-G5 |  |  |  |  |

IES File downloads for this product can be found at www.usaltg.com/downloads/asr.html

SOLID STATE AREA LIGHTING

## PROJECT TYPE:

## RAZAR WALLMOUNT-LED

S P E C I F I C A T I O N S

## OPTICAL HOUSING

Heavy cast low copper aluminum (A356 alloy: <0.2\% copper) assembly with integral cooling fins. The Optical Panel mounting surface is milled flat (surface variance $< \pm .003$ ") to facilitate thermal transfer of heat to housing and cooling fins. The Optical Housing bolts to the Electrical Housing forming a unified assembly. The minimum wall thickness is .188".

## ELECTRICAL HOUSING

Heavy cast low copper aluminum (A356 alloy; $<0.2 \%$ copper) assembly. Minimum wall thickness is .188". Fixture Mounting Plate affixes to mounting surface over a recessed j-box. Electrical Housing anchors on the top edge of the Mounting Plate and stainless steel recessed socket head screws tighten the Electrical Housing to the Mounting Plate from the bottom.

## PLED" ${ }^{\text {m }}$ OPTICAL MODULES

Emitters (LED's) are arrayed on a metal core PCB panel with each emitter located on a copper thermal transfer pad and enclosed by an LED refractor. LED optics completely seal each individual emitter to meet an IP66 rating. The asymmetric distributions, have a micro-reflector inside the refractor which re-directs the house side emitter output towards the street side and functions as a house side shielding element. Refractors are injection molded H12 acrylic. Each LED refractor is sealed to the PCB over an emitter and all refractors are retained by an aluminum frame. Any one Panel, or group of Panels in a luminaire, have the same optical pattern. LED refractors produce Type II, III, and Type IV site/area distributions as well as other specialty asymmetric distributions. Panels are field replaceable and field rotatable in $90^{\circ}$ increments.

## LED DRIVER(S)

Constant current electronic with a power factor of $>.90$ and a minimum operating temperature of $-40^{\circ} \mathrm{F} /-40^{\circ} \mathrm{C}$. Driver(s) is/are UL and cUL recognized and mounted directly agains $\dagger$ the Electrical Housing to facilitate thermal transfer, held down by universal clamps to facilitate easy removal. In-line terminal blocks facilitate wiring between the driver and optical arrays. Drivers accept an input of $120-277 \mathrm{~V}, 50 / 60 \mathrm{~Hz}$ or $347 \mathrm{~V}-480 \mathrm{~V}$, $50,60 \mathrm{~Hz}$. ( $0-10 \mathrm{~V}$ dimmable driver is standard. Driver has a minimum of 3 KV internal surge protection. Luminaire supplied with 20 KV surge protector for field accessible installation.)

## LED EMITTERS

High output LED's are utilized with drive currents ranging from 350 mA to 1050 mA . 70CRI Minimum. LED's are available in standard Neutral White (4000K), or optional Cool White (5000K) or Warm White (3000K). Consult Factory for other LED options.

AMBER LED's
PCA (Phosphor Converted Amber) LED's utilize phosphors to create color output similar to LPS lamps and have a slight output in the blue spectral bandwidth. TRA (True Amber) LED's utilize material that emits light in the amber spectral bandwidth only without the use of phosphors.

## FINISH

Electrostatically applied TGIC Polyester Powder Coat on substrate prepared with 20 PSI power wash at $140^{\circ} \mathrm{F}$. Four step media blast and iron phosphate pretreatment for protection and paint adhesion. $400^{\circ} \mathrm{F}$ bake for maximum hardness and durability.

$\longmapsto \quad B \longrightarrow$


| FIXTURE | A | B | c |
| :---: | :---: | :---: | :---: |
| RZRW1 | ( | ${ }_{\text {(205mm) }}^{12}$ | ${ }_{(152 m m)}^{6^{\prime \prime}}$ |
| RZRWI-EM | ${ }_{(1210}^{129 m)}$ | ${ }_{\text {(135mm) }}^{14}$ | ${ }_{(6.55 m)}^{60}$ |

RZR-WM1
PATENT PENDING


| FIXTURE | A | B | c |
| :---: | :---: | :---: | :---: |
| RZRW2 |  | ${ }_{(1205 m)}^{12}$ | ${ }_{(152 m m)}^{6 "}$ |
| RzRW2-EM | ${ }_{(1606}^{16}$ | ${ }_{\text {(356mm) }}^{14}$ | ${ }_{(6.55 m)}^{6.5}$ |

## RZR-WM2

PATENT PENDING


RZR-WM3
PATENT PENDING

## RAZAR WALLMOUNT SERIES-LED

S P E C I F I C A T I O N S


THE EMERGENCY OPTION BACK BOX EXTENDS 2" BEYOND THE STANDARD HOUSING AND CONTAINS THE EMERGENCY COMPONENTS (EC) INCLUDING BATTERIES OR CAN BE USED FOR SURFACE CONDUIT (SC) APPLICATIONS. THERE IS TO BE AN SC1, SC2, AND SC3 OPTION FORTHE DIFFERING HOUSING SIZES. SC SHIPS WITH THREADED CONDUIT PLUGS.
THE EM-LED SYSTEM PROVIDES POWER TO ALL LEDS IN THE ARRAY $(20,40$, or 60$)$ TO MEET THE FOLLOWING LIGHT LEVELS FOR A MINIMUM OF 90 MINUTES -
$W M 1=45 \% @ 350 M A$
$W M 2=36 \%$ @ 350MA
$W M 3=24 \% @ 350 M A$
*MULTIPLY THE \% ABOVE BY THE LUMEN OUTPUT @ 350MA

## PLED ${ }^{\circ}$ MODULES



RZR-WM3-LED E.P.A. = . 69
Available in:


40 LED Module

RZR-WM2-LED E.P.A. = . 47
Available in:
40 LED Module


20 LED Module
RZR-WM1-LED E.P.A. = 33
Available in:
20LED Module

| MAX INPUT WATTAGE |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| \# OF | DRIVE CURRENT |  |  |  |
| LED's | 350 mA | 525 mA | 700 mA | 1050 mA |
| 60 | 68 W | 99 W | 131 W | 198 W |
| 40 | 45 W | 66 W | 87 W | 134 W |
| 20 | 23 W | 33 W | 44 W | 66 W |

Spec/Order Example: RZR-WM2/PLED-IV/40LED-700mA/CW/277/RAL-8019-S/SF


| LED COUNT | $\begin{aligned} & \text { SOURCE } \\ & \text { TYPE } \end{aligned}$ | SOURCE | INITIAL LUMENS 4000K | INITIAL LUMENS 3000K | INITIAL LUMENS 5000K | L70 GREATER <br> THAN (HR)-TM21 | STARTING TEMP. | SYSTEM <br> WATTS | VOLTS | MAX <br> INPUT AMPS |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 20 | LED | 20 PLED Optical Module - 350mA | $\begin{aligned} & 2,706- \\ & 2,993 \end{aligned}$ | $\begin{aligned} & 2,571- \\ & 2,843 \end{aligned}$ | $\begin{aligned} & 2,841- \\ & 3,143 \end{aligned}$ | 60,000+ | $-20^{\circ} \mathrm{F}$ | 22 | $\begin{aligned} & 120 \\ & 277 \\ & 347 \end{aligned}$ | $\begin{aligned} & 0.19 \\ & 0.08 \\ & 0.07 \end{aligned}$ |
| 20 | LED | 20 PLED Optical Module - 525mA | $\begin{aligned} & 3,897- \\ & 4,310 \end{aligned}$ | $\begin{aligned} & 3,702- \\ & 4,095 \end{aligned}$ | $\begin{aligned} & 4,092- \\ & 4,526 \end{aligned}$ | 60,000+ | $-20^{\circ} \mathrm{F}$ | 33 | $\begin{aligned} & 120 \\ & 277 \\ & 347 \end{aligned}$ | $\begin{aligned} & 0.28 \\ & 0.12 \\ & 0.10 \end{aligned}$ |
| 20 | LED | 20 PLED Optical Module - 700mA | $\begin{aligned} & 4,942- \\ & 5,466 \end{aligned}$ | $\begin{aligned} & 4,695- \\ & 5,193 \end{aligned}$ | $\begin{aligned} & 5,189- \\ & 5,739 \end{aligned}$ | 60,000+ | $-20^{\circ} \mathrm{F}$ | 44 | $\begin{aligned} & 120 \\ & 277 \\ & 347 \end{aligned}$ | $\begin{aligned} & 0.37 \\ & 0.16 \\ & 0.13 \end{aligned}$ |
| 20 | LED | 20 PLED Optical Module - 1050mA | $\begin{aligned} & 6,564- \\ & 7,260 \end{aligned}$ | $\begin{aligned} & 6,236- \\ & 6,897 \end{aligned}$ | $\begin{aligned} & 6,892- \\ & 7,623 \end{aligned}$ | 60,000+ | $-20^{\circ} \mathrm{F}$ | 65 | $\begin{aligned} & 120 \\ & 277 \\ & 347 \end{aligned}$ | $\begin{aligned} & 0.55 \\ & 0.24 \\ & 0.19 \end{aligned}$ |
| 40 | LED | 40 PLED Optical Module - 350mA | $\begin{aligned} & 5,585- \\ & 6,178 \end{aligned}$ | $\begin{aligned} & 5,206- \\ & 5,869 \end{aligned}$ | $\begin{aligned} & 5,864 \text { - } \\ & 6,487 \end{aligned}$ | 60,000+ | $-20^{\circ} \mathrm{F}$ | 43 | $\begin{aligned} & 120 \\ & 277 \\ & 347 \end{aligned}$ | $\begin{aligned} & 0.36 \\ & 0.16 \\ & 0.13 \end{aligned}$ |
| 40 | LED | 40 PLED ${ }^{\circ}$ Optical Module - 525 mA | $\begin{aligned} & 8,059- \\ & 8,914 \end{aligned}$ | $\begin{aligned} & 7,656- \\ & 8,468 \end{aligned}$ | $\begin{aligned} & 8,462- \\ & 9,360 \end{aligned}$ | 60,000+ | $-20^{\circ} \mathrm{F}$ | 65 | $\begin{aligned} & 120 \\ & 277 \\ & 347 \end{aligned}$ | $\begin{aligned} & 0.55 \\ & 0.24 \\ & 0.19 \end{aligned}$ |
| 40 | LED | 40 PLED ${ }^{*}$ Optical Module - 700mA | $\begin{aligned} & \text { 10,240 - } \\ & 11,327 \end{aligned}$ | $\begin{aligned} & 9,728- \\ & 10,761 \end{aligned}$ | $\begin{aligned} & \text { 10,752 - } \\ & 11,893 \end{aligned}$ | 60,000+ | $-20^{\circ} \mathrm{F}$ | 87 | $\begin{aligned} & 120 \\ & 277 \\ & 347 \end{aligned}$ | $\begin{aligned} & 0.73 \\ & 0.32 \\ & 0.26 \end{aligned}$ |
| 40 | LED | 40 PLED ${ }^{\circ}$ Optical Module - 1050mA | $\begin{aligned} & 13,642- \\ & 15,089 \end{aligned}$ | $\begin{aligned} & 12,690- \\ & 14,335 \end{aligned}$ | $\begin{aligned} & 14,324- \\ & 15,843 \end{aligned}$ | 60,000+ | $-20^{\circ} \mathrm{F}$ | 129 | $\begin{aligned} & 120 \\ & 277 \\ & 347 \end{aligned}$ | $\begin{aligned} & 1.08 \\ & 0.47 \\ & 0.38 \end{aligned}$ |
| 60 | LED | 60 PLED Optical Module - 350mA | $\begin{aligned} & 8,118- \\ & 8,979 \end{aligned}$ | $\begin{aligned} & 7,712- \\ & 8,530 \end{aligned}$ | $\begin{aligned} & 8,524- \\ & 9,428 \end{aligned}$ | 60,000+ | $-20^{\circ} \mathrm{F}$ | 65 | $\begin{aligned} & 120 \\ & 277 \\ & 347 \end{aligned}$ | $\begin{aligned} & 0.55 \\ & 0.24 \\ & 0.19 \end{aligned}$ |
| 60 | LED | 60 PLED Optical Module - 525mA | $\begin{aligned} & 11,690- \\ & 12,930 \end{aligned}$ | $\begin{aligned} & 11,106- \\ & 12,284 \end{aligned}$ | $\begin{aligned} & 12,275- \\ & 13,577 \end{aligned}$ | 60,000+ | $-20^{\circ} \mathrm{F}$ | 98 | $\begin{aligned} & 120 \\ & 277 \\ & 347 \end{aligned}$ | $\begin{aligned} & 0.82 \\ & 0.36 \\ & 0.29 \end{aligned}$ |
| 60 | LED | 60 PLED Optical Module - 700mA | $\begin{aligned} & 14,825- \\ & 16,398 \end{aligned}$ | $\begin{aligned} & 14,084- \\ & 15,578 \end{aligned}$ | $\begin{aligned} & 15,566- \\ & 17,218 \end{aligned}$ | 60,000+ | $-20^{\circ} \mathrm{F}$ | 131 | $\begin{aligned} & 120 \\ & 277 \\ & 347 \end{aligned}$ | $\begin{aligned} & 1.09 \\ & 0.47 \\ & 0.38 \end{aligned}$ |
| 60 | LED | 60 PLED ${ }^{\text {© }}$ Optical Module - 1050mA | $\begin{aligned} & 19,691- \\ & 21,780 \end{aligned}$ | $\begin{aligned} & 18,706- \\ & 20,691 \end{aligned}$ | $\begin{aligned} & 20,676- \\ & 22,869 \end{aligned}$ | 60,000+ | $-20^{\circ} \mathrm{F}$ | 193 | $\begin{aligned} & 120 \\ & 277 \\ & 347 \end{aligned}$ | $\begin{aligned} & 1.61 \\ & 0.70 \\ & 0.56 \end{aligned}$ |

## NOTES:

1. Max Input Amps is the highest of starting, operating, or open circuit currents
2. Lumen values for LED Modules vary according to the distribution type
3. System Watts includes the source watts and all driver components.
4. Fuse value should be sufficient to protect all wiring components.
5. L7O(10K) - TM-21 $6 x$ rule applied

L70(10K) - Calculated $=244,000 @ 700 \mathrm{~mA}$
$=102,000 @ 1050 \mathrm{~mA}$
WARNING: All fixtures must be installed in accordance with local codes or the National Electrical Code. Failure to do so may result in serious personal injury.

## SNTS 4"

## FEATURES

## Shaft

4" square, fabricated from high grade structural steel tube. Shaft conforms to ASTM-A-501-68 specifications. Meets or exceeds minimum yield strength of 46,000 P.S.I. wall thickness 11 GA. (. 120 wall) or 7 GA . ( 180 wall) as specified. Reinforced hand hole is furnished with cover. Shaft is furnished with ground lug located inside pole on wall opposite hand hole.

## Base Plate

Fabricated from structural quality hot rolled steel. Meets or exceeds minimum yield strength of 36,000 P.S.I. base telescopes and is circumferentially welded to pole shaft. Slotted bolt holes provide 1" flexibility on either side of bolt circle centerline.

## Anchorage

(4) anchor bolts fabricated from hot rolled steel bar. Minimum yield strength of 50,000 P.S.I. bolts have "L" bend on one end and are threaded on the other. Bolts are fully galvanized and are furnished with two nuts and two washers.

## Base Cover

Fabricated from heavy gauge quality carbon steel. Two-piece cover conceals base.

## Finish

Electrostatically applied TGIC Polyester Powder Coat on substrate prepared with 20 PSI power wash at $140^{\circ} \mathrm{F}$. Four step media blast and iron phosphate pretreatment for protection and paint adhesion. $400^{\circ} \mathrm{F}$ bake for maximum hardness and durability.

## PROJECT TYPE:




|  | Engineering Data <br> Maximum EPA - Square Feet |  |  |  |  |
| :--- | :---: | :---: | :---: | :---: | :---: |
|  | Max. Fixture <br> Weight | 100 MPH | 90 MPH | 80 MPH | 70 MPH |
| Model Number |  |  |  |  |  |
| SNTS 104-11 | 400 | 16.7 | 20.5 | 26.1 | 33.4 |
| SNTS 124-11 | 400 | 12.2 | 16.1 | 20.4 | 25.8 |
| SNTS 144-11 | 400 | 9.9 | 12.8 | 16.1 | 20.2 |
| SNTS 154-11 | 400 | 8.9 | 11.4 | 14.4 | 17.9 |
| SNTS 164-11 | 400 | 7.9 | 10.1 | 12.8 | 15.9 |
| SNTS 184-11 | 400 | 6.2 | 8.2 | 10.1 | 13.8 |
| SNTS 204-11 | 400 | 4.8 | 6.2 | 7.9 | 11.6 |
| SNTS 204-7 | 450 | 8.8 | 11.3 | 14.0 | 17.4 |
| SNTS 254-11 | 350 | 1.6 | 3.2 | 5.5 | 8.8 |
| SNTS 254-7 | 450 | 4.3 | 6.1 | 9.1 | 11.2 |

All above design calculations are based on sustained
wind forces plus additional 1.3 wind gust
(Example: Pole rated at 80 MPH withstands 104 MPH gusts)

## Drilled Side Mount

Specify drilling location using codes below.


Spec/Order Example: SNTS204-7/2-180/RAL-6005-S

## ORDERING INFORMATION


U.S. ARCHITECTURAL - LIGHTING

## SOLID STATE LIGHTING

## FIXTURE TYPE:

## RAZAR BOLLARD-LED

S P E C I F I C A T I O N S

OPTICAL HOUSING
Heavy cast low copper aluminum (A356 alloy: <0.2\% copper) assembly with integral cooling fins. The Optical Panel mounting surface is milled flat (surface variance $< \pm .003$ ") to facilitate thermal transfer of heat to housing and cooling fins. Minimum wall thickness is .188".

SHAFT \& BASE
Extruded aluminum (6061-T6 alloy) riser welded to heavy cast aluminum (A356 alloy: $<0.2 \%$ copper) base. Riser has minimum wall thickness of .188". Electrical assembly including LED mains driver, LED Emergency driver (optional LED-EM) with batteries, and quick connectors suspended inside riser. Concealed bolts attach the Optical Housing bolts to Riser.

ANCHOR BOLTS
Four 3/8" $\times 10^{\prime \prime} \times 2^{\prime \prime}$ galvanized anchor bolts with couplings, leveling nuts, washers, template, and stainless bolts.

## PLED"' OPTICAL MODULES

Emitters (LED's) are arrayed on a metal core PCB panel with each emitter located on a copper thermal transfer pad and enclosed by an LED refractor. The asymmetric distributions have a micro-reflector inside the refractor that re-directs the house side emitter output towards the street side and functions as a house side shielding element. Refractors are injection molded H12 acrylic. Each LED refractor is sealed to the PCB over an emitter and all refractors are retained by an aluminum frame. All refractors in a Panel have the same optical pattern. LED refractors produce standard site/area distributions - Type II, and Type IV. Panels are field replaceable and field rotatable in $90^{\circ}$ increments.

## LED DRIVER(S)

Constant current electronic with a power factor of $>.90$ and a minimum operating temperature of $-40^{\circ} \mathrm{F} /-40^{\circ} \mathrm{C}$. Driver(s) is/are UL and cUL recognized and mounted directly against the Electrical Housing to facilitate thermal transfer, held down by universal clamps to facilitate easy removal. In-line terminal blocks facilitate wiring between the driver and optical arrays. Drivers accept an input of $120-277 \mathrm{~V}, 50 / 60 \mathrm{~Hz}$ or $347 \mathrm{~V}-480 \mathrm{~V}$, $50,60 \mathrm{~Hz}$. ( $0-10 \mathrm{~V}$ dimmable driver is standard. Driver has a minimum of 3 KV internal surge protection. Luminaire supplied with 20 KV surge protector for field accessible installation.)

## LED EMITTERS

High output LED's are utilized with drive currents ranging from 175 mA to 350 mA . 70 CRI Minimum. LED's are available in standard Neutral White (4000K), or optional Cool White (5000K) or Warm White (3000K). Consult Factory for other LED options.

## AMBER LED's

PCA (Phosphor Converted Amber) LED's utilize phosphors to create color output similar to LPS lamps and have a slight output in the blue spectral bandwidth. TRA (True Amber) LED's utilize material that emits light in the amber spectral bandwidth only without the use of phosphors.

## FINISH

Electrostatically applied TGIC Polyester Powder Coat on substrate prepared with 20 PSI power wash at $140^{\circ}$. Four step media blast and iron phosphate pretreatment for protection and paint adhesion. $400^{\circ} \mathrm{F}$ bake for maximum hardness and durability.


## RAZAR BOLLARD SERIES - LED



Spec/Order Example: RZRB1/PLED-IV/20LED-350mA/CW/277/RAL-8019-S/DF


| $\begin{aligned} & \text { LED } \\ & \text { COUNT } \end{aligned}$ | $\begin{aligned} & \text { SOURCE } \\ & \text { TYPE } \end{aligned}$ | SOURCE | INITIAL LUMENS 4000K | INITIAL LUMENS 3000K | INITIAL LUMENS 5000K | L70 GREATER THAN (HR) | STARTING TEMP. | SYSTEM WATTS | VOLTS | MAX INPUT AMPS |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 20 | LED | 20 PLED Optical Module-175mA | $\begin{aligned} & 1,401- \\ & 1,404 \end{aligned}$ | $\begin{aligned} & 1,226- \\ & 1,229 \end{aligned}$ | $\begin{aligned} & 1,434- \\ & 1,438 \end{aligned}$ | 60,000+ | $-20^{\circ} \mathrm{F}$ | 12 | $\begin{aligned} & 120 \\ & 277 \end{aligned}$ | $\begin{aligned} & 0.24 \\ & 0.10 \end{aligned}$ |
| 20 | LED | 20 PLED Optical Module - 350 mA | $\begin{aligned} & 2,501- \\ & 2,508 \end{aligned}$ | $\begin{aligned} & 2,190- \\ & 2,196 \end{aligned}$ | $\begin{aligned} & 2,561- \\ & 2,568 \end{aligned}$ | 60,000+ | $-20^{\circ} \mathrm{F}$ | 22 | $\begin{aligned} & 120 \\ & 277 \end{aligned}$ | $\begin{aligned} & 0.34 \\ & 0.15 \end{aligned}$ |
| 40 | LED | 40 PLED Optical Module - 175mA | $\begin{aligned} & 2,801- \\ & 2,808 \end{aligned}$ | $\begin{aligned} & 2,452- \\ & 2,459 \end{aligned}$ | $\begin{aligned} & 2,561- \\ & 2,568 \end{aligned}$ | 60,000+ | $-20^{\circ} \mathrm{F}$ | 22 | $\begin{aligned} & 120 \\ & 277 \end{aligned}$ | $\begin{aligned} & 0.38 \\ & 0.17 \end{aligned}$ |
| 40 | LED | 40 PLED Optical Module - 350 mA | $\begin{aligned} & 5,002- \\ & 5,015 \end{aligned}$ | $\begin{aligned} & 4,379- \\ & 4,391 \end{aligned}$ | $\begin{aligned} & 5,122- \\ & 5,136 \end{aligned}$ | 60,000+ | $-20^{\circ} \mathrm{F}$ | 44 | $\begin{aligned} & 120 \\ & 277 \end{aligned}$ | $\begin{aligned} & 0.38 \\ & 0.17 \end{aligned}$ |

## NOTES:

1. Max Input Amps is the highest of starting, operating, or open circuit currents
2. Lumen values for LED Modules vary according to the distribution type
3. System Watts includes the source watts and all driver components.
4. Fuse value should be sufficient to protect all wiring components. For electronic driver and LED component protection, use 10KV-20KV surge suppressors.
5. L70(10K) - TM-21 $6 x$ rule applied

WARNING: All fixtures must be installed in accordance with local codes or the National Electrical Code. Failure to do so may result in serious personal injury.
U.S. ARCHITECTURAL LIGHTING

## AREA \& ROADWAY LIGHTING

 RAZAR SERIES - LED LOW PROFILE AREA LUMINAIRE
## Optical Housing

Heavy cast, low copper aluminum assembly (A356 alloy, <.2\% copper) minimum wall thickness . 188". LED Module mounting area is machined to within a 0.002 " surface flatness variance for maximum surface contact and thermal conductivity from the LED modules to the radiating fins. Passive radiating fins above the LED Optics provide superior thermal management and long LED life. The optical and electrical compartments are integrated with the support arm to create one assembly. Cast and hinged driver compartment cover allows access to the drivers and wiring.

## Electrical Housing w/ Integrated Arm

Heavy cast low copper aluminum (A356 alloy; <0.2\% copper) assembly with integral cooling ribs surrounding the electrical compartment and a flat surface on the top of the arm to accommodate a photocell receptacle. Solid barrier wall separates optical and electrical compartments. The optical compartment and electrical compartment with the integrated support arm combine to create one assembly. Minimum wall thickness is .188". Cast and hinged driver assembly cover is integrated with wiring compartment cover.

## PLED ${ }^{\text {m }}$ Optics

Emitters (LED's) are arrayed on a metal core PCB panel with each emitter located on a copper thermal transfer pad and enclosed by an LED refractor. LED optics completely seal each individual emitter to meet an IP66 rating. In asymmetric distributions, a micro-reflector inside the refractor re-directs the house side emitter output towards the street side and functions as a house side shielding element. Refractors are injection molded H12 acrylic. Each LED refractor is sealed to the PCB over an emitter and all refractors are retained by an aluminum frame. Any one Panel, or group of Panels in a luminaire, have the same optical pattern. LED refractors produce standard site/area distributions. Panels are field replaceable and field rotatable in $90^{\circ}$ increments.

## LED Driver(s)

Constant current electronic with a power factor of $>.90$ and a minimum operating temperature of $-40^{\circ} \mathrm{F} /-40^{\circ} \mathrm{C}$. Driver(s) is/are UL and CUL recognized and mounted directly against the Electrical Housing to facilitate thermal transfer, held down by universal clamps to facilitate easy removal. In-line terminal blocks facilitate wiring between the driver and optical arrays. Drivers accept an input of $120-277 \mathrm{~V}, 50 / 60 \mathrm{~Hz}$ or $347 \mathrm{~V}-480 \mathrm{~V}$, $50,60 \mathrm{~Hz}$. ( $0-10 \mathrm{~V}$ dimmable driver is standard. Driver has a minimum of 3 KV internal surge protection. Luminaire supplied with 20KV surge protector for field accessible installation.)

## LED Emitters

High output LED's are utilized with drive currents ranging from 350 mA to 1050mA. 70CRI Minimum. LED's are available in standard Neutral White (4000K), or optional Cool White (5000K) or Warm White (3000K). Consult Factory for other LED options.

## Amber LED's

TRA (True Amber) LED's utilize material that emits light in the amber spectral bandwidth only without the use of phosphors.

## Finish

Electrostatically applied TGIC Polyester Powder Coat on substrate prepared with 20 PSI power wash at $140^{\circ}$. Four step media blast and iron phosphate pretreatment for protection and paint adhesion. $400^{\circ} \mathrm{F}$ bake for maximum hardness and durability.

## Mast Arm Fitter/Electrical Housing

Replaces standard Electrical Housing. Fits standard 2 3/8"O.D. horizontal tenon. Two (2) straps with two (2) bolts each encircle the lower half of the tenon. Upper half of the tenon rests on self-centering steps that position the angle of the luminaire at $0^{\circ},+1.5^{\circ},+1.5$ or $+3^{\circ}$ up from the horizontal. All hardware is stainless steel.

## PROJECT TYPE:



| FIXTURE | A | B | C | D |
| :---: | :---: | :---: | :---: | :---: |
| RZR-G | $\begin{gathered} 15^{\prime \prime} \\ 381 \mathrm{~mm} \end{gathered}$ | $\begin{aligned} & 36.5^{\prime \prime} \\ & 927 \mathrm{~mm} \end{aligned}$ | $\begin{gathered} \mathbf{3 "} \\ 76 \mathrm{~mm} \end{gathered}$ | $\begin{gathered} 7 " \\ 187 \mathrm{~mm} \end{gathered}$ |
| RZR | $14.75^{\prime \prime}$ | $\begin{aligned} & 28.25 " \\ & 718 \mathrm{~mm} \\ & \hline \end{aligned}$ | $2.75{ }^{\prime \prime}$ | $\begin{gathered} \mathbf{6 . 5 "} \\ 165 \mathrm{~mm} \\ \hline \end{gathered}$ |
| RZRM | $\begin{aligned} & 11.5^{\prime \prime} \\ & 292 \mathrm{~mm} \end{aligned}$ | $\begin{gathered} \mathbf{2 2 "} \\ 559 \mathrm{~mm} \end{gathered}$ | $\begin{aligned} & 2.5^{\prime \prime} \\ & 64 \mathrm{~mm} \end{aligned}$ | $\begin{aligned} & 5.25 " \\ & 133 \mathrm{~mm} \end{aligned}$ |
| RZR-MAF | $\begin{gathered} \hline 15^{\prime \prime} \\ 381 \mathrm{~mm} \end{gathered}$ | $\begin{aligned} & \hline \mathbf{2 8 . 2 5 "} \\ & 724 \mathrm{~mm} \end{aligned}$ | $2.5 "$ | $\begin{gathered} 4^{\prime \prime} \\ 102 \mathrm{~mm} \end{gathered}$ |

## SPECIFICATIONS

POLE DRILLING TEMPLATE



PLED ${ }^{m}$ MODULES


80 LED Module


48 LED Module


40 LED Module


ORDERING INFORMATION


## OPTIONS



## High Low Dimming For Switches (HLSW)

The HLSW is a Small Electronic Switch which Provides High Low Dimming Control Through the LED Driver's 0-10V Control. Switching is Done by Adding a Seconday AC Switched Hot Trigger Line to the HLSW in Addition to the Normal AC Power Line. When the Secondary Trigger Line is Powered, the Fixture will go to $100 \%$ Dimming. With no Power to the Trigger, the Fixture will operate at $50 \%$ or $25 \%$ Dimming. Switches for the Trigger Line can be a Normal AC Switch/Breaker or Timed Switch/Breaker.

## Wireless and Other Fixture Controls

Contact Factory for Wireless and Other Fixture Controls and Recomendations. Most Controls Can be Integrated and Factory Installed.

## EXTERNAL GLARE SHIELDS



EGS4-4 Sided Shield
Minimum Cutoff $=12^{\circ}$
Average Cutoff $=23^{\circ}$


EGS3W-3 Sided Shield
Minimum Rear Cutoff $=12^{\circ}$
Average Rear Cutoff $=23^{\circ}$
Minimum Side Cutoff $=4^{\circ}$
Average Side Cutoff $=16^{\circ}$

Glare Shields are rotatable on RZR and RZRM. Consult factory for custom applications.

INSTALLATION DETAIL


RZR-MAF Installation


RZR-WM Installation

## PHOTOMETRIC DATA GUIDE - LM-80 LUMEN MAINTENANCE

| LED Life / Operating Hours | Lumen <br> Depreciation | Lumen Depreciation <br> Scale Factor |
| :---: | :---: | :---: |
| 60,000 (10x Test Time Calculated) | L94 | 0.94 x |
| 100,000 (Theoretical Calculated) | L92 | 0.92 x |
| 150,000 (Theoretical Calcualted) | L89 | 0.89 x |

Lumen Depreciation Calculations Done in Accordance With IESNA TM-21 \& LM-80 ( $25^{\circ} \mathrm{C}$ Ambient) TM-21 6x Test Time Dicatates that $194 \mathbf{~} \mathbf{6 0 , 0 0 0}$ Hours.

## ELECTRICAL DATA GUIDE - AMPERAGE CHARTS

| \# of <br> LEDs | $\mathbf{m A}$ | System <br> Watts | $\mathbf{1 2 0 V}$ | $\mathbf{2 0 8 V}$ | $\mathbf{2 7 7 V}$ | $\mathbf{3 4 7 V}$ | $\mathbf{4 8 0 V}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 24 | 350 | 28 | 0.24 | 0.14 | 0.10 | 0.08 | 0.06 |
| 24 | 525 | 42 | 0.35 | 0.20 | 0.15 | 0.12 | 0.09 |
| 24 | 700 | 56 | 0.47 | 0.27 | 0.20 | 0.16 | 0.12 |
| 24 | 875 | 68 | 0.57 | 0.33 | 0.24 | 0.20 | 0.14 |
| 24 | 1050 | 82 | 0.68 | 0.39 | 0.30 | 0.24 | 0.17 |
| 48 | 350 | 53 | 0.44 | 0.25 | 0.19 | 0.15 | 0.11 |
| 48 | 525 | 79 | 0.66 | 0.38 | 0.29 | 0.23 | 0.16 |
| 48 | 700 | 105 | 0.88 | 0.51 | 0.38 | 0.30 | 0.22 |
| 48 | 875 | 132 | 1.10 | 0.63 | 0.48 | 0.38 | 0.27 |
| 48 | 1050 | 160 | 1.33 | 0.77 | 0.58 | 0.46 | 0.33 |
| 40 | 350 | 43 | 0.36 | 0.21 | 0.15 | 0.12 | 0.09 |
| 40 | 525 | 65 | 0.54 | 0.31 | 0.23 | 0.19 | 0.13 |
| 40 | 700 | 87 | 0.72 | 0.42 | 0.31 | 0.25 | 0.18 |
| 40 | 875 | 108 | 0.90 | 0.52 | 0.39 | 0.31 | 0.23 |
| 40 | 1050 | 128 | 1.07 | 0.62 | 0.46 | 0.37 | 0.27 |
| 80 | 350 | 85 | 0.71 | 0.41 | 0.31 | 0.25 | 0.18 |
| 80 | 525 | 129 | 1.08 | 0.62 | 0.47 | 0.37 | 0.27 |
| 80 | 700 | 174 | 1.45 | 0.83 | 0.63 | 0.50 | 0.36 |
| 80 | 875 | 216 | 1.80 | 1.04 | 0.78 | 0.62 | 0.45 |
| 80 | 1050 | 256 | 2.14 | 1.23 | 0.93 | 0.74 | 0.53 |
| 120 | 350 | 130 | 1.08 | 0.63 | 0.47 | 0.37 | 0.27 |
| 120 | 525 | 192 | 1.60 | 0.92 | 0.69 | 0.55 | 0.40 |
| 120 | 700 | 260 | 2.17 | 1.25 | 0.94 | 0.75 | 0.54 |
| 120 | 875 | 329 | 2.74 | 1.58 | 1.19 | 0.95 | 0.69 |
| 120 | 1050 | 398 | 3.32 | 1.91 | 1.44 | 1.15 | 0.83 |

## RZR SERIES - LED <br> PHOTOMETRIC DATA GUIDE - ISOFOOTCANDLE PLOTS

RZRM-PLED-48LED-700mA-40K - 18' Pole Height

MH DISTANCE (18')


MH DISTANCE (18')


MH DISTANCE (18')


MH DISTANCE (18')


MH DISTANCE (18')


MH DISTANCE (18')


MH DISTANCE (18')


MH DISTANCE (18')

$\qquad$

MH DISTANCE (18)


MH DISTANCE (18)


MH DISTANCE (18')


IES File downloads for this product can be found at www.usaltg.com/downloads/asr.html

## RZR SERIES - LED

## PHOTOMETRIC DATA GUIDE - ISOFOOTCANDLE PLOTS

RZR-PLED-80LED-700mA-40K - 25' Pole Height


## IES File downloads for this product can be found at www.usaltg.com/downloads/asr.html

## RZR SERIES - LED

## PHOTOMETRIC DATA GUIDE - ISOFOOTCANDLE PLOTS

RZRG-PLED-120LED-700mA-40K 30' Pole Height


IES File downloads for this product can be found at www.usaltg.com/downloads/asr.html

## PHOTOMETRIC DATA GUIDE - LUMEN TABLES (RZRM-PLED)

| RZR-M-PLED |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| LED Count | Drive Current (mA) | System Watts | Dist'n Type | 27K (2700K - 70CRI) |  |  | 30K (3000K-70CRI) |  |  | 40K (4000K - 70CRI) |  |  | 50K (5000K-70CRI) |  |  | System Watts | TRA ( 590 nm ) |  |  |
|  |  |  |  | LUMENS | LPW | BUG RATING | LUMENS | LPW | BUG RATING | LUMENS | LPW | BUG RATING | LUMENS | LPW | BUG RATING |  | LUMENS | LPW | BUG RATING |
| 24 | 350 | 28.2 | II | 3436 | 122 | B1-U0-G1 | 3709 | 132 | B1-U0-G1 | 3904 | 138 | B1-U0-G1 | 4100 | 145 | B1-U0-G1 | 20.0 | 1363 | 68 | B1-U0-G1 |
|  |  |  | II-FR | 3459 | 123 | B1-U0-G1 | 3734 | 132 | B1-U0-G1 | 3930 | 139 | B1-U0-G1 | 4127 | 146 | B1-U0-G1 |  | 1372 | 69 | B1-U0-G0 |
|  |  |  | I-ML | 3436 | 122 | B2-U0-G2 | 3709 | 132 | B2-U0-G2 | 3905 | 138 | B2-U0-G2 | 4100 | 145 | B2-U0-G2 |  | 1363 | 68 | B1-U0-G1 |
|  |  |  | III-M | 3496 | 124 | B1-U0-G1 | 3775 | 134 | B1-U0-G1 | 3973 | 141 | B1-U0-G1 | 4172 | 148 | B1-U0-G1 |  | 1387 | 69 | B1-U0-G0 |
|  |  |  | III-W | 3246 | 115 | B1-U0-G1 | 3505 | 124 | B1-U0-G1 | 3689 | 131 | B1-U0-G1 | 3873 | 137 | B1-U0-G1 |  | 1289 | 64 | B0-U0-G1 |
|  |  |  | IV | 3469 | 123 | B1-U0-G1 | 3746 | 133 | B1-U0-G1 | 3943 | 140 | B1-U0-G1 | 4140 | 147 | B1-U0-G1 |  | 1377 | 69 | B1-U0-G1 |
|  |  |  | IV-FT | 3161 | 112 | B1-U0-G1 | 3412 | 121 | B1-U0-G1 | 3592 | 127 | B1-U0-G1 | 3771 | 134 | B1-U0-G1 |  | 1254 | 63 | BO-U0-G1 |
|  |  |  | VSQ-N | 3627 | 129 | B2-U0-G0 | 3915 | 139 | B2-U0-G0 | 4121 | 146 | B2-U0-G0 | 4327 | 153 | B2-U0-G1 |  | 1439 | 72 | B1-U0-G0 |
|  |  |  | VSQ-M | 3556 | 126 | B2-U0-G1 | 3838 | 136 | B2-U0-G1 | 4041 | 143 | B2-U0-G1 | 4242 | 150 | B3-U0-G1 |  | 1410 | 71 | B1-U0-G0 |
|  |  |  | VSQ-W | 3471 | 123 | B3-U0-G1 | 3748 | 133 | B3-U0-G1 | 3945 | 140 | B3-U0-G1 | 4142 | 147 | B3-U0-G1 |  | 1377 | 69 | B1-U0-G1 |
|  |  |  | II-HS | 2513 | 89 | B0-U0-G1 | 2713 | 96 | B0-U0-G1 | 2856 | 101 | B0-U0-G1 | 2998 | 106 | B0-U0-G1 |  | 997 | 50 | BO-U0-G0 |
|  |  |  | II-FR-HS | 2556 | 91 | BO-U0-G0 | 2759 | 98 | BO-U0-G0 | 2905 | 103 | BO-U0-G0 | 3050 | 108 | BO-U0-G0 |  | 1014 | 51 | BO-U0-G0 |
|  |  |  | III-M-HS | 2543 | 90 | B0-U0-G1 | 2745 | 97 | BO-U0-G1 | 2889 | 102 | BO-U0-G1 | 3034 | 108 | BO-U0-G1 |  | 1008 | 50 | BO-U0-G0 |
|  |  |  | III-W-HS | 2488 | 88 | B0-U0-G1 | 2686 | 95 | B0-U0-G1 | 2827 | 100 | B0-U0-G1 | 2969 | 105 | B0-U0-G1 |  | 987 | 49 | B0-U0-G1 |
|  |  |  | IV-HS | 2626 | 93 | B0-U0-G1 | 2835 | 101 | B0-U0-G1 | 2984 | 106 | B0-U0-G1 | 3133 | 111 | BO-U0-G1 |  | 1042 | 52 | BO-U0-G0 |
|  |  |  | IV-FT-HS | 2481 | 88 | B0-U0-G1 | 2679 | 95 | B0-U0-G1 | 2820 | 100 | B0-U0-G1 | 2961 | 105 | B0-U0-G1 |  | 985 | 49 | BO-U0-G1 |
| 24 | 525 | 41.5 | 11 | 4908 | 118 | B1-U0-G1 | 5298 | 128 | B1-U0-G1 | 5577 | 134 | B1-U0-G1 | 5856 | 141 | B2-U0-G1 | 31.0 | 1586 | 51 | B1-U0-G1 |
|  |  |  | II-FR | 4941 | 119 | B1-U0-G1 | 5334 | 129 | B1-U0-G1 | 5614 | 135 | B2-U0-G1 | 5895 | 142 | B2-U0-G1 |  | 1598 | 52 | B1-U0-G0 |
|  |  |  | II-ML | 4908 | 118 | B2-U0-G2 | 5299 | 128 | B2-U0-G2 | 5578 | 134 | B2-U0-G2 | 5856 | 141 | B3-U0-G3 |  | 1587 | 51 | B1-U0-G1 |
|  |  |  | III-M | 4994 | 120 | B1-U0-G1 | 5392 | 130 | B1-U0-G1 | 5675 | 137 | B1-U0-G1 | 5959 | 144 | B1-U0-G2 |  | 1615 | 52 | B1-U0-G0 |
|  |  |  | III-W | 4637 | 112 | B1-U0-G2 | 5005 | 121 | B1-U0-G2 | 5269 | 127 | B1-U0-G2 | 5533 | 133 | B1-U0-G2 |  | 1500 | 48 | BO-U0-G1 |
|  |  |  | IV | 4956 | 119 | B1-U0-G1 | 5350 | 129 | B1-U0-G1 | 5632 | 136 | B1-U0-G1 | 5913 | 142 | B1-U0-G2 |  | 1602 | 52 | B1-U0-G1 |
|  |  |  | IV-FT | 4515 | 109 | B1-U0-G2 | 4875 | 117 | B1-U0-G2 | 5131 | 124 | B1-U0-G2 | 5388 | 130 | B1-U0-G2 |  | 1460 | 47 | BO-U0-G1 |
|  |  |  | VSQ-N | 5180 | 125 | B2-U0-G1 | 5592 | 135 | B2-U0-G1 | 5886 | 142 | B2-U0-G1 | 6181 | 149 | B2-U0-G1 |  | 1676 | 54 | B1-U0-G0 |
|  |  |  | VSQ-M | 5080 | 122 | B3-U0-G1 | 5484 | 132 | B3-U0-G1 | 5772 | 139 | B3-U0-G1 | 6061 | 146 | B3-U0-G1 |  | 1643 | 53 | B1-U0-G0 |
|  |  |  | VSQ-W | 4959 | 119 | B3-U0-G2 | 5353 | 129 | B3-U0-G2 | 5635 | 136 | B3-U0-G2 | 5917 | 143 | B3-U0-G2 |  | 1603 | 52 | B1-U0-G1 |
|  |  |  | 11-HS | 3589 | 86 | B0-U0-G1 | 3875 | 93 | B0-U0-G1 | 4079 | 98 | B0-U0-G1 | 4282 | 103 | B0-U0-G1 |  | 1161 | 37 | BO-U0-G0 |
|  |  |  | II-FR-HS | 3652 | 88 | B0-U0-G1 | 3942 | 95 | B0-U0-G1 | 4150 | 100 | B0-U0-G1 | 4357 | 105 | BO-U0-G1 |  | 1181 | 38 | BO-U0-G0 |
|  |  |  | III-M-HS | 3631 | 88 | B0-U0-G1 | 3920 | 94 | B0-U0-G1 | 4127 | 99 | B0-U0-G1 | 4333 | 104 | BO-U0-G2 |  | 1174 | 38 | BO-U0-G0 |
|  |  |  | III-W-HS | 3555 | 86 | BO-U0-G2 | 3838 | 92 | BO-U0-G2 | 4040 | 97 | BO-U0-G2 | 4242 | 102 | BO-U0-G2 |  | 1150 | 37 | BO-U0-G1 |
|  |  |  | IV-HS | 3751 | 90 | B0-U0-G1 | 4050 | 98 | BO-U0-G1 | 4263 | 103 | B0-U0-G1 | 4476 | 108 | B0-U0-G1 |  | 1213 | 39 | BO-U0-G0 |
|  |  |  | IV-FT-HS | 3545 | 85 | BO-U0-G2 | 3827 | 92 | BO-U0-G2 | 4029 | 97 | BO-U0-G2 | 4230 | 102 | BO-U0-G2 |  | 1146 | 37 | B0-U0-G1 |
| 24 | 700 | 55.9 | II | 6275 | 112 | B2-U0-G1 | 6774 | 121 | B2-U0-G2 | 7130 | 128 | B2-U0-G2 | 7487 | 134 | B2-U0-G2 | N/A | N/A |  |  |
|  |  |  | II-FR | 6317 | 113 | B2-U0-G1 | 6819 | 122 | B2-U0-G1 | 7178 | 128 | B2-U0-G1 | 7537 | 135 | B2-U0-G1 |  |  |  |  |
|  |  |  | II-ML | 6275 | 112 | B3-U0-G3 | 6774 | 121 | B3-U0-G3 | 7130 | 128 | B3-U0-G3 | 7487 | 134 | B3-U0-G3 |  |  |  |  |
|  |  |  | III-M | 6385 | 114 | B2-U0-G2 | 6893 | 123 | B2-U0-G2 | 7256 | 130 | B2-U0-G2 | 7618 | 136 | B2-U0-G2 |  |  |  |  |
|  |  |  | III-W | 5928 | 106 | B1-U0-G2 | 6399 | 114 | B1-U0-G2 | 6736 | 121 | B1-U0-G2 | 7073 | 127 | B1-U0-G2 |  |  |  |  |
|  |  |  | IV | 6337 | 113 | B2-U0-G2 | 6841 | 122 | B2-U0-G2 | 7201 | 129 | B2-U0-G2 | 7561 | 135 | B2-U0-G2 |  |  |  |  |
|  |  |  | IV-FT | 5772 | 103 | B1-U0-G2 | 6231 | 111 | B1-U0-G2 | 6559 | 117 | B1-U0-G2 | 6887 | 123 | B1-U0-G2 |  |  |  |  |
|  |  |  | VSQ-N | 6624 | 118 | B2-U0-G1 | 7151 | 128 | B2-U0-G1 | 7527 | 135 | B2-U0-G1 | 7903 | 141 | B3-U0-G1 |  |  |  |  |
|  |  |  | VSQ-M | 6494 | 116 | B3-U0-G1 | 7011 | 125 | B3-U0-G1 | 7380 | 132 | B3-U0-G1 | 7749 | 139 | B3-U0-G2 |  |  |  |  |
|  |  |  | VSQ-W | 6340 | 113 | B3-U0-G2 | 6844 | 122 | B3-U0-G2 | 7204 | 129 | B3-U0-G2 | 7565 | 135 | B3-U0-G2 |  |  |  |  |
|  |  |  | II-HS | 4589 | 82 | B1-U0-G1 | 4954 | 89 | B1-U0-G2 | 5215 | 93 | B1-U0-G2 | 5475 | 98 | B1-U0-G2 |  |  |  |  |
|  |  |  | III-RR-HS | 4668 | 84 | BO-U0-G1 | 5040 | 90 | B0-U0-G1 | 5305 | 95 | B0-U0-G1 | 5570 | 100 | B0-U0-G1 |  |  |  |  |
|  |  |  | III-M-HS | 4643 | 83 | BO-U0-G2 | 5012 | 90 | BO-U0-G2 | 5276 | 94 | BO-U0-G2 | 5539 | 99 | BO-U0-G2 |  |  |  |  |
|  |  |  | III-W-HS | 4544 | 81 | BO-U0-G2 | 4906 | 88 | BO-U0-G2 | 5164 | 92 | BO-U0-G2 | 5422 | 97 | BO-U0-G2 |  |  |  |  |
|  |  |  | IV-HS | 4796 | 86 | BO-U0-G2 | 5177 | 93 | BO-U0-G2 | 5450 | 97 | BO-U0-G2 | 5722 | 102 | BO-U0-G2 |  |  |  |  |
|  |  |  | IV-FT-HS | 4532 | 81 | BO-U0-G2 | 4893 | 88 | BO-U0-G2 | 5150 | 92 | BO-U0-G2 | 5408 | 97 | B0-U0-G2 |  |  |  |  |
| 24 | 875 | 67.8 | II | 7406 | 109 | B2-U0-G2 | 7995 | 118 | B2-U0-G2 | 8416 | 124 | B2-U0-G2 | 8837 | 130 | B2-U0-G2 | N/A | N/A |  |  |
|  |  |  | II-FR | 7456 | 110 | B2-U0-G1 | 8049 | 119 | B2-U0-G1 | 8473 | 125 | B2-U0-G1 | 8896 | 131 | B2-U0-G1 |  |  |  |  |
|  |  |  | 11-ML | 7406 | 109 | B3-U0-G3 | 7995 | 118 | B3-U0-G3 | 8416 | 124 | B3-U0-G3 | 8837 | 130 | B3-U0-G3 |  |  |  |  |
|  |  |  | III-M | 7536 | 111 | B2-U0-G2 | 8135 | 120 | B2-U0-G2 | 8563 | 126 | B2-U0-G2 | 8992 | 133 | B2-U0-G2 |  |  |  |  |
|  |  |  | III-W | 6997 | 103 | B1-U0-G2 | 7553 | 111 | B1-U0-G2 | 7951 | 117 | B2-U0-G2 | 8348 | 123 | B2-U0-G2 |  |  |  |  |
|  |  |  | IV | 7479 | 110 | B2-U0-G2 | 8073 | 119 | B2-U0-G2 | 8498 | 125 | B2-U0-G2 | 8923 | 132 | B2-U0-G2 |  |  |  |  |
|  |  |  | IV-FT | 6813 | 100 | B1-U0-G2 | 7355 | 108 | B2-U0-G2 | 7742 | 114 | B2-U0-G2 | 8129 | 120 | B2-U0-G2 |  |  |  |  |
|  |  |  | VSQ-N <br> VSQ | 7817 | 115 | B2-U0-G1 | 8439 | 124 | B3-U0-G1 | 8883 | 131 | B3-U0-G1 | 9327 | 138 | B3-U0-G1 |  |  |  |  |
|  |  |  | VSSQ-M | 7665 | 113 | B3-U0-G2 | 8275 | 122 | B3-U0-G2 | 8711 | 128 | B3-U0-G2 | 9146 | 135 | B3-U0-G2 |  |  |  |  |
|  |  |  | VSQ-W | 7482 | 110 | B3-U0-G2 | 8078 | 119 | B3-U0-G2 | 8503 | 125 | B4-U0-G2 | 8928 | 132 | B4-U0-G2 |  |  |  |  |
|  |  |  | II-HS | 5417 | 80 | B1-U0-G2 | 5847 | 86 | B1-U0-G2 | 6155 | 91 | B1-U0-G2 | 6463 | 95 | B1-U0-G2 |  |  |  |  |
|  |  |  | II-FR-HS | 5510 | 81 | B0-U0-G1 | 5948 | 88 | B1-U0-G1 | 6261 | 92 | B1-U0-G1 | 6574 | 97 | B1-U0-G1 |  |  |  |  |
|  |  |  | III-M-HS | 5480 | 81 | BO-U0-G2 | 5916 | 87 | BO-U0-G2 | 6227 | 92 | BO-U0-G2 | 6538 | 96 | BO-U0-G2 |  |  |  |  |
|  |  |  | III-W-HS | 5363 | 79 | BO-U0-G2 | 5790 | 85 | BO-U0-G2 | 6095 | 90 | BO-U0-G2 | 6399 | 94 | BO-U0-G2 |  |  |  |  |
|  |  |  | IV-HS | 5660 | 83 | BO-U0-G2 | 6110 | 90 | BO-U0-G2 | 6432 | 95 | BO-U0-G2 | 6753 | 100 | BO-U0-G2 |  |  |  |  |
|  |  |  | IV-FT-HS | 5349 | 79 | BO-U0-G2 | 5775 | 85 | BO-U0-G2 | 6078 | 90 | BO-U0-G2 | 6382 | 94 | BO-U0-G2 |  |  |  |  |
| 24 | 1050 | 82.0 | II | 8513 | 104 | B2-U0-G2 | 9190 | 112 | B2-U0-G2 | 9674 | 118 | B2-U0-G2 | 10157 | 124 | B2-U0-G2 | N/A | N/A |  |  |
|  |  |  | II-FR | 8570 | 105 | B2-U0-G1 | 9252 | 113 | B2-U0-G1 | 9739 | 119 | B2-U0-G1 | 10225 | 125 | B2-U0-G1 |  |  |  |  |
|  |  |  | 11-ML | 8513 | 104 | B3-U0-G3 | 9190 | 112 | B3-U0-G3 | 9674 | 118 | B3-U0-G3 | 10157 | 124 | B3-U0-G3 |  |  |  |  |
|  |  |  | III-M | 8662 | 106 | B2-U0-G2 | 9351 | 114 | B2-U0-G2 | 9843 | 120 | B2-U0-G2 | 10335 | 126 | B2-U0-G2 |  |  |  |  |
|  |  |  | III-W | 8042 | 98 | B2-U0-G2 | 8682 | 106 | B2-U0-G2 | 9139 | 111 | B2-U0-G3 | 9595 | 117 | B2-U0-G3 |  |  |  |  |
|  |  |  | IV | 8596 | 105 | B2-U0-G2 | 9280 | 113 | B2-U0-G2 | 9768 | 119 | B2-U0-G2 | 10256 | 125 | B2-U0-G2 |  |  |  |  |
|  |  |  | IV-FT | 7831 | 95 | B2-U0-G2 | 8454 | 103 | B2-U0-G2 | 8899 | 109 | B2-U0-G3 | 9344 | 114 | B2-U0-G3 |  |  |  |  |
|  |  |  | VSQ-N | 8985 | 110 | B3-U0-G1 | 9700 | 118 | B3-U0-G1 | 10210 | 125 | B3-U0-G1 | 10721 | 131 | B3-U0-G1 |  |  |  |  |
|  |  |  | VSQ-M | 8811 | 107 | B3-U0-G2 | 9512 | 116 | B3-U0-G2 | 10012 | 122 | B3-U0-G2 | 10513 | 128 | B3-U0-G2 |  |  |  |  |
|  |  |  | VSQ-W | 8601 | 105 | B4-U0-G2 | 9285 | 113 | B4-U0-G2 | 9773 | 119 | B4-U0-G3 | 10262 | 125 | B4-U0-G3 |  |  |  |  |
|  |  |  | 11-HS | 6226 | 76 | B1-U0-G2 | 6721 | 82 | B1-U0-G2 | 7075 | 86 | B1-U0-G2 | 7429 | 91 | B1-U0-G2 |  |  |  |  |
|  |  |  | II-FR-HS | 6333 | 77 | B1-U0-G1 | 6837 | 83 | B1-U0-G1 | 7197 | 88 | B1-U0-G1 | 7557 | 92 | B1-U0-G1 |  |  |  |  |
|  |  |  | III-M-HS | 6299 | 77 | BO-U0-G2 | 6799 | 83 | B0-U0-G2 | 7158 | 87 | BO-U0-G2 | 7515 | 92 | B1-U0-G2 |  |  |  |  |
|  |  |  | III-W-HS | 6165 | 75 | BO-U0-G2 | 6655 | 81 | BO-U0-G2 | 7005 | 85 | BO-U0-G2 | 7356 | 90 | BO-U0-G2 |  |  |  |  |
|  |  |  | IV-HS | 6506 | 79 | BO-U0-G2 | 7023 | 86 | BO-U0-G2 | 7393 | 90 | B1-U0-G2 | 7762 | 95 | B1-U0-G2 |  |  |  |  |
|  |  |  | \|V-FT-HS | 6148 | 75 | B0-U0-G2 | 6637 | 81 | BO-U0-G2 | 6986 | 85 | B1-U0-G3 | 7336 | 89 | B1-U0-G3 |  |  |  |  |

IES File downloads for this product can be found at www.usaltg.com/downloads/asr.html

PHOTOMETRIC DATA GUIDE - LUMEN TABLES (RZRM-PLED)

| RZR-M-PLED |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\begin{aligned} & \text { LED } \\ & \text { Count } \end{aligned}$ | Drive Current (mA) | System Watts | Dist'n Type | 27K (2700K - 70CRI) |  |  | 30K (3000K-70CRI) |  |  | 40K (4000K-70CRI) |  |  | 50K (5000K-70CRI) |  |  | System Watts | TRA ( 590 nm ) |  |  |
|  |  |  |  | LUMENS | LPW | BUG RATING | LUMENS | LPW | BUG RATING | LUMENS | LPW | BUG RATING | LUMENS | LPW | bug rating |  | LUMENS | LPW | bug rating |
| 48 | 350 | 52.5 | II | 6836 | 130 | B2-U0-G2 | 7380 | 141 | B2-U0-G2 | 7769 | 148 | B2-U0-G2 | 8157 | 155 | B2-U0-G2 | 41.0 | 2713 | 66 | BT-U0-G1 |
|  |  |  | II-FR | 6882 | 131 | B2-U0-G1 | 7430 | 142 | B2-U0-G1 | 7821 | 149 | B2-U0-G1 | 8212 | 156 | B2-U0-G1 |  | 2731 | 67 | B1-U0-G1 |
|  |  |  | 11-ML | 6837 | 130 | B3-U0-G3 | 7380 | 141 | B3-U0-G3 | 7769 | 148 | B3-U0-G3 | 8157 | 155 | B3-U0-G3 |  | 2713 | 66 | B1-U0-G1 |
|  |  |  | III-M | 6956 | 132 | B2-U0-G2 | 7509 | 143 | B2-U0-G2 | 7905 | 151 | B2-U0-G2 | 8300 | 158 | B2-U0-G2 |  | 2760 | 67 | B1-U0-G1 |
|  |  |  | III-W | 6459 | 123 | B1-U0-G2 | 6972 | 133 | B1-U0-G2 | 7339 | 140 | B1-U0-G2 | 7706 | 147 | B1-U0-G2 |  | 2563 | 63 | B1-U0-G1 |
|  |  |  | IV | 6903 | 131 | B2-U0-G2 | 7453 | 142 | B2-U0-G2 | 7845 | 149 | B2-U0-G2 | 8237 | 157 | B2-U0-G2 |  | 2740 | 67 | B1-U0-G1 |
|  |  |  | IV-FT | 6289 | 120 | B1-U0-G2 | 6789 | 129 | B1-U0-G2 | 7146 | 136 | B1-U0-G2 | 7503 | 143 | B2-U0-G2 |  | 2496 | 61 | B1-U0-G1 |
|  |  |  | VSQ-N | 7216 | 137 | B2-U0-G1 | 7790 | 148 | B2-U0-G1 | 8200 | 156 | B3-U0-G1 | 8610 | 164 | B3-U0-G1 |  | 2864 | 70 | B1-U0-G0 |
|  |  |  | VSQ-M | 7076 | 135 | B3-U0-G1 | 7639 | 146 | B3-U0-G2 | 8041 | 153 | B3-U0-G2 | 8443 | 161 | B3-U0-G2 |  | 2808 | 68 | B2-U0-G1 |
|  |  |  | VSQ-W | 6907 | 132 | B3-U0-G2 | 7456 | 142 | B3-U0-G2 | 7849 | 150 | B3-U0-G2 | 8242 | 157 | B3-U0-G2 |  | 2741 | 67 | B2-U0-G1 |
|  |  |  | II-HS | 5000 | 95 | B1-U0-G2 | 5398 | 103 | B1-U0-G2 | 5682 | 108 | B1-U0-G2 | 5966 | 114 | B1-U0-G2 |  | 1984 | 48 | B0-U0-G1 |
|  |  |  | II-RR-HS | 5087 | 97 | BO-U0-G1 | 5491 | 105 | BO-U0-G1 | 5780 | 110 | B1-U0-G1 | 6069 | 116 | B1-U0-G1 |  | 2018 | 49 | BO-U0-G0 |
|  |  |  | III-M-HS | 5059 | 96 | BO-U0-G2 | 5461 | 104 | BO-U0-G2 | 5748 | 109 | BO-U0-G2 | 6036 | 115 | BO-U0-G2 |  | 2007 | 49 | B0-U0-G1 |
|  |  |  | ${ }^{\text {III-W-HS }}$ | 4952 | 94 | BO-U0-G2 | 5345 | 102 | BO-U0-G2 | 5627 | 107 | BO-U0-G2 | 5908 | 113 | BO-U0-G2 |  | 1965 | 48 | B0-U0-G1 |
|  |  |  | IV-HS | 5224 | 100 | B0-U0-G2 | 5640 | 107 | BO-U0-G2 | 5937 | 113 | BO-U0-G2 | 6234 | 119 | BO-U0-G2 |  | 2074 | 51 | BO-U0-G1 |
|  |  |  | IV-FT-HS | 4938 | 94 | BO-U0-G2 | 5330 | 102 | BO-U0-G2 | 5611 | 107 | BO-U0-G2 | 5892 | 112 | BO-U0-G2 |  | 1960 | 48 | BO-U0-G1 |
| 48 | 525 | 79.0 | I | 9720 | 123 | B2-U0-G2 | 10493 | 133 | B2-U0-G2 | 11046 | 140 | B2-U0-G2 | 11598 | 147 | B2-U0-G2 | 62.0 | 3143 | 51 | B1-U0-G1 |
|  |  |  | II-FR | 9785 | 124 | B2-U0-G1 | 10564 | 134 | B2-U0-G1 | 11120 | 141 | B2-U0-G1 | 11676 | 148 | B3-U0-G1 |  | 3164 | 51 | B1-U0-G1 |
|  |  |  | II-ML | 9720 | 123 | B3-U0-G3 | 10494 | 133 | B3-U0-G3 | 11046 | 140 | B3-U0-G3 | 11598 | 147 | B3-U0-G3 |  | 3143 | 51 | B2-U0-G2 |
|  |  |  | III-M | 9891 | 125 | B2-U0-G2 | 10677 | 135 | B2-U0-G2 | 11240 | 142 | B2-U0-G2 | 11801 | 149 | B2-U0-G2 |  | 3198 | 52 | B1-U0-G1 |
|  |  |  | III-W | 9183 | 116 | B2-U0-G3 | 9914 | 125 | B2-U0-G3 | 10436 | 132 | B2-U0-G3 | 10958 | 139 | B2-U0-G3 |  | 2969 | 48 | B1-U0-G1 |
|  |  |  | IV | 9816 | 124 | B2-U0-G2 | 10597 | 134 | B2-U0-G2 | 11155 | 141 | B2-U0-G2 | 11712 | 148 | B2-U0-G2 |  | 3174 | 51 | B1-U0-G1 |
|  |  |  | IV-FT | 8942 | 113 | B2-U0-G2 | 9653 | 122 | B2-U0-G3 | 10161 | 129 | B2-U0-G3 | 10669 | 135 | B2-U0-G3 |  | 2892 | 47 | B1-U0-G1 |
|  |  |  | VSQ-N | 10260 | 130 | B3-U0-G1 | 11075 | 140 | B3-U0-G1 | 11659 | 148 | B3-U0-G1 | 12242 | 155 | B3-U0-G1 |  | 3317 | 54 | B2-U0-G0 |
|  |  |  | VSQ-M | 10060 | 127 | B3-U0-G2 | 10861 | 137 | B4-U0-G2 | 11432 | 145 | B4-U0-G2 | 12004 | 152 | B4-U0-G2 |  | 3253 | 52 | B2-U0-G1 |
|  |  |  | VSQ-W | 9821 | 124 | B4-U0-G3 | 10602 | 134 | B4-U0-G3 | 11160 | 141 | B4-U0-G3 | 11718 | 148 | B4-U0-G3 |  | 3175 | 51 | B2-U0-G1 |
|  |  |  | II-HS | 7110 | 90 | B1-U0-G2 | 7675 | 97 | B1-U0-G2 | 8079 | 102 | B1-U0-G2 | 8483 | 107 | B1-U0-G2 |  | 2298 | 37 | B0-U0-G1 |
|  |  |  | III-R-HS | 7231 | 92 | B1-U0-G1 | 7806 | 99 | B1-U0-G1 | 8217 | 104 | B1-U0-G1 | 8628 | 109 | B1-U0-G1 |  | 2339 | 38 | BO-U0-G0 |
|  |  |  | III-M-HS | 7192 | 91 | BO-U0-G2 | 7764 | 98 | B1-U0-G2 | 8173 | 103 | B1-U0-G2 | 8581 | 109 | B1-U0-G2 |  | 2325 | 38 | B0-U0-G1 |
|  |  |  | III-W-HS | 7040 | 89 | BO-U0-G2 | 7600 | 96 | BO-U0-G2 | 8000 | 101 | B1-U0-G2 | 8400 | 106 | B1-U0-G2 |  | 2276 | 37 | BO-U0-G1 |
|  |  |  | IV-HS | 7429 | 94 | B1-U0-G2 | 8020 | 102 | B1-U0-G2 | 8442 | 107 | B1-U0-G2 | 8864 | 112 | B1-U0-G2 |  | 2402 | 39 | B0-U0-G1 |
|  |  |  | IV-FT-HS | 7020 | 89 | B1-U0-G3 | 7579 | 96 | B1-U0-G3 | 7978 | 101 | B1-U0-G3 | 8377 | 106 | B1-U0-G3 |  | 2270 | 37 | BO-U0-G1 |
| 48 | 700 | 105.1 | II | 12226 | 116 | B2-U0-G2 | 13199 | 126 | B2-U0-G2 | 13894 | 132 | B2-U0-G2 | 14588 | 139 | B3-U0-G2 | N/A | N/A |  |  |
|  |  |  | II-FR | 12308 | 117 | B3-U0-G1 | 13287 | 126 | B3-U0-G1 | 13986 | 133 | B3-U0-G1 | 14686 | 140 | B3-U0-G1 |  |  |  |  |
|  |  |  | II-ML | 12227 | 116 | B3-U0-G3 | 13200 | 126 | B3-U0-G3 | 13894 | 132 | B3-U0-G3 | 14589 | 139 | B4-U0-G4 |  |  |  |  |
|  |  |  | III-M | 12440 | 118 | B2-U0-G2 | 13430 | 128 | B2-U0-G2 | 14137 | 135 | B2-U0-G2 | 14843 | 141 | B2-U0-G2 |  |  |  |  |
|  |  |  | III-W | 11550 | 110 | B2-U0-G3 | 12468 | 119 | B2-U0-G3 | 13125 | 125 | B2-U0-G3 | 13781 | 131 | B2-U0-G3 |  |  |  |  |
|  |  |  | IV | 12346 | 117 | B2-U0-G2 | 13329 | 127 | B2-U0-G2 | 14030 | 133 | B2-U0-G2 | 14731 | 140 | B2-U0-G2 |  |  |  |  |
|  |  |  | IV-FT | 11247 | 107 | B2-U0-G3 | 12141 | 116 | B2-U0-G3 | 12780 | 122 | B2-U0-G3 | 13419 | 128 | B2-U0-G3 |  |  |  |  |
|  |  |  | VSQ-N | 12904 | 123 | B3-U0-G1 | 13931 | 133 | B3-U0-G1 | 14663 | 140 | B3-U0-G1 | 15397 | 146 | B3-U0-G1 |  |  |  |  |
|  |  |  | VSQ-M | 12654 | 120 | B4-U0-G2 | 13660 | 130 | B4-U0-G2 | 14379 | 137 | B4-U0-G2 | 15099 | 144 | B4-U0-G2 |  |  |  |  |
|  |  |  | VSQ-W | 12352 | 118 | B4-U0-G3 | 13334 | 127 | B4-U0-G3 | 14036 | 134 | B4-U0-G3 | 14738 | 140 | B4-U0-G3 |  |  |  |  |
|  |  |  | II-HS | 8942 | 85 | B1-U0-G2 | 9653 | 92 | B1-U0-G2 | 10161 | 97 | B1-U0-G2 | 10669 | 102 | B1-U0-G2 |  |  |  |  |
|  |  |  | II-FR-HS | 9095 | 87 | B1-U0-G1 | 9819 | 93 | B1-U0-G1 | 10336 | 98 | B1-U0-G1 | 10852 | 103 | B1-U0-G1 |  |  |  |  |
|  |  |  | III-M-HS | 9045 | 86 | B1-U0-G2 | 9765 | 93 | B1-U0-G2 | 10279 | 98 | B1-U0-G2 | 10793 | 103 | B1-U0-G2 |  |  |  |  |
|  |  |  | III-W-HS | 8854 | 84 | B1-U0-G2 | 9558 | 91 | B1-U0-G3 | 10062 | 96 | B1-U0-G3 | 10565 | 101 | B1-U0-G3 |  |  |  |  |
|  |  |  | IV-HS | 9344 | 89 | B1-U0-G2 | 10087 | 96 | B1-U0-G2 | 10618 | 101 | B1-U0-G2 | 11149 | 106 | B1-U0-G2 |  |  |  |  |
|  |  |  | IV-FT-HS | 8831 | 84 | B1-U0-G3 | 9533 | 91 | B1-U0-G3 | 10035 | 95 | B1-U0-G3 | 10537 | 100 | B1-U0-G3 |  |  |  |  |
| 48 | 875 | 131.8 | II | 14829 | 113 | B3-U0-G2 | 16008 | 121 | B3-U0-G3 | 16851 | 128 | B3-U0-G3 | 17693 | 134 | B3-U0-G3 | N/A | N/A |  |  |
|  |  |  | II-FR | 14928 | 113 | B3-U0-G2 | 16115 | 122 | B3-U0-G2 | 16964 | 129 | B3-U0-G2 | 17812 | 135 | B3-U0-G2 |  |  |  |  |
|  |  |  | $11-\mathrm{ML}$ | 14829 | 113 | B4-U0-G4 | 16009 | 121 | B4-U0-G4 | 16851 | 128 | B4-U0-G4 | 17694 | 134 | B4-U0-G4 |  |  |  |  |
|  |  |  | III-M | 15088 | 114 | B2-U0-G2 | 16288 | 124 | B3-U0-G3 | 17145 | 130 | B3-U0-G3 | 18003 | 137 | B3-U0-G3 |  |  |  |  |
|  |  |  | III-W | 14009 | 106 | B2-U0-G3 | 15123 | 115 | B2-U0-G3 | 15919 | 121 | B3-U0-G3 | 16715 | 127 | B3-U0-G3 |  |  |  |  |
|  |  |  | IV | 14975 | 114 | B2-U0-G2 | 16166 | 123 | B3-U0-G2 | 17017 | 129 | B3-U0-G3 | 17867 | 136 | B3-U0-G3 |  |  |  |  |
|  |  |  | IV-FT | 13641 | 103 | B2-U0-G3 | 14726 | 112 | B3-U0-G3 | 15501 | 118 | B3-U0-G3 | 16276 | 123 | B3-U0-G3 |  |  |  |  |
|  |  |  | VSQ-N | 15652 | 119 | B3-U0-G1 | 16897 | 128 | B4-U0-G2 | 17786 | 135 | B4-U0-G2 | 18675 | 142 | B4-U0-G2 |  |  |  |  |
|  |  |  | VSQ-M | 15348 | 116 | B4-U0-G2 | 16568 | 126 | B4-U0-G2 | 17440 | 132 | B4-U0-G2 | 18312 | 139 | B4-U0-G2 |  |  |  |  |
|  |  |  | VSQ-W | 14981 | 114 | B4-U0-G3 | 16173 | 123 | B4-U0-G3 | 17024 | 129 | B5-U0-G3 | 17876 | 136 | B5-U0-G3 |  |  |  |  |
|  |  |  | II-HS | 10845 | 82 | B1-U0-G2 | 11707 | 89 | B1-U0-G2 | 12324 | 94 | B1-U0-G2 | 12940 | 98 | B1-U0-G2 |  |  |  |  |
|  |  |  | II-RR-HS | 11032 | 84 | B1-U0-G1 | 11909 | 90 | B1-U0-G2 | 12536 | 95 | B1-U0-G2 | 13162 | 100 | B1-U0-G2 |  |  |  |  |
|  |  |  | III-M-HS | 10971 | 83 | B1-U0-G2 | 11844 | 90 | B1-U0-G3 | 12467 | 95 | B1-U0-G3 | 13091 | 99 | B1-U0-G3 |  |  |  |  |
|  |  |  | III-W-HS | 10739 | 81 | B1-U0-G3 | 11594 | 88 | B1-U0-G3 | 12204 | 93 | B1-U0-G3 | 12814 | 97 | B1-U0-G3 |  |  |  |  |
|  |  |  | IV-HS | 11333 | 86 | B1-U0-G2 | 12234 | 93 | B1-U0-G2 | 12878 | 98 | B1-U0-G3 | 13522 | 103 | B1-U0-G3 |  |  |  |  |
|  |  |  | IV-FT-HS | 10711 | 81 | B1-U0-G3 | 11562 | 88 | B1-U0-G3 | 12171 | 92 | B1-U0-G3 | 12779 | 97 | B1-U0-G3 |  |  |  |  |
| 48 | 1050 | 159.6 | II | 17044 | 107 | B3-U0-G3 | 18400 | 115 | B3-U0-G3 | 19369 | 121 | B3-U0-G3 | 20337 | 127 | B3-U0-G3 | N/A | N/A |  |  |
|  |  |  | II-FR | 17159 | 108 | B3-U0-G2 | 18523 | 116 | B3-U0-G2 | 19498 | 122 | B3-U0-G2 | 20473 | 128 | B3-U0-G2 |  |  |  |  |
|  |  |  | II-ML | 17045 | 107 | B4-U0-G4 | 18401 | 115 | B4-U0-G4 | 19369 | 121 | B4-U0-G4 | 20338 | 127 | B4-U0-G4 |  |  |  |  |
|  |  |  | III-M | 17342 | 109 | B3-U0-G3 | 18722 | 117 | B3-U0-G3 | 19707 | 123 | B3-U0-G3 | 20692 | 130 | B3-U0-G3 |  |  |  |  |
|  |  |  | III-W | 16102 | 101 | B3-U0-G3 | 17383 | 109 | B3-U0-G3 | 18298 | 115 | B3-U0-G3 | 19213 | 120 | B3-U0-G4 |  |  |  |  |
|  |  |  | IV | 17212 | 108 | B3-U0-G3 | 18582 | 116 | B3-U0-G3 | 19559 | 123 | B3-U0-G3 | 20537 | 129 | B3-U0-G3 |  |  |  |  |
|  |  |  | IV-FT | 15680 | 98 | B3-U0-G3 | 16927 | 106 | B3-U0-G3 | 17818 | 112 | B3-U0-G3 | 18708 | 117 | B3-U0-G4 |  |  |  |  |
|  |  |  | VSQ-N | 17990 | 113 | B4-U0-G2 | 19421 | 122 | B4-U0-G2 | 20443 | 128 | B4-U0-G2 | 21466 | 134 | B4-U0-G2 |  |  |  |  |
|  |  |  | VSQ-M | 17641 | 111 | B4-U0-G2 | 19044 | 119 | B4-U0-G2 | 20046 | 126 | B4-U0-G2 | 21048 | 132 | B4-U0-G2 |  |  |  |  |
|  |  |  | VSQ-W | 17220 | 108 | B5-U0-G3 | 18590 | 116 | B5-U0-G3 | 19568 | 123 | B5-U0-G3 | 20546 | 129 | B5-U0-G3 |  |  |  |  |
|  |  |  | II-HS | 12465 | 78 | B1-U0-G2 | 13457 | 84 | B1-U0-G3 | 14165 | 89 | B1-U0-G3 | 14873 | 93 | B1-U0-G3 |  |  |  |  |
|  |  |  | III-R-HS | 12680 | 79 | B1-U0-G2 | 13688 | 86 | B1-U0-G2 | 14409 | 90 | B1-U0-G2 | 15129 | 95 | B1-U0-G2 |  |  |  |  |
|  |  |  | III-M-HS | 12611 | 79 | B1-U0-G3 | 13614 | 85 | B1-U0-G3 | 14330 | 90 | B1-U0-G3 | 15047 | 94 | B1-U0-G3 |  |  |  |  |
|  |  |  | III-W-HS | 12344 | 77 | B1-U0-G3 | 13326 | 83 | B1-U0-G3 | 14027 | 88 | B1-U0-G3 | 14728 | 92 | B1-U0-G4 |  |  |  |  |
|  |  |  | IV-HS | 13026 | 82 | B1-U0-G3 | 14062 | 88 | B1-U0-G3 | 14802 | 93 | B1-U0-G3 | 15542 | 97 | B1-U0-G3 |  |  |  |  |
|  |  |  | IV-FT-HS | 12311 | 77 | B1-U0-G3 | 13290 | 83 | B1-U0-G3 | 13989 | 88 | B1-U0-G4 | 14689 | 92 | B1-U0-G4 |  |  |  |  |

IES File downloads for this product can be found at www.usaltg.com/downloads/asr.htm

PHOTOMETRIC DATA GUIDE - LUMEN TABLES (RZR-PLED)

| RZR-PLED |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | DriveCurren (mA) | $\begin{gathered} \text { System } \\ \text { Watts } \end{gathered}$ | $\begin{aligned} & \text { Dist'n } \\ & \text { Type } \end{aligned}$ | 27K (2700K - 70CRI) |  |  | 30K (3000 - 70CRI) |  |  | 40K (4000k - 70CRI) |  |  | 50K (5000K - 70CRI) |  |  | System | TRA (590nm) |  |  |
|  |  |  |  | LUMENS | LPW | bug rating | LUMENS | LPW | bug rating | LUMENS | LPW | bug rating | LUMENS | LPW | bug rating |  | LUMENS | LPW | bug rating |
| 40 | 350 | 42.7 | II | 5819 | 136 | B2-U0-G1 | 6281 | 147 | B2-U0-G1 | 6612 | 155 | B2-U0-G2 | 6943 | 163 | B2-U0-G2 | 33.0 | 2309 | 70 | B1-U0-G1 |
|  |  |  | IIFR | 5858 | 137 | B2-00-G1 | 6324 | 148 | B2-U0-61 | 6657 | 156 | B2-U0-G1 | 6990 | 164 | B2-U0-G1 |  | 2325 | 70 | B1-U0-G0 |
|  |  |  | IIML | 5819 | 136 | B3-00-63 | 6282 | 147 | B3-00-63 | 6612 | 155 | B3-00-63 | 6943 | 163 | B3-00-63 |  | 2309 | 70 | B1-U0-G1 |
|  |  |  | III-M | 5921 | 139 | B1-U0-G2 | 6392 | 150 | B2-00-62 | 6728 | 158 | B2-U0-62 | 7065 | 165 | B2-U0-62 |  | 2349 | 71 | B1-U0-G1 |
|  |  |  | IIT-W | 5497 | 129 | B1-U0-G2 | 5935 | 139 | B1-U0-G2 | 6247 | 146 | B1-U0-G2 | 6559 | 154 | B1-U0-62 |  | 2182 | 66 | B1-U0-G1 |
|  |  |  | IV | 5876 | 138 | B1-U0-G2 | 6344 | 149 | B2-U0-G2 | 6677 | 156 | B2-U0-G2 | 7011 | 164 | B2-U0-G2 |  | 2332 | 71 | B1-U0-G1 |
|  |  |  | IV-FT | 5353 | 125 | B1-U0-62 | 5778 | 135 | B1-U0-G2 | 6083 | 142 | B1-U0-62 | 6387 | 150 | B1-U0-62 |  | 2124 | 64 | B1-U0-61 |
|  |  |  | VSQ-N | 6141 | 144 | B2-00-G1 | 6630 | 155 | B2-00-G1 | 6979 | 163 | B2-U0-G1 | 7328 | 172 | B2-U0-G1 |  | 2438 | 74 | B1-U0-G0 |
|  |  |  | VSQ-M | 6023 | 141 | B3-00-61 | 6502 | 152 | B3-00-61 | 6844 | 160 | B3-00-61 | 7186 | 168 | B3-00-61 |  | 2390 | 72 | B2-U0-61 |
|  |  |  | VSQ-W | 5879 | 138 | B3-00-62 | 6346 | 149 | B3-00-62 | 6680 | 156 | B3-00-62 | 7015 | 164 | B3-00-62 |  | 2333 | 71 | B2-U0-G1 |
|  |  |  | IIHS | 4256 | 100 | B0-U0-G1 | 4594 | 108 | B1-U0-G1 | 4836 | 113 | B1-U0-G2 | 5077 | 119 | B1-U0-G2 |  | 1689 | 51 | BO-UO-G0 |
|  |  |  | $11-\mathrm{R}$-HS | 4329 | 101 | B0-00-G1 | 4673 | 109 | B0-00-G1 | 4919 | 115 | BO-VO-G1 | 5165 | 121 | BO-U0-G1 |  | 1718 | 52 | Bo-U0-G0 |
|  |  |  | III-M-HS | 4305 | 101 | BO-UO-G2 | 4647 | 109 | BO-UO-G2 | 4892 | 115 | BO-UO-G2 | 5137 | 120 | BO-U0-G2 |  | 1708 | 52 | BO-UO-G1 |
|  |  |  | III-W-HS | 4214 | 99 | BO-UO-G2 | 4550 | 107 | BO-UO-G2 | 4789 | 112 | BO-U0-G2 | 5028 | 118 | BO-UO-G2 |  | 1673 | 51 | BO-U0-G1 |
|  |  |  | IV-HS | 4447 | 104 | B0-U0-G1 | 4801 | 112 | Bo-VO-G2 | 5054 | 118 | Bo-U0-G2 | 5306 | 124 | BO-U0-G2 |  | 1764 | 53 | Bo-VO-G1 |
|  |  |  | IV-T-HS | 4203 | 98 | BO-U0-G2 | 4537 | 106 | BO-U0-G2 | 4776 | 112 | BO-UO-G2 | 5015 | 117 | BO-U0-G2 |  | 1668 | 51 | BO-U0-G1 |
| 40 | 525 | 64.7 | " | 8396 | 130 | B2-U0-G2 | 9064 | 140 | B2-U0-G2 | 9541 | 147 | B2-U0-G2 | 10017 | 155 | B2-U0-G2 | 51.0 | 2715 | 53 | B1-U0-G1 |
|  |  |  | IIFR | 8452 | 131 | B2-U0-G1 | 9125 | 141 | B2-U0-61 | 9605 | 148 | B2-U0-G1 | 10085 | 156 | B2-U0-G1 |  | 2733 | 54 | B1-U0-G1 |
|  |  |  | IT-ML | 8396 | 130 | B3-00-63 | 9064 | 140 | B3-00-63 | 9541 | 147 | B3-U0-63 | 10018 | 155 | B3-00-63 |  | 2715 | 53 | B1-U0-G1 |
|  |  |  | III-M | 8543 | 132 | B2-U0-62 | 9223 | 143 | B2-U0-62 | 9708 | 150 | B2-U0-62 | 10194 | 158 | B2-U0-62 |  | 2762 | 54 | B1-U0-G1 |
|  |  |  | II-W | 7932 | 123 | B2-U0-G2 | 8563 | 132 | B2-U0-G2 | 9013 | 139 | B2-U0-G3 | 9464 | 146 | B2-U0-G3 |  | 2565 | 50 | B1-00-G1 |
|  |  |  | IV | 8478 | 131 | B2-U0-62 | 9152 | 141 | B2-U0-62 | 9634 | 149 | B2-U0-G2 | 10176 | 156 | B2-U0-62 |  | 2742 | 54 | B1-U0-G1 |
|  |  |  | IV-FT | 7724 | 119 | B2-U0-63 | 8338 | 129 | B2-U0-G3 | 8777 | 136 | B2-U0-G3 | 9216 | 142 | B2-U0-63 |  | 2497 | 49 | B1-U0-G1 |
|  |  |  | VSQ-N | 8861 | 137 | B3-00-G1 | 9566 | 148 | B3-00-61 | 10070 | 156 | B3-00-G1 | 10574 | 163 | B3-00-G1 |  | 2866 | 56 | B1-U0-G0 |
|  |  |  | VSQ-M | 8690 | 134 | B3-U0-G2 | 9381 | 145 | B3-00-62 | 9875 | 153 | B3-00-62 | 10369 | 160 | B3-00-G2 |  | 2809 | 55 | B2-U0-G1 |
|  |  |  | VSQ-W | 8483 | 131 | B4-U0-62 | 9157 | 142 | B4-U0-62 | 9640 | 149 | B4-U0-G3 | 10122 | 156 | B4-U0-63 |  | 2743 | 54 | B2-U0-G1 |
|  |  |  | II-HS | 6141 | 95 | B1-U0-G2 | 6629 | 102 | B1-U0-G2 | 6978 | 108 | B1-U0-G2 | 7327 | 113 | B1-U0-G2 |  | 1985 | 39 | BO-VO-G1 |
|  |  |  | II-FR-HS | 6246 | 97 | B1-U0-G1 | 6743 | 104 | B1-U0-G1 | 7098 | 110 | B1-U0-G1 | 7453 | 115 | B1-U0-G1 |  | 2020 | 40 | Bo-U0-G0 |
|  |  |  | IIT-M-HS | 6212 | 96 | BO-U0-G2 | 6706 | 104 | BO-U0-G2 | 7060 | 109 | BO-UO-G2 | 7412 | 115 | BO-U0-G2 |  | 2009 | 39 | BO-UO-G1 |
|  |  |  | IIT-W-HS | 6081 | 94 | BO-VO-G2 | 6564 | 101 | BO-U0-G2 | 6910 | 107 | B0-U0-G2 | 7255 | 112 | B0-U0-G2 |  | 1966 | 39 | Bo-U0-G1 |
|  |  |  | IV-HS | 6417 | 99 | Bo-U0-62 | 6927 | 107 | B0-U0-G2 | 7292 | 113 | B0-U0-G2 | 7656 | 118 | B1-U0-G2 |  | 2075 | 41 | Bo-V0-G1 |
|  |  |  | IV-F-HS | 6064 | 94 | B0-U0-G2 | 6546 | 101 | Bo-U0-G2 | 6891 | 107 | B1-U0-G2 | 7235 | 112 | B1-U0-63 |  | 1960 | 38 | Bo-U0-G1 |
| 40 | 700 | 86.8 | " | 10669 | 123 | B2-U0-G2 | 11518 | 133 | B2-U0-G2 | 12124 | 140 | B2-U0-G2 | 12730 | 147 | B2-U0-G2 | N/A | N/A |  |  |
|  |  |  | IIFR | 10740 | 124 | B2-U0-G1 | 11594 | 134 | B3-U0-G1 | 12205 | 141 | B3-00-G1 | 12815 | 148 | B3-U0-G1 |  |  |  |  |
|  |  |  | I-ML | 10669 | 123 | в3-00-63 | 11518 | 133 | в3-00-63 | 12124 | 140 | B3-00-63 | 12731 | 147 | B3-00-63 |  |  |  |  |
|  |  |  | III-M | 10856 | 125 | B2-U0-62 | 11719 | 135 | B2-U0-62 | 12336 | 142 | B2-U0-62 | 12953 | 149 | B2-U0-G2 |  |  |  |  |
|  |  |  | II-W | 10079 | 116 | B2-U0-G3 | 10880 | 125 | B2-U0-G3 | 11453 | 132 | B2-U0-63 | 12026 | 139 | B2-U0-63 |  |  |  |  |
|  |  |  | IV | 10774 | 124 | B2-U0-G2 | 11630 | 134 | B2-U0-G2 | 12243 | 141 | B2-U0-62 | 12855 | 148 | B2-U0-G2 |  |  |  |  |
|  |  |  | \|V-FT | 9814 | 113 | B2-U0-G3 | 10595 | 122 | B2-U0-G3 | 11153 | 128 | B2-U0-G3 | 11710 | 135 | B2-U0-G3 |  |  |  |  |
|  |  |  | VSQ-N | 11260 | 130 | B3-U0-61 | 12156 | 140 | B3-U0-G1 | 12796 | 147 | B3-U0-Gl | 13435 | 155 | B3-U0-G1 |  |  |  |  |
|  |  |  | VSS-M | 11042 | 127 | B4-00-G2 | 11920 | 137 | ${ }^{\text {B4-U0-G2 }}$ | 12548 | 145 | B4-U0-G2 | 13175 | ${ }^{152}$ | B4-U0-G2 |  |  |  |  |
|  |  |  | VSQ-W | 10778 | 124 | B4-U0.G3 | 11636 | 134 | B4-U0-63 | 12248 | 141 | B4-U0.G3 | 12860 | 148 | B4-U0-G3 |  |  |  |  |
|  |  |  | 1 IHS | 7803 | 90 | B1-U0-G2 | 8423 | 97 | B1-U0-G2 | 8866 | 102 | B1-U0-G2 | 9310 | 107 | B1-U0-G2 |  |  |  |  |
|  |  |  | II-FR-HS | 7937 | 91 | B1-U0-G1 | 8568 | 99 | B1-U0-G1 | 9019 | 104 | B1-U0-G1 | 9470 | 109 | B1-U0-G1 |  |  |  |  |
|  |  |  | IITM-HS | 7893 | 91 | B1-U0-G2 | 8521 | 98 | B1-U0-G2 | 8970 | 103 | B1-U0-G2 | 9418 | 109 | B1-U0-G2 |  |  |  |  |
|  |  |  | IITW-HS | 7726 | 89 | B0-U0-G2 | 8341 | 96 | B1-U0-62 | 8780 | 101 | B1-U0-62 | 9218 | 106 | B1-U0-62 |  |  |  |  |
|  |  |  | IV-HS | 8153 | 94 | B1-U0-G2 | 8802 | 101 | B1-U0-G2 | 9265 | 107 | B1-U0-G2 | 9728 | 112 | B1-U0-G2 |  |  |  |  |
|  |  |  | IV-FT-HS | 7705 | 89 | B1-U0-G3 | 8318 | 96 | B1-U0-63 | 8756 | 101 | B1-U0-G3 | 9194 | 106 | B1-U0-G3 |  |  |  |  |
| 40 | 875 | 108.0 | ${ }^{\prime \prime}$ | 12366 | 114 | B2-U0-G2 | 13349 | 124 | B2-U0-G2 | 14052 | 130 | B2-U0.-92 | 14754 | 137 | B3-U0-62 | N/A | N/A |  |  |
|  |  |  | II-FR | 12448 | 115 | B3-00-G1 | 13439 | 124 | B3-00-G1 | 14146 | 131 | B3-00-G1 | 14853 | 138 | B3-00-G2 |  |  |  |  |
|  |  |  | I-ML | 12366 | 115 | B3-00-63 | 13349 | 124 | B3-00-63 | 14052 | 130 | B3-00.-93 | 14755 | 137 | B4-U0-64 |  |  |  |  |
|  |  |  | IIT-M | 12581 | 116 | B2-U0-62 | 13582 | 126 | B2-U0-62 | 14297 | 132 | B2-U0-G2 | 15012 | 139 | B2-U0-G2 |  |  |  |  |
|  |  |  | II-W | 11682 | 108 | B2-U0-63 | 12611 | 117 | B2-U0-63 | 13275 | 123 | B2-U0-63 | 13939 | 129 | B2-U0-63 |  |  |  |  |
|  |  |  | IV | 12487 | 116 | B2-U0-G2 | 13480 | 125 | B2-U0-G2 | 14189 | 131 | B2-U0-G2 | 14899 | 138 | B2-U0-G2 |  |  |  |  |
|  |  |  | \|V-FT | 11375 | 105 | B2-U0-G3 | 12280 | 114 | B2-U0-G3 | 12926 | 120 | B2-U0-63 | 13573 | 126 | B2-U0-63 |  |  |  |  |
|  |  |  | VSQ-N | ${ }_{1}^{13051}$ | 121 | B3-00-61 | 14089 | 130 | B3-00-G1 | 14830 | ${ }^{137}$ | B3-00.-61 | 15572 | 144 | B3-00-G1 |  |  |  |  |
|  |  |  | VSQ-M | 12798 | 1118 | $\frac{84-00-62}{}$ | $\stackrel{13816}{13186}$ | 128 | B4-U0-62 <br> $84-10-63$ | 14543 | ${ }_{1}^{135}$ |  | $\frac{15270}{14005}$ | $\stackrel{141}{138}$ | B4-0-62 |  |  |  |  |
|  |  |  | VSQ-W | ${ }_{9}^{12492}$ | 116 | B4-U0-63 | ${ }_{9}^{13486}$ | 125 | B4-U-G3 | 14196 | ${ }_{1}^{131}$ | B4-U0-63 | ${ }^{14905}$ | $\frac{138}{100}$ | B44-U-G3 |  |  |  |  |
|  |  |  | II-FR-HS | 9199 | 85 | B1-U0-G1 | 9930 | 92 | B1-U0-G1 | 10453 | 97 | B1-U0-G1 | 10976 | 102 | B1-U0-G1 |  |  |  |  |
|  |  |  | III-M-HS | 9149 | 85 | B1-U0-G2 | 9876 | 91 | B1-U0-G2 | 10396 | 96 | B1-U0-G2 | 10916 | 101 | B1-U0-G2 |  |  |  |  |
|  |  |  | IITW-HS | 8955 | 83 | B1-U0-G2 | 9667 | 90 | B1-00-G3 | 10176 | 94 | B1-U0.-93 | 10685 | 99 | B1-U0-G3 |  |  |  |  |
|  |  |  | IV-HS | 9450 | 87 | B1-U0-G2 | 10201 | 94 | B1-U0-G2 | 10738 | 99 | B1-U0-G2 | 11275 | 104 | B1-U0-G2 |  |  |  |  |
|  |  |  | IV-T-HS | 8931 | 83 | B1-U0-G3 | 9641 | 89 | B1-U0-63 | 10149 | 94 | B1-U0-G3 | 10656 | 99 | B1-U0-G3 |  |  |  |  |
| 40 | 1050 | 128.2 | \\| | 14213 | 111 | B2-U0-G2 | 15344 | 120 | B3-U0-62 | 16151 | 126 | B3-U0-G3 | 16959 | 132 | B3-00-G3 | N/A | N/A |  |  |
|  |  |  | IIFR | 14308 | 112 | B3-U0-G1 | 15446 | 120 | B3-00-62 | 16259 | 127 | B3-00-62 | 17072 | 133 | B3-U0-62 |  |  |  |  |
|  |  |  | II-ML | 14214 | 111 | B3-00-G3 | 15344 | 120 | B4-U0-64 | 16152 | 126 | B4-U0.G4 | 16959 | 132 | B4-U0-64 |  |  |  |  |
|  |  |  | IITM | 14461 | 1113 | B2-U0-G2 | 15612 | 122 | B3-00-G2 | 16433 | 128 | B3-U0-63 | 17255 | 135 | B3-U0-63 |  |  |  |  |
|  |  |  | IIT-W | 13427 | 105 | B2-U0-63 | 14495 | 113 | B2-U0-63 | 15258 | 119 | B2-U0-63 | 16021 | 125 | B3-00-63 |  |  |  |  |
|  |  |  | IV | 14352 | 112 | B2-U0-G2 | 15494 | 121 | B3-U0-62 | 16309 | 127 | B3-00-63 | 17125 | 134 | B3-00-63 |  |  |  |  |
|  |  |  | V-FT | ${ }^{13075}$ | $\stackrel{102}{117}$ | B2-U0-G3 | $\frac{14175}{16194}$ | $\frac{110}{126}$ | $\frac{B 2-U 0-63}{\text { B4-U0-G1 }}$ | ${ }^{14858} 17046$ | $\stackrel{116}{133}$ | $\frac{B 3-00-G 3}{\text { B4 -00-G2 }}$ | 17601 | $\frac{122}{140}$ | B33-U-G3 <br> $8400-102$ |  |  |  |  |
|  |  |  | VSQ-N | 15001 | 117 | - ${ }^{\text {B3-U0-G1 }}$ | 16194 15880 | 126 | B4-U0-G1 B4-U0-G2 | 17046 | 133 <br> 130 | B4-U0-G2 B4-00-62 | 17899 | 140 | B4-U0-G2 B4-00-62 |  |  |  |  |
|  |  |  | VSQ-W | 14359 | 112 | B4-00-63 | 15501 | 121 | B4-00-G3 | 16317 | 127 | B44-00-G3 | 17132 | 134 | B45-0-G3 |  |  |  |  |
|  |  |  | 11 HS | 10395 | 81 | B1-U0-G2 | 11222 | 88 | B1-U0-G2 | 11813 | 92 | B1-U0-G2 | 12403 | 97 | B1-U0-G2 |  |  |  |  |
|  |  |  | IIF-R.HS | 10573 | 82 | B1-U0-G1 | 11414 | 89 | B1-U0-G2 | 12015 | 94 | B1-U0-62 | 12616 | 98 | B1-U0-G2 |  |  |  |  |
|  |  |  | III-M-HS | 10516 | 82 | B1-U0-G2 | 11352 | 89 | B1-U0-G2 | 11949 | 93 | B1-U0-G3 | 12547 | 98 | B1-U0-63 |  |  |  |  |
|  |  |  | III-W-Hs | 10293 | 80 | B1-U0-G3 | 11712 | 87 | B1-U0-G3 | 11696 | 91 | B1-U0-G3 | 12281 | 96 | B1-00-63 |  |  |  |  |
|  |  |  | $\left\lvert\, \frac{\mathrm{N}-\mathrm{HS}}{\mid \mathrm{V}-\mathrm{F}-\mathrm{HS}}\right.$ | 10862 | 85 | $\frac{B 1-00-62}{81-00-G 3}$ | $\frac{11726}{11082}$ | $\frac{91}{86}$ | $\frac{\mathrm{Bl}}{\mathrm{Bl}-\mathrm{OO}-\mathrm{G} 2}$ | $\frac{12343}{11665}$ | 96 | $\frac{\text { B1-U0-G2 }}{\text { B1-U0.G3 }}$ | $\frac{12960}{12248}$ | 101 | $\frac{\text { B1-U0-G3 }}{\text { B1-00-63 }}$ |  |  |  |  |

IES File downloads for this product can be found at www.usaltg.com/downloads/asr.html U.S. ARCHITECTURAL
LIGHTING

## PHOTOMETRIC DATA GUIDE - LUMEN TABLES (RZR-PLED)

| RZR-PLED |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\begin{array}{\|l\|} \text { LED } \\ \text { Count } \end{array}$ | Drive Curren (mA) | System Watts | Dist'n Type | 27K (2700K - 70CRI) |  |  | 30K (3000K - 70CRI) |  |  | 40K (4000K - 70CRI) |  |  | 50K (5000K-70CRI) |  |  | System Watts | TRA ( 590 nm ) |  |  |
|  |  |  |  | LUMENS | LPW | BUG RATING | LUMENS | LPW | bug rating | LUMENS | LPW | bug rating | LUMENS | LPW | bug rating |  | LUMENS | LPW | BUG RATING |
| 80 | 350 | 85.4 | \\| | 11277 | 132 | B2-U0-G2 | 12174 | 143 | B2-U0-G2 | 12814 | 150 | B2-U0-G2 | 13455 | 158 | B2-U0-G2 | 67.0 | 4475 | 67 | B1-U0-G1 |
|  |  |  | II-FR | 11352 | 133 | B3-U0-G1 | 12256 | 144 | B3-U0-G1 | 12901 | 151 | B3-U0-G1 | 13546 | 159 | B3-U0-G1 |  | 4504 | 67 | B1-U0-G1 |
|  |  |  | II-ML | 11277 | 132 | B3-U0-G3 | 12175 | 143 | B3-U0-G3 | 12815 | 150 | B3-U0-G3 | 13456 | 158 | B3-U0-G3 |  | 4475 | 67 | B2-U0-G2 |
|  |  |  | III-M | 11474 | 134 | B2-U0-G2 | 12387 | 145 | B2-U0-G2 | 13039 | 153 | B2-U0-G2 | 13691 | 160 | B2-U0-G2 |  | 4553 | 68 | B1-U0-G1 |
|  |  |  | III-W | 10654 | 125 | B2-U0-G3 | 11501 | 135 | B2-U0-G3 | 12106 | 142 | B2-U0-G3 | 12712 | 149 | B2-U0-G3 |  | 4228 | 63 | B1-U0-G2 |
|  |  |  | IV | 11388 | 133 | B2-U0-G2 | 12294 | 144 | B2-U0-G2 | 12941 | 152 | B2-U0-G2 | 13588 | 159 | B2-U0-G2 |  | 4518 | 67 | B1-U0-G1 |
|  |  |  | IV-FT | 10374 | 121 | B2-U0-G3 | 11199 | 131 | B2-U0-G3 | 11788 | 138 | B2-U0-G3 | 12377 | 145 | B2-U0-G3 |  | 4117 | 61 | B1-U0-G1 |
|  |  |  | VSQ-N | 11902 | 139 | B3-U0-G1 | 12849 | 150 | B3-U0-G1 | 13525 | 158 | B3-U0-G1 | 14202 | 166 | B3-U0-G1 |  | 4723 | 70 | B2-U0-G1 |
|  |  |  | VSQ-M | 11671 | 137 | B4-U0-G2 | 12600 | 148 | B4-U0-G2 | 13263 | 155 | B4-U0-G2 | 13927 | 163 | B4-U0-G2 |  | 4631 | 69 | B3-U0-G1 |
|  |  |  | VSQ-W | 11392 | 133 | B4-U0-G3 | 12299 | 144 | B4-U0-G3 | 12946 | 152 | B4-U0-G3 | 13593 | 159 | B4-U0-G3 |  | 4520 | 67 | B3-U0-G2 |
|  |  |  | II-HS | 8247 | 97 | B1-U0-G2 | 8903 | 104 | B1-U0-G2 | 9372 | 110 | B1-U0-G2 | 9840 | 115 | B1-U0-G2 |  | 3273 | 49 | B0-U0-G1 |
|  |  |  | II-RR-HS | 8389 | 98 | B1-U0-G1 | 9056 | 106 | B1-U0-G1 | 9533 | 112 | B1-U0-G1 | 10009 | 117 | B1-U0-G1 |  | 3329 | 50 | BO-U0-G1 |
|  |  |  | III-M-HS | 8344 | 98 | B1-U0-G2 | 9007 | 105 | B1-U0-G2 | 9482 | 111 | B1-U0-G2 | 9956 | 117 | B1-U0-G2 |  | 3311 | 49 | B0-U0-G1 |
|  |  |  | III-W-HS | 8167 | 96 | B1-U0-G2 | 8817 | 103 | B1-U0-G2 | 9281 | 109 | B1-U0-G2 | 9745 | 114 | B1-U0-G3 |  | 3240 | 48 | B0-U0-G1 |
|  |  |  | IV-HS | 8618 | 101 | B1-U0-G2 | 9304 | 109 | B1-U0-G2 | 9793 | 115 | B1-U0-G2 | 10283 | 120 | B1-U0-G2 |  | 3420 | 51 | BO-U0-G1 |
|  |  |  | IV-FT-HS | 8144 | 95 | B1-U0-G3 | 8792 | 103 | B1-U0-G3 | 9255 | 108 | B1-U0-G3 | 9718 | 114 | B1-U0-G3 |  | 3232 | 48 | B0-U0-G2 |
| 80 | 525 | 129.4 | II | 16239 | 125 | B3-U0-G3 | 17531 | 135 | B3-U0-G3 | 18454 | 143 | B3-U0-G3 | 19377 | 150 | B3-U0-G3 | 101.0 | 5251 | 52 | B1-U0-G1 |
|  |  |  | II-FR | 16348 | 126 | B3-U0-G2 | 17648 | 136 | B3-U0-G2 | 18577 | 144 | B3-U0-G2 | 19506 | 151 | B3-U0-G2 |  | 5286 | 52 | B1-U0-G1 |
|  |  |  | II-ML | 16240 | 126 | B4-U0-G4 | 17532 | 135 | B4-U0-G4 | 18454 | 143 | B4-U0-G4 | 19377 | 150 | B4-U0-G4 |  | 5251 | 52 | B2-U0-G2 |
|  |  |  | III-M | 16523 | 128 | B3-U0-G3 | 17837 | 138 | B3-U0-G3 | 18776 | 145 | B3-U0-G3 | 19715 | 152 | B3-U0-G3 |  | 5343 | 53 | B1-U0-G2 |
|  |  |  | III-W | 15341 | 119 | B2-U0-G3 | 16562 | 128 | B3-U0-G3 | 17433 | 135 | B3-U0-G3 | 18305 | 141 | B3-U0-G3 |  | 4961 | 49 | B1-U0-G2 |
|  |  |  | IV | 16398 | 127 | B3-U0-G3 | 17703 | 137 | B3-U0-G3 | 18635 | 144 | B3-U0-G3 | 19566 | 151 | B3-U0-G3 |  | 5302 | 52 | B1-U0-G1 |
|  |  |  | IV-FT | 14938 | 115 | B3-U0-G3 | 16127 | 125 | B3-U0-G4 | 16976 | 131 | B3-U0-G4 | 17824 | 138 | B3-U0-G4 |  | 4830 | 48 | B1-U0-G2 |
|  |  |  | VSQ-N | 17140 | 132 | B4-U0-G2 | 18504 | 143 | B4-U0-G2 | 19477 | 151 | B4-U0-G2 | 20451 | 158 | B4-U0-G2 |  | 5542 | 55 | B2-U0-G1 |
|  |  |  | VSQ-M | 16807 | 130 | B4-U0-G2 | 18144 | 140 | B4-U0-G2 | 19099 | 148 | B4-U0-G2 | 20053 | 155 | B4-U0-G2 |  | 5434 | 54 | B3-U0-G1 |
|  |  |  | VSQ-W | 16406 | 127 | B4-U0-G3 | 17711 | 137 | B5-U0-G3 | 18643 | 144 | B5-U0-G3 | 19575 | 151 | B5-U0-G3 |  | 5304 | 53 | B3-U0-G2 |
|  |  |  | II-HS | 11877 | 92 | B1-U0-G2 | 12821 | 99 | B1-U0-G2 | 13496 | 104 | B1-U0-G3 | 14171 | 110 | B1-U0-G3 |  | 3841 | 38 | B0-U0-G1 |
|  |  |  | II-FR-HS | 12081 | 93 | B1-U0-G2 | 13042 | 101 | B1-U0-G2 | 13728 | 106 | B1-U0-G2 | 14414 | 111 | B1-U0-G2 |  | 3906 | 39 | B0-U0-G1 |
|  |  |  | III-M-HS | 12016 | 93 | B1-U0-G3 | 12971 | 100 | B1-U0-G3 | 13654 | 106 | B1-U0-G3 | 14337 | 111 | B1-U0-G3 |  | 3885 | 38 | BO-U0-G1 |
|  |  |  | III-W-HS | 11760 | 91 | B1-U0-G3 | 12696 | 98 | B1-U0-G3 | 13364 | 103 | B1-U0-G3 | 14032 | 108 | B1-U0-G3 |  | 3803 | 38 | BO-U0-G2 |
|  |  |  | IV-HS | 12411 | 96 | B1-U0-G2 | 13398 | 104 | B1-U0-G3 | 14103 | 109 | B1-U0-G3 | 14808 | 114 | B1-U0-G3 |  | 4013 | 40 | B0-U0-G1 |
|  |  |  | IV-FT-HS | 11729 | 91 | B1-U0-G3 | 12662 | 98 | B1-U0-G3 | 13328 | 103 | B1-U0-G3 | 13995 | 108 | B1-U0-G4 |  | 3792 | 38 | BO-U0-G2 |
| 80 | 700 | 173.6 | I | 20595 | 119 | B3-U0-G3 | 22232 | 128 | B3-U0-G3 | 23403 | 135 | B3-U0-G3 | 24573 | 142 | B3-U0-G3 | N/A | N/A |  |  |
|  |  |  | II-FR | 20732 | 119 | B3-U0-G2 | 22381 | 129 | B3-U0-G2 | 23559 | 136 | B3-U0-G2 | 24736 | 142 | B3-U0-G2 |  |  |  |  |
|  |  |  | II-ML | 20595 | 119 | B4-U0-G4 | 22233 | 128 | B4-U0-G4 | 23403 | 135 | B4-U0-G4 | 24573 | 142 | B4-U0-G4 |  |  |  |  |
|  |  |  | III-M | 20954 | 121 | B3-U0-G3 | 22621 | 130 | B3-U0-G3 | 23812 | 137 | B3-U0-G4 | 25003 | 144 | B3-U0-G4 |  |  |  |  |
|  |  |  | III-W | 19456 | 112 | B3-U0-G4 | 21003 | 121 | B3-U0-G4 | 22109 | 127 | B3-U0-G4 | 23214 | 134 | B3-U0-G4 |  |  |  |  |
|  |  |  | IV | 20797 | 120 | B3-U0-G3 | 22451 | 129 | B3-U0-G3 | 23633 | 136 | B3-U0-G3 | 24814 | 143 | B3-U0-G4 |  |  |  |  |
|  |  |  | IV-FT | 18945 | 109 | B3-U0-G4 | 20452 | 118 | B3-U0-G4 | 21528 | 124 | B3-U0-G4 | 22604 | 130 | B3-U0-G4 |  |  |  |  |
|  |  |  | VSQ-N | 21737 | 125 | B4-U0-G2 | 23466 | 135 | B4-U0-G2 | 24701 | 142 | B4-U0-G2 | 25936 | 149 | B4-U0-G2 |  |  |  |  |
|  |  |  | VSQ-M | 21314 | 123 | B5-U0-G3 | 23010 | 133 | B5-U0-G3 | 24221 | 140 | B5-U0-G3 | 25432 | 146 | B5-U0-G3 |  |  |  |  |
|  |  |  | VSQ-W | 20806 | 120 | B5-U0-G3 | 22461 | 129 | B5-U0-G4 | 23643 | 136 | B5-U0-G4 | 24825 | 143 | B5-U0-G4 |  |  |  |  |
|  |  |  | II-HS | 15062 | 87 | B1-U0-G3 | 16260 | 94 | B1-U0-G3 | 17115 | 99 | B1-U0-G3 | 17971 | 104 | B1-U0-G3 |  |  |  |  |
|  |  |  | 11-FR-HS | 15321 | 88 | B1-U0-G2 | 16539 | 95 | B1-U0-G2 | 17410 | 100 | B1-U0-G2 | 18280 | 105 | B1-U0-G2 |  |  |  |  |
|  |  |  | III-M-HS | 15238 | 88 | B1-U0-G3 | 16450 | 95 | B1-U0-G3 | 17315 | 100 | B1-U0-G3 | 18181 | 105 | B1-U0-G4 |  |  |  |  |
|  |  |  | III-W-HS | 14915 | 86 | B1-U0-G4 | 16101 | 93 | B1-U0-G4 | 16948 | 98 | B1-U0-G4 | 17796 | 103 | B1-U0-G4 |  |  |  |  |
|  |  |  | IV-HS | 15739 | 91 | B1-U0-G3 | 16991 | 98 | B1-U0-G3 | 17885 | 103 | B1-U0-G3 | 18780 | 108 | B1-U0-G3 |  |  |  |  |
|  |  |  | IV-FT-HS | 14874 | 86 | B1-U0-G4 | 16058 | 92 | B1-U0-G4 | 16903 | 97 | B1-U0-G4 | 17748 | 102 | B1-U0-G4 |  |  |  |  |
| 80 | 875 | 215.9 | II | 23798 | 110 | B3-U0-G3 | 25691 | 119 | B3-U0-G3 | 27043 | 125 | B3-U0-G4 | 28395 | 132 | B3-U0-G4 | N/A | N/A |  |  |
|  |  |  | II-FR | 23957 | 111 | B3-U0-G2 | 25862 | 120 | B3-U0-G2 | 27223 | 126 | B3-U0-G2 | 28585 | 132 | B4-U0-G2 |  |  |  |  |
|  |  |  | II-ML | 23799 | 110 | B4-U0-G4 | 25692 | 119 | B4-U0-G4 | 27044 | 125 | B4-U0-G4 | 28396 | 132 | B4-U0-G4 |  |  |  |  |
|  |  |  | III-M | 24214 | 112 | B3-U0-G4 | 26140 | 121 | B3-U0-G4 | 27516 | 127 | B3-U0-G4 | 28892 | 134 | B3-U0-G4 |  |  |  |  |
|  |  |  | III-W | 22482 | 104 | B3-U0-G4 | 24270 | 112 | B3-U0-G4 | 25548 | 118 | B3-U0-G4 | 26825 | 124 | B3-U0-G4 |  |  |  |  |
|  |  |  | IV | 24032 | 111 | B3-U0-G3 | 25943 | 120 | B3-U0-G4 | 27309 | 126 | B3-U0-G4 | 28674 | 133 | B3-U0-G4 |  |  |  |  |
|  |  |  | IV-FT | 21892 | 101 | B3-U0-G4 | 23634 | 109 | B3-U0-G5 | 24877 | 115 | B3-U0-G5 | 26121 | 121 | B3-U0-G5 |  |  |  |  |
|  |  |  | VSQ-N | 25118 | 116 | B4-U0-G2 | 27116 | 126 | B5-U0-G2 | 28543 | 132 | B5-U0-G2 | 29970 | 139 | B5-U0-G2 |  |  |  |  |
|  |  |  | VSQ-M | 24630 | 114 | B5-U0-G3 | 26589 | 123 | B5-U0-G3 | 27988 | 130 | B5-U0-G3 | 29387 | 136 | B5-U0-G3 |  |  |  |  |
|  |  |  | VSQ-W | 24042 | 111 | B5-U0-G4 | 25954 | 120 | B5-U0-G4 | 27321 | 127 | B5-U0-G4 | 28686 | 133 | B5-U0-G4 |  |  |  |  |
|  |  |  | II-HS | 17405 | 81 | B1-U0-G3 | 18789 | 87 | B1-U0-G3 | 19778 | 92 | B1-U0-G4 | 20766 | 96 | B2-U0-G4 |  |  |  |  |
|  |  |  | II-FR-HS | 17704 | 82 | B1-U0-G2 | 19112 | 89 | B1-U0-G2 | 20118 | 93 | B1-U0-G2 | 21124 | 98 | B1-U0-G2 |  |  |  |  |
|  |  |  | III-M-HS | 17608 | 82 | B1-U0-G4 | 19008 | 88 | B1-U0-G4 | 20009 | 93 | B1-U0-G4 | 21009 | 97 | B1-U0-G4 |  |  |  |  |
|  |  |  | III-W-HS | 17234 | 80 | B1-U0-G4 | 18605 | 86 | B1-U0-G4 | 19584 | 91 | B1-U0-G4 | 20564 | 95 | B1-U0-G4 |  |  |  |  |
|  |  |  | IV-HS | 18187 | 84 | B1-U0-G3 | 19634 | 91 | B1-U0-G4 | 20667 | 96 | B1-U0-G4 | 21701 | 101 | B1-U0-G4 |  |  |  |  |
|  |  |  | IV-FT-HS | 17188 | 80 | B1-U0-G4 | 18555 | 86 | B1-U0-G4 | 19532 | 90 | B1-U0-G4 | 20509 | 95 | B1-U0-G4 |  |  |  |  |
| 80 | 1050 | 256.4 | II | 27354 | 107 | B3-U0-G4 | 29530 | 115 | B4-U0-G4 | 31084 | 121 | B4-U0-G4 | 32638 | 127 | B4-U0-G4 | N/A | N/A |  |  |
|  |  |  | II-FR | 27536 | 107 | B3-U0-G2 | 29727 | 116 | B4-U0-G2 | 31291 | 122 | B4-U0-G2 | 32856 | 128 | B4-U0-G2 |  |  |  |  |
|  |  |  | 11-ML | 27355 | 107 | B4-U0-G4 | 29531 | 115 | B5-U0-G5 | 31085 | 121 | B5-U0-G5 | 32639 | 127 | B5-U0-G5 |  |  |  |  |
|  |  |  | III-M | 27832 | 109 | B3-U0-G4 | 30046 | 117 | B3-U0-G4 | 31627 | 123 | B4-U0-G4 | 33209 | 130 | B4-U0-G4 |  |  |  |  |
|  |  |  | III-W | 25841 | 101 | B3-U0-G4 | 27897 | 109 | B3-U0-G4 | 29365 | 115 | B3-U0-G5 | 30834 | 120 | B3-U0-G5 |  |  |  |  |
|  |  |  | IV | 27622 | 108 | B3-U0-G4 | 29820 | 116 | B3-U0-G4 | 31389 | 122 | B4-U0-G4 | 32959 | 129 | B4-U0-G4 |  |  |  |  |
|  |  |  | IV-FT | 25163 | 98 | B3-U0-G5 | 27165 | 106 | B3-U0-G5 | 28595 | 112 | B3-U0-G5 | 30024 | 117 | B3-U0-G5 |  |  |  |  |
|  |  |  | VSQ-N | 28871 | 113 | B5-U0-G2 | 31168 | 122 | B5-U0-G2 | 32808 | 128 | B5-U0-G2 | 34448 | 134 | B5-U0-G2 |  |  |  |  |
|  |  |  | VSQ-M | 28310 | 110 | B5-U0-G3 | 30561 | 119 | B5-U0-G3 | 32170 | 125 | B5-U0-G4 | 33779 | 132 | B5-U0-G4 |  |  |  |  |
|  |  |  | VSQ-W | 27634 | 108 | B5-U0-G4 | 29833 | 116 | B5-U0-G4 | 31403 | 122 | B5-U0-G5 | 32973 | 129 | B5-U0-G5 |  |  |  |  |
|  |  |  | II-HS | 20005 | 78 | B1-U0-G4 | 21596 | 84 | B2-U0-G4 | 22733 | 89 | B2-U0-G4 | 23870 | 93 | B2-U0-G4 |  |  |  |  |
|  |  |  | II-FR-HS | 20349 | 79 | B1-U0-G2 | 21968 | 86 | B1-U0-G2 | 23124 | 90 | B1-U0-G2 | 24280 | 95 | B1-U0-G2 |  |  |  |  |
|  |  |  | III-M-HS | 20239 | 79 | B1-U0-G4 | 21848 | 85 | B1-U0-G4 | 22998 | 90 | B1-U0-G4 | 24148 | 94 | B1-U0-G4 |  |  |  |  |
|  |  |  | III-W-HS | 19809 | 77 | B1-U0-G4 | 21385 | 83 | B1-U0-G4 | 22511 | 88 | B1-U0-G4 | 23636 | 92 | B1-U0-G5 |  |  |  |  |
|  |  |  | IV-HS | 20905 | 82 | B1-U0-G4 | 22568 | 88 | B1-U0-G4 | 23756 | 93 | B1-U0-G4 | 24943 | 97 | B1-U0-G4 |  |  |  |  |
|  |  |  | IV-FT-HS | 19756 | 77 | B1-U0-G4 | 21328 | 83 | B1-U0-G4 | 22451 | 88 | B1-U0-G5 | 23573 | 92 | B1-U0-G5 |  |  |  |  |

## PHOTOMETRIC DATA GUIDE - LUMEN TABLES (RZRG-PLED)

| RZR-G-PLED |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\begin{aligned} & \text { LED } \\ & \text { Count } \end{aligned}$ | Drive Current (mA) | System Watts | Dist'n Type | 27K (2700K-70CRI) |  |  | 30K (3000K-70CRI) |  |  | 40K (4000K-70CRI) |  |  | 50K (5000K - 70CRI) |  |  | System Watts | TRA ( 590 nm ) |  |  |
|  |  |  |  | LUMENS | LPW | BUG RATING | LUMENS | LPW | bug rating | LUMENS | LPW | BUG RATING | LUMENS | LPW | bug rating |  | LUMENS | LPW | BUG RATING |
| 80 | 350 | 87.0 | II | 11409 | 131 | B2-U0-G2 | 12317 | 142 | B2-U0-G2 | 12965 | 149 | B2-U0-G2 | 13613 | 156 | B2-U0-G2 | 67.0 | 4528 | 68 | B1-U0-G1 |
|  |  |  | II-FR | 11485 | 132 | B3-U0-G1 | 12398 | 143 | B3-U0-G1 | 13051 | 150 | B3-U0-G1 | 13703 | 158 | B3-U0-G1 |  | 4558 | 68 | B1-U0-G1 |
|  |  |  | II-ML | 11409 | 131 | B3-U0-G3 | 12317 | 142 | B3-U0-G3 | 12965 | 149 | B3-U0-G3 | 13613 | 156 | B3-U0-G3 |  | 4528 | 68 | B2-U0-G2 |
|  |  |  | III-M | 11608 | 133 | B2-U0-G2 | 12531 | 144 | B2-U0-G2 | 13191 | 152 | B2-U0-G2 | 13850 | 159 | B2-U0-G2 |  | 4553 | 68 | B1-U0-G1 |
|  |  |  | III-W | 10778 | 124 | B2-U0-G3 | 11635 | 134 | B2-U0-G3 | 12248 | 141 | B2-U0-G3 | 12860 | 148 | B2-U0-G3 |  | 4276 | 64 | B1-U0-G2 |
|  |  |  | IV | 11520 | 132 | B2-U0-G2 | 12437 | 143 | B2-U0-G2 | 13091 | 150 | B2-U0-G2 | 13746 | 158 | B2-U0-G2 |  | 4572 | 68 | B1-U0-G1 |
|  |  |  | IV-FT | 10494 | 121 | B2-U0-G3 | 11330 | 130 | B2-U0-G3 | 11926 | 137 | B2-U0-G3 | 12522 | 144 | B2-U0-G3 |  | 4165 | 62 | B1-U0-G1 |
|  |  |  | VSQ-N | 12041 | 138 | B3-U0-G1 | 12999 | 149 | B3-U0-G1 | 13683 | 157 | B3-U0-G1 | 14367 | 165 | B3-U0-G1 |  | 4779 | 71 | B2-U0-G1 |
|  |  |  | VSQ-M | 11808 | 136 | B4-U0-G2 | 12747 | 147 | B4-U0-G2 | 13418 | 154 | B4-U0-G2 | 14089 | 162 | B4-U0-G2 |  | 4686 | 70 | B3-U0-G1 |
|  |  |  | VSQ-W | 11526 | 132 | B4-U0-G3 | 12443 | 143 | B4-U0-G3 | 13097 | 151 | B4-U0-G3 | 13752 | 158 | B4-U0-G3 |  | 4574 | 68 | B3-U0-G2 |
|  |  |  | II-HS | 8464 | 97 | B1-U0-G2 | 9138 | 105 | B1-U0-G2 | 9618 | 111 | B1-U0-G2 | 10099 | 116 | B1-U0-G2 |  | 3359 | 50 | B0-U0-G1 |
|  |  |  | III-R-HS | 8609 | 99 | B1-U0-G1 | 9294 | 107 | B1-U0-G1 | 9783 | 112 | B1-U0-G1 | 10274 | 118 | B1-U0-G1 |  | 3417 | 51 | BO-U0-G1 |
|  |  |  | III-M-HS | 8563 | 98 | B1-U0-G2 | 9244 | 106 | B1-U0-G2 | 9731 | 112 | B1-U0-G2 | 10217 | 117 | B1-U0-G2 |  | 3398 | 51 | B0-U0-G1 |
|  |  |  | III-W-HS | 8382 | 96 | B1-U0-G2 | 9048 | 104 | B1-U0-G2 | 9525 | 109 | B1-U0-G3 | 10001 | 115 | B1-U0-G3 |  | 3326 | 50 | B0-U0-G1 |
|  |  |  | IV-HS | 8845 | 102 | B1-U0-G2 | 9548 | 110 | B1-U0-G2 | 10051 | 116 | B1-U0-G2 | 10553 | 121 | B1-U0-G2 |  | 3510 | 52 | BO-U0-G1 |
|  |  |  | IV-FT-HS | 8359 | 96 | B1-U0-G3 | 9024 | 104 | B1-U0-G3 | 9499 | 109 | B1-U0-G3 | 9974 | 115 | B1-U0-G3 |  | 3317 | 50 | B0-U0-G2 |
| 80 | 525 | 129.0 | 11 | 16394 | 127 | B3-U0-G3 | 17698 | 137 | B3-U0-G3 | 18629 | 144 | B3-U0-G3 | 19560 | 152 | B3-U0-G3 | 101.0 | 5301 | 52 | B1-U0-G1 |
|  |  |  | II-FR | 16503 | 128 | B3-U0-G2 | 17816 | 138 | B3-U0-G2 | 18753 | 145 | B3-U0-G2 | 19691 | 153 | B3-U0-G2 |  | 5336 | 53 | B1-U0-G1 |
|  |  |  | II-ML | 16394 | 127 | B4-U0-G4 | 17698 | 137 | B4-U0-G4 | 18630 | 144 | B4-U0-G4 | 19561 | 152 | B4-U0-G4 |  | 5302 | 52 | B2-U0-G2 |
|  |  |  | III-M | 16680 | 129 | B3-U0-G3 | 14740 | 114 | B2-U0-G2 | 18955 | 147 | B3-U0-G3 | 19902 | 154 | B3-U0-G3 |  | 5343 | 53 | B1-U0-G2 |
|  |  |  | \|III-W | 15488 | 120 | B2-U0-G3 | 16720 | 130 | B3-U0-G3 | 17600 | 136 | B3-U0-G3 | 18479 | 143 | B3-U0-G4 |  | 5008 | 50 | B1-U0-G2 |
|  |  |  | IV | 16555 | 128 | B3-U0-G3 | 17871 | 139 | B3-U0-G3 | 18812 | 146 | B3-U0-G3 | 19753 | 153 | B3-U0-G3 |  | 5353 | 53 | B1-U0-G1 |
|  |  |  | IV-FT | 15081 | 117 | B3-U0-G3 | 16280 | 126 | B3-U0-G3 | 17137 | 133 | B3-U0-G3 | 17994 | 139 | B3-U0-G3 |  | 4877 | 48 | B1-U0-G2 |
|  |  |  | \|VSQ-N | 17303 | 134 | B4-U0-G2 | 18679 | 145 | B4-U0-G2 | 19663 | 152 | B4-U0-G2 | 20646 | 160 | B4-U0-G2 |  | 5595 | 55 | B2-U0-G1 |
|  |  |  | VSQ-M | 16967 | 132 | B4-U0-G2 | 18317 | 142 | B4-U0-G2 | 19281 | 149 | B4-U0-G2 | 20245 | 157 | B4-U0-G2 |  | 5486 | 54 | B3-U0-G1 |
|  |  |  | VVS-W | 16562 | 128 | B4-U0-G3 | 17880 | 139 | B5-U0-G3 | 18821 | 146 | B5-U0-G3 | 19762 | 153 | B5-U0-G3 |  | 5355 | 53 | B3-U0-G2 |
|  |  |  | II-HS | 12089 | 94 | B1-U0-G2 | 13052 | 101 | B1-U0-G3 | 13738 | 106 | B1-U0-G3 | 14425 | 112 | B1-U0-G3 |  | 3909 | 39 | B0-U0-G1 |
|  |  |  | III-R-HS | 12298 | 95 | B1-U0-G2 | 13276 | 103 | B1-U0-G2 | 13975 | 108 | B1-U0-G2 | 14674 | 114 | B1-U0-G2 |  | 3977 | 39 | B0-U0-G1 |
|  |  |  | III-M-HS | 12231 | 95 | B1-U0-G3 | 13204 | 102 | B1-U0-G3 | 13899 | 108 | B1-U0-G3 | 14594 | 113 | B1-U0-G3 |  | 3954 | 39 | B0-U0-G1 |
|  |  |  | III-W-HS | 11971 | 93 | B1-U0-G3 | 12924 | 100 | B1-U0-G3 | 13604 | 105 | B1-U0-G3 | 14284 | 111 | B1-U0-G3 |  | 3871 | 38 | B0-U0-G2 |
|  |  |  | IV-HS | 12633 | 98 | B1-U0-G2 | 13638 | 106 | B1-U0-G3 | 14356 | 111 | B1-U0-G3 | 15074 | 117 | B1-U0-G3 |  | 4085 | 40 | BO-U0-G1 |
|  |  |  | IV-FT-HS | 11940 | 93 | B1-U0-G3 | 12889 | 100 | B1-U0-G3 | 13568 | 105 | B1-U0-G3 | 14246 | 110 | B1-U0-G4 |  | 3861 | 38 | B0-U0-G2 |
| 80 | 700 | 174.0 | II | 20914 | 120 | B3-U0-G3 | 22578 | 130 | B3-U0-G3 | 23766 | 137 | B3-U0-G3 | 24955 | 143 | B3-U0-G3 | N/A | N/A |  |  |
|  |  |  | II-FR | 21054 | 121 | B3-U0-G2 | 22729 | 131 | B3-U0-G2 | 23924 | 137 | B3-U0-G2 | 25121 | 144 | B3-U0-G2 |  |  |  |  |
|  |  |  | II-ML | 20915 | 120 | B4-U0-G4 | 22579 | 130 | B4-U0-G4 | 23767 | 137 | B4-U0-G4 | 24955 | 143 | B4-U0-G4 |  |  |  |  |
|  |  |  | III-M | 21280 | 122 | B3-U0-G3 | 22972 | 132 | B3-U0-G3 | 24182 | 139 | B3-U0-G4 | 25391 | 146 | B3-U0-G4 |  |  |  |  |
|  |  |  | III-W | 19759 | 114 | B3-U0-G4 | 21330 | 123 | B3-U0-G4 | 22453 | 129 | B3-U0-G4 | 23575 | 135 | B3-U0-G4 |  |  |  |  |
|  |  |  | IV | 21120 | 121 | B3-U0-G3 | 22800 | 131 | B3-U0-G3 | 24000 | 138 | B3-U0-G3 | 25200 | 145 | B3-U0-G4 |  |  |  |  |
|  |  |  | IV-FT | 19239 | 111 | B3-U0-G4 | 20770 | 119 | B3-U0-G4 | 21862 | 126 | B3-U0-G4 | 22956 | 132 | B3-U0-G4 |  |  |  |  |
|  |  |  | VSQ-N | 22074 | 127 | B4-U0-G2 | 23831 | 137 | B4-U0-G2 | 25084 | 144 | B4-U0-G2 | 26339 | 151 | B4-U0-G2 |  |  |  |  |
|  |  |  | VSQ-M | 21646 | 124 | B5-U0-G3 | 23367 | 134 | B5-U0-G3 | 24598 | 141 | B5-U0-G3 | 25827 | 148 | B5-U0-G3 |  |  |  |  |
|  |  |  | VSQ-W | 21129 | 121 | B5-U0-G4 | 22810 | 131 | B5-U0-G4 | 24010 | 138 | B5-U0-G4 | 25212 | 145 | B5-U0-G4 |  |  |  |  |
|  |  |  | II-HS | 15363 | 88 | B1-U0-G3 | 16586 | 95 | B1-U0-G3 | 17458 | 100 | B1-U0-G3 | 18332 | 105 | B1-U0-G3 |  |  |  |  |
|  |  |  | II-RR-HS | 15628 | 90 | B1-U0-G2 | 16872 | 97 | B1-U0-G2 | 17759 | 102 | B1-U0-G2 | 18647 | 107 | B1-U0-G2 |  |  |  |  |
|  |  |  | III-M-HS | 15542 | 89 | B1-U0-G3 | 16778 | 96 | B1-U0-G3 | 17662 | 102 | B1-U0-G4 | 18545 | 107 | B1-U0-G4 |  |  |  |  |
|  |  |  | III-W-HS | 15213 | 87 | B1-U0-G4 | 16423 | 94 | B1-U0-G4 | 17288 | 99 | B1-U0-G4 | 18152 | 104 | B1-U0-G4 |  |  |  |  |
|  |  |  | IV-HS | 16055 | 92 | B1-U0-G3 | 17331 | 100 | B1-U0-G3 | 18244 | 105 | B1-U0-G3 | 19155 | 110 | B1-U0-G3 |  |  |  |  |
|  |  |  | IV-FT-HS | 15172 | 87 | B1-U0-G4 | 16380 | 94 | B1-U0-G4 | 17242 | 99 | B1-U0-G4 | 18104 | 104 | B1-U0-G4 |  |  |  |  |
| 80 | 875 | 219.7 | II | 25063 | 114 | B3-U0-G3 | 27057 | 123 | B3-U0-G4 | 28481 | 130 | B3-U0-G4 | 29905 | 136 | B4-U0-G4 | N/A | N/A |  |  |
|  |  |  | II-FR | 25230 | 115 | B3-U0-G2 | 27237 | 124 | B3-U0-G2 | 28670 | 130 | B4-U0-G2 | 30104 | 137 | B4-U0-G2 |  |  |  |  |
|  |  |  | II-ML | 25064 | 114 | B4-U0-G4 | 27057 | 123 | B4-U0-G4 | 28481 | 130 | B4-U0-G4 | 29906 | 136 | B5-U0-G5 |  |  |  |  |
|  |  |  | III-M | 25501 | 116 | B3-U0-G4 | 27529 | 125 | B3-U0-G4 | 28978 | 132 | B3-U0-G4 | 30427 | 138 | B3-U0-G4 |  |  |  |  |
|  |  |  | III-W | 23677 | 108 | B3-U0-G4 | 25560 | 116 | B3-U0-G4 | 26906 | 122 | B3-U0-G4 | 28251 | 129 | B3-U0-G4 |  |  |  |  |
|  |  |  | IV | 25309 | 115 | B3-U0-G4 | 27322 | 124 | B3-U0-G4 | 28760 | 131 | B3-U0-G4 | 30198 | 137 | B3-U0-G4 |  |  |  |  |
|  |  |  | IV-FT | 23056 | 105 | B3-U0-G4 | 24889 | 113 | B3-U0-G4 | 26200 | 119 | B3-U0-G4 | 27509 | 125 | B3-U0-G4 |  |  |  |  |
|  |  |  | VSQ-N | 26453 | 120 | B4-U0-G2 | 28557 | 130 | B5-U0-G2 | 30060 | 137 | B5-U0-G2 | 31563 | 144 | B5-U0-G2 |  |  |  |  |
|  |  |  | \| VSQ-M | 25939 | 118 | B5-U0-G3 | 28002 | 127 | B5-U0-G3 | 29476 | 134 | B5-U0-G3 | 30950 | 141 | B5-U0-G3 |  |  |  |  |
|  |  |  | VSQ-W | 25320 | 115 | B5-U0-G4 | 27335 | 124 | B5-U0-G4 | 28773 | 131 | B5-U0-G4 | 30212 | 138 | B5-U0-G4 |  |  |  |  |
|  |  |  | II-HS | 18330 | 83 | B1-U0-G3 | 19788 | 90 | B1-U0-G4 | 20830 | 95 | B2-U0-G4 | 21871 | 100 | B2-U0-G4 |  |  |  |  |
|  |  |  | II-FR-HS | 18645 | 85 | B1-U0-G2 | 20128 | 92 | B1-U0-G2 | 21188 | 96 | B1-U0-G2 | 22247 | 101 | B1-U0-G2 |  |  |  |  |
|  |  |  | III-M-HS | 18543 | 84 | B1-U0-G4 | 20018 | 91 | B1-U0-G4 | 21072 | 96 | B1-U0-G4 | 22125 | 101 | B1-U0-G4 |  |  |  |  |
|  |  |  | III-W-HS | 18151 | 83 | B1-U0-G4 | 19594 | 89 | B1-U0-G4 | 20626 | 94 | B1-U0-G4 | 21657 | 99 | B1-U0-G4 |  |  |  |  |
|  |  |  | IV-HS | 19154 | 87 | B1-U0-G3 | 20677 | 94 | B1-U0-G4 | 21766 | 99 | B1-U0-G4 | 22854 | 104 | B1-U0-G4 |  |  |  |  |
|  |  |  | IV-FT-HS | 18102 | 82 | B1-U0-G4 | 19541 | 89 | B1-U0-G4 | 20571 | 94 | B1-U0-G4 | 21599 | 98 | B1-U0-G4 |  |  |  |  |
| 80 | 1050 | 266.0 | II | 28808 | 108 | B4-U0-G4 | 31099 | 117 | B4-U0-G4 | 32736 | 123 | B4-U0-G4 | 34373 | 129 | B4-U0-G4 | N/A | N/A |  |  |
|  |  |  | II-FR | 29000 | 109 | B4-U0-G2 | 31306 | 118 | B4-U0-G2 | 32954 | 124 | B4-U0-G2 | 34602 | 130 | B4-U0-G2 |  |  |  |  |
|  |  |  | II-ML | 28809 | 108 | B5-U0-G5 | 31100 | 117 | B5-U0-G5 | 32737 | 123 | B5-U0-G5 | 34374 | 129 | B5-U0-G5 |  |  |  |  |
|  |  |  | III-M | 29311 | 110 | B3-U0-G4 | 31643 | 119 | B4-U0-G4 | 33308 | 125 | B4-U0-G4 | 34974 | 131 | B4-U0-G4 |  |  |  |  |
|  |  |  | III-W | 27215 | 102 | B3-U0-G4 | 29380 | 110 | B3-U0-G5 | 30926 | 116 | B3-U0-G5 | 32473 | 122 | B3-U0-G5 |  |  |  |  |
|  |  |  | IV | 29091 | 109 | B3-U0-G4 | 31404 | 118 | B4-U0-G4 | 33058 | 124 | B4-U0-G4 | 34710 | 130 | B4-U0-G4 |  |  |  |  |
|  |  |  | IV-FT | 26501 | 100 | B3-U0-G4 | 28608 | 108 | B3-U0-G4 | 30114 | 113 | B3-U0-G5 | 31620 | 119 | B3-U0-G5 |  |  |  |  |
|  |  |  | VSQ-N | 30405 | 114 | B5-U0-G2 | 32824 | 123 | B5-U0-G2 | 34551 | 130 | B5-U0-G2 | 36279 | 136 | B5-U0-G2 |  |  |  |  |
|  |  |  | VSQ-M | 29815 | 112 | B5-U0-G3 | 32186 | 121 | B5-U0-G4 | 33880 | 127 | B5-U0-G4 | 35575 | 134 | B5-U0-G4 |  |  |  |  |
|  |  |  | V VS-W | 29104 | 109 | B5-U0-G4 | 31419 | 118 | B5-U0-G5 | 33073 | 124 | B5-U0-G5 | 34726 | 131 | B5-U0-G5 |  |  |  |  |
|  |  |  | II-HS | 21069 | 79 | B2-U0-G4 | 22745 | 86 | B2-U0-G4 | 23942 | 90 | B2-U0-G4 | 25139 | 95 | B2-U0-G4 |  |  |  |  |
|  |  |  | III-R-HS | 21432 | 81 | B1-U0-G2 | 23136 | 87 | B1-U0-G2 | 24354 | 92 | B1-U0-G2 | 25571 | 96 | B2-U0-G2 |  |  |  |  |
|  |  |  | III-M-HS | 21314 | 80 | B1-U0-G4 | 23009 | 87 | B1-U0-G4 | 24220 | 91 | B1-U0-G4 | 25431 | 96 | B1-U0-G4 |  |  |  |  |
|  |  |  | III-W-HS | 20862 | 78 | B1-U0-G4 | 22521 | 85 | B1-U0-G4 | 23708 | 89 | B1-U0-G5 | 24893 | 94 | B1-U0-G5 |  |  |  |  |
|  |  |  | IV-HS | 22016 | 83 | B1-U0-G4 | 23766 | 89 | B1-U0-G4 | 25018 | 94 | B1-U0-G4 | 26268 | 99 | B1-U0-G4 |  |  |  |  |
|  |  |  | IV-FT-HS | 20807 | 78 | B1-U0-G4 | 22467 | 84 | B1-U0-G5 | 23644 | 89 | B1-U0-G5 | 24826 | 93 | B1-U0-G5 |  |  |  |  |

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## PHOTOMETRIC DATA GUIDE - LUMEN TABLES (RZRG-PLED)

| RZR-G-PLED |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\begin{aligned} & \text { LED } \\ & \text { Count } \end{aligned}$ | DriveCurrent$(\mathrm{mA})$ | System Watts | Dist'nType | 27K (2700K - 70CRI) |  |  | 30K (3000K-70CRI) |  |  | 40K (4000K-70CRI) |  |  | 50K (5000K-70CRI) |  |  | System Watts | TRA ( 590 nm ) |  |  |
|  |  |  |  | LUMENS | LPW | bug rating | LUMENS | LPW | bug rating | LUMENS | LPW | bug rating | LUMENS | LPW | bug rating |  | LUMENS | LPW | BUG RATING |
| 120 | 350 | 130.0 | II | 16889 | 130 | B3-U0-G3 | 18233 | 140 | B3-U0-G3 | 19192 | 148 | B3-U0-G3 | 20152 | 155 | B3-U0-G3 | 100.0 | 6702 | 67 | B2-U0-G2 |
|  |  |  | II-FR | 17001 | 131 | B3-U0-G2 | 18354 | 141 | B3-U0-G2 | 19320 | 149 | B3-U0-G2 | 20286 | 156 | B3-U0-G2 |  | 6747 | 67 | B2-U0-G1 |
|  |  |  | II-ML | 16890 | 130 | B4-U0-G4 | 18233 | 140 | B4-U0-G4 | 19193 | 148 | B4-U0-G4 | 20152 | 155 | B4-U0-G4 |  | 6703 | 67 | B3-U0-G3 |
|  |  |  | III-M | 17184 | 132 | B3-U0-G3 | 18552 | 143 | B3-U0-G3 | 19527 | 150 | B3-U0-G3 | 20504 | 158 | B3-U0-G3 |  | 6818 | 68 | B2-U0-G2 |
|  |  |  | III-W | 15956 | 123 | B3-U0-G3 | 17224 | 132 | B3-U0-G3 | 18131 | 139 | B3-U0-G3 | 19037 | 146 | B3-U0-G4 |  | 6331 | 63 | B1-U0-G2 |
|  |  |  | IV | 17055 | 131 | B3-U0-G3 | 18411 | 142 | B3-U0-G3 | 19381 | 149 | B3-U0-G3 | 20349 | 157 | B3-U0-G3 |  | 6768 | 68 | B2-U0-G2 |
|  |  |  | IV-FT | 15537 | 120 | B3-U0-G3 | 16772 | 129 | B3-U0-G3 | 17655 | 136 | B3-U0-G3 | 18538 | 143 | B3-U0-G4 |  | 6165 | 62 | B1-U0-G2 |
|  |  |  | VSQ-N | 17825 | 137 | B4-U0-G2 | 19243 | 148 | B4-U0-G2 | 20256 | 156 | B4-U0-G2 | 21269 | 164 | B4-U0-G2 |  | 7073 | 71 | B2-U0-G1 |
|  |  |  | \| VSQ-M | 17480 | 134 | B4-U0-G2 | 18870 | 145 | B4-U0-G2 | 19863 | 153 | B4-U0-G2 | 20857 | 160 | B4-U0-G2 |  | 6936 | 69 | B3-U0-G1 |
|  |  |  | VSQ-W | 17062 | 131 | B5-U0-G3 | 18420 | 142 | B5-U0-G3 | 19389 | 149 | B5-U0-G3 | 20358 | 157 | B5-U0-G3 |  | 6771 | 68 | B3-U0-G2 |
|  |  |  | II-HS | 12352 | 95 | B1-U0-G2 | 13334 | 103 | B1-U0-G3 | 14036 | 108 | B1-U0-G3 | 14738 | 113 | B1-U0-G3 |  | 4901 | 49 | B1-U0-G2 |
|  |  |  | II-FR-HS | 12564 | 97 | B1-U0-G2 | 13564 | 104 | B1-U0-G2 | 14277 | 110 | B1-U0-G2 | 14992 | 115 | B1-U0-G2 |  | 4986 | 50 | BO-U0-G1 |
|  |  |  | III-M-HS | 12496 | 96 | B1-U0-G3 | 13490 | 104 | B1-U0-G3 | 14199 | 109 | B1-U0-G3 | 14910 | 115 | B1-U0-G3 |  | 4959 | 50 | BO-U0-G2 |
|  |  |  | III-W-HS | 12231 | 94 | B1-U0-G3 | 13204 | 102 | B1-U0-G3 | 13899 | 107 | B1-U0-G3 | 14594 | 112 | B1-U0-G3 |  | 4853 | 49 | BO-U0-G2 |
|  |  |  | IV-HS | 12907 | 99 | B1-U0-G3 | 13934 | 107 | B1-U0-G3 | 14667 | 113 | B1-U0-G3 | 15400 | 118 | B1-U0-G3 |  | 5122 | 51 | BO-U0-G2 |
|  |  |  | IV-FT-HS | 12198 | 94 | B1-U0-G3 | 13168 | 101 | B1-U0-G3 | 13862 | 107 | B1-U0-G4 | 14555 | 112 | B1-U0-G4 |  | 4840 | 48 | BO-U0-G2 |
| 120 | 525 | 192.0 | 1 | 24123 | 126 | B3-U0-G3 | 26042 | 136 | B3-U0-G3 | 27413 | 143 | B3-U0-G4 | 28783 | 150 | B4-U0-G4 | 152.0 | 7800 | 51 | B2-U0-G2 |
|  |  |  | II-FR | 24284 | 126 | B3-U0-G2 | 26216 | 137 | B3-U0-G2 | 27596 | 144 | B3-U0-G2 | 28975 | 151 | B4-U0-G2 |  | 7853 | 52 | B2-U0-G1 |
|  |  |  | II-ML | 24124 | 126 | B4-U0-G4 | 26042 | 136 | B4-U0-G4 | 27414 | 143 | B4-U0-G4 | 28784 | 150 | B5-U0-G5 |  | 7800 | 51 | B3-U0-G3 |
|  |  |  | III-M | 24545 | 128 | B3-U0-G4 | 26498 | 138 | B3-U0-G4 | 27892 | 145 | B3-U0-G4 | 29287 | 153 | B3-U0-G4 |  | 7937 | 52 | B2-U0-G2 |
|  |  |  | III-W | 22789 | 119 | B3-U0-G4 | 24603 | 128 | B3-U0-G4 | 25897 | 135 | B3-U0-G4 | 27192 | 142 | B3-U0-G4 |  | 7368 | 48 | B1-U0-G2 |
|  |  |  | IV | 24360 | 127 | B3-U0-G4 | 26298 | 137 | B3-U0-G4 | 27682 | 144 | B3-U0-G4 | 29066 | 151 | B3-U0-G4 |  | 7876 | 52 | B2-U0-G2 |
|  |  |  | IV-FT | 22191 | 116 | B3-U0-G4 | 23956 | 125 | B3-U0-G4 | 25217 | 131 | B3-U0-G4 | 26478 | 138 | B3-U0-G4 |  | 7176 | 47 | B1-U0-G2 |
|  |  |  | VSQ-N | 25461 | 133 | B4-U0-G2 | 27486 | 143 | B5-U0-G2 | 28933 | 151 | B5-U0-G2 | 30379 | 158 | B5-U0-G2 |  | 8233 | 54 | B3-U0-G1 |
|  |  |  | VSQ-M | 24967 | 130 | B5-U0-G3 | 26952 | 140 | B5-U0-G3 | 28371 | 148 | B5-U0-G3 | 29789 | 155 | B5-U0-G3 |  | 8073 | 53 | B3-U0-G2 |
|  |  |  | VSQ-W | 24371 | 127 | B5-U0-G4 | 26309 | 137 | B5-U0-G4 | 27695 | 144 | B5-U0-G4 | 29079 | 151 | B5-U0-G4 |  | 7881 | 52 | B3-U0-G2 |
|  |  |  | II-HS | 17642 | 92 | B1-U0-G3 | 19046 | 99 | B1-U0-G3 | 20048 | 104 | B1-U0-G4 | 21050 | 110 | B2-U0-G4 |  | 5704 | 38 | B1-U0-G2 |
|  |  |  | II-FR-HS | 17946 | 93 | B1-U0-G2 | 19373 | 101 | B1-U0-G2 | 20393 | 106 | B1-U0-G2 | 21413 | 112 | B1-U0-G2 |  | 5803 | 38 | B1-U0-G1 |
|  |  |  | III-M-HS | 17848 | 93 | B1-U0-G4 | 19268 | 100 | B1-U0-G4 | 20282 | 106 | B1-U0-G4 | 21296 | 111 | B1-U0-G4 |  | 5772 | 38 | B0-U0-G2 |
|  |  |  | III-W-HS | 17470 | 91 | B1-U0-G4 | 18860 | 98 | B1-U0-G4 | 19852 | 103 | B1-U0-G4 | 20844 | 109 | B1-U0-G4 |  | 5649 | 37 | BO-U0-G2 |
|  |  |  | IV-HS | 18435 | 96 | B1-U0-G3 | 19902 | 104 | B1-U0-G4 | 20949 | 109 | B1-U0-G4 | 21997 | 115 | B1-U0-G4 |  | 5961 | 39 | BO-U0-G2 |
|  |  |  | IV-FT-HS | 17423 | 91 | B1-U0-G4 | 18809 | 98 | B1-U0-G4 | 19799 | 103 | B1-U0-G4 | 20789 | 108 | B1-U0-G4 |  | 5633 | 37 | BO-U0-G2 |
| 120 | 700 | 260.0 | II | 30656 | 118 | B4-U0-G4 | 33094 | 127 | B4-U0-G4 | 34836 | 134 | B4-U0-G4 | 36578 | 141 | B4-U0-G4 | N/A | N/A |  |  |
|  |  |  | II-FR | 30860 | 119 | B4-U0-G2 | 33315 | 128 | B4-U0-G2 | 35068 | 135 | B4-U0-G2 | 36822 | 142 | B4-U0-G2 |  |  |  |  |
|  |  |  | II-ML | 30657 | 118 | B5-U0-G5 | 33095 | 127 | B5-U0-G5 | 34837 | 134 | B5-U0-G5 | 36579 | 141 | B5-U0-G5 |  |  |  |  |
|  |  |  | III-M | 31191 | 120 | B4-U0-G4 | 33673 | 130 | B4-U0-G4 | 35445 | 136 | B4-U0-G4 | 37217 | 143 | B4-U0-G4 |  |  |  |  |
|  |  |  | III-W | 28960 | 111 | B3-U0-G4 | 31265 | 120 | B3-U0-G5 | 32909 | 127 | B3-U0-G5 | 34555 | 133 | B3-U0-G5 |  |  |  |  |
|  |  |  | IV | 30956 | 119 | B4-U0-G4 | 33418 | 129 | B4-U0-G4 | 35177 | 135 | B4-U0-G4 | 36936 | 142 | B4-U0-G4 |  |  |  |  |
|  |  |  | IV-FT | 28200 | 108 | B3-U0-G4 | 30444 | 117 | B3-U0-G5 | 32046 | 123 | B3-U0-G5 | 33648 | 129 | B3-U0-G5 |  |  |  |  |
|  |  |  | VSQ-N | 32356 | 124 | B5-U0-G2 | 34929 | 134 | B5-U0-G2 | 36768 | 141 | B5-U0-G2 | 38606 | 148 | B5-U0-G2 |  |  |  |  |
|  |  |  | VSQ-M | 31727 | 122 | B5-U0-G4 | 34250 | 132 | B5-U0-G4 | 36054 | 139 | B5-U0-G4 | 37856 | 146 | B5-U0-G4 |  |  |  |  |
|  |  |  | VSQ-W | 30971 | 119 | B5-U0-G4 | 33434 | 129 | B5-U0-G5 | 35194 | 135 | B5-U0-G5 | 36953 | 142 | B5-U0-G5 |  |  |  |  |
|  |  |  | II-HS | 22420 | 86 | B2-U0-G4 | 24203 | 93 | B2-U0-G4 | 25478 | 98 | B2-U0-G4 | 26751 | 103 | B2-U0-G4 |  |  |  |  |
|  |  |  | III-R-HS | 22806 | 88 | B1-U0-G2 | 24619 | 95 | B1-U0-G2 | 25916 | 100 | B2-U0-G2 | 27212 | 105 | B2-U0-G2 |  |  |  |  |
|  |  |  | III-M-HS | 22682 | 87 | B1-U0-G4 | 24485 | 94 | B1-U0-G4 | 25774 | 99 | B1-U0-G4 | 27063 | 104 | B1-U0-G4 |  |  |  |  |
|  |  |  | III-W-HS | 22201 | 85 | B1-U0-G4 | 23967 | 92 | B1-U0-G5 | 25228 | 97 | B1-U0-G5 | 26489 | 102 | B1-U0-G5 |  |  |  |  |
|  |  |  | IV-HS | 23428 | 90 | B1-U0-G4 | 25291 | 97 | B1-U0-G4 | 26622 | 102 | B1-U0-G4 | 27953 | 108 | B1-U0-G4 |  |  |  |  |
|  |  |  | IV-FT-HS | 22141 | 85 | B1-U0-G5 | 23902 | 92 | B1-U0-G5 | 25160 | 97 | B1-U0-G5 | 26418 | 102 | B1-U0-G5 |  |  |  |  |
| 120 | 875 | 329.0 | 1 | 36574 | 111 | B4-U0-G4 | 39483 | 120 | B4-U0-G4 | 41561 | 126 | B4-U0-G4 | 43639 | 133 | B4-U0-G5 | N/A | N/A |  |  |
|  |  |  | II-FR | 36818 | 112 | B4-U0-G2 | 39746 | 121 | B4-U0-G2 | 41838 | 127 | B4-U0-G3 | 43930 | 134 | B4-U0-G3 |  |  |  |  |
|  |  |  | II-ML | 36575 | 111 | B5-U0-G5 | 39485 | 120 | B5-U0-G5 | 41562 | 126 | B5-U0-G5 | 43640 | 133 | B5-U0-G5 |  |  |  |  |
|  |  |  | III-M | 37213 | 113 | B4-U0-G4 | 40174 | 122 | B4-U0-G5 | 42288 | 129 | B4-U0-G5 | 44402 | 135 | B4-U0-G5 |  |  |  |  |
|  |  |  | III-W | 34552 | 105 | B3-U0-G5 | 37300 | 113 | B3-U0-G5 | 39263 | 119 | B4-U0-G5 | 41226 | 125 | B4-U0-G5 |  |  |  |  |
|  |  |  | IV | 36932 | 112 | B4-U0-G4 | 39870 | 121 | B4-U0-G5 | 41969 | 128 | B4-U0-G5 | 44067 | 134 | B4-U0-G5 |  |  |  |  |
|  |  |  | IV-FT | 33644 | 102 | B3-U0-G5 | 36321 | 110 | B3-U0-G5 | 38232 | 116 | B4-U0-G5 | 40144 | 122 | B4-U0-G5 |  |  |  |  |
|  |  |  | VSQ-N | 38602 | 117 | B5-U0-G2 | 41673 | 127 | B5-U0-G2 | 43866 | 133 | B5-U0-G2 | 46060 | 140 | B5-U0-G2 |  |  |  |  |
|  |  |  | VSQ-M | 37852 | 115 | B5-U0-G4 | 40863 | 124 | B5-U0-G4 | 43014 | 131 | B5-U0-G4 | 45165 | 137 | B5-U0-G4 |  |  |  |  |
|  |  |  | VSQ-W | 36950 | 112 | B5-U0-G5 | 39888 | 121 | B5-U0-G5 | 41988 | 128 | B5-U0-G5 | 44088 | 134 | B5-U0-G5 |  |  |  |  |
|  |  |  | II-HS | 26748 | 81 | B2-U0-G4 | 28876 | 88 | B2-U0-G4 | 30395 | 92 | B2-U0-G4 | 31916 | 97 | B2-U0-G5 |  |  |  |  |
|  |  |  | III-R-HS | 27209 | 83 | B2-U0-G2 | 29373 | 89 | B2-U0-G2 | 30919 | 94 | B2-U0-G2 | 32465 | 99 | B2-U0-G3 |  |  |  |  |
|  |  |  | III-M-HS | 27060 | 82 | B1-U0-G4 | 29213 | 89 | B1-U0-G5 | 30750 | 93 | B1-U0-G5 | 32287 | 98 | B1-U0-G5 |  |  |  |  |
|  |  |  | III-W-HS | 26487 | 81 | B1-U0-G5 | 28593 | 87 | B1-U0-G5 | 30098 | 91 | B1-U0-G5 | 31603 | 96 | B1-U0-G5 |  |  |  |  |
|  |  |  | IV-HS | 27951 | 85 | B1-U0-G4 | 30174 | 92 | B1-U0-G4 | 31762 | 97 | B1-U0-G5 | 33350 | 101 | B1-U0-G5 |  |  |  |  |
|  |  |  | IV-FT-HS | 26416 | 80 | B1-U0-G5 | 28517 | 87 | B1-U0-G5 | 30018 | 91 | B1-U0-G5 | 31519 | 96 | B2-U0-G5 |  |  |  |  |
| 120 | 1050 | 398.0 | II | 42039 | 106 | B4-U0-G5 | 45383 | 114 | B4-U0-G5 | 47771 | 120 | B4-U0-G5 | 50160 | 126 | B5-U0-G5 | N/A | N/A |  |  |
|  |  |  | II-FR | 42319 | 106 | B4-U0-G3 | 45685 | 115 | B4-U0-G3 | 48089 | 121 | B4-U0-G3 | 50494 | 127 | B4-U0-G3 |  |  |  |  |
|  |  |  | II-ML | 42040 | 106 | B5-U0-G5 | 45384 | 114 | B5-U0-G5 | 47773 | 120 | B5-U0-G5 | 50161 | 126 | B5-U0-G5 |  |  |  |  |
|  |  |  | III-M | 42774 | 107 | B4-U0-G5 | 46177 | 116 | B4-U0-G5 | 48606 | 122 | B4-U0-G5 | 51037 | 128 | B4-U0-G5 |  |  |  |  |
|  |  |  | III-W | 39714 | 100 | B4-U0-G5 | 42873 | 108 | B4-U0-G5 | 45130 | 113 | B4-U0-G5 | 47387 | 119 | B4-U0-G5 |  |  |  |  |
|  |  |  | IV | 42451 | 107 | B4-U0-G5 | 45828 | 115 | B4-U0-G5 | 48240 | 121 | B4-U0-G5 | 50652 | 127 | B4-U0-G5 |  |  |  |  |
|  |  |  | IV-FT | 38671 | 97 | B4-U0-G5 | 41748 | 105 | B4-U0-G5 | 43945 | 110 | B4-U0-G5 | 46143 | 116 | B4-U0-G5 |  |  |  |  |
|  |  |  | VSQ-N | 44370 | 111 | B5-U0-G2 | 47899 | 120 | B5-U0-G3 | 50421 | 127 | B5-U0-G3 | 52942 | 133 | B5-U0-G3 |  |  |  |  |
|  |  |  | VSQ-M | 43508 | 109 | B5-U0-G4 | 46969 | 118 | B5-U0-G4 | 49441 | 124 | B5-U0-G4 | 51914 | 130 | B5-U0-G5 |  |  |  |  |
|  |  |  | VVQ-W | 42471 | 107 | B5-U0-G5 | 45849 | 115 | B5-U0-G5 | 48262 | 121 | B5-U0-G5 | 50676 | 127 | B5-U0-G5 |  |  |  |  |
|  |  |  | II-HS | 30745 | 77 | B2-U0-G4 | 33191 | 83 | B2-U0-G5 | 34938 | 88 | B2-U0-G5 | 36685 | 92 | B2-U0-G5 |  |  |  |  |
|  |  |  | II-FR-HS | 31274 | 79 | B2-U0-G3 | 33761 | 85 | B2-U0-G3 | 35539 | 89 | B2-U0-G3 | 37315 | 94 | B2-U0-G3 |  |  |  |  |
|  |  |  | III-M-HS | 31104 | 78 | B1-U0-G5 | 33578 | 84 | B1-U0-G5 | 35345 | 89 | B2-U0-G5 | 37112 | 93 | B2-U0-G5 |  |  |  |  |
|  |  |  | III-W-HS | 30444 | 76 | B1-U0-G5 | 32866 | 83 | B1-U0-G5 | 34596 | 87 | B1-U0-G5 | 36325 | 91 | B2-U0-G5 |  |  |  |  |
|  |  |  | IV-HS | 32127 | 81 | B1-U0-G5 | 34683 | 87 | B2-U0-G5 | 36508 | 92 | B2-U0-G5 | 38333 | 96 | B2-U0-G5 |  |  |  |  |
|  |  |  | IV-FT-HS | 30363 | 76 | B1-U0-G5 | 32777 | 82 | B2-U0-G5 | 34504 | 87 | B2-U0-G5 | 36229 | 91 | B2-U0-G5 |  |  |  |  |

IES File downloads for this product can be found at www.usaltg.com/downloads/asr.html

SOLID STATE AREA LIGHTING

## PROJECT TYPE:

## RAZAR WALLMOUNT-LED

S P E C I F I C A T I O N S

## OPTICAL HOUSING

Heavy cast low copper aluminum (A356 alloy: <0.2\% copper) assembly with integral cooling fins. The Optical Panel mounting surface is milled flat (surface variance $< \pm .003$ ") to facilitate thermal transfer of heat to housing and cooling fins. The Optical Housing bolts to the Electrical Housing forming a unified assembly. The minimum wall thickness is .188".

## ELECTRICAL HOUSING

Heavy cast low copper aluminum (A356 alloy; $<0.2 \%$ copper) assembly. Minimum wall thickness is .188". Fixture Mounting Plate affixes to mounting surface over a recessed j-box. Electrical Housing anchors on the top edge of the Mounting Plate and stainless steel recessed socket head screws tighten the Electrical Housing to the Mounting Plate from the bottom.

## PLED" ${ }^{\text {m }}$ OPTICAL MODULES

Emitters (LED's) are arrayed on a metal core PCB panel with each emitter located on a copper thermal transfer pad and enclosed by an LED refractor. LED optics completely seal each individual emitter to meet an IP66 rating. The asymmetric distributions, have a micro-reflector inside the refractor which re-directs the house side emitter output towards the street side and functions as a house side shielding element. Refractors are injection molded H12 acrylic. Each LED refractor is sealed to the PCB over an emitter and all refractors are retained by an aluminum frame. Any one Panel, or group of Panels in a luminaire, have the same optical pattern. LED refractors produce Type II, III, and Type IV site/area distributions as well as other specialty asymmetric distributions. Panels are field replaceable and field rotatable in $90^{\circ}$ increments.

## LED DRIVER(S)

Constant current electronic with a power factor of $>.90$ and a minimum operating temperature of $-40^{\circ} \mathrm{F} /-40^{\circ} \mathrm{C}$. Driver(s) is/are UL and cUL recognized and mounted directly agains $\dagger$ the Electrical Housing to facilitate thermal transfer, held down by universal clamps to facilitate easy removal. In-line terminal blocks facilitate wiring between the driver and optical arrays. Drivers accept an input of $120-277 \mathrm{~V}, 50 / 60 \mathrm{~Hz}$ or $347 \mathrm{~V}-480 \mathrm{~V}$, $50,60 \mathrm{~Hz}$. ( $0-10 \mathrm{~V}$ dimmable driver is standard. Driver has a minimum of 3 KV internal surge protection. Luminaire supplied with 20 KV surge protector for field accessible installation.)

## LED EMITTERS

High output LED's are utilized with drive currents ranging from 350 mA to 1050 mA . 70CRI Minimum. LED's are available in standard Neutral White (4000K), or optional Cool White (5000K) or Warm White (3000K). Consult Factory for other LED options.

AMBER LED's
PCA (Phosphor Converted Amber) LED's utilize phosphors to create color output similar to LPS lamps and have a slight output in the blue spectral bandwidth. TRA (True Amber) LED's utilize material that emits light in the amber spectral bandwidth only without the use of phosphors.

## FINISH

Electrostatically applied TGIC Polyester Powder Coat on substrate prepared with 20 PSI power wash at $140^{\circ} \mathrm{F}$. Four step media blast and iron phosphate pretreatment for protection and paint adhesion. $400^{\circ} \mathrm{F}$ bake for maximum hardness and durability.

$\longmapsto \quad B \longrightarrow$


| FIXTURE | A | B | c |
| :---: | :---: | :---: | :---: |
| RZRW1 | ( | ${ }_{\text {(205mm) }}^{12}$ | ${ }_{(152 m m)}^{6^{\prime \prime}}$ |
| RZRWI-EM | ${ }_{(1210}^{129 m)}$ | ${ }_{\text {(135mm) }}^{14}$ | ${ }_{(6.55 m)}^{60}$ |

RZR-WM1
PATENT PENDING


| FIXTURE | A | B | c |
| :---: | :---: | :---: | :---: |
| RZRW2 |  | ${ }_{(1205 m)}^{12}$ | ${ }_{(152 m m)}^{6 "}$ |
| RzRW2-EM | ${ }_{(1606}^{16}$ | ${ }_{\text {(356mm) }}^{14}$ | ${ }_{(6.55 m)}^{6.5}$ |

## RZR-WM2

PATENT PENDING


RZR-WM3
PATENT PENDING

## RAZAR WALLMOUNT SERIES-LED

S P E C I F I C A T I O N S


THE EMERGENCY OPTION BACK BOX EXTENDS 2" BEYOND THE STANDARD HOUSING AND CONTAINS THE EMERGENCY COMPONENTS (EC) INCLUDING BATTERIES OR CAN BE USED FOR SURFACE CONDUIT (SC) APPLICATIONS. THERE IS TO BE AN SC1, SC2, AND SC3 OPTION FORTHE DIFFERING HOUSING SIZES. SC SHIPS WITH THREADED CONDUIT PLUGS.
THE EM-LED SYSTEM PROVIDES POWER TO ALL LEDS IN THE ARRAY $(20,40$, or 60$)$ TO MEET THE FOLLOWING LIGHT LEVELS FOR A MINIMUM OF 90 MINUTES -
$W M 1=45 \% @ 350 M A$
$W M 2=36 \%$ @ 350MA
$W M 3=24 \% @ 350 M A$
*MULTIPLY THE \% ABOVE BY THE LUMEN OUTPUT @ 350MA

## PLED ${ }^{\circ}$ MODULES



RZR-WM3-LED E.P.A. = . 69
Available in:


40 LED Module

RZR-WM2-LED E.P.A. = . 47
Available in:
40 LED Module


20 LED Module
RZR-WM1-LED E.P.A. = 33
Available in:
20LED Module

| MAX INPUT WATTAGE |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| \# OF | DRIVE CURRENT |  |  |  |
| LED's | 350 mA | 525 mA | 700 mA | 1050 mA |
| 60 | 68 W | 99 W | 131 W | 198 W |
| 40 | 45 W | 66 W | 87 W | 134 W |
| 20 | 23 W | 33 W | 44 W | 66 W |

Spec/Order Example: RZR-WM2/PLED-IV/40LED-700mA/CW/277/RAL-8019-S/SF


| LED COUNT | $\begin{aligned} & \text { SOURCE } \\ & \text { TYPE } \end{aligned}$ | SOURCE | INITIAL LUMENS 4000K | INITIAL LUMENS 3000K | INITIAL LUMENS 5000K | L70 GREATER <br> THAN (HR)-TM21 | STARTING TEMP. | SYSTEM <br> WATTS | VOLTS | MAX <br> INPUT AMPS |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 20 | LED | 20 PLED Optical Module - 350mA | $\begin{aligned} & 2,706- \\ & 2,993 \end{aligned}$ | $\begin{aligned} & 2,571- \\ & 2,843 \end{aligned}$ | $\begin{aligned} & 2,841- \\ & 3,143 \end{aligned}$ | 60,000+ | $-20^{\circ} \mathrm{F}$ | 22 | $\begin{aligned} & 120 \\ & 277 \\ & 347 \end{aligned}$ | $\begin{aligned} & 0.19 \\ & 0.08 \\ & 0.07 \end{aligned}$ |
| 20 | LED | 20 PLED Optical Module - 525mA | $\begin{aligned} & 3,897- \\ & 4,310 \end{aligned}$ | $\begin{aligned} & 3,702- \\ & 4,095 \end{aligned}$ | $\begin{aligned} & 4,092- \\ & 4,526 \end{aligned}$ | 60,000+ | $-20^{\circ} \mathrm{F}$ | 33 | $\begin{aligned} & 120 \\ & 277 \\ & 347 \end{aligned}$ | $\begin{aligned} & 0.28 \\ & 0.12 \\ & 0.10 \end{aligned}$ |
| 20 | LED | 20 PLED Optical Module - 700mA | $\begin{aligned} & 4,942- \\ & 5,466 \end{aligned}$ | $\begin{aligned} & 4,695- \\ & 5,193 \end{aligned}$ | $\begin{aligned} & 5,189- \\ & 5,739 \end{aligned}$ | 60,000+ | $-20^{\circ} \mathrm{F}$ | 44 | $\begin{aligned} & 120 \\ & 277 \\ & 347 \end{aligned}$ | $\begin{aligned} & 0.37 \\ & 0.16 \\ & 0.13 \end{aligned}$ |
| 20 | LED | 20 PLED Optical Module - 1050mA | $\begin{aligned} & 6,564- \\ & 7,260 \end{aligned}$ | $\begin{aligned} & 6,236- \\ & 6,897 \end{aligned}$ | $\begin{aligned} & 6,892- \\ & 7,623 \end{aligned}$ | 60,000+ | $-20^{\circ} \mathrm{F}$ | 65 | $\begin{aligned} & 120 \\ & 277 \\ & 347 \end{aligned}$ | $\begin{aligned} & 0.55 \\ & 0.24 \\ & 0.19 \end{aligned}$ |
| 40 | LED | 40 PLED Optical Module - 350mA | $\begin{aligned} & 5,585- \\ & 6,178 \end{aligned}$ | $\begin{aligned} & 5,206- \\ & 5,869 \end{aligned}$ | $\begin{aligned} & 5,864 \text { - } \\ & 6,487 \end{aligned}$ | 60,000+ | $-20^{\circ} \mathrm{F}$ | 43 | $\begin{aligned} & 120 \\ & 277 \\ & 347 \end{aligned}$ | $\begin{aligned} & 0.36 \\ & 0.16 \\ & 0.13 \end{aligned}$ |
| 40 | LED | 40 PLED ${ }^{\circ}$ Optical Module - 525 mA | $\begin{aligned} & 8,059- \\ & 8,914 \end{aligned}$ | $\begin{aligned} & 7,656- \\ & 8,468 \end{aligned}$ | $\begin{aligned} & 8,462- \\ & 9,360 \end{aligned}$ | 60,000+ | $-20^{\circ} \mathrm{F}$ | 65 | $\begin{aligned} & 120 \\ & 277 \\ & 347 \end{aligned}$ | $\begin{aligned} & 0.55 \\ & 0.24 \\ & 0.19 \end{aligned}$ |
| 40 | LED | 40 PLED ${ }^{*}$ Optical Module - 700mA | $\begin{aligned} & \text { 10,240 - } \\ & 11,327 \end{aligned}$ | $\begin{aligned} & 9,728- \\ & 10,761 \end{aligned}$ | $\begin{aligned} & \text { 10,752 - } \\ & 11,893 \end{aligned}$ | 60,000+ | $-20^{\circ} \mathrm{F}$ | 87 | $\begin{aligned} & 120 \\ & 277 \\ & 347 \end{aligned}$ | $\begin{aligned} & 0.73 \\ & 0.32 \\ & 0.26 \end{aligned}$ |
| 40 | LED | 40 PLED ${ }^{\circ}$ Optical Module - 1050mA | $\begin{aligned} & 13,642- \\ & 15,089 \end{aligned}$ | $\begin{aligned} & 12,690- \\ & 14,335 \end{aligned}$ | $\begin{aligned} & 14,324- \\ & 15,843 \end{aligned}$ | 60,000+ | $-20^{\circ} \mathrm{F}$ | 129 | $\begin{aligned} & 120 \\ & 277 \\ & 347 \end{aligned}$ | $\begin{aligned} & 1.08 \\ & 0.47 \\ & 0.38 \end{aligned}$ |
| 60 | LED | 60 PLED Optical Module - 350mA | $\begin{aligned} & 8,118- \\ & 8,979 \end{aligned}$ | $\begin{aligned} & 7,712- \\ & 8,530 \end{aligned}$ | $\begin{aligned} & 8,524- \\ & 9,428 \end{aligned}$ | 60,000+ | $-20^{\circ} \mathrm{F}$ | 65 | $\begin{aligned} & 120 \\ & 277 \\ & 347 \end{aligned}$ | $\begin{aligned} & 0.55 \\ & 0.24 \\ & 0.19 \end{aligned}$ |
| 60 | LED | 60 PLED Optical Module - 525mA | $\begin{aligned} & 11,690- \\ & 12,930 \end{aligned}$ | $\begin{aligned} & 11,106- \\ & 12,284 \end{aligned}$ | $\begin{aligned} & 12,275- \\ & 13,577 \end{aligned}$ | 60,000+ | $-20^{\circ} \mathrm{F}$ | 98 | $\begin{aligned} & 120 \\ & 277 \\ & 347 \end{aligned}$ | $\begin{aligned} & 0.82 \\ & 0.36 \\ & 0.29 \end{aligned}$ |
| 60 | LED | 60 PLED Optical Module - 700mA | $\begin{aligned} & 14,825- \\ & 16,398 \end{aligned}$ | $\begin{aligned} & 14,084- \\ & 15,578 \end{aligned}$ | $\begin{aligned} & 15,566- \\ & 17,218 \end{aligned}$ | 60,000+ | $-20^{\circ} \mathrm{F}$ | 131 | $\begin{aligned} & 120 \\ & 277 \\ & 347 \end{aligned}$ | $\begin{aligned} & 1.09 \\ & 0.47 \\ & 0.38 \end{aligned}$ |
| 60 | LED | 60 PLED ${ }^{\text {© }}$ Optical Module - 1050mA | $\begin{aligned} & 19,691- \\ & 21,780 \end{aligned}$ | $\begin{aligned} & 18,706- \\ & 20,691 \end{aligned}$ | $\begin{aligned} & 20,676- \\ & 22,869 \end{aligned}$ | 60,000+ | $-20^{\circ} \mathrm{F}$ | 193 | $\begin{aligned} & 120 \\ & 277 \\ & 347 \end{aligned}$ | $\begin{aligned} & 1.61 \\ & 0.70 \\ & 0.56 \end{aligned}$ |

## NOTES:

1. Max Input Amps is the highest of starting, operating, or open circuit currents
2. Lumen values for LED Modules vary according to the distribution type
3. System Watts includes the source watts and all driver components.
4. Fuse value should be sufficient to protect all wiring components.
5. L7O(10K) - TM-21 $6 x$ rule applied

L70(10K) - Calculated $=244,000 @ 700 \mathrm{~mA}$
$=102,000 @ 1050 \mathrm{~mA}$
WARNING: All fixtures must be installed in accordance with local codes or the National Electrical Code. Failure to do so may result in serious personal injury.

## SNTS 4"

## FEATURES

## Shaft

4" square, fabricated from high grade structural steel tube. Shaft conforms to ASTM-A-501-68 specifications. Meets or exceeds minimum yield strength of 46,000 P.S.I. wall thickness 11 GA. (. 120 wall) or 7 GA . ( 180 wall) as specified. Reinforced hand hole is furnished with cover. Shaft is furnished with ground lug located inside pole on wall opposite hand hole.

## Base Plate

Fabricated from structural quality hot rolled steel. Meets or exceeds minimum yield strength of 36,000 P.S.I. base telescopes and is circumferentially welded to pole shaft. Slotted bolt holes provide 1" flexibility on either side of bolt circle centerline.

## Anchorage

(4) anchor bolts fabricated from hot rolled steel bar. Minimum yield strength of 50,000 P.S.I. bolts have "L" bend on one end and are threaded on the other. Bolts are fully galvanized and are furnished with two nuts and two washers.

## Base Cover

Fabricated from heavy gauge quality carbon steel. Two-piece cover conceals base.

## Finish

Electrostatically applied TGIC Polyester Powder Coat on substrate prepared with 20 PSI power wash at $140^{\circ} \mathrm{F}$. Four step media blast and iron phosphate pretreatment for protection and paint adhesion. $400^{\circ} \mathrm{F}$ bake for maximum hardness and durability.

## PROJECT TYPE:




|  | Engineering Data <br> Maximum EPA - Square Feet |  |  |  |  |
| :--- | :---: | :---: | :---: | :---: | :---: |
|  | Max. Fixture <br> Weight | 100 MPH | 90 MPH | 80 MPH | 70 MPH |
| Model Number |  |  |  |  |  |
| SNTS 104-11 | 400 | 16.7 | 20.5 | 26.1 | 33.4 |
| SNTS 124-11 | 400 | 12.2 | 16.1 | 20.4 | 25.8 |
| SNTS 144-11 | 400 | 9.9 | 12.8 | 16.1 | 20.2 |
| SNTS 154-11 | 400 | 8.9 | 11.4 | 14.4 | 17.9 |
| SNTS 164-11 | 400 | 7.9 | 10.1 | 12.8 | 15.9 |
| SNTS 184-11 | 400 | 6.2 | 8.2 | 10.1 | 13.8 |
| SNTS 204-11 | 400 | 4.8 | 6.2 | 7.9 | 11.6 |
| SNTS 204-7 | 450 | 8.8 | 11.3 | 14.0 | 17.4 |
| SNTS 254-11 | 350 | 1.6 | 3.2 | 5.5 | 8.8 |
| SNTS 254-7 | 450 | 4.3 | 6.1 | 9.1 | 11.2 |

All above design calculations are based on sustained
wind forces plus additional 1.3 wind gust
(Example: Pole rated at 80 MPH withstands 104 MPH gusts)

## Drilled Side Mount

Specify drilling location using codes below.


Spec/Order Example: SNTS204-7/2-180/RAL-6005-S

## ORDERING INFORMATION


U.S. ARCHITECTURAL - LIGHTING




1. Main Block, west elevation

2. Main Block, primary entrance at center of façade

3. Main Block, west elevation

4. Main Block and Stair Tower A, west and north elevations

Underwood Computing Machine Company Factory

5. Main Block, Stair Tower A entrance

7. Main Block and Stair Tower A, west and south elevations

6. Main Block, west elevation

8. View northeast towards south and east complex elevations

Underwood Computing Machine Company Factory

9. Main Block, south and east elevations

11. Boiler Room and Coal Storage Addition, south and east elevations

10. Boiler Room, south elevation

12. Coal Storage Addition and Hardening Department, south elevations

Underwood Computing Machine Company Factory

13. Boiler Room and Coal Storage Addition, east and south elevations; Main Block and rear chimney visible in background

15. CMU Addition at east elevation of Polishing and Plating Department

14. (L-R) Coal Storage Addition, Hardening Department, and Polishing \& Plating Department, south and east elevations

16. CMU Addition at east elevation of Polishing and Plating Department, Main Block in background

Underwood Computing Machine Company Factory

17. Cafeteria and CMU Addition, south and east elevations

19. Cafeteria and CMU Addition, east and north elevations

18. View southwest towards east elevations

20. Cafeteria, north and west elevations

21. (L-R) Cafeteria, Polishing \& Plating Department, Hyphen and Main Block, west, north and east elevations

23. Hyphen, north elevation

22. (L-R) Cafeteria and Polishing \& Plating Department, west elevations

24. Main Block, east elevation

25. Main Block and Stair Tower B, north elevations

26. Main Block, Stair Tower B entrance

27. Main Block, north and west elevations

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

### 1.2 SUMMARY

A. Section includes maintenance, restoration, and cleaning of brick and stone masonry.

1. Repairing unit masonry, including replacing units and custom masonry units.
2. Re-anchoring veneers.
3. Repointing joints.
4. Selective replacement of trim units.
5. Painting steel uncovered during the work.
6. Removal of un-used anchors.
7. Cleaning exposed masonry surfaces.
8. Providing new openings and infilling existing openings in existing masonry.
9. Heating of materials in cold weather.
10. The scope of masonry work is identified on the Drawings. All the systems and processes identified in this specification section may or may not be required. The Contractor shall review the Drawings and Specification together and coordinate the scope of work required.
B. Related Requirements:
11. Division 01 Section "Historic Treatment Procedures".
12. Division 02 Section "Selective Demolition."
13. Division 04 Section "Unit Masonry."
14. Division 07 Section "Joint Sealants" for sealing joints in restored masonry.
15. Division 07 Section "Sheet Metal Flashing and Trim" for flashings.
C. Products installed, but not furnished, under this Section include the following:
16. Steel lintels for masonry, furnished under Division 05 Section "Metal Fabrications."
1.3 INTENT
A. Due to the various buildings and exposures over time, provide (4) separate mortar colors for mock-ups in (4) locations. Three color variations per mock-up shall be provided for SHPO approval at each location.

### 1.4 DEFINITIONS

A. Very Low-Pressure Spray: Under 100 psi
B. Low-Pressure Spray: 100 to $400 \mathrm{psi} ; 4$ to 6 gpm .
C. Medium-Pressure Spray: 400 to 800 psi; 4 to 6 gpm .
D. Saturation Coefficient: Ratio of the weight of water absorbed during immersion in cold water to weight absorbed during immersion in boiling water; used as an indication of resistance of masonry units to freezing and thawing.

### 1.5 SCOPE OF WORK

A. The scope of masonry work is identified on the Drawings. All the systems and processes identified in this specification section may or may not be required. The masonry sub-contractor shall review the Drawings and specification together and coordinate the scope of work required.

### 1.6 SUBMITTALS

A. Product Data: For each type of product.

1. Include recommendations for application and use. Include test data substantiating that products comply with requirements.
2. For cast-stone and stone trim units, include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
B. Samples for Verification: Before erecting the mock-up, of the following:
3. Each type of new exposed masonry material to be used for replacing existing materials. Include in each set of samples the full range of colors and textures to be expected in the completed Work. Provide straps or panels containing at least four masonry units.
4. Each type and color of mortar for pointing and masonry repair in the form of sample strips, 6 -inches long by $1 / 4$-inch wide, set in aluminum or plastic channels.
a. Each set shall contain a close color range of at least three (3) samples of different mixes of colored sands and cements that product a mortar matching the cleaned masonry when cured and dry.
b. Submit with precise measurements on ingredients, proportions, gradations, and sources of colored sands from which each sample was made. Confirm availability of these ingredients.
5. Patching Compound: Submit sets of patching compound Samples in the form of plugs (patches in drilled holes) in sample units of masonry representative of the range of masonry colors on the building.
a. Have each set contain a close color range of at least three samples of different mixes of patching compound that matches the variations in existing masonry when cured and dry.
6. Each type of masonry cleaning.
7. Sealant Materials: See Division 07 Section "Joint Sealants."
8. Accessories: Each type of anchor, accessory, and miscellaneous support.
C. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names, and addresses of architects and owners. Skilled and experienced masons specializing in the repair and re-pointing of existing historic masonry walls shall do all work.
D. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients. Include test reports, per ASTM C780, for mortar mixes required to comply with property specification.
E. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units,
mortar type, and resulting net-area compressive strength of masonry determined according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.
F. Material Certificates: Include statements of material properties indicating compliance with requirements including compliance with standards and type designations within standards. Provide for each type and size of the following:
9. Cementitious materials. Include brand, type, and name of manufacturer.
10. Pre-blended, dry mortar mixes. Include description of type and proportions of ingredients.

### 1.7 INTENT

A. Cleaning: Clean exterior masonry surfaces using the gentlest materials and techniques possible which produce an acceptable degree of cleaning. It is understood that some surfaces are not cleanable by gentle methods and, when approved by the Architect such surfaces will remain incompletely cleaned.

1. Use the lowest concentration of cleaning solutions necessary to obtain acceptable clean masonry surfaces. Since the entire building is slated to be cleaned, and numerous surface contaminants are present, multiple cleaning methods and solutions will be required.
B. Repairing Masonry and Re-Pointing: Where indicated on the Drawings, repair or replace damaged masonry and re-point mortar joints to match the color texture and tooling of acceptable original work. Re-pointing work is intended to fill holes and voids in masonry construction, to replace crumbly or deteriorated mortar with sound mortar, and to make the existing walls as weatherproof and watertight as possible.
C. Repairing Masonry and Parging: Where indicated on the Drawings, remove loose parging and mortar back to sound mortar, repair or replace damaged masonry and re-point deep mortar joints to match the color texture and tooling of acceptable original work. Re-pointing work is intended to fill deep holes and voids in masonry construction, to replace crumbly or deteriorated mortar with sound mortar, and to make the existing walls as weatherproof and watertight as possible. Parge walls after mortar repairs are performed.
D. Work under this section is to conform to the United States Secretary of the Interior's Standards for Rehabilitation, as administered by the National Park Service and as follows:

## 1. The Connecticut State Historic Preservation Office (SHPO)

E. Demolition work that impacts masonry assemblies, including but not necessarily limited to removal of metal anchorages and cutting of new masonry openings, shall be part of the scope of Work of this Section.

1. Work shall be performed by the Masonry Sub-Contractor.

### 1.8 QUALITY ASSURANCE

A. Qualifications: Engage an experienced mason to perform work of this Section. Firm shall have completed work similar in material, design, and extent to that indicated for this Project with a record of successful in-service performance for a period of not less than ten (10) years.

1. Field Supervision: Maintain experienced full-time supervisors on Project site during times that masonry restoration and cleaning work is in progress.
2. Restoration Worker Qualifications: Persons who are experienced in restoration work of types they will be performing.
B. Cleaning and Repair Appearance Standard: Cleaned and repaired surfaces are to have a uniform appearance as viewed from 10 -feet away by Architect. Perform additional paint and stain removal, general cleaning, and spot repairing of small areas that are noticeably different, so that surface blends smoothly into surrounding areas.
C. Mockups: Prepare mockup of restoration and cleaning to demonstrate aesthetic effects and set quality standards for materials and execution and for fabrication and installation.
3. Masonry Repair: Prepare sample areas for each type of masonry material indicated to have repair work performed. If not otherwise indicated, size each mockup not smaller than two adjacent whole units or approximately 48 -inches in least dimension. Erect sample areas in existing walls unless otherwise indicated, to demonstrate quality of materials, workmanship, and blending with existing work. Include the following as a minimum:
a. Replacement: Four brick units replaced.
b. Patching: Three small holes at least 1-inch in diameter, for each type of masonry material indicated to be patched. Leave no evidence of repair.
c. Re-Anchoring Veneers: Install three masonry repair anchors in mockup wall assembly of each anchor type required.
4. Re-Pointing: Prepare two separate sample areas, for each type of re-pointing required; one for demonstrating methods and quality of workmanship expected in removing mortar from joints and the other for demonstrating quality of materials and workmanship expected in pointing mortar joints. Provide areas of approximately 24 -inches square.
a. Obtain Architect's approval of mockups before starting the remainder of unit masonry restoration and cleaning.
b. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
5. Parging: Prepare two separate sample areas, for each type of re-pointing required; one for demonstrating methods and quality of workmanship expected in removing loose parge and mortar from joints and the other for demonstrating quality of materials and workmanship expected in pointing mortar joints and parging. Provide areas of approximately 24 -inches square.
a. Obtain Architect's approval of mockups before starting the remainder of unit masonry restoration and cleaning.
b. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
6. Cleaning: Prepare sample approximately 4 -square feet for each type of masonry and surface condition.
a. Test cleaners and methods on samples of adjacent materials for possible adverse reactions. Do not use cleaners and methods known to have a deleterious effect(s).
b. Allow a waiting period of not less than seven (7) calendar days after completion of sample cleaning to permit a study of sample panels for negative reactions.
7. Locate mock-ups on the building where directed by the Architect. Samples should be located in inconspicuous areas.
8. Notify Architect and OPM at least seven (7) calendar days in advance when mockups are ready for review.
9. Approval of mockups for compliance with historical replication as detailed and indicated on the Drawings is required by the National Park Service and the State and Local Historic District Commission having jurisdiction.
a. Approval of mockups is also for other material and construction qualities specifically approved by the Architect,
b. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless such deviations are specifically approved by Architect and the State and Local Historic District Commission in writing.
10. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
11. Maintain mockups during construction to serve as the standard for the Work.
12. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
D. Source of Materials: Obtain materials for masonry restoration from a single source for each type of material required (brick, stone, lime, sand, etc.) to ensure a match of quality, color, pattern, and texture.
E. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from a single manufacturer for each cementitious component and from one source or producer for each aggregate.
F. Pre-Installation Conference: Conduct conference at Project site.
13. Review methods and procedures related to masonry restoration, repair and cleaning including, but not limited to, the following:
a. Construction schedule. Verify availability of materials, Restoration Specialist's personnel, equipment, and facilities needed to make progress and avoid delays.
b. Materials, material application, sequencing, tolerances, and required clearances.

### 1.9 DELIVERY, STORAGE AND HANDLING

A. Store masonry units and cementitious materials on elevated platforms in a dry location. If masonry units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If masonry units or cementitious materials become wet, do not install until they are dry.
B. Coordinate delivery of materials to avoid delaying the Work and to minimize the need for on-site storage.
C. Store hydrated lime in manufacturer's original and unopened containers. Discard lime if containers have been damaged or have been opened for more than two days.
D. Store sand where grading and other required characteristics can be maintained, and contamination avoided.
E. Store masonry accessories to prevent corrosion and accumulation of dirt and oil.
F. Comply with manufacturer's written instructions for minimum and maximum temperature requirements for storage.

### 1.10 FIELD CONDITIONS

A. Do not re-point mortar joints, excluding joints to be pointed with lime mortar, or repair masonry unless air temperature is between and 40 and 90 deg $F$ and will remain so for at least seven (7) calendar days after completion of Work.

1. At no additional cost to the project, the Contractor may provide temporary heat and enclosure to perform the Work.
B. Clean masonry surfaces only when air temperature is 40 deg $F$ and above and will remain so for at least seven (7) calendar days after completion of cleaning.
C. Protection of Masonry: During construction, cover projections and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
D. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil from masonry.
2. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
3. Protect sills, ledges, and projections from mortar droppings.
4. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
5. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.
E. For manufactured repair materials, perform work within the environmental limits set by each manufacturer.
F. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602. Include heating of materials.
6. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg Fand above and will remain so until masonry has dried, but not less than seven (7) calendar days after completing cleaning.
G. Hot-Weather Requirements: Comply with hot-weather construction requirements in TMS 602/ACI 530.1/ASCE 6. Protect masonry repair and mortar-joint pointing when temperature and humidity conditions produce excessive evaporation of water from mortar and repair materials. Provide artificial shade and wind breaks and use cooled materials as required to minimize evaporation. Do not apply mortar to substrates with temperatures of 90 deg F and above unless otherwise indicated.

### 1.11 COORDINATION

A. Coordinate masonry restoration and cleaning with public circulation and egress at Project site.

### 1.12 SEQUENCING AND SCHEDULING

A. Order materials as soon as possible to avoid delaying completion of the Work.
B. Perform masonry restoration work in the following sequence:

1. Remove plant growth, unused anchors, and miscellaneous items.
2. Remove paint.
3. Inspect for open mortar joints and repair before cleaning to prevent the intrusion of water and other cleaning materials into the wall.
4. Perform preliminary cleaning at masonry surfaces.
5. Repair masonry including removal and replacement, infilling openings, removal and resetting, crack repair, and disassembly of masonry for new openings.
6. Rake out existing mortar and point masonry joints.
7. Repair existing masonry, including replacing existing unit with new.
8. Point existing mortar joints of masonry indicated to be restored and as otherwise noted.
9. Clean excess mortar from masonry surfaces.
10. Lightly clean all work, unless indicated on the Drawings.
11. After all work has been completed, complete a final rinse of masonry surfaces with lowpressure water only as the scaffold is being dismantled.
C. As scaffolding is removed, patch anchor holes used to attach scaffolding. Patch holes in masonry units to comply with "Masonry Unit Patching" Article. Patch holes in mortar joints to comply with "Repointing Masonry" Article.

PART 2 - PRODUCTS

### 2.1 MASONRY MATERIALS

A. Brick: Where required, provide new face brick with the same physical properties, colors, surface texture, size, and shape to match existing brickwork.

1. Provide building brick complying with ASTM C62, Grade SW where in contact with earth, Grade SW, MW, or NW for concealed backup; and of same vertical dimension as face brick, for masonry work concealed from view.
2. For existing brickwork that exhibits a range of colors or color variation within units, provide brick that proportionally matches that range and variation rather than brick that matches an individual color within that range.
B. Stone: Where required, provide natural building stone of variety, color, finish, size, and shape to match existing.
C. Concrete Masonry Units: Where required, provide new units in compliance with the requirements of Division 04 Section "Unit Masonry."

### 2.2 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C150, Type I or Type II, white or gray or both where required for color matching of exposed mortar.

1. Provide cement shall not contain more than 0.60 percent total alkali when tested as per ASTM C114.
B. Hydrated Lime: ASTM C207, Type S.
C. Mortar Sand: ASTM C144 unless otherwise indicated.
2. Color: Provide natural sand necessary to produce required mortar color.
3. For pointing mortar, provide sand with rounded edges.
4. Match size, texture, and gradation of existing mortar sand as closely as possible. Blend several sands if necessary, to achieve suitable match.
D. Mortar Pigments: Natural and synthetic iron oxides, compounded for mortar mixes. Use only pigments with a record of satisfactory performance in masonry mortars.
5. Products: Subject to compliance with requirements, provide one of the following:
a. Bayer Corporation, Industrial Chemicals Div.; Bayferrox Iron Oxide Pigments.
b. Davis Colors; True Tone Mortar Colors.
c. Solomon Grind-Chem Services, Inc.; SGS Mortar Colors.
E. Aggregate for Mortar: ASTM C144.
6. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
7. For joints less than $1 / 4$ inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.
8. White-Mortar Aggregates: Natural white sand or crushed white stone.
9. Colored Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.
F. Aggregate for Grout: ASTM C404.
G. Water: Potable.

### 2.3 CLEANING MATERIALS

A. Water: Potable.
B. Hot Water: Water heated to a temperature of 140 to 160 deg F.
C. Job-Mixed Detergent Solution: Solution prepared by mixing 2 cups of tetrasodium polyphosphate, $1 / 2$ cup of laundry detergent, and 20 quarts of hot water for every 5 gal of solution required.
D. Mold, Mildew, and Algae Remover, Job Mixed: Solution prepared by mixing 2 cups of tetrasodium pyrophosphate (TSPP), 5 quarts of 5 percent sodium hypochlorite (bleach), and 15 quarts of hot water for every 5 gal . of solution required.
E. Non-Acidic Liquid Cleaner: Manufacturer's standard mildly alkaline liquid cleaner formulated for removing mold, mildew, and other organic soiling from ordinary building materials, including polished stone, brick, aluminum, plastics, and wood.

1. Products: Subject to compliance with requirements, provide one of the following:
a. Dominion Restoration Products, Inc.; Bio-Cleanse.
b. Dumond Chemicals, Inc.; Safe n' Easy Architectural Cleaner/Restorer.
c. Price Research, Ltd.; Price Non-Acid Masonry Cleaner.
d. PROSOCO; Enviro Klean 2010 All Surface Cleaner.
2. Dilute chemical cleaners with water to produce solutions not exceeding concentration recommended by chemical-cleaner manufacturer.
F. Mild Acidic Cleaner: Manufacturer's standard mildly acidic cleaner containing no muriatic (hydrochloric), hydrofluoric, or sulfuric acid; or ammonium bifluoride or chlorine bleaches.
3. Products: Subject to compliance with requirements, provide one of the following:
a. ABR Products, Inc.; X-190 Limestone \& Concrete Cleaner.
b. Diedrich Technologies Inc.; Envirorestore 100.
c. Dominion Restoration Products, Inc.; DR-60 Stone and Masonry Cleaner.
d. PROSOCO; Enviro Klean BioWash.
e. EaCO Chem, Inc. HD Britenol
4. Dilute chemical cleaners with water to produce solutions not exceeding concentration recommended by chemical-cleaner manufacturer.

### 2.4 ACCESSORY MATERIALS

A. Liquid Strippable Masking Agent: Manufacturer's standard liquid, film-forming, strippable masking material for protecting glass, metal, and polished stone surfaces from damaging effects of acidic and alkaline masonry cleaners.

1. Products: Subject to compliance with requirements, provide one of the following:
a. ABR Products, Inc.; Rubber Mask.
b. Price Research, Ltd.; Price Mask.
c. PROSOCO; Sure Klean Strippable Masking.
B. Sealant: Refer to Division 07 Section "Joint Sealants" for a sealant and backer rod.
C. Setting Buttons and Shims: Resilient plastic buttons, non-staining to masonry, sized to suit joint thicknesses and bed depths of masonry units without intruding into required depths of pointing materials.
D. Masonry Anchors and Pins: Fabricate from Type 304 stainless-steel rods. Provide threaded and unthreaded rods as required.
2. Masonry Repair Anchors, Expansion Type: Mechanical fasteners designed for masonry veneer stabilization consisting of $1 / 4$-inch- diameter, Type 304 stainless-steel rod with brass expanding shells at each end and water-shedding washer in the middle. Expanding shells shall be designed to provide positive mechanical anchorage to veneer on one end and backup masonry on the other.
a. Products: Subject to compliance with requirements, provide one of the following:
1) BLOK-LOK Limited; Torq-Lok.
2) Dur-O-Wal, a Hohmann \& Barnard company; Mechanical Anchor Series DA5000 or DA5100.
3) Hohmann \& Barnard, Inc.; \#521RA-B.
2. Masonry Repair Anchors, Spiral Type: Driven-in, Type 304 stainless-steel spiral rods designed to be installed in drilled holes and relying on screw effect rather than adhesive to secure them to backup and veneer. Anchors are flexible in plane of veneer but rigid perpendicular to it.
a. Products: Subject to compliance with requirements, provide one of the following:
1) BLOK-LOK Limited; Spira-Lok.
2) Dur-O-Wal, a Hohmann \& Barnard company; Dur-O-Flex Friction Pinning Anchor DA508
3) Heckmann Building Products, Inc.; \#391 Remedial Wall Tie.
4) Hohmann \& Barnard, Inc.; Helix Spiro-Ties.
E. Stone to Stone Adhesive: One-part cementitious stone adhesive recommended by adhesive manufacturer for type of stone repair indicated and matching stone color.
1. Basis of Design Product: Cathedral Stone Products, Inc.; MasonRE Adhesive.
F. Horizontal and Vertical Masonry Joint Covers: T-shaped and L-shaped soft lead flashing bed in sealant. Refer to the Drawings for locations.
2. Basis of Design Product: "Type-A and Type-B "Weathercap Joint Protective System" by Weathercap, Inc. - Slidell, LA.
G. Paint Remover: Manufacturer's standard covered or skin-forming formulation for removing paint coatings from masonry.
3. Products: Subject to compliance with requirements, provide one of the following:
a. ABR Products, Inc.; Grip 'N Strip 800 Fast Acting.
b. Diedrich Technologies Inc.; 606 Multi-Layer Paint Remover or 606X Extra Thick Multi-Layer Paint Remover with pull-off removal system.
c. Dumond Chemicals, Inc.; Peel Away 1 System.
d. PROSOCO; Enviro Klean Safety Peel 1 or Enviro Klean Safety Peel 3 with Enviro Klean Overcoat.
H. Masking Tape: Non-staining, nonabsorbent material; compatible with mortar, joint primers, sealants, and surfaces adjacent to joints; and that easily comes off entirely, including adhesive.
I. Antirust Coating: Fast-curing, lead- and chromate-free, self-curing, universal modified-alkyd primer according to MPI \#23 surface-tolerant, anticorrosive metal primer.
4. Surface Preparation: Use coating requiring no better than -SP 3, "Power Tool Cleaning" surface preparation according to manufacturer's literature or certified statement.

### 2.5 MORTAR, PARGE, AND GROUT MIXES

A. Measurement and Mixing: Measure cementitious materials and sand in a dry condition by volume or equivalent weight. Do not measure by shovel; use known measure. Mix materials in a clean, mechanical batch mixer.

1. Mixing Pointing Mortar: Thoroughly mix cementitious materials and sand together before adding any water. Then mix again adding only enough water to produce a damp, unworkable mix that will retain its form when pressed into a ball. Maintain mortar in this dampened condition for 15 to 30 minutes. Add remaining water in small portions until mortar reaches desired consistency. Use mortar within one hour of final mixing; do not re-temper or use partially hardened material.
B. Colored Mortar: Produce mortar of color required by using specified ingredients. Do not alter specified proportions without Architect's approval.
2. Mortar Pigments: Where mortar pigments are indicated, do not exceed a pigment-tocement ratio of $1: 10$ by weight.
C. Do not use admixtures unless otherwise indicated.
D. Pointing Mortar for Brick and Stone: Mix mortar materials with 1-part Portland cement, 1.25parts lime, and 5 -parts sand. Add mortar pigments to produce mortar colors required.
E. Parge Coat: Mix mortar materials with 1-part Portland cement, $1 / 2$ part lime, and 3-parts sand.
F. Rebuilding/Setting Mortar for Brick and Stone: Mix same as pointing mortar except mortar pigments are not required.

### 2.6 MASONRY PATCHING COMPOUNDS

A. Masonry Patching Compound: Factory-mixed cementitious product that is custom manufactured for patching masonry.

1. Basis of Design Products:
a. Brick: "Jahn M110 Historic Pointing Mortar" by Cathedral Stone Products, Inc.
b. Granite: "Jahn M160 Granite Patching Mortar." by Cathedral Stone Products, Inc.
2. Use formulation that is vapor and water permeable (equal to or more than the masonry unit), exhibits low shrinkage, has lower modulus of elasticity than the masonry units being repaired, and develops high bond strength to all types of masonry.
3. Materials must have working qualities and retardation control to permit forming and sculpturing where necessary.
4. Formulate patching compound used for patching masonry in colors and textures to match each masonry unit being patched. Provide not less than three colors to enable matching the color, texture, and variation of each unit.

### 2.7 MATERIALS FOR EPOXY CRACK INJECTION

A. Epoxy Crack Injection Adhesive:

1. Hairline cracks up to $3 / 16$ " in width: Jahn M30 Micro Injection Adhesive.
a. Premixed cementitious injection grout that contains no corrosive constituents. The adhesive achieves extraordinary flow capacity, high penetration, and strong adhesion. Refer to product literature and technical data for material specifications. Use formulations of product suitable for varying substrates.
2. Cracks approximately $3 / 16$ " to $3 / 8^{\prime \prime}$ in width: Jahn M40 Crack and Void Injection Grout.
a. Premixed cementitious injection grout that does not contain any acrylic, latex, or other synthetic polymer bonding agents or additives. The grout only needs to be mixed with clean water. The grout is vapor permeable, frost and salt resistant, shrink resistant, and is physically compatible with the substrate. Refer to product literature and technical data for material specifications.

### 2.8 MIXING FOR EPOXY CRACK INJECTION

A. It is recommended that safety goggles, gloves, and a dust mask be worn for protection. Do not mix more material than can be used within approximately 30 minutes. Discard any mixed material that has been unused for 30 minutes or more.

## B. Jahn M30:

1. The mixing ratio is approximately 2 to 5 parts powder to 1 part water by volume.
2. Mix mechanically using a high-speed drill (3,000 RPM or higher) equipped with a Jiffler type-mixing paddle. After mixing, the mortar should be poured into another clean container using a sieve. Continued agitation is necessary if the mortar is allowed to sit prior to use.
C. Jahn M40:
3. The mixing ratio is approximately $2-21 / 2$ parts powder to 1 part water by volume.
4. Mix manually or mechanically, using a slow speed drill (400-600 RPM) equipped with a Jiffler type-mixing paddle. The material should be mixed for a minimum of three minutes, with continued agitation should the product be allowed to sit prior to use

## PART 3 - EXECUTION

### 3.1 PROTECTION

A. Protect persons, motor vehicles, surrounding surfaces of building being restored, building site, plants, and surrounding buildings from harm resulting from masonry restoration work.

1. Erect temporary protective covers over walkways and at points of pedestrian and vehicular entrance and exit that must remain in service during course of restoration and cleaning work.
B. Comply with chemical-cleaner manufacturer's written instructions for protecting building and other surfaces against damage from exposure to its products. Prevent chemical-cleaning solutions from contacting people, motor vehicles, landscaping, buildings, and other surfaces that could be harmed by such contact.
2. Cover adjacent surfaces with materials that are proven to resist chemical cleaners used unless chemical cleaners being used will not damage adjacent surfaces. Use materials that contain only waterproof, UV-resistant adhesives. Apply masking agents to comply with manufacturer's written instructions. Do not apply liquid masking agent to painted or porous surfaces. When no longer needed, promptly remove masking to prevent adhesive staining.
3. Keep wall wet below area being cleaned to prevent streaking from runoff.
4. Do not clean masonry during winds of sufficient force to spread cleaning solutions to unprotected surfaces.
5. Neutralize and collect alkaline and acid wastes for disposal off Owner's property.
6. Dispose of runoff from cleaning operations by legal means and in a manner that prevents soil erosion, undermining of paving and foundations, damage to landscaping, and water penetration into building interiors.
C. Prevent mortar from staining face of surrounding masonry and other surfaces.
7. Cover sills, ledges, and projections to protect from mortar droppings.
8. Keep wall area wet below rebuilding and pointing work to discourage mortar from adhering.
9. Immediately remove mortar in contact with exposed masonry and other surfaces.
10. Clean mortar splatters from scaffolding at end of each day.
D. Remove downspouts adjacent to masonry and store in a secure area during masonry restoration and cleaning. Reinstall when masonry restoration and cleaning are complete.
11. Provide temporary rain drainage during work to direct water away from building.

### 3.2 PLANT, MOSS, AND ALGAE REMOVAL

A. Completely remove all plant, moss, and algae growth from masonry surfaces. Work is part of basic scope of Contract and is exclusive of cleaning Work that may be provided per Alternates.

1. Cut ground-rooted creeping vegetation at grade and allow to die off before removal from masonry surfaces. Apply root-killing solution to plant roots according to manufacturer's written instructions.
2. Cut masonry-rooted vegetation below foliage and allow to die off before removal.
3. Completely remove all vegetative growth from masonry surfaces, being careful to remove all tendrils and suckers.
4. Clean all moss and algae from masonry surfaces. Use herbicidal solution per approved cleaning products if necessary.

### 3.3 MISCELLANEOUS ANCHOR REMOVAL

A. Remove all obsolete metal anchors, fasteners and brackets, wood nailers, and other extraneous items anchoring piping, conduit, downspouts, lighting, and electrical devices, etc., that are indicated for removal on the Drawings. Remove non-structural masonry-embedded metal corner guards and door frames only where indicated on the Drawings.

1. All removal Work shall be performed by Masonry Contractor.
2. Remove items so as to avoid spalling or cracking masonry.
3. If item cannot be removed without damaging masonry, cut item flush at masonry surface and core drill surrounding masonry as close around item as practical.
4. Patch holes following procedures of this Section.

### 3.4 MISCELLANEOUS PAINT REMOVAL

A. Paint Removal:

1. Remove loose and peeling paint using low-pressure spray, scrapers, stiff brushes, or a combination of these. Let surface dry thoroughly.
2. Apply paint remover to dry, painted masonry with trowel, spatula, or as recommended by manufacturer.
3. Apply cover, if required by manufacturer, per manufacturer's written instructions.
4. Allow paint remover to remain on surface for period recommended by manufacturer or as determined in test panels.
5. Scrape off paint and remover and collect for disposal.
6. Rinse with water applied by low-pressure spray to remove chemicals and paint residue.
7. Apply acidic cleaner or manufacturer's recommended after wash to masonry, while surface is still wet, using low-pressure spray equipment or soft-fiber brush. Let cleaner or after wash remain on surface as a neutralizing agent for period recommended by chemical-cleaner or after wash manufacturer.
8. Rinse with cold water applied by low-pressure spray to remove chemicals and soil.

### 3.5 PRELIMINARY CLEANING

A. Preliminary Cleaning: Before beginning general cleaning, remove extraneous substances that are resistant to cleaning methods being used. Extraneous substances include paint, calking, asphalt, and tar.

1. Carefully remove heavy accumulations of material from surface of masonry with a sharp chisel. Do not scratch or chip masonry surface.
2. Remove paint and caulking with paint remover.
a. Comply with requirements in "Paint Removal" Article.
b. Repeat application up to two times if needed.
3. Remove asphalt and tar with solvent-type paint remover.
a. Comply with requirements in "Paint Removal" Article.
b. Apply paint remover only to asphalt and tar by brush without pre-wetting.
c. Allow paint remover to remain on surface for 10 to 30 minutes.
d. Repeat application if needed.

### 3.6 REPOINTING BRICK AND STONE

A. Rake out and re-point joints to the following extent:

1. All joints in areas indicated on Drawings.
2. Joints where mortar is missing or where they contain holes.
3. Cracked joints where cracks are 1/16-inch or more in width and of any depth.
4. Joints where they are deteriorated to point that mortar can be easily removed by hand, without tools.
5. Joints where they sound hollow when tapped by metal object.
6. Joints where they are worn back $1 / 4$-inch or more from surface.
7. Joints that have spalled.
8. Joints where they have been filled with substances other than mortar.
B. Rake out joints as follows, according to procedures demonstrated in approved mockup:
9. Remove mortar from joints to depth of 2 times joint width, but not less than $1 / 2$-inch or not less than that required to expose sound, un-weathered mortar.
10. Remove mortar from masonry surfaces within raked-out joints to provide reveals with square backs and to expose masonry for contact with pointing mortar. Brush, vacuum, or flush joints to remove dirt and loose debris.
11. Do not spall edges of masonry units or widen joints. Replace or patch damaged masonry units as directed by Architect.
a. Use power-operated grinders, preferably pneumatic, to cut out mortar bed joints. Where power-operated grinders will not provide satisfactory results, remove mortar from top and bottom of vertical joints and other joints by hand using a chisel and resilient mallet.
C. Notify Architect of unforeseen detrimental conditions including voids in mortar joints, cracks, loose masonry units, rotted wood, rusted metal, and other deteriorated items.
D. Pointing with Mortar:
12. Rinse joint surfaces with water to remove dust and mortar particles. Time rinsing application so, at time of pointing, joint surfaces are damp but free of standing water. If rinse water dries, dampen joint surfaces before pointing.
13. Apply pointing mortar first to areas where existing mortar was removed to depths greater than surrounding areas. Apply in layers not greater than $3 / 8$-inch until a uniform depth is formed. Fully compact each layer thoroughly and allow it to become thumbprint hard before applying next layer.
14. After low areas have been filled to same depth as remaining joints, point all joints by placing mortar in layers not greater than $3 / 8$ inch. Fully compact each layer and allow to become thumbprint hard before applying next layer. Where existing masonry units have worn or rounded edges, slightly recess finished mortar surface below face of masonry to avoid widened joint faces. Take care not to spread mortar beyond joint edges onto exposed masonry surfaces or to featheredge the mortar.
15. When mortar is thumbprint hard, tool joints to match original appearance of joints as demonstrated in approved mockup. Finish joint by brushing with stiff brush to texture joint to match existing joint surface texture. Remove excess mortar from edge of joint by brushing.
16. Cure mortar by maintaining in thoroughly damp condition for at least 72 consecutive hours including weekends and holidays. Acceptable curing methods include covering with wet burlap and plastic sheeting, periodic hand misting, and periodic mist spraying using system of pipes, mist heads, and timers.
17. Hairline cracking within the mortar or mortar separation at edge of a joint is unacceptable. Completely remove such mortar and re-point.
E. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

### 3.7 BRICK REMOVAL, REPLACEMENT, AND INFILL

A. At locations indicated, remove bricks that are damaged, spalled, or deteriorated or are to be reused. Carefully remove by hand entire units from joint to joint, without damaging surrounding masonry, in a manner that permits replacement with full-size units.
B. Support and protect remaining masonry that surrounds removal area. Maintain flashing, reinforcement, lintels, and adjoining construction in an undamaged condition.
C. Notify Architect of unforeseen detrimental conditions including voids, cracks, bulges, and loose units in existing masonry backup, rotted wood, rusted metal, and other deteriorated items.
D. Remove and salvage in an undamaged condition as many whole bricks as possible.

1. Remove mortar, loose particles, and soil from brick by cleaning with hand chisels, brushes, and water.
2. Remove sealants by cutting close to brick with utility knife and cleaning with solvents.
3. Stack and store salvaged brick for reuse.
E. Clean bricks surrounding removal areas by removing mortar, dust, and loose particles in preparation for replacement.
F. Replace removed damaged brick with other removed brick in good condition where possible, or with new brick matching existing brick, including size. Do not use broken units unless they can be cut to a usable size, without visible damage.
G. Install new or salvaged brick to replace removed brick. Fit units into bonding and coursing pattern of existing brick. If cutting is required, use a motor-driven saw designed to cut masonry with clean, sharp, unchipped edges.
4. Maintain joint width for replacement units to match existing joints.
5. Use setting buttons or shims to set units accurately spaced with uniform joints.
6. At exterior openings cut by power saws remove cut bricks and tooth-in new bricks.
7. All brick faces exposed to weather must be outside faces of whole bricks.
8. Cut brick faces exposed to weather are not acceptable.
H. Lay replacement brick with completely filled bed, head, and collar joints. Butter ends with sufficient mortar to fill head joints and shove into place. Wet both replacement and surrounding clay bricks that have ASTM C67 initial rates of absorption (suction) of more than 30 g per 30 sq . inch minimum. Use wetting methods which ensure units are nearly saturated, but surface is dry when units are laid.
9. Tool exposed mortar joints in repaired areas to match joints of surrounding existing brickwork. Finish joint by brushing with stiff brush to texture joint to match existing joint surface texture.
10. Rake out mortar used for laying brick before mortar sets and point new mortar joints in repaired area to comply with requirements for re-pointing existing masonry, and at same time as re-pointing of surrounding area.
11. When mortar is sufficiently hard to support units, remove shims and other devices interfering with pointing of joints.

## 3.8 <br> BACKUP MASONRY REMOVAL AND REPLACEMENT

A. Where backup masonry is fractured or unstable and at locations indicated, remove mortar and masonry units that are broken or deteriorated and rebuild with whole, new brick or whole
salvaged units. Carefully remove entire units from joint to joint, without damaging surrounding masonry, in a manner that permits replacement with full-size units.
B. Support and protect remaining masonry that surrounds removal area.
C. Maintain flashing, reinforcement, anchors, lintels, and adjoining construction in an undamaged condition.
D. Notify Architect of unforeseen detrimental conditions, including voids, cracks, bulges, loose units beyond the removal area, rotted wood, rusted metal, and other deteriorated items.
E. Remove in an undamaged condition as many whole bricks as possible.

1. Remove mortar, loose particles, and soil from brick by cleaning with hand chisels, brushes, and water.
2. Remove sealants by cutting close to brick with utility knife and cleaning with solvents.
3. Store brick for reuse. Store off ground, on skids, and protected from weather.
4. Deliver cleaned brick not required for reuse to Owner unless otherwise indicated.
F. Clean masonry surrounding removal areas by removing mortar, dust, and loose particles in preparation for brick replacement.
G. Replace removed damaged brick with salvaged backup brick in good condition, where possible, or with new building brick matching existing backup brick. Do not use broken units unless they can be cut to usable size.
H. Install replacement brick into bonding and coursing pattern of existing brick. If cutting is required, use a motor-driven saw designed to cut masonry with clean, sharp, unchipped edges.
I. Lay replacement brick with rebuilding (setting) mortar and with completely filled bed, head, and collar joints. Butter ends with sufficient mortar to fill head joints and shove into place. Wet both replacement and surrounding bricks that have ASTM C67 initial rates of absorption (suction) of more than $30 \mathrm{~g} / 30 \mathrm{sq}$. in. per min. Use wetting methods that ensure that units are nearly saturated, but surface is dry when laid.
J. Curing: Cure mortar by maintaining in thoroughly damp condition for at least 72 consecutive hours, including weekends and holidays.
5. Hairline cracking within the mortar or mortar separation at edge of a joint is unacceptable. Completely remove such mortar and repoint.

### 3.9 REANCHORING VENEERS

A. Install masonry repair anchors in horizontal mortar joints and according to manufacturer's written instructions. Space anchors not more than 12 -inches on center vertically and 8 -inches on center horizontally apart unless otherwise indicated. Install at locations to avoid penetrating flashing.
B. Recess anchors $5 / 8$-inch or more from surface of mortar joint, and fill recess with pointing mortar.

### 3.10 PAINTING STEEL UNCOVERED DURING THE WORK

A. Notify Architect if steel is exposed during masonry removal. Where Architect determines that steel is structural, or for other reasons cannot be totally removed, prepare, and paint it as follows:

1. Surface Preparation: Remove paint, rust, and other contaminants according to -SP 3, "Power Tool Cleaning" as applicable to comply with paint manufacturer's recommended preparation.
2. Antirust Coating: Immediately paint exposed steel with two coats of antirust coating, following coating manufacturer's written instructions and without exceeding manufacturer's recommended rate of application (dry film thickness per coat).
B. If on inspection and rust removal, the thickness of a steel member is found to be reduced from rust by more than $1 / 16$ inch notify Architect before proceeding.

### 3.11 MASONRY UNIT PATCHING

## A. Patching Bricks:

1. Remove loose material from masonry surface. Carefully remove additional material so patch will not have feathered edges but will have square or slightly undercut edges on area to be patched and will be at least $1 / 4$ inch thick, but not less than recommended by patching compound manufacturer.
2. Mask adjacent mortar joint or rake out for repointing if patch will extend to edge of masonry unit.
3. Mix patching compound in individual batches to match each unit being patched.
4. Rinse surface to be patched and leave damp, but without standing water.
5. Brush-coat surfaces with slurry coat of patching compound according to manufacturer's written instructions.
6. Place patching compound in layers as recommended by patching compound manufacturer, but not less than $1 / 4$ inch or more than 2 inches thick. Roughen surface of each layer to provide a key for next layer.
7. Trowel, scrape, or carve surface of patch to match texture and surrounding surface plane or contour of the masonry unit. Shape and finish surface before or after curing, as determined by testing, to best match existing masonry unit.
8. Keep each layer damp for 72 hours or until patching compound has set.
3.12 MASONRY INSTALLATION, GENERAL
A. Thickness: Build walls and other masonry construction to full thickness shown.
B. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, un-chipped edges. Allow units to dry before laying, unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.
C. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures. Mix units from several pallets or cubes as they are placed.
D. Matching Existing Masonry: Match type, coursing, bonding, color, and texture. Verify in field, and then submit samples and constructing mock-ups for Architect's review and approval.
E. Comply with construction tolerances in ACI 530.1/ASCE 6/TMS 602 and with the following:
9. For conspicuous vertical lines such as external corners, door jambs, reveals, and expansion/control joints; do not vary from plumb by more than an $1 / 8$-inch in 10 feet and $1 / 4$-inch in 20 feet, but no more than a $1 / 2$-inchmaximum.
10. For vertical alignment of exposed head joints, do not vary from plumb by more than a 1/4-inch in 10 feet, or $1 / 2$-inchmaximum.
11. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than an $1 / 8$-inch in 10 feet, $1 / 4$-inch in 20 feet, or $1 / 2$-inch maximum.
12. For exposed bed joints, do not vary from thickness indicated by more than plus or minus an $1 / 8$-inch, with a maximum thickness limited to $1 / 2$-inch. Do not vary from bed-joint thickness of adjacent courses by more than an $1 / 8$-inch.
13. For exposed head joints, do not vary from thickness indicated by more than plus or minus $1 / 8$-inch. Do not vary from adjacent bed and head-joint thicknesses by more than $1 / 8-$ inch.
14. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than $1 / 16$-inch except due to warpage of masonry within specified tolerances for units.
15. For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than $1 / 16$-inch from one masonry unit to the next.

### 3.13 MORTAR BEDDING AND JOINTING

A. Lay masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.
B. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness, unless otherwise indicated.
C. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint), unless otherwise indicated.

### 3.14 PATCHING AND REPAIRING HOLES IN BRICK

A. For holes with a diameter of 2-inches or less, pack hole full depth with mortar. For holes with a diameter of larger than 2-inches, remove cut brick and replace with salvaged brick or new brick matching the existing.

### 3.15 DISASSEMBLY OF MASONRY

A. Carefully remove by hand masonry indicated on drawings to be removed. Remove units from joint to joint and in a manner to permit removal without damaging surrounding brick or other materials.
B. Support and protect construction that surrounds removal area.
C. Salvage as many whole, undamaged brick units as possible.
D. Remove mortar from salvaged units and store for reuse.
3.16 STONE CRACK REPAIR
A. Design Intent. The objectives of the Work of this Article include:

1. Repair of existing cracks using non-structural repairs using composite patch material.
B. Crack repair with composite patch material.
2. Cut out crack using a rotary tool for the full length and expanse of the crack. Crack shall be cut out to a depth back to sound stone not less than $1 / 2$-inch deep.
3. Install composite patch material per manufacturer's instructions in the cut-out area. Color of material shall match the host stone.
4. Clean cementitious crack filler from face of stone before it sets by scrubbing with water. Tool surface of material to match the host stone.

### 3.17 PARGING

A. Parge interior faces of masonry walls, where indicated, in one uniform coats to a total thickness of $1 / 4$ " inch. Dampen wall before applying first coat.
B. Use a steel-trowel finish to produce a smooth, flat, dense surface with a maximum surface variation of $1 / 8$-inch per foot.
C. Damp-cure parging for at least 24 hours and protect parging until cured.

### 3.18 CLEANING MASONRY

A. Proceed with cleaning in an orderly manner; work from bottom to top of each scaffold width and from one end of each elevation to the other. Ensure that dirty residues and rinse water will not wash over cleaned, dry surfaces.
B. Use only those cleaning methods indicated for each masonry material and location.
C. Perform each cleaning method indicated in a manner that results in uniform coverage of all surfaces, including corners, moldings, and interstices, and that produces an even effect without streaking or damaging masonry surfaces.
D. It may be necessary to employ different cleaning methods and products to clean the various materials and surfaces. Begin by cleaning with water, the gentlest means available. When water washing does not achieve the desired result, proceed with more aggressive methods as listed (in increasingly aggressive methods) below:

1. Method \#1A - Cold-Water Wash: Clean masonry with cold, low-pressure water.
2. Method \#1B - Hot Pressurized Water Wash: Clean stone masonry with hot water lowpressure spray hot water, followed by brushing.
3. Method \#2 - Detergent Cleaning: Clean masonry with a detergent solution applied as follows:
a. Wet masonry with cold water applied by low-pressure spray.
b. Scrub masonry with detergent solution using medium-soft brushes until soil is thoroughly dislodged and can be removed by rinsing. Use small brushes to remove soil from mortar joints and crevices. Dip brush in solution often to ensure that adequate fresh detergent is used, and that masonry surface remains wet.
c. Rinse with cold water to remove detergent solution and soil.
d. Apply rinse by medium-pressure spray.
e. Repeat cleaning procedure above where required to produce the cleaning effect established by mockup.
4. Method \#3 - Chemical Cleaning: If above options to not achieve acceptable results, as determined by the Architect, proceed with chemical cleaning of masonry surfaces. Use only the gentlest means necessary to achieve acceptable results as determined by the Architect. Clean brick masonry with nonacidic liquid cleaners applied as follows:
a. Wet masonry with water applied by low-pressure spray.
b. Apply cleaner to masonry in two applications by brush or low-pressure spray. Let cleaner remain on surface for period as recommended by chemical-cleaner manufacturer and as stablished by mockup.
c. Do not allow chemicals to remain on surface for periods longer than those indicated or recommended by manufacturer.
d. Rinse with water applied by low-pressure spray to remove chemicals and soil.
e. Repeat cleaning procedure above where required to produce cleaning effect established by mockup. Do not repeat more than once.
E. Final Cleaning: After mortar has fully hardened, thoroughly clean exposed masonry surfaces of excess mortar and foreign matter, use wood scrapers, stiff-nylon or fiber brushes, and clean water, spray applied at low pressure.
5. Do not use metal scrapers or brushes.
6. Do not use acidic or alkaline cleaners.
7. Wash adjacent woodwork and other non-masonry surfaces. Use detergent and soft brushes or cloths.
8. Clean mortar and debris from roof; remove debris from gutters and downspouts. Rinse off roof and flush gutters and downspouts.
9. Sweep and rake adjacent pavement and grounds to remove mortar and debris. Where necessary, pressure wash pavement surfaces to remove mortar, dust, dirt, and stains.

### 3.19 MASONRY WASTE DISPOSAL

A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.
B. Excess Masonry Waste: Remove excess clean masonry waste and other masonry materials, and legally dispose of off Owner's property.

## END OF SECTION 040120

## Site Summary

The Underwood Computing Machine Company Factory property is comprised of seven fully integrated masonry buildings constructed between 1917 and 1927 to accommodate the manufacture of early calculators and billing machines. After the stock market crash in 1929, production moved a half mile northeast to the Underwood Typewriter factory at 581 Capitol Avenue (demolished 1970), and the Machine Company property was eventually converted to a research, development, engineering, and patent facility in 1936 for Underwood-Elliot Fisher.

Located in Hartford's Parkville neighborhood, the Main Block was constructed in 1917 by architect Frank H. Oldershaw with its primary (west) elevation facing Arbor Street. The Boiler Room, Hardening Department, and Polishing \& Plating Department buildings, also constructed in 1917, project from the Main Block's rear (east) elevation. The company Cafeteria, erected in 1927 by the Tidewater Building Company, extends eastward from the Polishing \& Plating Department's north elevation. The Hyphen, constructed in 1935 by Lockwood Green Engineers, was designed to facilitate access between the Main Block and former Polishing and Plating building. Finally, the Coal Storage Addition was completed in 1943 by Standard Structural Steel, and the two concrete masonry unit (CMU) Additions completed during the last quarter of the $20^{\text {th }}$ century.

The buildings are grouped and described below according to their dates of construction (DOC). Figure 1 provides an annotated site plan with building names and DOC, and the colored font below corresponds to the colors on the annotated plan.

## Project Summary

The rehabilitation of the former Underwood Computing Machine Company Factory will be undertaken in two phases. The majority of work comprising Phase I will be focused on the Real Art Ways (RAW) space within the former Hardening Department, Polishing \& Plating Department, Cafeteria, and CMU Additions, and will include:

- Interior rehabilitation of the existing RAW space
- New or upgraded mechanical, electrical, plumbing, and fire protection systems within the Real Art Ways space
- Construction of the proposed Addition
- New roofs throughout \& restoration of the existing rooftop signage
- Elevator code upgrades
- Sitework

Phase II will focus on the exterior envelope and interior rehabilitation of the Main Block, including:

- Exterior masonry cleaning, repairs, and repointing
- Partial window replacement
- Restoration of original exterior entrances
- Modification of original stair railings to comply with the Connecticut and International Building Code Regulations
- New hardwood floor in the Main Block lobby
- New accessible lavatories on each floor of the Main Block
- New RAW office and Learning and Engagement spaces on first floor of the Main Block
- New or updated mechanical, electrical, plumbing, and fire protection systems within the Main Block


## Number 1

## Architectural Feature: Approximate Date of Feature:

Exterior Masonry<br>1917, 1927, 1935, 1943, Late $20^{\text {th }} \mathrm{C}$.

## Describe Existing Feature and its Condition:

The Main Block is a west-facing, four-story, 39-bay-by-six-bay, red brick building with Italianate influences. Its six southernmost bays cant slightly southward, creating an inverted " J " footprint that follows the curve along Arbor Street.

The building rests on a concrete foundation clad with roughly hewn brownstone. Regularly-spaced window openings feature brownstone sills and segmental arch lintels; the fourth floor windows are capped by five rows of corbelled brick. A metal cornice, painted to appear as having a patina finish, defines the roofline along each elevation. Various window openings throughout contain red brick infill. Stair towers projecting from the southwest (identified as Stair Tower A on the annotated site plan) and northwest (Stair Tower B) corners are framed by brownstone quoins, and feature two vertical rows of brownstone block extending from the foundation to the roofline. Rounded arch entryways access each tower from the façade. Above each entryway are inset beveled brownstone blocks with raised numbering identifying the date of construction, "1917".

The main entrance, centered on the façade, was likely added when the property was converted to a research and development facility in 1936. The formed concrete surround, extending from the building's foundation to the second floor windowsills, is comprised of a series of linear setbacks that create a stepped outline. Massive, modern raised lettering identifying the building's address, " 56 ", are positioned above the transom.

The side (north and south) and rear (east) elevations are similar in configuration and detailing to the façade. An off-center water tower and elevator shaft project above the roofline, adjacent to an exterior brick chimney.

The Boiler Room is connected to the Main Block's east elevation, the Hyphen's south elevation, and the Coal Storage Addition and Hardening Department's west elevations. The single-story building has red brick walls with a corbelled brick and copper cornice similar to the Main Block. Two wide window openings with brownstone sills and segmental arch lintels pierce the south elevation, and one large entrance occupies the east elevation. Various gas meters and pipes are mounted to the exterior masonry. The Coal Storage Addition is also a single-story red brick structure. A punched garage door opening at the south elevation accesses the interior; the building contains no window openings. A parapet above the south wall is capped with terracotta coping.

The single-story Hardening Department is connected to the Boiler Room at its west elevation, to the Hyphen and Polishing \& Plating Department at its north elevation, and to the Coal Storage Addition at its south elevation. The building measures eight-bays-by-three-bays with red brick walls that rest on a concrete foundation and rise to a corbelled brick and copper cornice. Segmental arched window openings have brownstone sills; various openings contain concrete infill.

The single-story Polishing \& Plating Department is connected to the Hardening Department at its south elevation, to the Hyphen at its west elevation, and the Cafeteria at its north elevation. A fire
wall with terra cotta coping projects above the roofline between the Polishing and Hardening buildings. Window openings are identical to those in the Main Block and Hardening Department with segmental arches and brownstone sills. At the rear elevation, windows are infilled with painted concrete. A CMU Addition extends from the east elevation. Measuring seven-bays-by-one-bay, the structure has various square and rectangular window openings and one entrance centered on the façade (east elevation). Signage identifying the current occupant and project applicant, REAL ART WAYS, is painted across the north half of the façade.

The single-story Cafeteria connects to the Polishing \& Plating Department and CMU Addition at its south elevation. The building measures seven-bays-by-three-bays with red brick walls and large, rectangular window openings containing painted infill. A brick parapet with terra cotta coping projects above the roofline along the east, west and south elevations. A single-story, one-bay-by-three-bay CMU Addition extends from the Cafeteria's east elevation.

The single-story, red brick Hyphen connects to the Main Block at its west elevation, the Boiler Room and Hardening Department at its south elevation, and the Polishing \& Plating Department at its east elevation. One modern entrance and a series of square window openings are punched along the north elevation.

The exteriors remain in fair to good condition with visible soiling and staining of the brick and brownstone elements. Some efflorescence is visible at grade.

| Photo No. <br> Drawing No. | $1-27$ <br> Existing Conditions: AX30, AX31, AX32, AX33 |
| :--- | :--- |
| Renderings | Proposed Plans: A30, A31, A32, A33 <br>  <br> Real Art Ways Night Concert |
| Specifications | Maintenance of Masonry |
| Figure 1 | Annotated Site Plan |

## Describe Work and Impact on Existing Feature:

## Phase I

## Addition

The Polishing \& Plating Department's late $20^{\text {th }}$ century CMU Addition will be removed and a rectangular, single-story, lobby, café, theater, and live arts addition constructed. Exterior walls will be clad with a metal panel system and windows will be insulated aluminum sash with latticed aluminum overhangs for sun shading. The corridor proposed between the new construction and Polishing \& Plating Department, highlighted in pink on Sheet A21C (Proposed First Floor Plan), will serve as a visual separation between the two buildings. Primary access to this space will be provided by two pairs of aluminum storefront systems positioned between the Addition and Polishing \& Plating Department. The projecting canopy capping the entrance will include signage identifying the new "Real Art Ways" space. The roof will be flat TPO. Interior finishes are described below under Number 5: Circulation and Number 6: Interior.

## Phase II

All existing brick, brownstone, and concrete will be rehabilitated in accordance with the Secretary of the Interior's Standards for Rehabilitation and Preservation Briefs 1 and 2. Areas of mortar deterioration will be repointed with a mortar mix consistent with the original. In limited areas where masonry is too damaged for repair or bricks are cracked or missing, new brick will be replaced inkind or repaired to match the original in size, color, and texture. Masonry cleaning will be undertaken in areas of repair and repointing; Black Beauty or any other harsh abrasive will not be used to clean the masonry. Any proposed surface cleaning shall be conducted using the gentlest means possible. Specifications for masonry cleaning, repair, and replacement are provided with this submittal.

Metal elements will be gently cleaned with a nonacidic liquid chemical cleaner and will be repainted to match the existing patina finish.

The modern raised lettering identifying the building's address, " 56 ", above the main entrance will be removed and the stone repaired.

## Number 2

Architectural Feature:
Approximate Date of Feature:

Windows
1917, 1927, 1935, 1943, Late 20th C.

## Description of Existing Feature and its Condition:

Most of the Main Block windows consist of aluminum replacement sash. Those along the west elevation are comprised of pairs of hung, six-over-six units positioned beneath 12-light fixed sash. The north, south, and east elevation windows are simpler, and typically feature pairs of one-over-one windows beneath a glazed transom.

A limited assortment of historic wood sash remains throughout, including eight-over-eight, 10-over10 , and 20-over-20 hung units. A pair of nine-over-nine wood windows in rectangular openings flank the main entrance at the façade/west elevation. Along the second floor of the east elevation, many units were partially replaced; the lower halves contain sliding aluminum inserts positioned beneath the original 20-light wood sash. The historic wood was covered with metal panels, likely in an attempt to reduce exposure to the elements and continued deterioration.

Various openings contain brick or plywood infill, and most of the first-floor units along the west elevation have metal security grilles riveted to the exterior masonry.

The wood windows are in fair condition and suffer from deference maintenance with flaking and peeling paint and broken panes, which has likely caused water intrusion and rot. Replacement windows are in good and operable condition.

The Boiler Room has two window openings on its south elevation that each contain three sets of six-over-six hung wood sash separated by simple flat mullions. The only window opening on the east elevation contains CMU and brick infill. There are no windows in the Coal Storage Addition.

The Hardening Department has a pair of replacement aluminum sash that match the configuration of the replacement units in the Main Block's east elevation. The remaining openings contain CMU infill.

The Polishing \& Plating Department retains three historic 25 -over- 15 wood sash at its east elevation. The remaining window openings contain concrete and brick infill. The CMU Addition contains punched aluminum windows in various configurations.

All of the Cafeteria window openings contain concrete or brick infill. The CMU Addition contains four-light windows in the south and east elevations covered by steel security grates.

The Hyphen has six punched one-over-one aluminum windows on its north elevation.

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Photo No. \(\quad 1-28,30,33,35,41-43,48-50,52,54,78,82,84,87-89,96\)
    Existing Wood Window Photographs 1-9
    Existing Conditions: AX30, AX31, AX32, AX33, AX50
    Proposed Plans: A30, A31, A32, A33, A50
    DBVW Window Survey
```


## Description of Proposed Work and Impact on Existing Feature:

## Phase I

Three modern replacement windows in the Hardening Department will be removed and the openings infilled with CMU to accommodate the proposed theaters (see Sheet A31, Detail 3).

## Phase II

Most of the Main Block aluminum replacement windows will be retained and repaired, as needed.
Masonry-infilled openings will be retained.
Security grilles will be removed and will not be replaced.
The pair of nine-over-nine wood sash flanking the main entrance will be restored.
All remaining wood sash and frames in the Main Block and Polishing \& Plating Department, as well as the partially-replaced sash at the Main Block's east elevation, will be completely removed and replaced with new Low-E, double-glazed, fixed over awning aluminum windows with spacer bars, exterior applied muntins and interior screens within the existing window openings. Extant original windows will be used to replicate the size, configuration, and profiles of the original windows as closely as possible. Custom aluminum brick molds will be fabricated to closely approximate the existing. Windows and brick molds will be green to match the historic color.

The change in window operability from double-hung to awning is due to the overall size of the windows. The following summary was provided by the project's window vendor, Winnco:
"The biggest issue with either the single- or double-hung options is the overall size of the existing windows. If the windows were to be made as either a single or double hung window, they would be larger than the AAMA test size ( 60 " $x 99$ ") and would most likely not come with a warranty. If we say in general the existing window openings are approximately 60 " $x 120$ ", the weight of the window sashes would be approximately 150 lbs. each. This is more than the balancers can reasonably handle. Also, the meeting rails will not meet the wind load or dead load requirements at this size. This is the main reason we opted to go with the hung replica option."

The Boiler Room windows will be fully removed and replaced with new Low-E, double-glazed, energy efficient six-over-six aluminum sash with spacer bars, exterior applied muntins and interior screens within the existing window openings. Extant original windows will be used to replicate the size, configuration, and profiles of the original windows as closely as possible. Custom aluminum brick molds will be fabricated to closely approximate the existing. Windows and brick molds will be green to match the historic color. The modern Coal Storage overhead door will be repaired and painted (see photos $11 \& 12$ for reference).

The Polishing \& Plating Department's infilled openings will be retained. The CMU Addition windows will be removed to accommodate the proposed Addition.

The Cafeteria's infilled openings will be retained. The CMU Addition windows will be retained, repaired as needed, and painted.

The punched Hyphen one-over-one aluminum sash will be retained and repaired as needed.

## Number 3

Architectural Feature:
Approximate Date of Feature:

Exterior Entrances
1917, 1927, 1935, 1943, Late 20th C.

## Description of Existing Feature and its Condition:

The Underwood Computing Machine Company complex has a total of 15 exterior entrances; seven of these doors access the Main Block. Stair towers A and B have pairs of original, half-light, raised panel doors within round arch masonry openings. The north leaf of each pair and both transoms are covered/infilled with plywood. Access is provided by concrete walkways and brownstone or granite stairs.

At the center of the façade is the main entrance. Accessed by a concrete walkway and stair with flanking knee walls, the entrance is comprised of an aluminum storefront system with glazed a transom and sidelights.

Additional flush metal doors or aluminum storefront systems are located on the south and east elevations. Two at the east elevation are capped by canvas canopies anchored to the exterior masonry by steel rods.

A pair of paneled doors accesses the Boiler Room on its east elevation, and a modern rolling overhead garage door accesses the Coal Storage Addition on its south elevation.

The Hardening Department and Polishing \& Plating Department have no exterior entrances.
The Polishing \& Plating Department's CMU Addition has two entrances at its east elevation. The main entrance to the RAW space is comprised of steel doors and a glazed transom accessed by a former concrete loading dock. The entrance is capped by a standing seam shed roof supported by square metal posts. The secondary entrance at the south end of the elevation is a flush metal door and concrete stair surrounded by a modern metal enclosure.

The Cafeteria has three punched exterior entrances located at its east, north, and west elevations. All are modern flush fire rated metal doors; the pair at the east elevation has vision panels.

The Hyphen is accessed on the north elevation by an aluminum storefront system. A modern canvas canopy is fastened to the exterior masonry.

Photo No. 1-5, 11-13, 15-21, 23, 24, 26-28, 37, 46, 48, 59
Drawing No. Existing Conditions: AX30, AX31, AX32, AX33, AX52
Proposed Plans: A30, A31, A32, A33, A52
Product Specification Mapes Super Lumideck Flat Soffit Canopy

## Description of Proposed Work and Impact on Existing Feature:

## Phase I

No work is proposed in Phase I.

## Phase II

Most of the existing exterior entrances will be retained and repaired as needed.
The Main Block's historic stair tower doors will be restored, per details provided on Sheets AX52 and A52. The existing plywood will be removed, and the north leaves and transoms fit with new glass. Original/deteriorated hardware will be replaced with code-compliant handles and locks.

The fabric canopies capping the secondary entrances at the Main Block and Hyphen will be replaced with new aluminum canopies that are more compatible with the industrial character of the complex. Please see the Mapes Super Lumideck Flat Soffit Canopy product specification for additional information.

As noted above, the Polishing \& Plating Department's CMU Addition will be removed. The proposed Addition will have four fully glazed aluminum storefront systems at the east and south elevations.

## Number 4

Architectural Feature:
Approximate Date of Feature: 1917, 1927, 1935, 1943, Late 20th C.

## Description of Existing Feature and its Condition:

The Main Block has a tar and gravel roof pierced by various vents and mechanical equipment surrounded by a masonry parapet. The stair towers and rear water tower have hipped roofs clad in asphalt shingles. A copper vent hood caps the water tower. Signage is mounted to the roof's northeast corner.

The Boiler Room has a tar and gravel roof, and the Coal Storage Addition has a flat membrane with modern aluminum gutters and downspouts.

The Hardening Department has flat tar and gravel roof and masonry parapet.
The Polishing \& Plating Department has a flat membrane roof and masonry parapet, with condensing units mounted at its north and south ends. The CMU Addition has a flat membrane roof.

The Cafeteria has a flat membrane flat pierced by nine pyramidal skylights. The Addition has a flat membrane roof with mechanical units. A metal safety guardrail is mounted to the CMU north, south, and east masonry walls around the roof.

The Hyphen has a flat membrane roof pierced by a single skylight and masonry parapet walls. The roof and skylight remain in poor condition, due to continual water incursion and ponding around the opening.

| Photo No. | N/A |
| :--- | :--- |
| Drawing No. | Existing Conditions: AX25A, AX25B, AX25C |
|  | Proposed Plans: A25A, A25B, A25C |

## Description of Proposed Work and Impact on Existing Feature:

## Phase I

All existing roofs will be removed. New roofs will have rigid insulation above the decking and new TPO systems installed. The stair tower asphalt shingles will be replaced with new architectural asphalt shingles. New mechanical equipment will replace the existing in most locations.

The signage mounted to the Main Block's northeast corner will be retained and restored.
An equipment screen will be integrated into the existing guardrail system on the CMU Addition.
The Hyphen skylight will be infilled to ensure the existing electrical equipment in this space remains weatherproof and intact.

New mechanical equipment is proposed on the Addition roof.

## Phase II

Mechanical equipment updates/upgrades will include new units on the roof in the same locations as the existing units.

## Number 5

$\begin{array}{ll}\text { Architectural Feature: } & \text { Mechanical, Plumbing, and Electrical Systems } \\ \text { Approximate Date of Feature: } & \text { Late 1980s-Present }\end{array}$ Approximate Date of Feature: Late 1980s-Present

## Describe Existing Feature and its Condition:

The mechanical and life safety systems have been altered over the years and are outdated, including boilers, hot water heaters, the heating distribution system, and fire alarm systems.

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Photo No. N/A
Drawing No. N/A
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## Describe Work and Impact on Existing Feature:

## Phase I

New mechanical, plumbing and electrical systems will be installed in the updated RAW program space. All new systems will comply with current building code requirements and will be sized appropriately. Existing rooftop mechanicals will be replaced in-kind approximately in their existing locations.

## Phase II

New or updated mechanical, plumbing, electrical and fire protection systems will be installed in the Main Block. All new or updated systems will comply with current building code requirements and will be sized appropriately. Existing rooftop mechanicals will be replaced in-kind approximately in their existing locations and new equipment added.

## Number 6

## Architectural Feature: Site

Approximate Date of Feature: N/A

## Description of Existing Feature and its Condition:

The building is located on a 2.93 -acre lot bound by $16-30$ Arbor Street on the north, Arbor and Orange streets on the west, 22 Orange Street and associated garages on the south, and the Connecticut Fastrak Busway on the east. A cast-iron picket fence follows the parcel line along Orange and Arbor streets, enclosing the site frontage along the façade/west elevation.

Paved pedestrian paths access each of the three exterior entrances on the front elevation.
A landscaped area surrounds the Boiler Room, Coal Storage, and Hardening Department at the southwest corner of the site. The remainder of the parcel consists of paved parking.

| Photo No. | 1, 2, 4, 6-25, 27 |
| :--- | :--- |
| Drawing No. | Existing Conditions: AX10 |
|  | $\underline{\text { Proposed Plans: A10 }}$ |

## Description of Proposed Work and Impact on Existing Feature:

## Phase I

The existing parking will be reconfigured and zoning-required islands and landscaping provided. The vehicular lane to the east of the site will be moved further east to increase the required landscaped area. A new concrete terrace will be added to the south side of the addition outside of the proposed café.

The landscaped area at the southwest corner of the site will be cleared of overgrown brush. Paved pedestrian pathways will be installed around the proposed Addition, Cafeteria, Polishing and Plating, and Hardening Department buildings.

## Phase II

The existing cast iron picket fence will be repaired and repainted.

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

### 1.2 SUMMARY

A. Section includes maintenance, restoration, and cleaning of brick and stone masonry.

1. Repairing unit masonry, including replacing units and custom masonry units.
2. Re-anchoring veneers.
3. Repointing joints.
4. Selective replacement of trim units.
5. Painting steel uncovered during the work.
6. Removal of un-used anchors.
7. Cleaning exposed masonry surfaces.
8. Providing new openings and infilling existing openings in existing masonry.
9. Heating of materials in cold weather.
10. The scope of masonry work is identified on the Drawings. All the systems and processes identified in this specification section may or may not be required. The Contractor shall review the Drawings and Specification together and coordinate the scope of work required.
B. Related Requirements:
11. Division 01 Section "Historic Treatment Procedures".
12. Division 02 Section "Selective Demolition."
13. Division 04 Section "Unit Masonry."
14. Division 07 Section "Joint Sealants" for sealing joints in restored masonry.
15. Division 07 Section "Sheet Metal Flashing and Trim" for flashings.
C. Products installed, but not furnished, under this Section include the following:
16. Steel lintels for masonry, furnished under Division 05 Section "Metal Fabrications."
1.3 INTENT
A. Due to the various buildings and exposures over time, provide (4) separate mortar colors for mock-ups in (4) locations. Three color variations per mock-up shall be provided for SHPO approval at each location.

### 1.4 DEFINITIONS

A. Very Low-Pressure Spray: Under 100 psi
B. Low-Pressure Spray: 100 to $400 \mathrm{psi} ; 4$ to 6 gpm .
C. Medium-Pressure Spray: 400 to 800 psi; 4 to 6 gpm .
D. Saturation Coefficient: Ratio of the weight of water absorbed during immersion in cold water to weight absorbed during immersion in boiling water; used as an indication of resistance of masonry units to freezing and thawing.

### 1.5 SCOPE OF WORK

A. The scope of masonry work is identified on the Drawings. All the systems and processes identified in this specification section may or may not be required. The masonry sub-contractor shall review the Drawings and specification together and coordinate the scope of work required.

### 1.6 SUBMITTALS

A. Product Data: For each type of product.

1. Include recommendations for application and use. Include test data substantiating that products comply with requirements.
2. For cast-stone and stone trim units, include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
B. Samples for Verification: Before erecting the mock-up, of the following:
3. Each type of new exposed masonry material to be used for replacing existing materials. Include in each set of samples the full range of colors and textures to be expected in the completed Work. Provide straps or panels containing at least four masonry units.
4. Each type and color of mortar for pointing and masonry repair in the form of sample strips, 6 -inches long by $1 / 4$-inch wide, set in aluminum or plastic channels.
a. Each set shall contain a close color range of at least three (3) samples of different mixes of colored sands and cements that product a mortar matching the cleaned masonry when cured and dry.
b. Submit with precise measurements on ingredients, proportions, gradations, and sources of colored sands from which each sample was made. Confirm availability of these ingredients.
5. Patching Compound: Submit sets of patching compound Samples in the form of plugs (patches in drilled holes) in sample units of masonry representative of the range of masonry colors on the building.
a. Have each set contain a close color range of at least three samples of different mixes of patching compound that matches the variations in existing masonry when cured and dry.
6. Each type of masonry cleaning.
7. Sealant Materials: See Division 07 Section "Joint Sealants."
8. Accessories: Each type of anchor, accessory, and miscellaneous support.
C. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names, and addresses of architects and owners. Skilled and experienced masons specializing in the repair and re-pointing of existing historic masonry walls shall do all work.
D. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients. Include test reports, per ASTM C780, for mortar mixes required to comply with property specification.
E. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units,
mortar type, and resulting net-area compressive strength of masonry determined according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.
F. Material Certificates: Include statements of material properties indicating compliance with requirements including compliance with standards and type designations within standards. Provide for each type and size of the following:
9. Cementitious materials. Include brand, type, and name of manufacturer.
10. Pre-blended, dry mortar mixes. Include description of type and proportions of ingredients.

### 1.7 INTENT

A. Cleaning: Clean exterior masonry surfaces using the gentlest materials and techniques possible which produce an acceptable degree of cleaning. It is understood that some surfaces are not cleanable by gentle methods and, when approved by the Architect such surfaces will remain incompletely cleaned.

1. Use the lowest concentration of cleaning solutions necessary to obtain acceptable clean masonry surfaces. Since the entire building is slated to be cleaned, and numerous surface contaminants are present, multiple cleaning methods and solutions will be required.
B. Repairing Masonry and Re-Pointing: Where indicated on the Drawings, repair or replace damaged masonry and re-point mortar joints to match the color texture and tooling of acceptable original work. Re-pointing work is intended to fill holes and voids in masonry construction, to replace crumbly or deteriorated mortar with sound mortar, and to make the existing walls as weatherproof and watertight as possible.
C. Repairing Masonry and Parging: Where indicated on the Drawings, remove loose parging and mortar back to sound mortar, repair or replace damaged masonry and re-point deep mortar joints to match the color texture and tooling of acceptable original work. Re-pointing work is intended to fill deep holes and voids in masonry construction, to replace crumbly or deteriorated mortar with sound mortar, and to make the existing walls as weatherproof and watertight as possible. Parge walls after mortar repairs are performed.
D. Work under this section is to conform to the United States Secretary of the Interior's Standards for Rehabilitation, as administered by the National Park Service and as follows:

## 1. The Connecticut State Historic Preservation Office (SHPO)

E. Demolition work that impacts masonry assemblies, including but not necessarily limited to removal of metal anchorages and cutting of new masonry openings, shall be part of the scope of Work of this Section.

1. Work shall be performed by the Masonry Sub-Contractor.

### 1.8 QUALITY ASSURANCE

A. Qualifications: Engage an experienced mason to perform work of this Section. Firm shall have completed work similar in material, design, and extent to that indicated for this Project with a record of successful in-service performance for a period of not less than ten (10) years.

1. Field Supervision: Maintain experienced full-time supervisors on Project site during times that masonry restoration and cleaning work is in progress.
2. Restoration Worker Qualifications: Persons who are experienced in restoration work of types they will be performing.
B. Cleaning and Repair Appearance Standard: Cleaned and repaired surfaces are to have a uniform appearance as viewed from 10 -feet away by Architect. Perform additional paint and stain removal, general cleaning, and spot repairing of small areas that are noticeably different, so that surface blends smoothly into surrounding areas.
C. Mockups: Prepare mockup of restoration and cleaning to demonstrate aesthetic effects and set quality standards for materials and execution and for fabrication and installation.
3. Masonry Repair: Prepare sample areas for each type of masonry material indicated to have repair work performed. If not otherwise indicated, size each mockup not smaller than two adjacent whole units or approximately 48 -inches in least dimension. Erect sample areas in existing walls unless otherwise indicated, to demonstrate quality of materials, workmanship, and blending with existing work. Include the following as a minimum:
a. Replacement: Four brick units replaced.
b. Patching: Three small holes at least 1-inch in diameter, for each type of masonry material indicated to be patched. Leave no evidence of repair.
c. Re-Anchoring Veneers: Install three masonry repair anchors in mockup wall assembly of each anchor type required.
4. Re-Pointing: Prepare two separate sample areas, for each type of re-pointing required; one for demonstrating methods and quality of workmanship expected in removing mortar from joints and the other for demonstrating quality of materials and workmanship expected in pointing mortar joints. Provide areas of approximately 24 -inches square.
a. Obtain Architect's approval of mockups before starting the remainder of unit masonry restoration and cleaning.
b. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
5. Parging: Prepare two separate sample areas, for each type of re-pointing required; one for demonstrating methods and quality of workmanship expected in removing loose parge and mortar from joints and the other for demonstrating quality of materials and workmanship expected in pointing mortar joints and parging. Provide areas of approximately 24 -inches square.
a. Obtain Architect's approval of mockups before starting the remainder of unit masonry restoration and cleaning.
b. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
6. Cleaning: Prepare sample approximately 4 -square feet for each type of masonry and surface condition.
a. Test cleaners and methods on samples of adjacent materials for possible adverse reactions. Do not use cleaners and methods known to have a deleterious effect(s).
b. Allow a waiting period of not less than seven (7) calendar days after completion of sample cleaning to permit a study of sample panels for negative reactions.
7. Locate mock-ups on the building where directed by the Architect. Samples should be located in inconspicuous areas.
8. Notify Architect and OPM at least seven (7) calendar days in advance when mockups are ready for review.
9. Approval of mockups for compliance with historical replication as detailed and indicated on the Drawings is required by the National Park Service and the State and Local Historic District Commission having jurisdiction.
a. Approval of mockups is also for other material and construction qualities specifically approved by the Architect,
b. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless such deviations are specifically approved by Architect and the State and Local Historic District Commission in writing.
10. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
11. Maintain mockups during construction to serve as the standard for the Work.
12. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
D. Source of Materials: Obtain materials for masonry restoration from a single source for each type of material required (brick, stone, lime, sand, etc.) to ensure a match of quality, color, pattern, and texture.
E. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from a single manufacturer for each cementitious component and from one source or producer for each aggregate.
F. Pre-Installation Conference: Conduct conference at Project site.
13. Review methods and procedures related to masonry restoration, repair and cleaning including, but not limited to, the following:
a. Construction schedule. Verify availability of materials, Restoration Specialist's personnel, equipment, and facilities needed to make progress and avoid delays.
b. Materials, material application, sequencing, tolerances, and required clearances.

### 1.9 DELIVERY, STORAGE AND HANDLING

A. Store masonry units and cementitious materials on elevated platforms in a dry location. If masonry units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If masonry units or cementitious materials become wet, do not install until they are dry.
B. Coordinate delivery of materials to avoid delaying the Work and to minimize the need for on-site storage.
C. Store hydrated lime in manufacturer's original and unopened containers. Discard lime if containers have been damaged or have been opened for more than two days.
D. Store sand where grading and other required characteristics can be maintained, and contamination avoided.
E. Store masonry accessories to prevent corrosion and accumulation of dirt and oil.
F. Comply with manufacturer's written instructions for minimum and maximum temperature requirements for storage.

### 1.10 FIELD CONDITIONS

A. Do not re-point mortar joints, excluding joints to be pointed with lime mortar, or repair masonry unless air temperature is between and 40 and 90 deg $F$ and will remain so for at least seven (7) calendar days after completion of Work.

1. At no additional cost to the project, the Contractor may provide temporary heat and enclosure to perform the Work.
B. Clean masonry surfaces only when air temperature is 40 deg $F$ and above and will remain so for at least seven (7) calendar days after completion of cleaning.
C. Protection of Masonry: During construction, cover projections and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
D. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil from masonry.
2. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
3. Protect sills, ledges, and projections from mortar droppings.
4. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
5. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.
E. For manufactured repair materials, perform work within the environmental limits set by each manufacturer.
F. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602. Include heating of materials.
6. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg Fand above and will remain so until masonry has dried, but not less than seven (7) calendar days after completing cleaning.
G. Hot-Weather Requirements: Comply with hot-weather construction requirements in TMS 602/ACI 530.1/ASCE 6. Protect masonry repair and mortar-joint pointing when temperature and humidity conditions produce excessive evaporation of water from mortar and repair materials. Provide artificial shade and wind breaks and use cooled materials as required to minimize evaporation. Do not apply mortar to substrates with temperatures of 90 deg F and above unless otherwise indicated.

### 1.11 COORDINATION

A. Coordinate masonry restoration and cleaning with public circulation and egress at Project site.

### 1.12 SEQUENCING AND SCHEDULING

A. Order materials as soon as possible to avoid delaying completion of the Work.
B. Perform masonry restoration work in the following sequence:

1. Remove plant growth, unused anchors, and miscellaneous items.
2. Remove paint.
3. Inspect for open mortar joints and repair before cleaning to prevent the intrusion of water and other cleaning materials into the wall.
4. Perform preliminary cleaning at masonry surfaces.
5. Repair masonry including removal and replacement, infilling openings, removal and resetting, crack repair, and disassembly of masonry for new openings.
6. Rake out existing mortar and point masonry joints.
7. Repair existing masonry, including replacing existing unit with new.
8. Point existing mortar joints of masonry indicated to be restored and as otherwise noted.
9. Clean excess mortar from masonry surfaces.
10. Lightly clean all work, unless indicated on the Drawings.
11. After all work has been completed, complete a final rinse of masonry surfaces with lowpressure water only as the scaffold is being dismantled.
C. As scaffolding is removed, patch anchor holes used to attach scaffolding. Patch holes in masonry units to comply with "Masonry Unit Patching" Article. Patch holes in mortar joints to comply with "Repointing Masonry" Article.

PART 2 - PRODUCTS

### 2.1 MASONRY MATERIALS

A. Brick: Where required, provide new face brick with the same physical properties, colors, surface texture, size, and shape to match existing brickwork.

1. Provide building brick complying with ASTM C62, Grade SW where in contact with earth, Grade SW, MW, or NW for concealed backup; and of same vertical dimension as face brick, for masonry work concealed from view.
2. For existing brickwork that exhibits a range of colors or color variation within units, provide brick that proportionally matches that range and variation rather than brick that matches an individual color within that range.
B. Stone: Where required, provide natural building stone of variety, color, finish, size, and shape to match existing.
C. Concrete Masonry Units: Where required, provide new units in compliance with the requirements of Division 04 Section "Unit Masonry."

### 2.2 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C150, Type I or Type II, white or gray or both where required for color matching of exposed mortar.

1. Provide cement shall not contain more than 0.60 percent total alkali when tested as per ASTM C114.
B. Hydrated Lime: ASTM C207, Type S.
C. Mortar Sand: ASTM C144 unless otherwise indicated.
2. Color: Provide natural sand necessary to produce required mortar color.
3. For pointing mortar, provide sand with rounded edges.
4. Match size, texture, and gradation of existing mortar sand as closely as possible. Blend several sands if necessary, to achieve suitable match.
D. Mortar Pigments: Natural and synthetic iron oxides, compounded for mortar mixes. Use only pigments with a record of satisfactory performance in masonry mortars.
5. Products: Subject to compliance with requirements, provide one of the following:
a. Bayer Corporation, Industrial Chemicals Div.; Bayferrox Iron Oxide Pigments.
b. Davis Colors; True Tone Mortar Colors.
c. Solomon Grind-Chem Services, Inc.; SGS Mortar Colors.
E. Aggregate for Mortar: ASTM C144.
6. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
7. For joints less than $1 / 4$ inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.
8. White-Mortar Aggregates: Natural white sand or crushed white stone.
9. Colored Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.
F. Aggregate for Grout: ASTM C404.
G. Water: Potable.

### 2.3 CLEANING MATERIALS

A. Water: Potable.
B. Hot Water: Water heated to a temperature of 140 to 160 deg F.
C. Job-Mixed Detergent Solution: Solution prepared by mixing 2 cups of tetrasodium polyphosphate, $1 / 2$ cup of laundry detergent, and 20 quarts of hot water for every 5 gal of solution required.
D. Mold, Mildew, and Algae Remover, Job Mixed: Solution prepared by mixing 2 cups of tetrasodium pyrophosphate (TSPP), 5 quarts of 5 percent sodium hypochlorite (bleach), and 15 quarts of hot water for every 5 gal . of solution required.
E. Non-Acidic Liquid Cleaner: Manufacturer's standard mildly alkaline liquid cleaner formulated for removing mold, mildew, and other organic soiling from ordinary building materials, including polished stone, brick, aluminum, plastics, and wood.

1. Products: Subject to compliance with requirements, provide one of the following:
a. Dominion Restoration Products, Inc.; Bio-Cleanse.
b. Dumond Chemicals, Inc.; Safe n' Easy Architectural Cleaner/Restorer.
c. Price Research, Ltd.; Price Non-Acid Masonry Cleaner.
d. PROSOCO; Enviro Klean 2010 All Surface Cleaner.
2. Dilute chemical cleaners with water to produce solutions not exceeding concentration recommended by chemical-cleaner manufacturer.
F. Mild Acidic Cleaner: Manufacturer's standard mildly acidic cleaner containing no muriatic (hydrochloric), hydrofluoric, or sulfuric acid; or ammonium bifluoride or chlorine bleaches.
3. Products: Subject to compliance with requirements, provide one of the following:
a. ABR Products, Inc.; X-190 Limestone \& Concrete Cleaner.
b. Diedrich Technologies Inc.; Envirorestore 100.
c. Dominion Restoration Products, Inc.; DR-60 Stone and Masonry Cleaner.
d. PROSOCO; Enviro Klean BioWash.
e. EaCO Chem, Inc. HD Britenol
4. Dilute chemical cleaners with water to produce solutions not exceeding concentration recommended by chemical-cleaner manufacturer.

### 2.4 ACCESSORY MATERIALS

A. Liquid Strippable Masking Agent: Manufacturer's standard liquid, film-forming, strippable masking material for protecting glass, metal, and polished stone surfaces from damaging effects of acidic and alkaline masonry cleaners.

1. Products: Subject to compliance with requirements, provide one of the following:
a. ABR Products, Inc.; Rubber Mask.
b. Price Research, Ltd.; Price Mask.
c. PROSOCO; Sure Klean Strippable Masking.
B. Sealant: Refer to Division 07 Section "Joint Sealants" for a sealant and backer rod.
C. Setting Buttons and Shims: Resilient plastic buttons, non-staining to masonry, sized to suit joint thicknesses and bed depths of masonry units without intruding into required depths of pointing materials.
D. Masonry Anchors and Pins: Fabricate from Type 304 stainless-steel rods. Provide threaded and unthreaded rods as required.
2. Masonry Repair Anchors, Expansion Type: Mechanical fasteners designed for masonry veneer stabilization consisting of $1 / 4$-inch- diameter, Type 304 stainless-steel rod with brass expanding shells at each end and water-shedding washer in the middle. Expanding shells shall be designed to provide positive mechanical anchorage to veneer on one end and backup masonry on the other.
a. Products: Subject to compliance with requirements, provide one of the following:
1) BLOK-LOK Limited; Torq-Lok.
2) Dur-O-Wal, a Hohmann \& Barnard company; Mechanical Anchor Series DA5000 or DA5100.
3) Hohmann \& Barnard, Inc.; \#521RA-B.
2. Masonry Repair Anchors, Spiral Type: Driven-in, Type 304 stainless-steel spiral rods designed to be installed in drilled holes and relying on screw effect rather than adhesive to secure them to backup and veneer. Anchors are flexible in plane of veneer but rigid perpendicular to it.
a. Products: Subject to compliance with requirements, provide one of the following:
1) BLOK-LOK Limited; Spira-Lok.
2) Dur-O-Wal, a Hohmann \& Barnard company; Dur-O-Flex Friction Pinning Anchor DA508
3) Heckmann Building Products, Inc.; \#391 Remedial Wall Tie.
4) Hohmann \& Barnard, Inc.; Helix Spiro-Ties.
E. Stone to Stone Adhesive: One-part cementitious stone adhesive recommended by adhesive manufacturer for type of stone repair indicated and matching stone color.
1. Basis of Design Product: Cathedral Stone Products, Inc.; MasonRE Adhesive.
F. Horizontal and Vertical Masonry Joint Covers: T-shaped and L-shaped soft lead flashing bed in sealant. Refer to the Drawings for locations.
2. Basis of Design Product: "Type-A and Type-B "Weathercap Joint Protective System" by Weathercap, Inc. - Slidell, LA.
G. Paint Remover: Manufacturer's standard covered or skin-forming formulation for removing paint coatings from masonry.
3. Products: Subject to compliance with requirements, provide one of the following:
a. ABR Products, Inc.; Grip 'N Strip 800 Fast Acting.
b. Diedrich Technologies Inc.; 606 Multi-Layer Paint Remover or 606X Extra Thick Multi-Layer Paint Remover with pull-off removal system.
c. Dumond Chemicals, Inc.; Peel Away 1 System.
d. PROSOCO; Enviro Klean Safety Peel 1 or Enviro Klean Safety Peel 3 with Enviro Klean Overcoat.
H. Masking Tape: Non-staining, nonabsorbent material; compatible with mortar, joint primers, sealants, and surfaces adjacent to joints; and that easily comes off entirely, including adhesive.
I. Antirust Coating: Fast-curing, lead- and chromate-free, self-curing, universal modified-alkyd primer according to MPI \#23 surface-tolerant, anticorrosive metal primer.
4. Surface Preparation: Use coating requiring no better than -SP 3, "Power Tool Cleaning" surface preparation according to manufacturer's literature or certified statement.

### 2.5 MORTAR, PARGE, AND GROUT MIXES

A. Measurement and Mixing: Measure cementitious materials and sand in a dry condition by volume or equivalent weight. Do not measure by shovel; use known measure. Mix materials in a clean, mechanical batch mixer.

1. Mixing Pointing Mortar: Thoroughly mix cementitious materials and sand together before adding any water. Then mix again adding only enough water to produce a damp, unworkable mix that will retain its form when pressed into a ball. Maintain mortar in this dampened condition for 15 to 30 minutes. Add remaining water in small portions until mortar reaches desired consistency. Use mortar within one hour of final mixing; do not re-temper or use partially hardened material.
B. Colored Mortar: Produce mortar of color required by using specified ingredients. Do not alter specified proportions without Architect's approval.
2. Mortar Pigments: Where mortar pigments are indicated, do not exceed a pigment-tocement ratio of $1: 10$ by weight.
C. Do not use admixtures unless otherwise indicated.
D. Pointing Mortar for Brick and Stone: Mix mortar materials with 1-part Portland cement, 1.25parts lime, and 5 -parts sand. Add mortar pigments to produce mortar colors required.
E. Parge Coat: Mix mortar materials with 1-part Portland cement, $1 / 2$ part lime, and 3-parts sand.
F. Rebuilding/Setting Mortar for Brick and Stone: Mix same as pointing mortar except mortar pigments are not required.

### 2.6 MASONRY PATCHING COMPOUNDS

A. Masonry Patching Compound: Factory-mixed cementitious product that is custom manufactured for patching masonry.

1. Basis of Design Products:
a. Brick: "Jahn M110 Historic Pointing Mortar" by Cathedral Stone Products, Inc.
b. Granite: "Jahn M160 Granite Patching Mortar." by Cathedral Stone Products, Inc.
2. Use formulation that is vapor and water permeable (equal to or more than the masonry unit), exhibits low shrinkage, has lower modulus of elasticity than the masonry units being repaired, and develops high bond strength to all types of masonry.
3. Materials must have working qualities and retardation control to permit forming and sculpturing where necessary.
4. Formulate patching compound used for patching masonry in colors and textures to match each masonry unit being patched. Provide not less than three colors to enable matching the color, texture, and variation of each unit.

### 2.7 MATERIALS FOR EPOXY CRACK INJECTION

A. Epoxy Crack Injection Adhesive:

1. Hairline cracks up to $3 / 16$ " in width: Jahn M30 Micro Injection Adhesive.
a. Premixed cementitious injection grout that contains no corrosive constituents. The adhesive achieves extraordinary flow capacity, high penetration, and strong adhesion. Refer to product literature and technical data for material specifications. Use formulations of product suitable for varying substrates.
2. Cracks approximately $3 / 16$ " to $3 / 8^{\prime \prime}$ in width: Jahn M40 Crack and Void Injection Grout.
a. Premixed cementitious injection grout that does not contain any acrylic, latex, or other synthetic polymer bonding agents or additives. The grout only needs to be mixed with clean water. The grout is vapor permeable, frost and salt resistant, shrink resistant, and is physically compatible with the substrate. Refer to product literature and technical data for material specifications.

### 2.8 MIXING FOR EPOXY CRACK INJECTION

A. It is recommended that safety goggles, gloves, and a dust mask be worn for protection. Do not mix more material than can be used within approximately 30 minutes. Discard any mixed material that has been unused for 30 minutes or more.

## B. Jahn M30:

1. The mixing ratio is approximately 2 to 5 parts powder to 1 part water by volume.
2. Mix mechanically using a high-speed drill (3,000 RPM or higher) equipped with a Jiffler type-mixing paddle. After mixing, the mortar should be poured into another clean container using a sieve. Continued agitation is necessary if the mortar is allowed to sit prior to use.
C. Jahn M40:
3. The mixing ratio is approximately $2-21 / 2$ parts powder to 1 part water by volume.
4. Mix manually or mechanically, using a slow speed drill (400-600 RPM) equipped with a Jiffler type-mixing paddle. The material should be mixed for a minimum of three minutes, with continued agitation should the product be allowed to sit prior to use

## PART 3 - EXECUTION

### 3.1 PROTECTION

A. Protect persons, motor vehicles, surrounding surfaces of building being restored, building site, plants, and surrounding buildings from harm resulting from masonry restoration work.

1. Erect temporary protective covers over walkways and at points of pedestrian and vehicular entrance and exit that must remain in service during course of restoration and cleaning work.
B. Comply with chemical-cleaner manufacturer's written instructions for protecting building and other surfaces against damage from exposure to its products. Prevent chemical-cleaning solutions from contacting people, motor vehicles, landscaping, buildings, and other surfaces that could be harmed by such contact.
2. Cover adjacent surfaces with materials that are proven to resist chemical cleaners used unless chemical cleaners being used will not damage adjacent surfaces. Use materials that contain only waterproof, UV-resistant adhesives. Apply masking agents to comply with manufacturer's written instructions. Do not apply liquid masking agent to painted or porous surfaces. When no longer needed, promptly remove masking to prevent adhesive staining.
3. Keep wall wet below area being cleaned to prevent streaking from runoff.
4. Do not clean masonry during winds of sufficient force to spread cleaning solutions to unprotected surfaces.
5. Neutralize and collect alkaline and acid wastes for disposal off Owner's property.
6. Dispose of runoff from cleaning operations by legal means and in a manner that prevents soil erosion, undermining of paving and foundations, damage to landscaping, and water penetration into building interiors.
C. Prevent mortar from staining face of surrounding masonry and other surfaces.
7. Cover sills, ledges, and projections to protect from mortar droppings.
8. Keep wall area wet below rebuilding and pointing work to discourage mortar from adhering.
9. Immediately remove mortar in contact with exposed masonry and other surfaces.
10. Clean mortar splatters from scaffolding at end of each day.
D. Remove downspouts adjacent to masonry and store in a secure area during masonry restoration and cleaning. Reinstall when masonry restoration and cleaning are complete.
11. Provide temporary rain drainage during work to direct water away from building.

### 3.2 PLANT, MOSS, AND ALGAE REMOVAL

A. Completely remove all plant, moss, and algae growth from masonry surfaces. Work is part of basic scope of Contract and is exclusive of cleaning Work that may be provided per Alternates.

1. Cut ground-rooted creeping vegetation at grade and allow to die off before removal from masonry surfaces. Apply root-killing solution to plant roots according to manufacturer's written instructions.
2. Cut masonry-rooted vegetation below foliage and allow to die off before removal.
3. Completely remove all vegetative growth from masonry surfaces, being careful to remove all tendrils and suckers.
4. Clean all moss and algae from masonry surfaces. Use herbicidal solution per approved cleaning products if necessary.

### 3.3 MISCELLANEOUS ANCHOR REMOVAL

A. Remove all obsolete metal anchors, fasteners and brackets, wood nailers, and other extraneous items anchoring piping, conduit, downspouts, lighting, and electrical devices, etc., that are indicated for removal on the Drawings. Remove non-structural masonry-embedded metal corner guards and door frames only where indicated on the Drawings.

1. All removal Work shall be performed by Masonry Contractor.
2. Remove items so as to avoid spalling or cracking masonry.
3. If item cannot be removed without damaging masonry, cut item flush at masonry surface and core drill surrounding masonry as close around item as practical.
4. Patch holes following procedures of this Section.

### 3.4 MISCELLANEOUS PAINT REMOVAL

A. Paint Removal:

1. Remove loose and peeling paint using low-pressure spray, scrapers, stiff brushes, or a combination of these. Let surface dry thoroughly.
2. Apply paint remover to dry, painted masonry with trowel, spatula, or as recommended by manufacturer.
3. Apply cover, if required by manufacturer, per manufacturer's written instructions.
4. Allow paint remover to remain on surface for period recommended by manufacturer or as determined in test panels.
5. Scrape off paint and remover and collect for disposal.
6. Rinse with water applied by low-pressure spray to remove chemicals and paint residue.
7. Apply acidic cleaner or manufacturer's recommended after wash to masonry, while surface is still wet, using low-pressure spray equipment or soft-fiber brush. Let cleaner or after wash remain on surface as a neutralizing agent for period recommended by chemical-cleaner or after wash manufacturer.
8. Rinse with cold water applied by low-pressure spray to remove chemicals and soil.

### 3.5 PRELIMINARY CLEANING

A. Preliminary Cleaning: Before beginning general cleaning, remove extraneous substances that are resistant to cleaning methods being used. Extraneous substances include paint, calking, asphalt, and tar.

1. Carefully remove heavy accumulations of material from surface of masonry with a sharp chisel. Do not scratch or chip masonry surface.
2. Remove paint and caulking with paint remover.
a. Comply with requirements in "Paint Removal" Article.
b. Repeat application up to two times if needed.
3. Remove asphalt and tar with solvent-type paint remover.
a. Comply with requirements in "Paint Removal" Article.
b. Apply paint remover only to asphalt and tar by brush without pre-wetting.
c. Allow paint remover to remain on surface for 10 to 30 minutes.
d. Repeat application if needed.

### 3.6 REPOINTING BRICK AND STONE

A. Rake out and re-point joints to the following extent:

1. All joints in areas indicated on Drawings.
2. Joints where mortar is missing or where they contain holes.
3. Cracked joints where cracks are 1/16-inch or more in width and of any depth.
4. Joints where they are deteriorated to point that mortar can be easily removed by hand, without tools.
5. Joints where they sound hollow when tapped by metal object.
6. Joints where they are worn back $1 / 4$-inch or more from surface.
7. Joints that have spalled.
8. Joints where they have been filled with substances other than mortar.
B. Rake out joints as follows, according to procedures demonstrated in approved mockup:
9. Remove mortar from joints to depth of 2 times joint width, but not less than $1 / 2$-inch or not less than that required to expose sound, un-weathered mortar.
10. Remove mortar from masonry surfaces within raked-out joints to provide reveals with square backs and to expose masonry for contact with pointing mortar. Brush, vacuum, or flush joints to remove dirt and loose debris.
11. Do not spall edges of masonry units or widen joints. Replace or patch damaged masonry units as directed by Architect.
a. Use power-operated grinders, preferably pneumatic, to cut out mortar bed joints. Where power-operated grinders will not provide satisfactory results, remove mortar from top and bottom of vertical joints and other joints by hand using a chisel and resilient mallet.
C. Notify Architect of unforeseen detrimental conditions including voids in mortar joints, cracks, loose masonry units, rotted wood, rusted metal, and other deteriorated items.
D. Pointing with Mortar:
12. Rinse joint surfaces with water to remove dust and mortar particles. Time rinsing application so, at time of pointing, joint surfaces are damp but free of standing water. If rinse water dries, dampen joint surfaces before pointing.
13. Apply pointing mortar first to areas where existing mortar was removed to depths greater than surrounding areas. Apply in layers not greater than $3 / 8$-inch until a uniform depth is formed. Fully compact each layer thoroughly and allow it to become thumbprint hard before applying next layer.
14. After low areas have been filled to same depth as remaining joints, point all joints by placing mortar in layers not greater than $3 / 8$ inch. Fully compact each layer and allow to become thumbprint hard before applying next layer. Where existing masonry units have worn or rounded edges, slightly recess finished mortar surface below face of masonry to avoid widened joint faces. Take care not to spread mortar beyond joint edges onto exposed masonry surfaces or to featheredge the mortar.
15. When mortar is thumbprint hard, tool joints to match original appearance of joints as demonstrated in approved mockup. Finish joint by brushing with stiff brush to texture joint to match existing joint surface texture. Remove excess mortar from edge of joint by brushing.
16. Cure mortar by maintaining in thoroughly damp condition for at least 72 consecutive hours including weekends and holidays. Acceptable curing methods include covering with wet burlap and plastic sheeting, periodic hand misting, and periodic mist spraying using system of pipes, mist heads, and timers.
17. Hairline cracking within the mortar or mortar separation at edge of a joint is unacceptable. Completely remove such mortar and re-point.
E. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

### 3.7 BRICK REMOVAL, REPLACEMENT, AND INFILL

A. At locations indicated, remove bricks that are damaged, spalled, or deteriorated or are to be reused. Carefully remove by hand entire units from joint to joint, without damaging surrounding masonry, in a manner that permits replacement with full-size units.
B. Support and protect remaining masonry that surrounds removal area. Maintain flashing, reinforcement, lintels, and adjoining construction in an undamaged condition.
C. Notify Architect of unforeseen detrimental conditions including voids, cracks, bulges, and loose units in existing masonry backup, rotted wood, rusted metal, and other deteriorated items.
D. Remove and salvage in an undamaged condition as many whole bricks as possible.

1. Remove mortar, loose particles, and soil from brick by cleaning with hand chisels, brushes, and water.
2. Remove sealants by cutting close to brick with utility knife and cleaning with solvents.
3. Stack and store salvaged brick for reuse.
E. Clean bricks surrounding removal areas by removing mortar, dust, and loose particles in preparation for replacement.
F. Replace removed damaged brick with other removed brick in good condition where possible, or with new brick matching existing brick, including size. Do not use broken units unless they can be cut to a usable size, without visible damage.
G. Install new or salvaged brick to replace removed brick. Fit units into bonding and coursing pattern of existing brick. If cutting is required, use a motor-driven saw designed to cut masonry with clean, sharp, unchipped edges.
4. Maintain joint width for replacement units to match existing joints.
5. Use setting buttons or shims to set units accurately spaced with uniform joints.
6. At exterior openings cut by power saws remove cut bricks and tooth-in new bricks.
7. All brick faces exposed to weather must be outside faces of whole bricks.
8. Cut brick faces exposed to weather are not acceptable.
H. Lay replacement brick with completely filled bed, head, and collar joints. Butter ends with sufficient mortar to fill head joints and shove into place. Wet both replacement and surrounding clay bricks that have ASTM C67 initial rates of absorption (suction) of more than 30 g per 30 sq . inch minimum. Use wetting methods which ensure units are nearly saturated, but surface is dry when units are laid.
9. Tool exposed mortar joints in repaired areas to match joints of surrounding existing brickwork. Finish joint by brushing with stiff brush to texture joint to match existing joint surface texture.
10. Rake out mortar used for laying brick before mortar sets and point new mortar joints in repaired area to comply with requirements for re-pointing existing masonry, and at same time as re-pointing of surrounding area.
11. When mortar is sufficiently hard to support units, remove shims and other devices interfering with pointing of joints.

## 3.8 <br> BACKUP MASONRY REMOVAL AND REPLACEMENT

A. Where backup masonry is fractured or unstable and at locations indicated, remove mortar and masonry units that are broken or deteriorated and rebuild with whole, new brick or whole
salvaged units. Carefully remove entire units from joint to joint, without damaging surrounding masonry, in a manner that permits replacement with full-size units.
B. Support and protect remaining masonry that surrounds removal area.
C. Maintain flashing, reinforcement, anchors, lintels, and adjoining construction in an undamaged condition.
D. Notify Architect of unforeseen detrimental conditions, including voids, cracks, bulges, loose units beyond the removal area, rotted wood, rusted metal, and other deteriorated items.
E. Remove in an undamaged condition as many whole bricks as possible.

1. Remove mortar, loose particles, and soil from brick by cleaning with hand chisels, brushes, and water.
2. Remove sealants by cutting close to brick with utility knife and cleaning with solvents.
3. Store brick for reuse. Store off ground, on skids, and protected from weather.
4. Deliver cleaned brick not required for reuse to Owner unless otherwise indicated.
F. Clean masonry surrounding removal areas by removing mortar, dust, and loose particles in preparation for brick replacement.
G. Replace removed damaged brick with salvaged backup brick in good condition, where possible, or with new building brick matching existing backup brick. Do not use broken units unless they can be cut to usable size.
H. Install replacement brick into bonding and coursing pattern of existing brick. If cutting is required, use a motor-driven saw designed to cut masonry with clean, sharp, unchipped edges.
I. Lay replacement brick with rebuilding (setting) mortar and with completely filled bed, head, and collar joints. Butter ends with sufficient mortar to fill head joints and shove into place. Wet both replacement and surrounding bricks that have ASTM C67 initial rates of absorption (suction) of more than $30 \mathrm{~g} / 30 \mathrm{sq}$. in. per min. Use wetting methods that ensure that units are nearly saturated, but surface is dry when laid.
J. Curing: Cure mortar by maintaining in thoroughly damp condition for at least 72 consecutive hours, including weekends and holidays.
5. Hairline cracking within the mortar or mortar separation at edge of a joint is unacceptable. Completely remove such mortar and repoint.

### 3.9 REANCHORING VENEERS

A. Install masonry repair anchors in horizontal mortar joints and according to manufacturer's written instructions. Space anchors not more than 12 -inches on center vertically and 8 -inches on center horizontally apart unless otherwise indicated. Install at locations to avoid penetrating flashing.
B. Recess anchors $5 / 8$-inch or more from surface of mortar joint, and fill recess with pointing mortar.

### 3.10 PAINTING STEEL UNCOVERED DURING THE WORK

A. Notify Architect if steel is exposed during masonry removal. Where Architect determines that steel is structural, or for other reasons cannot be totally removed, prepare, and paint it as follows:

1. Surface Preparation: Remove paint, rust, and other contaminants according to -SP 3, "Power Tool Cleaning" as applicable to comply with paint manufacturer's recommended preparation.
2. Antirust Coating: Immediately paint exposed steel with two coats of antirust coating, following coating manufacturer's written instructions and without exceeding manufacturer's recommended rate of application (dry film thickness per coat).
B. If on inspection and rust removal, the thickness of a steel member is found to be reduced from rust by more than $1 / 16$ inch notify Architect before proceeding.

### 3.11 MASONRY UNIT PATCHING

## A. Patching Bricks:

1. Remove loose material from masonry surface. Carefully remove additional material so patch will not have feathered edges but will have square or slightly undercut edges on area to be patched and will be at least $1 / 4$ inch thick, but not less than recommended by patching compound manufacturer.
2. Mask adjacent mortar joint or rake out for repointing if patch will extend to edge of masonry unit.
3. Mix patching compound in individual batches to match each unit being patched.
4. Rinse surface to be patched and leave damp, but without standing water.
5. Brush-coat surfaces with slurry coat of patching compound according to manufacturer's written instructions.
6. Place patching compound in layers as recommended by patching compound manufacturer, but not less than $1 / 4$ inch or more than 2 inches thick. Roughen surface of each layer to provide a key for next layer.
7. Trowel, scrape, or carve surface of patch to match texture and surrounding surface plane or contour of the masonry unit. Shape and finish surface before or after curing, as determined by testing, to best match existing masonry unit.
8. Keep each layer damp for 72 hours or until patching compound has set.
3.12 MASONRY INSTALLATION, GENERAL
A. Thickness: Build walls and other masonry construction to full thickness shown.
B. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, un-chipped edges. Allow units to dry before laying, unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.
C. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures. Mix units from several pallets or cubes as they are placed.
D. Matching Existing Masonry: Match type, coursing, bonding, color, and texture. Verify in field, and then submit samples and constructing mock-ups for Architect's review and approval.
E. Comply with construction tolerances in ACI 530.1/ASCE 6/TMS 602 and with the following:
9. For conspicuous vertical lines such as external corners, door jambs, reveals, and expansion/control joints; do not vary from plumb by more than an $1 / 8$-inch in 10 feet and $1 / 4$-inch in 20 feet, but no more than a $1 / 2$-inchmaximum.
10. For vertical alignment of exposed head joints, do not vary from plumb by more than a 1/4-inch in 10 feet, or $1 / 2$-inchmaximum.
11. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than an $1 / 8$-inch in 10 feet, $1 / 4$-inch in 20 feet, or $1 / 2$-inch maximum.
12. For exposed bed joints, do not vary from thickness indicated by more than plus or minus an $1 / 8$-inch, with a maximum thickness limited to $1 / 2$-inch. Do not vary from bed-joint thickness of adjacent courses by more than an $1 / 8$-inch.
13. For exposed head joints, do not vary from thickness indicated by more than plus or minus $1 / 8$-inch. Do not vary from adjacent bed and head-joint thicknesses by more than $1 / 8-$ inch.
14. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than $1 / 16$-inch except due to warpage of masonry within specified tolerances for units.
15. For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than $1 / 16$-inch from one masonry unit to the next.

### 3.13 MORTAR BEDDING AND JOINTING

A. Lay masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.
B. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness, unless otherwise indicated.
C. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint), unless otherwise indicated.

### 3.14 PATCHING AND REPAIRING HOLES IN BRICK

A. For holes with a diameter of 2-inches or less, pack hole full depth with mortar. For holes with a diameter of larger than 2-inches, remove cut brick and replace with salvaged brick or new brick matching the existing.

### 3.15 DISASSEMBLY OF MASONRY

A. Carefully remove by hand masonry indicated on drawings to be removed. Remove units from joint to joint and in a manner to permit removal without damaging surrounding brick or other materials.
B. Support and protect construction that surrounds removal area.
C. Salvage as many whole, undamaged brick units as possible.
D. Remove mortar from salvaged units and store for reuse.
3.16 STONE CRACK REPAIR
A. Design Intent. The objectives of the Work of this Article include:

1. Repair of existing cracks using non-structural repairs using composite patch material.
B. Crack repair with composite patch material.
2. Cut out crack using a rotary tool for the full length and expanse of the crack. Crack shall be cut out to a depth back to sound stone not less than $1 / 2$-inch deep.
3. Install composite patch material per manufacturer's instructions in the cut-out area. Color of material shall match the host stone.
4. Clean cementitious crack filler from face of stone before it sets by scrubbing with water. Tool surface of material to match the host stone.

### 3.17 PARGING

A. Parge interior faces of masonry walls, where indicated, in one uniform coats to a total thickness of $1 / 4$ " inch. Dampen wall before applying first coat.
B. Use a steel-trowel finish to produce a smooth, flat, dense surface with a maximum surface variation of $1 / 8$-inch per foot.
C. Damp-cure parging for at least 24 hours and protect parging until cured.

### 3.18 CLEANING MASONRY

A. Proceed with cleaning in an orderly manner; work from bottom to top of each scaffold width and from one end of each elevation to the other. Ensure that dirty residues and rinse water will not wash over cleaned, dry surfaces.
B. Use only those cleaning methods indicated for each masonry material and location.
C. Perform each cleaning method indicated in a manner that results in uniform coverage of all surfaces, including corners, moldings, and interstices, and that produces an even effect without streaking or damaging masonry surfaces.
D. It may be necessary to employ different cleaning methods and products to clean the various materials and surfaces. Begin by cleaning with water, the gentlest means available. When water washing does not achieve the desired result, proceed with more aggressive methods as listed (in increasingly aggressive methods) below:

1. Method \#1A - Cold-Water Wash: Clean masonry with cold, low-pressure water.
2. Method \#1B - Hot Pressurized Water Wash: Clean stone masonry with hot water lowpressure spray hot water, followed by brushing.
3. Method \#2 - Detergent Cleaning: Clean masonry with a detergent solution applied as follows:
a. Wet masonry with cold water applied by low-pressure spray.
b. Scrub masonry with detergent solution using medium-soft brushes until soil is thoroughly dislodged and can be removed by rinsing. Use small brushes to remove soil from mortar joints and crevices. Dip brush in solution often to ensure that adequate fresh detergent is used, and that masonry surface remains wet.
c. Rinse with cold water to remove detergent solution and soil.
d. Apply rinse by medium-pressure spray.
e. Repeat cleaning procedure above where required to produce the cleaning effect established by mockup.
4. Method \#3 - Chemical Cleaning: If above options to not achieve acceptable results, as determined by the Architect, proceed with chemical cleaning of masonry surfaces. Use only the gentlest means necessary to achieve acceptable results as determined by the Architect. Clean brick masonry with nonacidic liquid cleaners applied as follows:
a. Wet masonry with water applied by low-pressure spray.
b. Apply cleaner to masonry in two applications by brush or low-pressure spray. Let cleaner remain on surface for period as recommended by chemical-cleaner manufacturer and as stablished by mockup.
c. Do not allow chemicals to remain on surface for periods longer than those indicated or recommended by manufacturer.
d. Rinse with water applied by low-pressure spray to remove chemicals and soil.
e. Repeat cleaning procedure above where required to produce cleaning effect established by mockup. Do not repeat more than once.
E. Final Cleaning: After mortar has fully hardened, thoroughly clean exposed masonry surfaces of excess mortar and foreign matter, use wood scrapers, stiff-nylon or fiber brushes, and clean water, spray applied at low pressure.
5. Do not use metal scrapers or brushes.
6. Do not use acidic or alkaline cleaners.
7. Wash adjacent woodwork and other non-masonry surfaces. Use detergent and soft brushes or cloths.
8. Clean mortar and debris from roof; remove debris from gutters and downspouts. Rinse off roof and flush gutters and downspouts.
9. Sweep and rake adjacent pavement and grounds to remove mortar and debris. Where necessary, pressure wash pavement surfaces to remove mortar, dust, dirt, and stains.

### 3.19 MASONRY WASTE DISPOSAL

A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.
B. Excess Masonry Waste: Remove excess clean masonry waste and other masonry materials, and legally dispose of off Owner's property.

## END OF SECTION 040120

## DBVW Window Survey Summary

Those windows that remain in poor condition exhibit areas of water infiltration that has caused damage to the interior of the sash and the sills, including cracking, paint failure, and rot. Paint failure, including blistering, flaking, and peeling, is visible on most surfaces, which is indicative of water penetration and deterioration. The glazing putty is loose, cracked, and missing sections, which has allowed water to saturate the wood, especially at the joints. Operability is difficult/unfeasible due to the weight and deterioration of the units. In addition, many of the original wood windows were partially replaced, resulting in retention of the original upper halves and sliding aluminum inserts in the lower halves. Additional photos of the deteriorated wood windows are linked above.

Those windows that remain in fair condition are typically the replacement aluminum sash that are not historically appropriate and have been inadequately installed. Sealants are not visible and improper fasteners.

Windows that are in good condition have the appropriate configurations, remain operable, and were constructed \& installed correctly.

First Floor Existing Window Type Keyplan

* Note: Window types EX-21 to EX-23 are not historic and omitted from this survey



## Second Floor Existing Window Type Keyplan



## Third Floor Existing Window Type Keyplan



## Fourth Floor Existing Window Type Keyplan



## Existing Window Summary

| Total Windows <br> and In fills | Fully In filled | Original <br> Windows | Non-Original <br> Windows | Hybrid Original and <br> Non- Original Windows |
| :--- | :--- | :--- | :--- | :--- |
| 385 | 31 | 53 | 273 | 28 |
| $100 \%$ | $8.1 \%$ | $13.8 \%$ | $70.9 \%$ | $7.3 \%$ |

Note:
These totals only reflect windows on the exterior of the building and do not include any existing in filled, or removed windows which became a part of the interior of the building during any additions. These total also do not include any windows which are a part of the CMU addition.

EX-1- Original Wood Window

| Good | Fair | Poor |
| :--- | :--- | :--- |
| 0 | 0 | 35 |
| $0 \%$ | $0 \%$ | $100 \%$ |



EX-1 - Original 20/20 double hung arched wood window


EX-1- Interior


EX-1-Exterior


EX-1-Interior

## EX-2- Original Metal Window

| Good | Fair | Poor |
| :--- | :--- | :--- |
| 0 | 0 | 3 |
| $0 \%$ | $0 \%$ | $100 \%$ |



EX-2 - Original 20/20 double hung
arched metal window with wire glass


EX-2- Interior

EX-3- Partially Original Wood Window

| Good | Fair | Poor |
| :--- | :--- | :--- |
| 0 | 0 | 3 |
| $0 \%$ | $0 \%$ | $100 \%$ |



EX-3 - Non-Original aluminum sliding window installed under original 20 pane upper sash


EX-3- Interior

EX-4- Partially Original Wood Window

| Good | Fair | Poor |
| :--- | :--- | :--- |
| 0 | 0 | 25 |
| $0 \%$ | $0 \%$ | $100 \%$ |



EX-4- Non-Original aluminum sliding window installed under original 20 pane upper sash covered with plywood


EX-4- Interior


EX-4- Interior

EX-5- Non-Original Aluminum Window

| Good | Fair | Poor |
| :--- | :--- | :--- |
| 0 | 86 | 0 |
| $0 \%$ | $100 \%$ | $0 \%$ |



EX-5 - Non-Original double mulled double hung aluminum window with arched transom. No exterior caulking is visible at the aluminum replacement windows


EX-5- Interior Sill

EX-6- Non-Original Aluminum
Window

| Good | Fair | Poor |
| :--- | :--- | :--- |
| 0 | 156 | 0 |
| $0 \%$ | $100 \%$ | $0 \%$ |



EX-6- Non-Original double mulled 6/6 double hung aluminum window with 12 pane arched transom


EX-6- Replacement windows have typically been inadequately installed. No sealant is visible and improper fasteners have been used

EX-7- Non-Original Aluminum
Window

| Good | Fair | Poor |
| :--- | :--- | :--- |
| 0 | 2 | 0 |
| $0 \%$ | $100 \%$ | $0 \%$ |



EX-7 - Non-Original double mulled double hung aluminum window with arched transom


EX-7- Interior

EX-8- Replacement Aluminum Double Hung Window

| Good | Fair | Poor |
| :--- | :--- | :--- |
| 0 | 0 | 7 |
| $0 \%$ | $0 \%$ | $100 \%$ |



EX-8- Replacement aluminum double hung window with carpentry in fill above


EX-8- Interior

EX-9- Non-Original Aluminum Window

| Good | Fair | Poor |
| :--- | :--- | :--- |
| 0 | 3 | 0 |
| $0 \%$ | $100 \%$ | $0 \%$ |



EX-9 - Non-Original 8/8 double hung aluminum window with 8 pane arched transom


EX-9- Interior

## EX-10- Original Wood Window

| Good | Fair | Poor |
| :--- | :--- | :--- |
| 0 | 2 | 0 |
| $0 \%$ | $100 \%$ | $0 \%$ |



EX-10- Original 9/9 double hung wood window


EX-10- Interior

## EX-11- Original Wood Window

| Good | Fair | Poor |
| :--- | :--- | :--- |
| 0 | 0 | 2 |
| $0 \%$ | $0 \%$ | $100 \%$ |



EX-11 -Original 4/4 double hung arched wood window


EX-11- Interior

## EX-12- Original Wood Window

| Good | Fair | Poor |
| :--- | :--- | :--- |
| 0 | 0 | 2 |
| $0 \%$ | $0 \%$ | $100 \%$ |



EX-12- Original triple mulled 6/6 double hung arched wood window


EX-12- Interior

EX-13- Original Wood Window

| Good | Fair | Poor |
| :--- | :--- | :--- |
| 0 | 0 | 1 |
| $0 \%$ | $0 \%$ | $100 \%$ |



EX-13 - Original 6/6 double hung arched wood window


EX-13- Interior

EX-14- Non-Original Wood Window

| Good | Fair | Poor |
| :--- | :--- | :--- |
| 0 | 6 | 0 |
| $0 \%$ | $100 \%$ | $0 \%$ |



EX-14- Non-Original double hung arched aluminum window


EX-14- Interior

## EX-15- Original Wood Window

| Good | Fair | Poor |
| :--- | :--- | :--- |
| 0 | 0 | 2 |
| $0 \%$ | $0 \%$ | $100 \%$ |



EX-15 - Original 6 pane fixed wood window


EX-15- Interior

## EX-16- Original Wood Window

| Good | Fair | Poor |
| :--- | :--- | :--- |
|  |  | 4 |
| $0 \%$ | $0 \%$ | $100 \%$ |



EX-16- Original 6/6 double hung arched wood window


EX-16- Interior

EX-17- Original Wood Window

| Good | Fair | Poor |
| :--- | :--- | :--- |
| 0 | 0 | 2 |
| $0 \%$ | $0 \%$ | $100 \%$ |



EX-17 - Non-Original 10 pane fixed arched aluminum window


EX-17- Interior

EX-18- Non-Original Aluminum Window

| Good | Fair | Poor |
| :--- | :--- | :--- |
| 0 | 5 | 0 |
| $0 \%$ | $100 \%$ | $0 \%$ |



EX-18- Non-Original double hung aluminum window


EX-18- Interior

EX-19- Non-Original Wood Window

| Good | Fair | Poor |
| :--- | :--- | :--- |
|  | 7 |  |
| $0 \%$ | $100 \%$ | $0 \%$ |



EX-19 - Non-Original double hung arched aluminum window


EX-19- Interior

EX-20- Replacement sliding window over masonry in fill

| Good | Fair | Poor |
| :--- | :--- | :--- |
|  | 1 |  |
| $0 \%$ | $100 \%$ | $0 \%$ |



EX-19 - Replacement sliding window over masonry in fill


EX-19- Interior

Infilled Window Types


Window infilled with brick


Window Infilled with Block


## 1. Existing wood window


2. Bottom rail and sill

3. Stile and muntins

4. Brick mold

5. Existing wood window

6. Brick mold, stile, bottom rail, sill and muntin


## 7. Muntin detail


8. Muntins, stile and brick mold

9. Sill and bottom rail

RE: Real Art Ways Expansion<br>56 Arbor Street<br>Hartford, Connecticut

To Whom It May Concern:

On behalf of 56 Arbor Street LLC, the owner of 56 Arbor Street, Hartford, Connecticut, I am acknowledging that I have been informed that The Public Archaeology Laboratory, Inc is in the process of submitting permitting applications to the City of Hartford for the expansion project associated with this property. 56 Arbor Street LLC consents to the submission of these applications and other applications as deemed necessary during the review process.

Sincerely,


Will K. Wilkins
Executive Director
Real Art Ways, Inc
56 Arbor Street LLC

