



Installation Overview for View Controls, Software and Services (CSS)



# Responsibilities: Installation Scope of Each Trade

# View responsibilities:

- 1. Shipment of IGUs, control system, programming and commissioning.
- 2. Assign a View Project Manager that will guide the project team successfully through the project from kickoff to closeout.
- 3. Provide all product documentation including IGU, roof sensor, control panel, window controller, and wiring datasheets.
- 4. Provide Preliminary Interconnect and Final Interconnect Drawings.
- 5. Provide training on proper installation of all View equipment and best practices.
- 6. Provide IGU and control system shipments on committed ship dates.
- 7. Mobilize Field Service Engineers (FSE) to perform final commissioning.
- 8. Mobilize Customer Success Manager (CSM) to work directly with end user during the construction phase and end phase to customize system and provide occupant training.
- 9. Provide a turnover package and operations training.
- 10. Provide warranty, support and service.

### **Glazing Contractor responsibilities:**

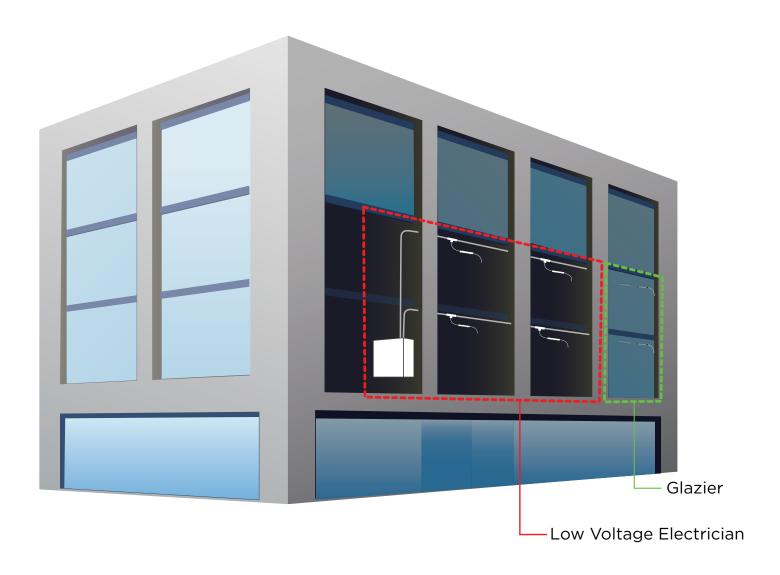
- 1. Provide shop drawings of View Smart Glass locations as specified by the architect.
- 2. Provide the final IGU sizes and makeup, IGU cable lengths and routing in the glazing system, phased shipment schedule, and packaging needs.
- 3. Provide Mark IDs for all IGU sizes.
- 4. Approve location of Smart Window Connector and routing of IGU cables in glazing system as specified in View glazier integration drawings.
- 5. Provide safe and secure storage of View materials until building is ready for installation.
- 6. IGU installation in facade with IGU cable stubbed out to agreed upon accessible location for easy hand-off to the low-voltage contractor or electricial contractor (Do not deviate from drawings without approval from View PM).
- 7. Label all IGU cables per View interconnect drawing. Glazier is responsible for testing each IGU during fabrication process using the GTT (glazier test tool), provided by View. Follow testing protocols found in the Glazier Quick Start Guide on View's website.
- 8. Label each IGU cable with green "TESTED" label (green "TESTED" labels provided by View).
- 9. Provide glazier support during View functional hardware testing and commissioning phase.
- 10. Do NOT field splice IGU cables or Smart Window Connectors.

## Low-Voltage or Electrical Contractor responsibilities:

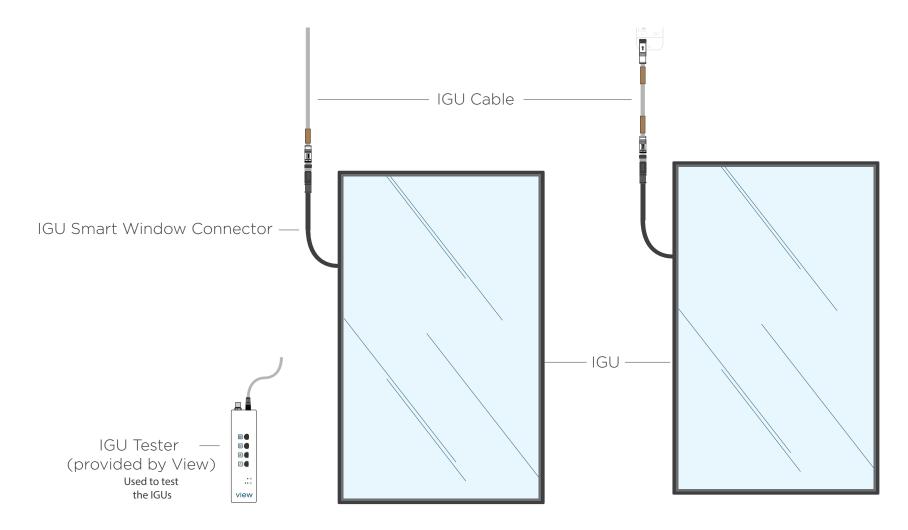
- 1. Based on View's design guidelines and data sheets, assist View with defining locations and routing of View control system including:
  - Control panels
  - Trunk cables
  - Power Insert cables
  - Splitters
  - Drop cables
  - Window controllers
  - IGU cables
  - Sky Sensor
  - Network connection cables
- 2. Provide final lengths of all cabling based on View's Preliminary Interconnect Drawing that will result in the Bill of Materials (BOM).
- 3. Define any phased delivery requirements based on the construction schedule.
- 4. Take delivery and provide safe and secure storage of View materials until building is ready for installation.
- 5. Installation of the following per View interconnect drawings (Do not deviate from drawings without approval from View PM):
  - Control panels
  - Trunk cables
  - Power Insert cables
  - Splitters
  - Drop cables
  - Window controllers
  - IGU cables
  - Sky Sensor
  - Network connection cables
  - Cell modem

- 6. All building penetrations, coring, raceways and sleeves necessary to accommodate View control cables. This work should be coordinated with glazing contractor and GC in accordance with local building codes.
- 7. If IGU cable needs to be extended, Low-Voltage or Electrical contractor shall test and label all IGUs using GTT (glazier test tool), see GTT guide for labeling protocol.
- 8. Labeling all trunk lines, power insert lines and IGU cables per View interconnect drawing.
- 9. Perform all Functional Hardware Testing prior to deployment of View FSE (Field Service Engineer).
- 10. Provide field support as needed during commissioning phase including, repairing items identified by the View FSE during commissioning phase. Any billable hours for troubleshooting should be coordinated with the General Contractor (GC).
- 11. Keep track of all cable and equipment changes including lengths, locations and cable pathways. Provide accurate redline drawings to View Project Manager at completion of project.
- 12. Electrician to provide stable power prior to functional hardware testing and commissioning.
- 13. All network cabling and connections between View equipment and customer network. If distance between View control panels exceeds 100-meters, fiber is required (i.e. control panels and sky sensor).
- 14. Some Union projects require the Low-Voltage contractor to install the IGU cables in the glazing system, check with the View project manager prior to bidding.
- 15. Do NOT field splice IGU cables or Smart Window Connectors.

# Glazier scope (in green) and LVE scope (in red)



# **Basic components for Glaziers**



Viewing from inside out

## **Glazier Resources**



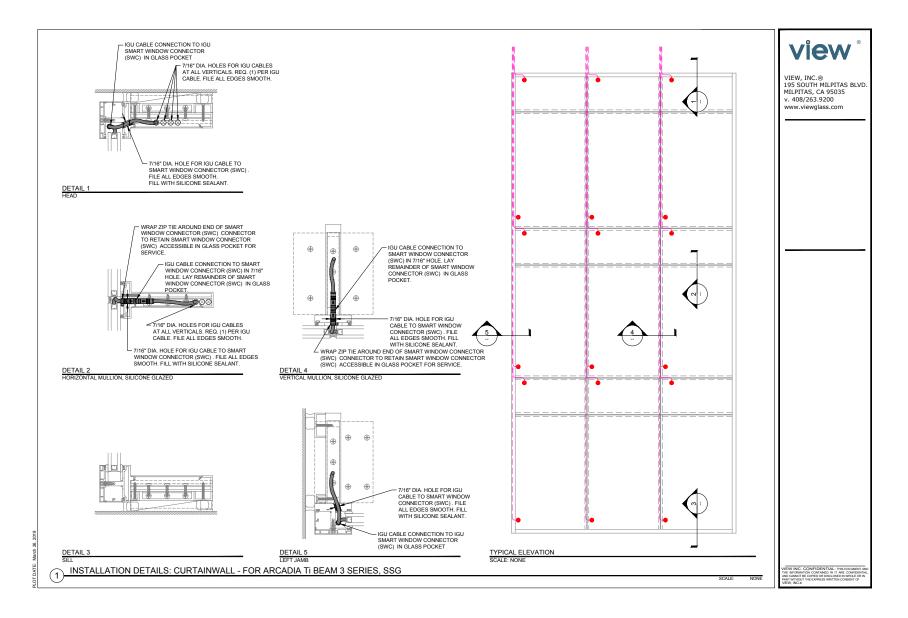
## **Glazing Installation Labor Estimate Example**

Below is a table showing an example IGU quantity for a 10,000 sq. ft. (glass area) building. Also shown are the expected additional installation labor minutes per IGU and extended total labor hours accounting for the total number of IGUs. This additional installation time is related to the glazier preparing the IGU frames by drilling holes, deburring hole edges, inserting silicone grommets, and sealing penetrations with silicone as needed to route IGU cable per View interconnect drawings. Glazier is also responsible for labeling IGU cables per View interconnect drawing. In this example, we are using \$100.00/hour for the labor rate. We suggest using local market labor rates for this project.

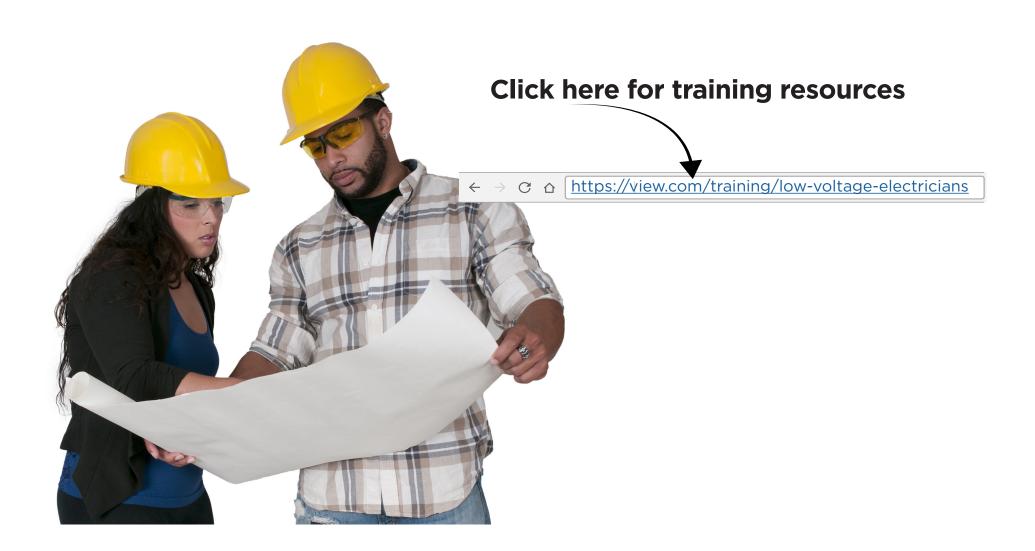
For this example, the IGU and Smart Window Connector are shown in the chart below. The IGU Smart Window Connector will be connected to the IGU cable by the glazing contractor and needs to be made accessible for the LV Electrician.

DEVICE/ITEM	QTY	LABOR MINUTES PER DEVICE	ESTIMATED TOTAL LABOR HOURS	LABOR RATE	TOTAL
IGU	500	45	375	\$100.00	\$37,500.00

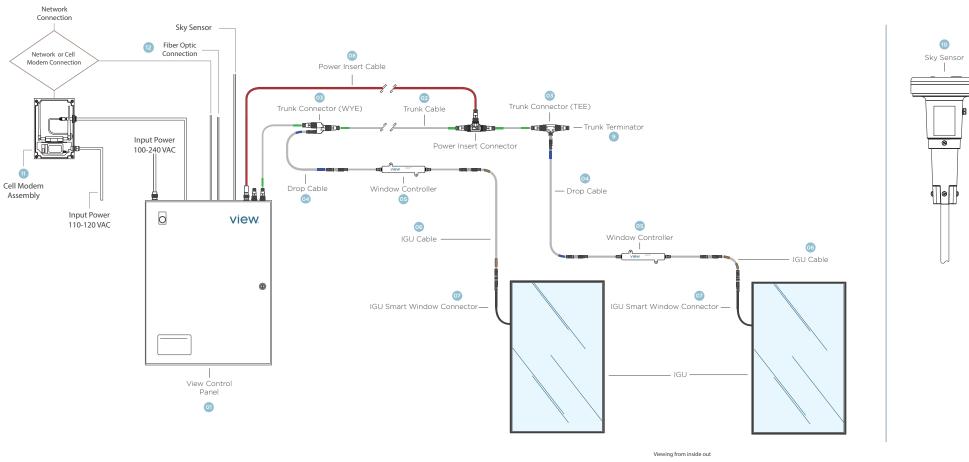
# **Glazier Shop Drawings**



# Low Voltage Electrician Resources



# **Components of View Control System without Dropbox**



# **Basic Control System Components Descriptions**

#### **Cabling System**

The View cabling system uses a trunk line/drop line network topology. In this topology, the trunk cable carries both power and data through the entire length of the installation. Drop cables are then tapped off of the trunk cable using trunk connectors at locations where window controllers are installed. The window controllers are then connected to individual IGU units via an IGU cable. Note: Component data sheets will supersede the information found here.

### Control Panel

Wall-mounted enclosure (21" x 29" x 9") that contains the power supplies, master controller, as well as auxiliary connections such as Ethernet and external sensors. At least one control panel is required for each installation. Each control panel can support up to 256 window controllers. For larger or multi-floor installations, multiple control panels may be required. Each Control Panel requires a dedicated 20-amp circuit (20-amp@120 VAC or 10-amp @240VAC).

#### Specifications for Control Panel:

 Input
 AC 100-240V ± 15%

 Frequency
 50-60 Hz ± 6%

 Output
 Class 2 24 VDC

### **Trunk Cable**

Pre-terminated cables fitted with 7/8", 5-pin connectors. Simple, hand-screw connection with no special tools required.

#### Specifications for Trunk Cabling:

- Max combined length approx. 1,500'
- Available in lengths from 1' to 160' (meter or fractional meter increments)
- Available in standard and plenum rated cables

## **103** Trunk Connectors

Used to connect drop cables to the trunk cable. Connectors available in both "Tee" and "Wye" configurations for installation flexibility.

### Orop Cable

Provides power and data to the window controller. Ties into the trunk cable via the trunk connector.

#### Specifications for Drop Cabling:

- Available in lengths from 1' to 32.9' (meter or fractional meter increments)
- Available in standard and plenum rated cables

### Window Controller

Facilitates power transmission to each IGU. Connected to a drop cable on one end and an IGU cable on the other end. Must be installed at an accessible, environmentally-controlled location. Typically one window controller is installed per IGU.

#### Specifications for Window Controllers:

Input 24 VDC

Output Range between  $\pm$  5 VDC Dimensions 4-5/8" x 3/4" x 3/4"

### 06 IGU Cable

Connects a window controller to the IGU Smart Window Connector cable.

#### Specifications for IGU Cabling:

- Available in lengths from 1' to 100' (meter or fractional meter increments)
- Available in standard and plenum rated cables
- Max combined length from the WC to the IGU is 100'

### **IGU Smart Window Connector**

Each IGU receives power from the control system through an IGU Smart Window Connector. The Smart Window Connector connector is embedded with a digital ID that is unique to that IGU's dimensions and specifications.

#### Specifications for IGU Smart Window Connector:

- -15" length located 3" from corner. Location changes based on shape and dimensions. See IGU data sheet for exact location.
- Requires 7/16" hole size

### Power Insert Cable

Transmits power from a power source to the trunk line via a

power insert connector. The power insert cable is 14/4 wire (14-AWG/4-conductor) spool options.

For long trunk lines, power inserts may be required to provide appropriate power. The power inserts can originate from:

- 1. Power output ports from the control panel
- 2. Standalone power injection panel (not shown in diagram)

#### Specifications for Power Insert Cabling:

- Field wireable power insert cables available in up to 1,000' spools
- One power insert is typically required after every (24) window controller connections
- All power insert cables are plenum rated

### Trunk Terminator

Installed at the end of each trunk line and also all unused trunk ports at the View control panel.

### Sky Sensor

Used to detect external light and infrared levels. Data from the sensor is transmitted to the control panel for Intelligence. It is typically mounted on the roof top.

### Specifications for Sky Sensor:

- Connects to View control panel via CAT5 cable
- Mounts to rooftop, must be clear of obstructions, 360-degree view of the horizon

### Cell Modem

Used as a temporary network connection to the View Site Ops monitoring system. Requires 110/120VAC 60Hz.

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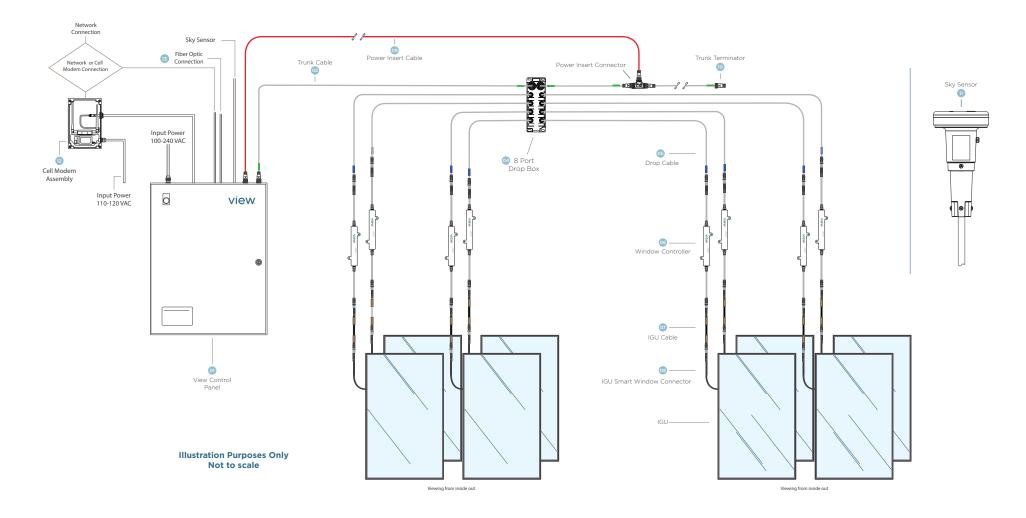
For connection of multiple control panels on a site: 2 Optional Fiber-optic kits are available for network connectivity greater than 328'.

- Multi Mode fiber for distances greater than 328' but less than 1500 feet.
- Single Mode fiber for distances greater than 1500 feet.

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· Maximum 2 Fiber Kits per Control Panel.

# **Components of View Control System with Dropbox**



## **Basic Control System Components Descriptions**

### **Cabling System**

The View cabling system uses a trunk line/drop line network topology. In this topology, the trunk cable carries both power and data through the entire length of the installation. Drop cables are then tapped off of the trunk cable using trunk connectors at locations where window controllers are installed. The window controllers are then connected to individual IGU units via an IGU cable. **Note:** Component data sheets will supersede the information found here.

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#### Specifications for Control Panel:

Input AC 100-240V ± 15% Frequency 50-60 Hz ± 6%

Output Class 2 24 VDC

### Trunk Cable

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#### Specifications for Trunk Cabling:

- Max combined length approx. 1,500'
- Available in lengths from 1' to 160' (meter or fractional meter increments)
- Available in standard and plenum rated cables

## 3 8-Port Drop Box

A network distribution component used to connect multiple Drop Cables to a Trunk Line. The distribution component will have 8 Drop Cable connection ports.

### Drop Cable

Provides power and data to the window controller. Ties into the trunk cable via the trunk connector.

Specifications for Drop Cabling:

- Available in lengths from 1' to 32.9' (meter or fractional meter increments)
- Available in standard and plenum rated cables

### Window Controller

Facilitates power transmission to each IGU. Connected to a drop cable on one end and an IGU cable on the other end. Must be installed at an accessible, environmentally-controlled location. Typically one window controller is installed per IGU.

#### Specifications for Window Controllers:

Input 24 VDC
Output Range between ± 5 VDC
Dimensions 4-5/8" x 3/4" x 3/4"

### 00 IGU Cable

Connects a window controller to the IGU Smart Window Connector cable.

#### Specifications for IGU Cabling:

- Available in lengths from 1' to 100' (meter or fractional meter increments)
- Available in standard and plenum rated cables
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Each IGU receives power from the control system through an IGU Smart Window Connector. The Smart Window Connector connector is embedded with a digital ID that is unique to that IGU's dimensions and specifications.

#### Specifications for IGU Smart Window Connector:

- ~15" length located 3" from corner. Location changes based on shape and dimensions. See IGU data sheet for exact location.
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## **®** Power Insert Cable

Transmits power from a power source to the trunk line via a

power insert connector. The power insert cable is 14/4 wire (14-AWG/4-conductor) spool options.

For long trunk lines, power inserts may be required to provide appropriate power. The power inserts can originate from:

- 1. Power output ports from the control panel
- 2. Standalone power injection panel (not shown in diagram)

#### Specifications for Power Insert Cabling:

- Field wireable power insert cables available in up to 1,000' spools
- One power insert is typically required after every (24) window controller connections
- All power insert cables are plenum rated

### Trunk Terminator

Installed at the end of each trunk line and also all unused trunk ports at the View control panel.

### Sky Sensor

Used to detect external light and temperature levels. Data from the sensor is transmitted to the control panel for Intelligence. It is typically mounted on the roof top.

#### Specifications for Sky Sensor:

- Connects to View control panel via CAT5 cable
- Mounts to rooftop, must be clear of obstructions, 360-degree view of the horizon

## Cell Modem

Used as a temporary network connection to the View Site Ops monitoring system. Requires 110/120VAC 60Hz.

## Fiber Kit

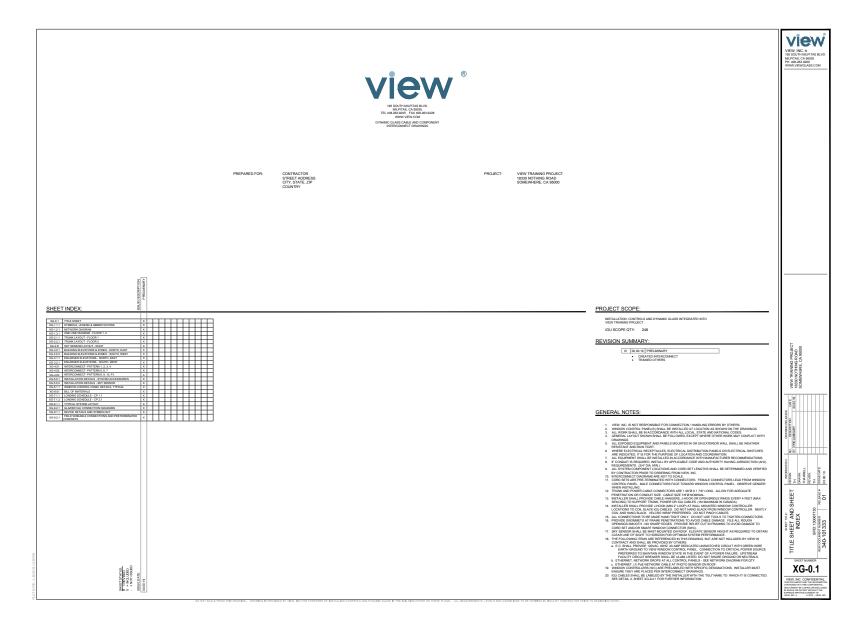
For connection of multiple control panels on a site: Two optional fiber-optic kits are available for network connectivity greater than 328'.

- Multi Mode fiber for distances greater than 328' but less than 1500 feet.
- Single Mode fiber for distances greater than 1500 feet.

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Maximum 2 Fiber Kits per Control Panel.

# Front Page of the Interconnect Drawing



### **General Notes**

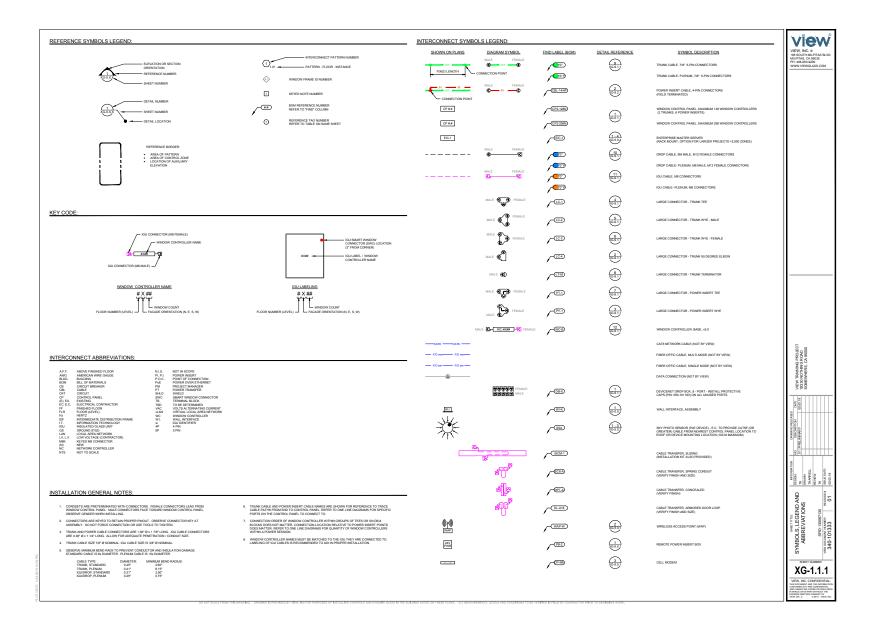
- VIEW, INC. IS NOT RESPONSIBLE FOR CONNECTION / HANDLING ERRORS BY OTHERS.
- 2. WINDOW CONTROL PANEL(S) SHALL BE INSTALLED AT LOCATION AS SHOWN ON THE DRAWINGS.
- 3. ALL WORK SHALL BE IN ACCORDANCE WITH ALL LOCAL, STATE AND NATIONAL CODES.
- GENERAL LAYOUT SHOWN SHALL BE FOLLOWED, EXCEPT WHERE OTHER WORK MAY CONFLICT WITH DRAWINGS.
- 5. ALL EXPOSED EQUIPMENT AND PANELS MOUNTED IN OR ON EXTERIOR WALL SHALL BE WEATHER RESISTANT AND RAIN TIGHT.
- WHERE ELECTRICAL RECEPTACLES, ELECTRICAL DISTRIBUTION PANELS OR ELECTRICAL SWITCHES ARE INDICATED, IT IS FOR THE PURPOSE OF LOCATION AND COORDINATION.
- 7. ALL EQUIPMENT SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER RECOMMENDATIONS.
- 8. IF CONDUIT IS REQUIRED, INSTALL BY APPLICABLE CODE AND AUTHORITY HAVING JURISDICTION (AHJ) REQUIREMENTS. (3/4" DIA. MIN.)
- ALL SYSTEM COMPONENT LOCATIONS AND CORD SET LENGTHS SHALL BE DETERMINED AND VERIFIED BY CONTRACTOR PRIOR TO ORDERING FROM VIEW, INC.
- 10. INTERCONNECT DIAGRAMS ARE NOT TO SCALE.
- 11. CORD SETS ARE PRE-TERMINATED WITH CONNECTORS. FEMALE CONNECTORS LEAD FROM WINDOW CONTROL PANEL. MALE CONNECTORS FACE TOWARD WINDOW CONTROL PANEL. OBSERVE GENDER WHEN INSTALLING.
- 12. TRUNK AND POWER CABLE CONNECTORS ARE 1.06"Ø X 1 7/8" LONG. ALLOW FOR ADEQUATE PENETRATION OR CONDUIT SIZE. CABLE SIZE 7/8"Ø NOMINAL.
- 13. INSTALLER SHALL PROVIDE CABLE HANGERS, J-HOOK OR OPEN BRIDLE RINGS EVERY 4 FEET (MAX SPACING) TO SUPPORT TRUNK, POWER OR IGU CABLES. (1M MAXIMUM IN CANADA)
- 14. INSTALLER SHALL PROVIDE J-HOOK (MIN 2" LOOP) AT WALL MOUNTED WINDOW CONTROLLER LOCATIONS

- TO COIL SLACK IGU CABLES. DO NOT HANG SLACK FROM WINDOW CONTROLLER. NEATLY COIL AND HANG SLACK. VELCRO WRAP PREFERRED. DO NOT PINCH CABLES.
- 15. ALL CONNECTIONS TO BE MADE HAND TIGHT ONLY. DO NOT USE TOOLS TO TIGHTEN CONNECTORS.
- 16. PROVIDE GROMMETS AT FRAME PENETRATIONS TO AVOID CABLE DAMAGE. FILE ALL ROUGH OPENINGS SMOOTH NO SHARP EDGES. PROVIDE RELIEF CUT IN FRAMING TO AVOID DAMAGE TO CORD SET AND/OR SMART WINDOW CONNECTOR (SWC).
- 17. SKY SENSOR SHALL BE MAST MOUNTED ON ROOF. ELEVATE SENSOR HEIGHT AS REQUIRED TO OBTAIN CLEAR LINE OF SIGHT TO HORIZON FOR OPTIMUM SYSTEM PERFORMANCE.
- 18. THE FOLLOWING ITEMS ARE REFERENCED IN THIS DRAWING, BUT ARE NOT INCLUDED BY VIEW IN CONTRACT AND SHALL BE PROVIDED BY OTHERS:
  - **a.** E.C. SHALL PROVIDE 120VAC, 60HZ, 20 AMP DEDICATED UNSWITCHED CIRCUIT WITH GREEN WIRE EARTH GROUND TO VIEW WINDOW CONTROL PANEL. CONNECTION TO CRITICAL POWER SOURCE PREFERRED TO MAINTAIN WINDOW STATE IN THE EVENT OF A POWER FAILURE. UPSTREAM FACILITY CIRCUIT BREAKER SHALL BE UL489 LISTED. DO NOT SHARE GROUND OR NEUTRALS.
  - **b.** ETHERNET, NETWORK DROPS AT ALL CONTROL PANELS SEE NETWORK DIAGRAM FOR QTY.
  - **c.** ETHERNET, (1) POE NETWORK CABLE AT PHOTO SENSOR ON ROOF.
- 19. WINDOW CONTROLLERS (WC) ARE PRELABELED WITH SPECIFIC DESIGNATIONS. INSTALLER MUST ENSURE THEY ARE PLACED PER INTERCONNECT DRAWINGS.
- 20.IGU CABLES SHALL BE LABELED BY THE INSTALLER WITH THE "IGU" NAME TO WHICH IT IS CONNECTED.

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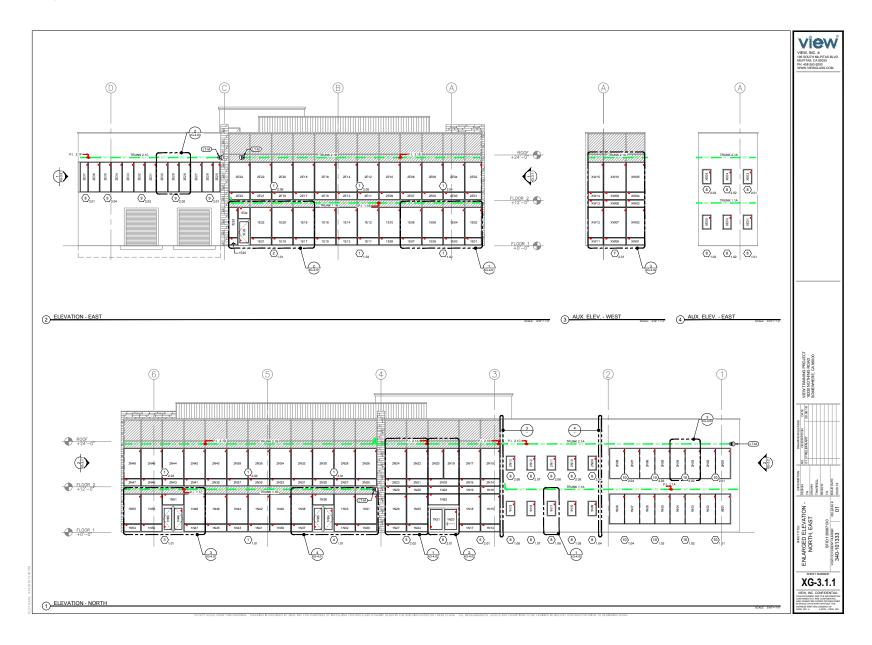
SEE DETAIL 3, SHEET XG-9.2.1 FOR FURTHER INFORMATION

# Symbols, Legends and Abbreviations Used

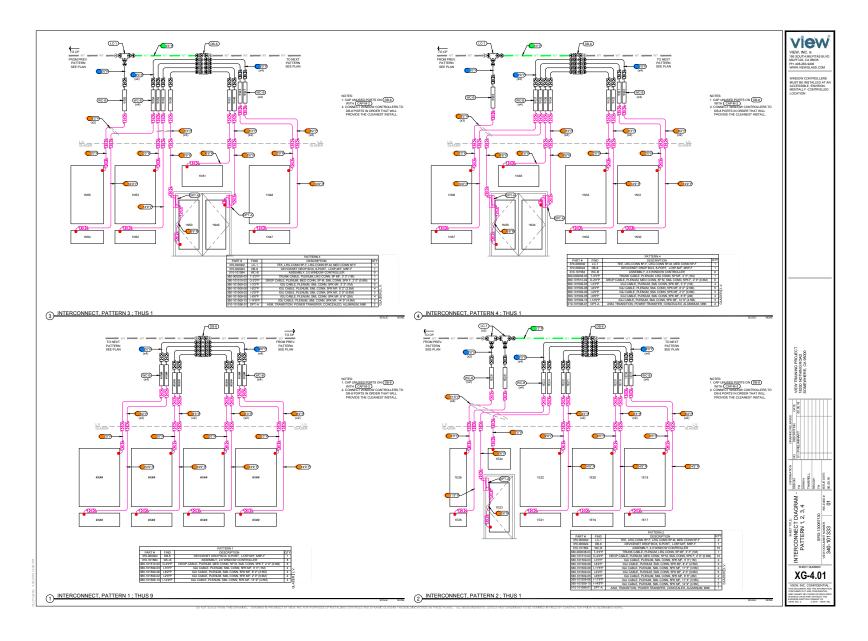


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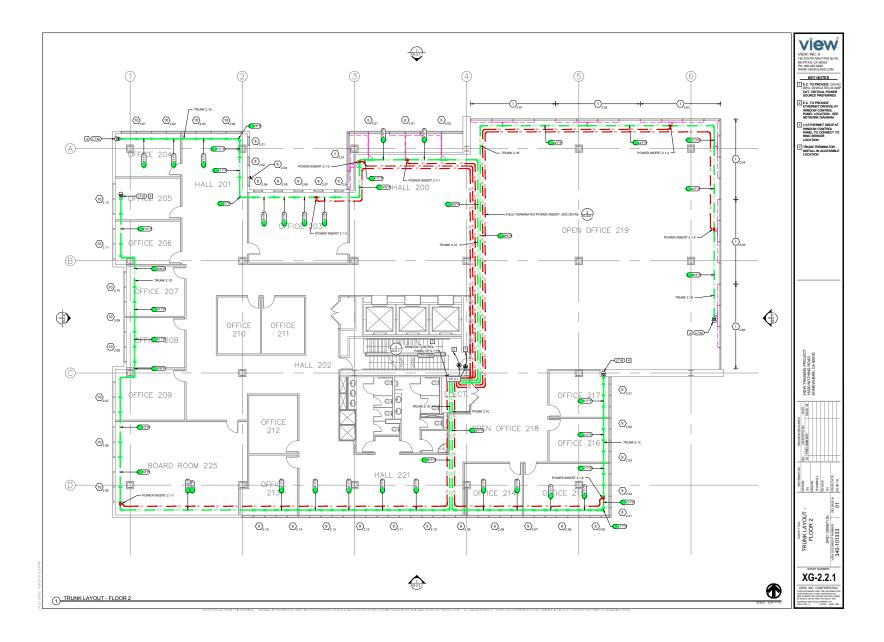
# **Detail Example**



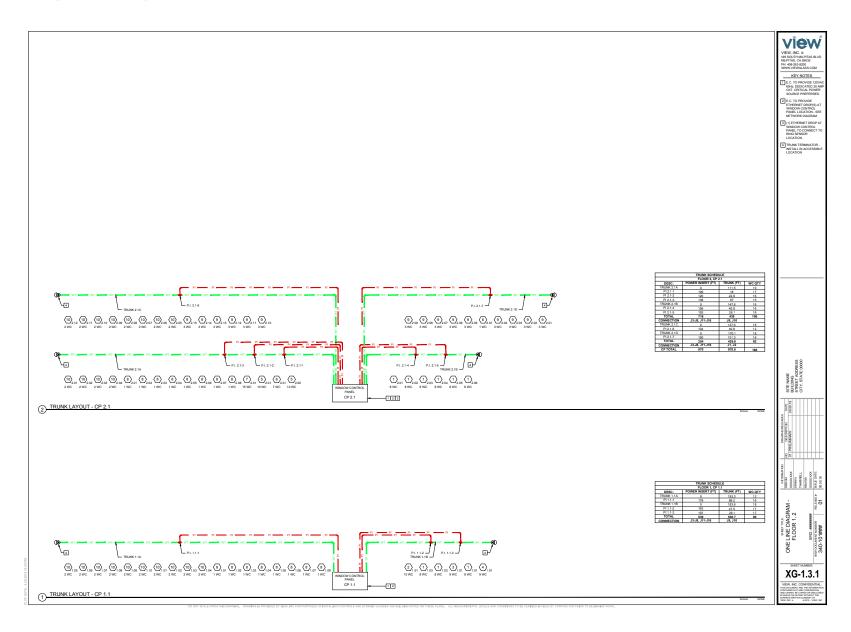
# Detail Example 2



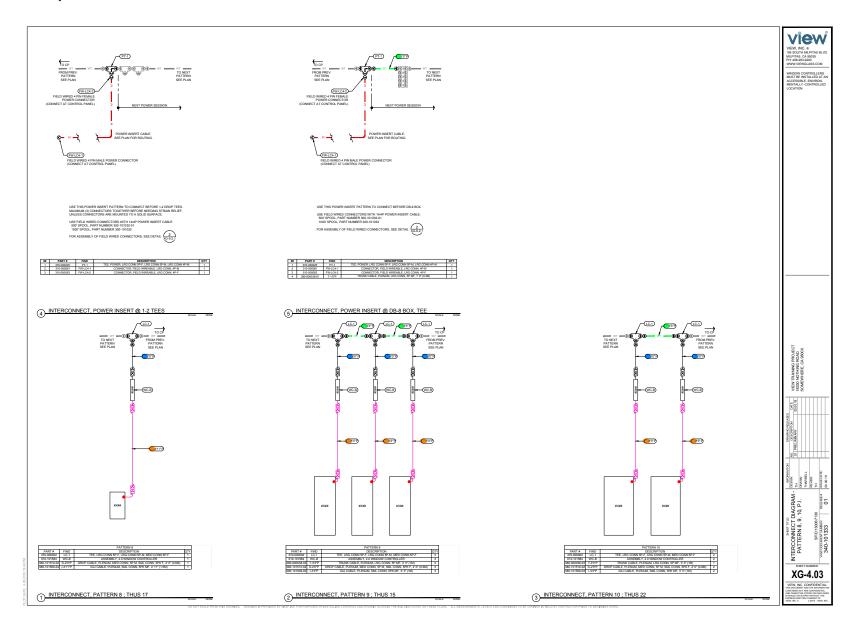
# **Trunk Line Layout Example**



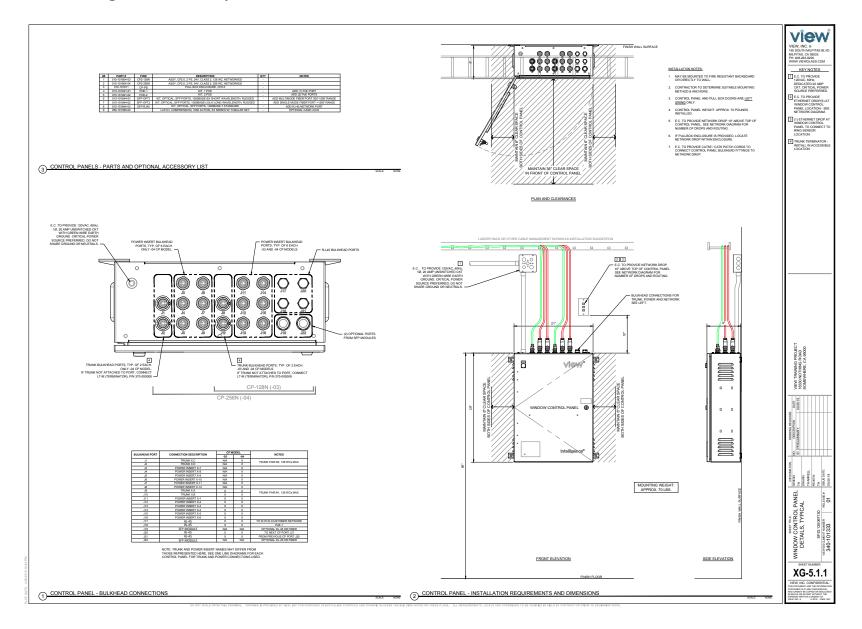
# **One-Line Diagram Example**



# Pattern Example

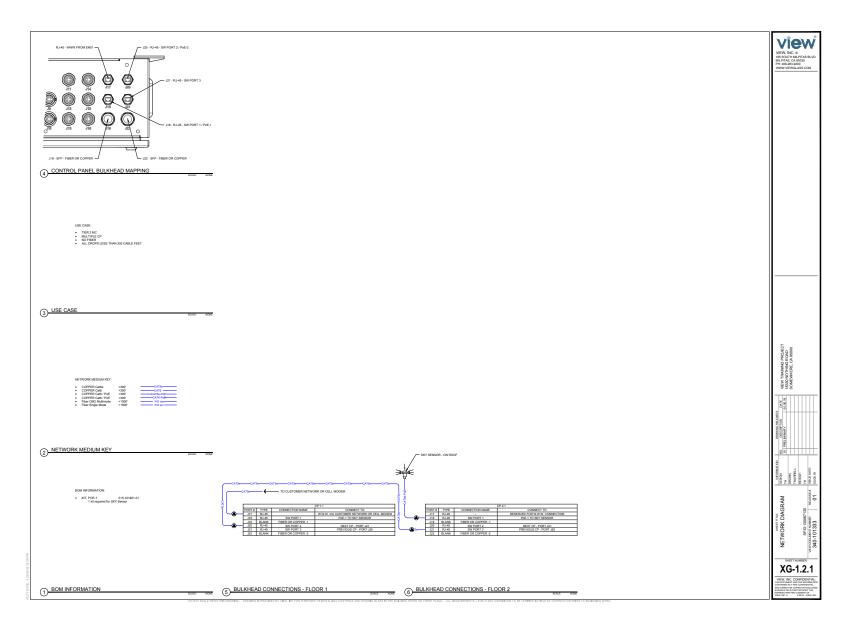


# **Control Panel Configuration Example**

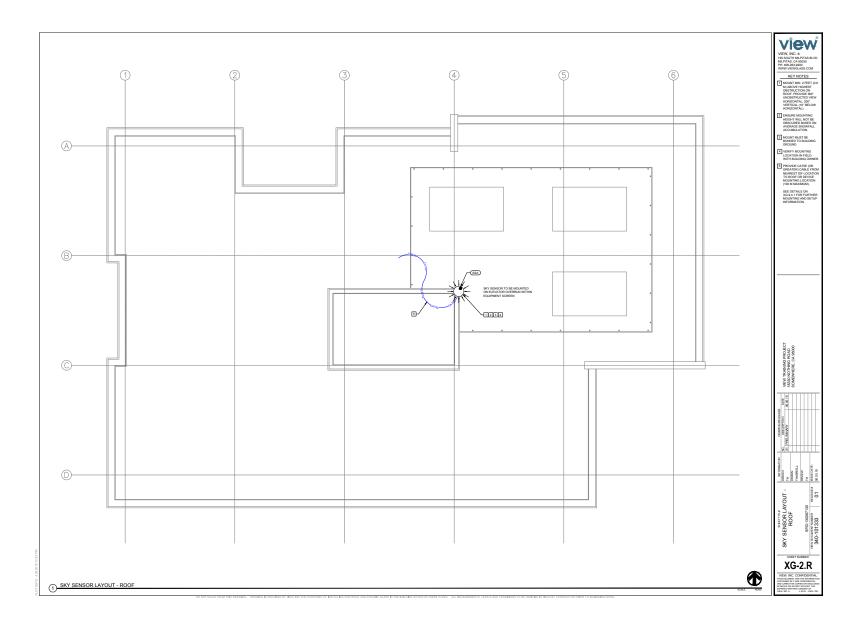


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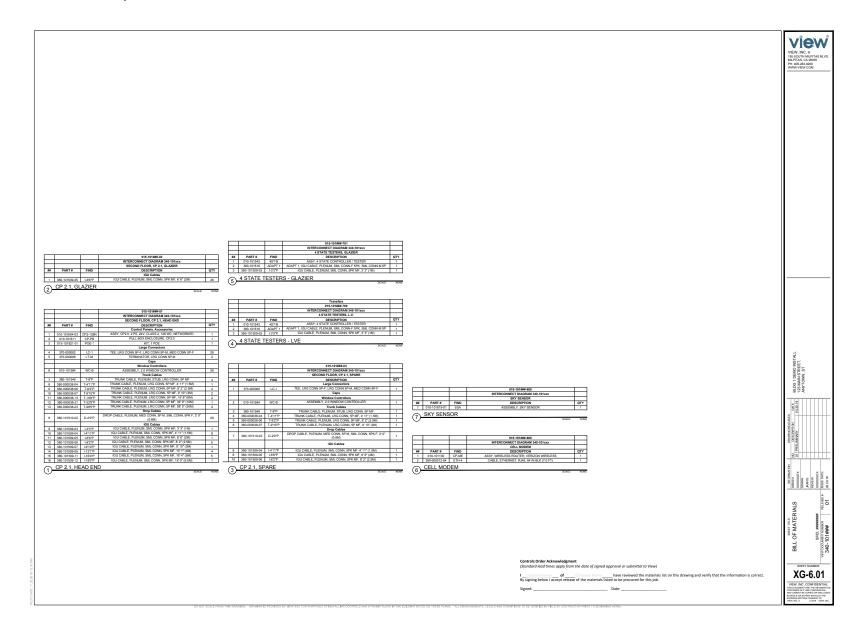
# **System Network Requirements Example**



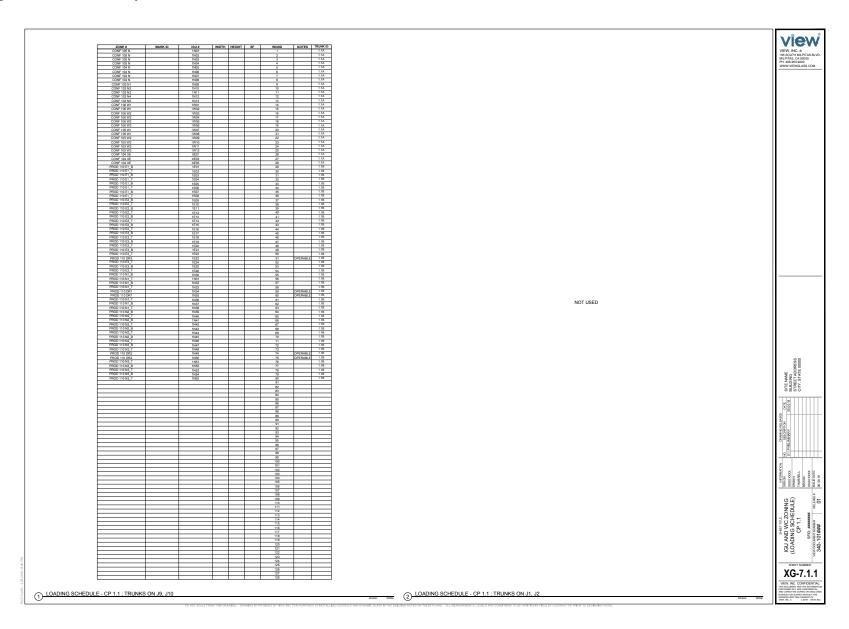
# Roof Layout for Sky Sensor



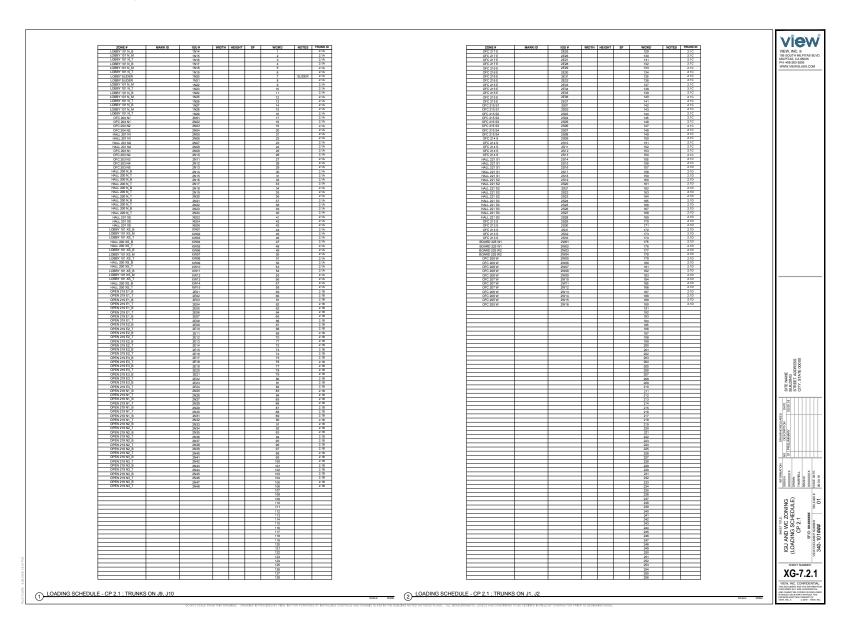
# **Bill of Materials Example**



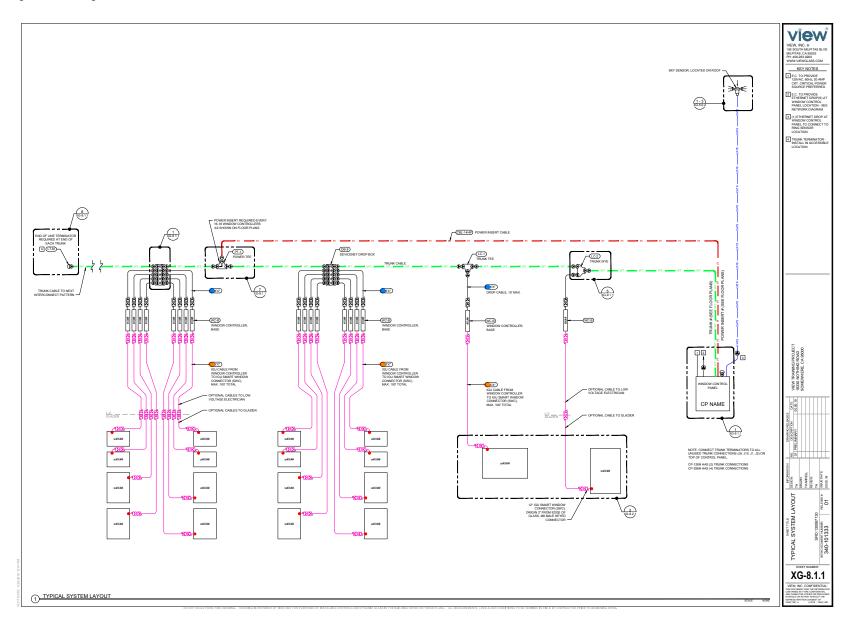
# **Loading Schedule Example**



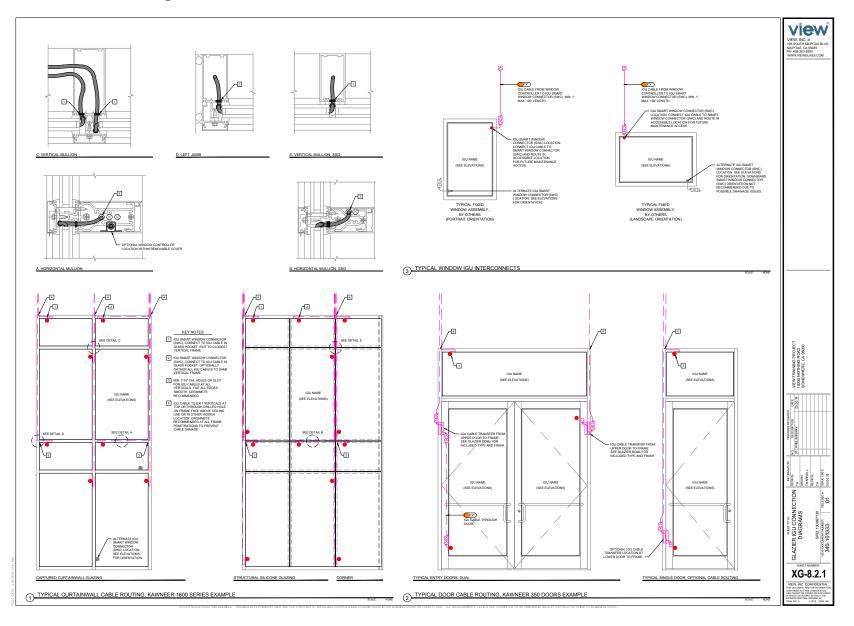
# **Loading Schedule Example**



# **Typical System Layout**

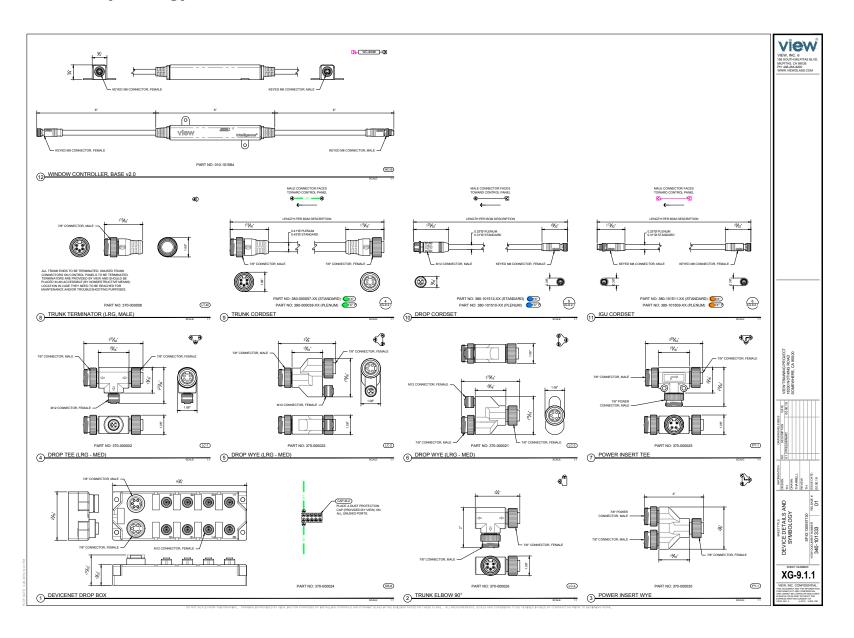


# **Glazier IGU Connection Diagrams**

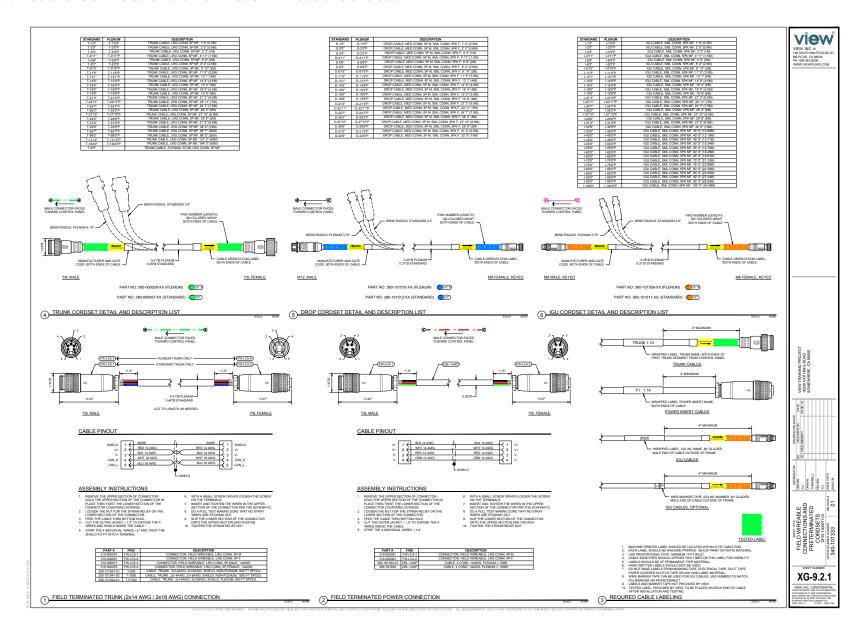


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# **Device Details and Symbology**



## Field Wireable Connections and Preterminated Cordset

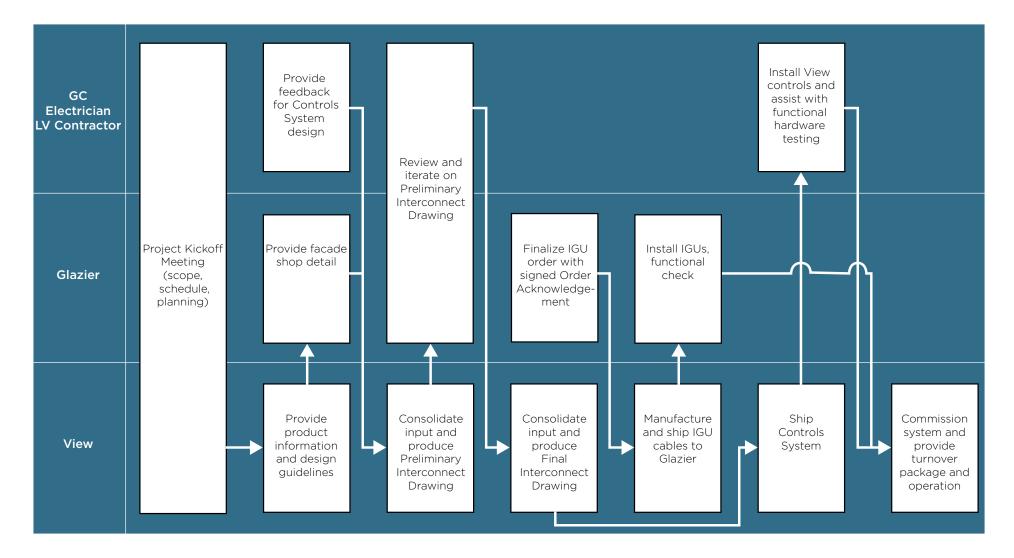


# List of typically used Data Sheets

- IGU
- IGU Cable
- Drop Cable
- Trunk Cable
- Power Cable
- Door Loop
- Power Injection Panel
- Window Controller
- Sky Sensor

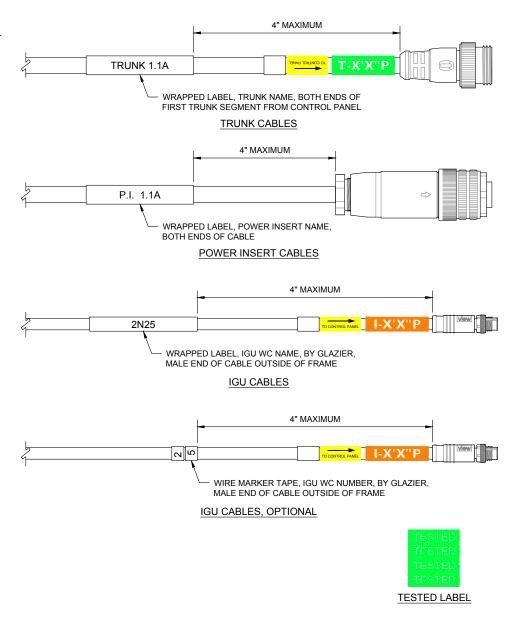
Datasheets are available <u>here</u> on the View website

# **Glass Implementation Process**



# **Proper Cable Labeling**

- MACHINE PRINTED LABEL SHOULD BE LOCATED WITHIN 4" OF CABLE END.
- EACH LABEL SHOULD BE MACHINE PRINTED BLACK PRINT ON WHITE MATERIAL.
- 3. USE PROPORTIONAL FONT, MINIMUM 14 PT BOLD.
- CABLE IDENTIFIER SHOULD APPEAR TWO TIMES ON THE LABEL FOR VISIBILITY.
- 5. LABELS SHOULD BE OF PERMANENT TYPE MATERIAL.
- 6. HAND WRITTEN LABELS SHOULD NOT BE USED.
- DO NOT MAKE LABELS FROM MASKING TAPE, ELECTRICAL TAPE, DUCT TAPE, PAPER COVERED SCOTCH TAPE OR ANY NON LABEL MATERIAL.
- 8. WIRE MARKER TAPE CAN BE USED FOR IGU CABLES. USE NUMBER TO MATCH IGU MARKING ON INTERCONNECT.
- 9. LABELS AND MARKER TAPE NOT PROVIDED BY VIEW.
- TESTED LABEL, PROVIDED BY VIEW, TO BE PLACED ON EACH END OF CABLE AFTER INSTALLATION AND TESTING.

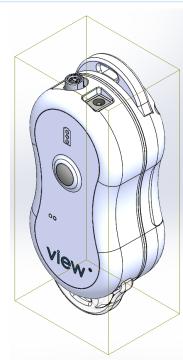


## **GTT (Glazier Test Tool)**

The View Glazier Test Tool (GTT) is a portable convenient way to test View IGU, IGU pigtail and cable operation. In a 30-60 second test, the GTT will indicate whether the windows, pigtails, and cables are connected and operating properly. This device should be used on all View installations as per below instructions.

This device is designed for use by Glaziers, Low-Voltage Electricians and View FSE's who install and test View Smart Windows.





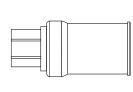
## What's Included:



Glazier Test Tool 010-101781



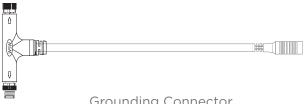
Silicon Cover 020-101673



Pigtail Caps (x10) 370-101509



DC Charger 750-101502



Grounding Connector 370-101516



Alligator Clip Cable 380-101558