



NORTHWESTERN
UNIVERSITY

DESIGN GUIDELINES
AND
TECHNICAL STANDARDS

Date of Issuance: January 1, 2014

APPENDIX

A. Division 01 – General:

1. NU AutoCAD Standard Layers, dated 5/26/2004
2. NU Design Guidelines for Interior Finishes, dated 1/1/2014
3. NU Design Checklist and Guidance to Life Safety Systems, dated 2/10/2014

B. Division 25 – Integrated Automation:

1. NU Direct Digital Control Standards dated 12/18/2013
2. NU DDC SI Spec dated 2/12/2014

C. Division 26 – Electrical:

1. NU Standard Exterior Light Fixture – Lumec
2. NU Standard Metering Enclosure and Wiring Diagram
3. NU Standard CCTV Equipment – Pelco
4. NU Standard Emergency Telephone – Ramtel
5. NU Standard AED Cabinet – HeartStation

D. Division 27 – Communications:

1. NUIT Standards included by reference only. Contact NU Project Manager for additional information.

E. Division 32 – Exterior Improvements:

1. NU Standard Site Furnishings – Gretchen Bench – Landscape Forms
2. NU Standard Site Furnishings – Bike Rack – Wabash Valley
3. NU Standard Site Furnishings – Trash / Recycling – Victor Stanley

Northwestern University

Facilities Management - Planning

AutoCAD Standard Layers (using plotstyle "NU plotstyle 1.ctb")

Revised: 26 May 2004

File: Northwestern University CAD Layer Standards Rev.xls

Layer Name	Description	Display Color #	Linetype	Print Color
ARCHITECTURAL LAYERS				
A-ANNO	General annotation that does not fit into any other category	3	Cont	Black
A-ANNO-AREA	Area Calculation	7	Cont	Black
A-ANNO-ASGN	Assignee	7	Cont	Black
A-ANNO-DIMS	Dimensions	140 *	Cont	Lt. Blue
A-ANNO-TITL	Building Name and Floor Number	2	Cont	Black
A-ANNO-USE	Use	7	Cont	Black
A-POLYLINE	Area Calculation Boundary line	1	Cont	Black
A-AREA-IDEN	Room Numbers, Tennant ID, Area Calcs	7***	Cont	Black
A-AREA-PATT	FM Space hatch patterns	7	Cont	FM Space**
A-CLNG	Ceiling Information	3	Cont	Black
A-CLNG-GRID	Ceiling Grid	4	Cont	Black
A-COLS	Columns	170*	Cont	Dk. Blue
A-DOOR	Doors	90 *	Cont	Green
A-EQIP	Equipment	5	Cont	Black
A-FLOR-CASE	Casework	5	Cont	Black
A-FLOR-CHSE	Chases and other Vertical Penetrations	210*	Cont	Magenta
A-FLOR-EVTR	Elevator Cars and Equipment	30 *	Cont	Orange
A-FLOR-IDEN	Room Numbers, Names, Targets	3	Cont	Black
A-FLOR-PATT	Floor Tiles and other Surface Patterns	30	Cont	Orange
A-FLOR-PFIX	Plumbing Fixtures	5	Cont	Black
A-FLOR-SLAB	Floor Edges that do not meet walls, Slab Perforations, Stages	5	Cont	Black
A-FLOR-STRS	Stair Treads, Escalators, Ladders	10 *	Cont	Red
A-FLOR-TPTN	Toilet Partitions	151***	Cont	Black
A-FURN	Furniture	5	Hidden2	Black
A-GLAZ	Windows, Window Walls, Curtain Walls, Glazed Partitions	130 *	Cont	Cyan
A-GLAZ-SILL	Windowsills	5	Cont	Black
A-LAB-CASE	Fixed Lab Casework/Benches	190	Mix	190
A-LAB-SINK	Sinks in Laboratory only	135	Cont	135
A-LAB-TEXT	Lab Fixture Text	140	Cont	140
A-LITE	Light Fixtures	3	Cont	Black
A-PORCH	Porches, porch walls	3	Cont	Black
A-ROOF	Roof	5	Cont	Black
A-WALL-CAGE	Interior Fences or Caged Areas	190	Hidden	190
A-WALL-EXTR	Exterior walls	1	Cont	Black
A-WALL-INTR	Interior walls	3	Cont	Black
CIVIL LAYERS				
C-BLDG	Built elements	2	Cont	Black
C-COMM	Site Communication/Telephone Poles, Boxes, Towers	2	Cont	Black
C-ELEC	Underground Electric	2	Hidden2	Black
C-FIRE	Fire Protection-Underground Lines	3	Dashdot2	Black
C-IT	IT Communication Lines-Underground	4	Cont	Black
C-NGAS	Natural Gas-Pipes, Manholes, Meters, Storage Tanks	3	Cont	Black
C-PKNG	Parking Lots	3	Cont	Black
C-PROP	Property Lines, Survey Benchmarks	1	Phantom2	Black
C-ROAD	Roads	3	Cont	Black
C-SDWK	Sidewalks & Alleys	3	Cont	Black
C-STEAM	Steam & Condensate	3	Cont	Black
C-SSWR	Sanitary Sewers-Manholes, Pumping Stations	3	Cont	Black
C-TOPO	Contour Lines and Elevations	5	Cont	Black
C-WATR	Domestic Water-Underground Lines	3	Hidden2	Black
C-TUNL	Underground Tunnel	3	Cont	Black

ELECTRICAL LAYERS				
E-COMM	Telephone, Communication Outlets	3	Cont	Black
E-CTRL	Electric Control Systems	3	Cont	Black
E-FIRE	Fire Alarm, Fire Extinguishers	3	Cont	Black
E-LITE	Lighting	3	Hidden2	Black
E-LTNG	Lightning Protection System	3	Cont	Black
E-POWR	Power	3	Hidden2	Black
E-SERT	Security	3	Cont	Black
E-SITE-UNDR	Underground Electrical lines	3	Hidden2	Black
FIRE PROTECTION				
F-PROT	Fire System	3	Cont	Black
LANDSCAPE LAYERS				
L-IRRG	Irrigation Systems	2	Hidden2	Black
L-PLNT	Plant & Landscape Materials	151***	Cont	Black
L-PLNT-BEDS	Rock, bark and Other Landscaping Beds	3	Cont	Black
L-PLNT-TURF	Lawn Areas	3	Cont	Black
L-SITE	Site elements	2	Cont	Black
L-SITE-FURN	Site Furnishings	2	Cont	Black
L-SITE-LITE	Exterior Site Lighting	3	Cont	Black
L-SITE-REC	Athletic and Recreational Fields	4	Cont	Black
L-SITE-SIGN	Signage and Donor Info	3	Cont	Black
L-WALK	Walks and Steps	3	Cont	Black
MECHANICAL LAYERS				
M-CONT	Controls & Instrumentations	3	Cont	Black
M-DUST	Dust & Fume Collection Sys (and Riser Diagram)	3	Cont	Black
M-ELHT-EQPM	Electric Heat Equipment (and Riser Diagram)	3	Cont	Black
M-HVAC	HVAC System	3	Cont	Black
M-MDGS	Medical Gas Systems	3	Hidden2	Black
PLUMBING LAYERS				
P-FIXT	Plumbing Fixtures	5	Cont	Black
STRUCTURAL LAYERS				
S-GRID	Column Grid	4	Hidden	Black

* denotes that layer prints in color, otherwise, all layers print as black (see gradient note below)

** denotes that the plotted color is defined by the FM Space program

***L-PLNT-Color 4 revised to 151 because it read too dark. (revised July 20 by Dana)

*** A-AREA-IDEN - Color #40 is set by FM Space. Change color in AutoCAD to color #7 (white) (revised 29 April 2004)

***A-FLOR-TPTN-Color #4 changed to 151, read too dark for bathrooms, (revised July 21 by Dana)

Gradient Note: Color numbers 1-5 denote a gradient from darkest (1) to lightest (5) when plotstyle "NU plotstyle 1.ctb" is used. See document R:\CAD Layer Documentation\NU Using Color.dwg for notes about plotted colors and lineweights.

The following is a summary of recommended interior finishes for the most common space types. Review project specific requirements with the NU Project Manager. Review requirements for specialty spaces including auditoriums, research labs, residential spaces, and food service with the NU Manager.

Space Type	Design Considerations	Flooring	Wall Base	Walls	Ceiling
Entrances / Vestibules	High Volume Traffic Slip Resistance Walk-off mats Acoustic Considerations STC 45-50 Separation	Review options with NU Project Manager	Review options with NU Project Manager	Acrylic latex paint Low VOC Satin Finish Review alternatives with NU Project Manager	Gypsum ceiling board; Review alternatives with NU Project Manager
Lobbies	High Volume Traffic Slip Resistance Acoustic Considerations STC 45-50 Separation	Review options with NU Project Manager	Review options with NU Project Manager	Review options with NU Project Manager	Review options with NU Project Manager
Corridors	High Volume Traffic Slip Resistance Acoustic Considerations STC 50 Separation	Resilient tile or sheet; Patterned carpet	4-inch high rubber	Acrylic latex paint Low VOC Satin Finish	Suspended acoustic ceiling system 9/16-inch suspended ceiling grid Acoustic ceiling panels 0.65 NRC / 0.85 LRV
Stairways	High Volume Traffic Slip Resistance Acoustic Considerations STC 45-50 Separation	Concrete or terrazzo stair treads Review alternatives with NU Project Manager	Review options with NU Project Manager	Epoxy paint Low VOC Eggshell Finish Wall protection	Suspended acoustic ceiling system 9/16-inch suspended ceiling grid Acoustic ceiling panels 0.65 NRC / 0.85 LRV

Space Type	Design Considerations	Flooring	Wall Base	Walls	Ceiling
Classrooms	Medium Volume Traffic Acoustic Considerations STC 50 Separation Dimmable / Controllable Lighting	Resilient tile or sheet	4-inch high rubber	Acrylic latex paint Low VOC Satin Finish	Suspended acoustic ceiling system 9/16-inch suspended ceiling grid Acoustic ceiling panels 0.65 NRC / 0.85 LRV
Computer Labs	Medium Volume Traffic Acoustic Considerations STC 50 Separation Dimmable / Controllable Lighting	Resilient tile or sheet; Patterned carpet	4-inch high rubber	Acrylic latex paint Low VOC Satin Finish	Suspended acoustic ceiling system 9/16-inch suspended ceiling grid Acoustic ceiling panels 0.65 NRC / 0.85 LRV
Labs – Dry	Medium Volume Traffic Acoustic Considerations STC 45-50 Separation Dimmable / Controllable Lighting	Resilient sheet; Epoxy	4-inch high rubber; Integral epoxy wall base	Acrylic latex paint Low VOC Satin Finish	Suspended acoustic ceiling system 9/16-inch suspended ceiling grid Acoustic ceiling panels 0.65 NRC / 0.85 LRV
Labs – Wet	Medium Volume Traffic Acoustic Considerations STC 45-50 Separation Dimmable / Controllable Lighting Slip Resistance / Spills / Chemical Staining	Resilient sheet; Epoxy	4-inch high rubber; Integral epoxy wall base	Acrylic latex paint Low VOC Satin Finish	Suspended acoustic ceiling system 9/16-inch suspended ceiling grid Acoustic ceiling panels 0.65 NRC / 0.85 LRV

Space Type	Design Considerations	Flooring	Wall Base	Walls	Ceiling
Offices	Low Volume Traffic STC 45-50 Separation Dimmable / Controllable Lighting	Patterned carpet	4-inch high rubber	Acrylic latex paint Low VOC Satin Finish	Suspended acoustic ceiling system 9/16-inch suspended ceiling grid Acoustic ceiling panels 0.65 NRC / 0.85 LRV
Conference Room	Low Volume Traffic Acoustic Considerations STC 50-55 Separation Dimmable / Controllable Lighting Audio/Visual Systems	Patterned carpet	4-inch high rubber	Acrylic latex paint Low VOC Satin Finish	Suspended acoustic ceiling system 9/16-inch suspended ceiling grid Acoustic ceiling panels 0.65 NRC / 0.85 LRV
Copy Room	Medium Volume Traffic Acoustic Considerations STC 45-50 Separation Dimmable / Controllable Lighting Chemical Staining	Resilient tile or sheet; Patterned carpet	4-inch high rubber	Acrylic latex paint Low VOC Satin Finish	Suspended acoustic ceiling system 9/16-inch suspended ceiling grid Acoustic ceiling panels 0.65 NRC / 0.85 LRV
Storage Room	Low Volume Traffic STC 50 Separation Built-in shelving vs. furniture	Resilient tile or sheet; Patterned carpet	4-inch high rubber	Acrylic latex paint Low VOC Satin Finish	Suspended acoustic ceiling system 9/16-inch suspended ceiling grid Acoustic ceiling panels 0.65 NRC / 0.85 LRV

Space Type	Design Considerations	Flooring	Wall Base	Walls	Ceiling
Public Restroom	High Volume Traffic STC 50 Separation Slip Resistance / Spills	Ceramic Tile; Porcelain Tile; Terrazzo;	Ceramic Tile; Porcelain Tile; Terrazzo;	Ceramic Tile; Porcelain Tile;	Gypsum ceiling board; Suspended acoustic ceiling system 9/16-inch suspended ceiling grid Acoustic / moisture resistant ceiling panels 0.65 NRC / 0.85 LRV
Janitors Closet	Low Volume Traffic STC 50 Separation Slip Resistance / Spills / Chemical Staining	Sealed concrete; Resilient tile or sheet	4-inch high rubber	Epoxy paint Low VOC Eggshell Finish Wall protection	Suspended acoustic ceiling system 9/16-inch suspended ceiling grid Acoustic ceiling panels 0.65 NRC / 0.85 LRV
Mechanical / Electrical Rooms	Low Volume Traffic STC 50 Separation Review specific requirements in Technical Standards	Sealed concrete	4-inch high rubber	Epoxy paint Low VOC Eggshell Finish	Exposed construction, painted

NORTHWESTERN UNIVERSITY
Design checklist and guidance to Life Safety Systems
(10-Feb 2014)

Building Information provided by Facilities Management Planning

(The questions will be turned into statements for the drawing notes)

1. Building Name:_____
2. Building Address:_____
3. Building: NEW EXISTING
4. Building Stories (total):_____
5. Total Building Area in square feet :_____
6. Building height:_____
7. IBC Building Use (occupancy):_____
8. The building is used for:_____
9. IBC Building Construction Type:_____
10. Does the building have a full sprinkler system? YES NO PARTIAL
11. Does the building have a generator? YES NO
12. Does the building have a fire pump? YES NO
13. Is the building on a fire pump loop? YES NO

Project Information provided by the Project Manager

(The questions will be turned into statements for the drawing notes)

1. Circle one:
 - A. New construction
 - B. Demolition
 - C. Remodel (cosmetic)
 - D. Modest renovation
 - E. Renovation (major room/system modifications)

2. What rooms of the existing building are involved? (list or provide plan)

3. How many square feet of renovation or construction are involved? _____
4. Are existing exit paths being altered? YES NO N/A
5. Are exterior doors being added? YES (contact UP) NO
6. Age of existing sprinkler heads (20 year life): _____
7. Is a non-water fire suppression system involved in the project? YES NO
8. Is a pre-action fire suppression system involved in the project? YES NO
9. Is the existing FS system supported every 12' to structure properly?
YES NO N/A
10. Are there any smoke evacuation systems (atriums) in the project? YES NO
11. Is any existing gas detection system getting modified? YES NO N/A
12. Are any areas of refuge getting modified? YES NO
13. Are any existing emergency phones getting modified? YES NO
14. Are any fossil fuels being used in the project area? YES NO
15. Will streets/fire department vehicle access lanes be changed or blocked?
YES NO N/A
16. Will fire department connections or fire hydrants be changed for this project?
YES NO N/A
17. Are there adjacent occupied buildings within 30 feet of the new building?
YES NO N/A
18. Are the areas adjacent to the renovation occupied? YES NO N/A
19. What is the rating of the construction zone boundary walls? 1hr 2hr NONE
20. Will the HVAC system be turned off in the construction zone? YES NO
21. Are the adjacent and vertically adjacent FA zone strobes visible and do they
need to be synched to the renovation area? YES NO

22. Will gas or diesel equipment be used adjacent to occupied buildings?
(Provide equipment scrubbers and carbon filters in AHU's if YES) YES NO

Building information provided by Electrical shop

(The questions will be turned into statements for the drawing notes)

1. Existing building FA manufacturer: _____
2. Age of existing FA system: _____
3. Is the building sub zoned for evacuation? YES NO
4. Does the FA system have voice evacuation capabilities? YES NO
5. Does the FA system have central station voice alert capabilities? YES NO
6. The FA system has a class A or B communication loop.
7. Where is the fire command center or panel located? _____
8. Where are FA annunciators located? _____
9. The existing EM lighting is powered by GENERATOR or BATTERY?
10. Do stairway doors lock to prevent reentry? Yes NO
11. New FA circuits will be wired to panel or sub-panel _____
12. Where is the sub-panel located? _____
13. The existing FA circuits for the construction area run through a junction box located in room _____.
14. For non-battery powered systems, is there enough EM power for the EM lighting in the renovated space? YES NO
15. Provide last FA system maintenance report.

FM Senior Staff review and decision regarding existing FA system

(Questions four, seven and eight will be turned into statements for the drawing notes)

1. What is the percentage of new or renovated space to the total square feet in the building? _____
2. Age of existing FA system: _____

3. How much longer will the existing FA system model be supported by the manufacturer? _____
4. Fire alarm systems should be replaced every 15 years by IEEE standards.
5. The existing FA system will be REPLACED RECONFIGURED NO WORK
6. Age of existing sprinkler heads (20 year life): _____
7. Sprinkler systems should be replaced every 30 years by IEEE standards.
8. The sprinkler Heads will be KEPT REPLACED
9. The existing FS system will be REPLACED RECONFIGURED NO WORK

FA Bidding Guidance:

(The option taken below will be stated in the drawing notes)

1. New building FA system specifications will be limited to approved University manufacturers.
2. Major renovations in existing building require the FA system to be evaluated for adequacy and expected life span. If the existing fire alarm system is near to the end of service life, a new FA system shall be bid to the approved University manufacturers.
3. Where new FA systems are provided, a predesign walk through will be scheduled between the Electrical Shop and the design Electrical Engineer.
4. Minor renovations or renovations in buildings with adequate FA systems shall be designed directly by the existing FA system manufacturer as a consultant to the Architect. This design or shop drawing will be included in the design package to the Electrical or General Contractor for bidding. The existing FA system manufacturer will provide pricing, components and programming as a part of the Electrical subcontractor's or General Contractor's bid.
5. Where existing systems are used or modified, a predesign walk through will be scheduled between the existing FA manufacturer, Risk Management and the Electrical Shop.

City of Evanston Requirements (Synopsis)

(include in design drawings as notes)

1. A building permit is required when a project area changes use, changes the exit path or affects a life Safety system.

2. The new or renovated area must be designed in accordance with IBC 2012, the Illinois Accessibility Code, 2010 NFPA 72 and 2010 NFPA 13.
3. An alarm or sprinkler permit is required for any modification to the life safety system. The NU Electrical Shop and Risk Management must review the drawings prior to submission to the City.
4. FA or FS shut-downs cannot be for more than 6 hours a day in occupied structures.
5. FA or FS shut-downs cannot be for more than 20 hours a week in occupied structures.
6. Only one safety system (FA or FS) can be shut-down at a time in occupied structures unless a fire watch plan is pre-approved by the Fire Marshall.
7. Modifying or adding less than 20 sprinkler heads does not require a hydro test (visual test is required to clear permit).
8. All final room, area of rescue assistance, stair level of exit, and standard exiting signage including Braille where required must be installed prior to the TCO inspection.
9. Provide inspection tags for all fire extinguishers.
10. Provide tent signage for extinguishers and hose stations.
11. Fire hose stations must have pressure reducing valves with 2.5"x 1.5" NST reducers.
12. All student residence halls shall have NFPA 72 and NFPA 13 full and complete coverage.
13. Provide dual power CO detectors within 15 of every sleeping room.
14. Provide elevator key boxes at all elevator locations.
15. Each building will have a Knox box with all building keys at the front entrance and other locations requested by EFD.
16. New structures and major renovation projects larger than 5,000 square feet shall have a sprinkler system installed. The sprinkler requirement for minor renovation projects of this size shall be reviewed individually by EFD.

17. An outside line accessible phone shall be provided in each fire command center. Fire command centers required by code shall be 200 square feet and have a minimum dimension of 10 feet.
18. Provide a lighted concrete pad and outside strobe over the STORZ type building Fire Department Connection.
19. All building exits shall have a paved illuminated path to a public way.
20. Audible devices shall provide a minimum sound pressure level of 15 decibels above ambient noise in all areas of any building (70 dba minimum or 15 dba above ambient at the pillow in residential occupancies with the door shut). The maximum sound pressure level is 110 decibels.
21. It should be noted that upon completion of Fire Alarm hardware modifications and/or programming modifications, a FA test of at least 10% of the existing unmodified system will have to be performed in addition to the complete project area as required by the code.
22. Temporary winter heating propane tanks must be kept 25 feet away from any building. Gas supply hoses must be kept off of the floor or ground. (requires site approval from EFD)
23. ABC rated fire extinguishers greater than or equal to Classification 10A: 60B:C shall be placed at a maximum travel distance of 75 feet in occupied spaces and 50 feet in construction areas.
24. All doors on hold opens will be released and closed and any stairway door shall be unlocked throughout the entire building upon fire alarm signal.
25. Smoke detectors shall be installed at the top of each stairway and elevator shaft.
26. Install a horn/speaker at the top most level in an exit stair.
27. Smoke detectors installed for elevator recall and control will also activate the building and/or zone alarm signals.
28. During a full fire alarm, silencing the alarm panel shall not turn off the visual alarm devices (strobes) in the building or at the exterior strobe for the Fire Department connection.
29. All visible visual devices shall be synchronized. This may require older strobes on multiple floors to be replaced.

Northwestern University General Requirements (Synopsis)

(include in design drawings as notes)

1. Hot work permits are managed through the NU Facilities Management Shops.
2. Risk Management shall inspect the open ceiling prior to the City inspection.
3. Existing rated walls adjacent to the construction zone shall be fire caulked.
4. Existing non rated walls adjacent to the construction zone shall be caulked to prevent smoke migration.
5. Provide a fire extinguisher in all pantries and kitchens.
6. Microwaves shall not be placed in any exit paths.
7. Combination safety shower/eye washes shall comply with ANSI code Z358.1
8. When required at the level of discharge on an exit stair, stair barriers (gate) shall be 42" high
9. Stairs and elevator cabs shall be numbered and labeled both inside and out.
10. Security cameras shall be placed at all exits and large occupancy areas.

Northwestern University Life Safety System Requirements (synopsis)

(include in design drawings as notes)

1. Sprinkler flow switches shall be set between a 30 and 45 second delay.
2. Contact the Electrical Shop for the approved list of fire alarm shop drawing symbols.
3. Offices shall be assumed to have two occupants and require a visual device.
4. New construction shall be designed with voice capable devices for mass notification direct from University Police. This requires a fiber optic cable connection between the FA panel and data closet and include the programming to interface with the NUPD system.
5. All audio visual devices shall be marked with "ALERT".
6. Ceiling mounted strobes are preferred by the University.
7. Maximum speaker/horn output should not be above 80 decibels in office type areas and 105 decibels in mechanical areas.

8. "T-tapping" of intelligent (addressable) fire alarm initiating circuits is not permitted.
9. Any new fire alarm control panel, and its back box enclosure, shall accommodate a minimum of 25 percent additional zones for hardwire and 25 percent additional initiating points for addressable systems.
10. For non-code required Fire Command Centers, fire alarm control panels shall be located in a secure location having a minimum one hour fire resistance rated enclosure for any building. A two hour fire resistance rated enclosure is required for major facilities having command centers or voice alert. Rooms shall have clean conditioned air with a temperature range of 50 to 80 degrees F and without wide fluctuations in humidity. Floor space and wall space shall provide room to install and maintain all systems and equipment located within. At least three feet of clear space shall be provided in front of all cabinets.
11. Any new fire alarm control panels will be connected by the University to the campus wide central ADT supervisory system. New ADT installations require both analog telephone and standard data connections directly adjacent to the ADT panel.
12. Smoke detectors, manual pull stations and heat detectors may be combined on the same addressable zone. Flow switches, valve tamper switches, and duct smoke detectors shall each be on separate zones.
13. Each laboratory suite/room over 500 square feet shall be provided with at least one audio/visual alerting device and one manual pull station at the exit.
14. A visual alerting device shall be installed in all public washrooms.
15. Electric powered magnetic door holders shall be supplied with 24 volt dc from the fire alarm system.
16. Wire nuts are not acceptable for joining wires. Either crimp connections or wire terminal strips shall be used to join wires. Wire terminal strips shall be permanently mounted inside junction boxes with wires neatly bundled and arranged.
17. Smoke detector(s) shall be installed in the room housing the main and auxiliary fire alarm control panels, elevator machine room, telephone rooms, main electrical switch gear room and computer rooms over 500 square feet in area.
18. Fixed temperature 195 degree heat detectors will be installed in sheltered outside electrical vaults and emergency generator rooms.

- 19..Residential buildings will have hard wired single station smoke detectors in the rooms with system connected photoelectric type smoke detectors in the corridors.
- 20.. Rate-of-rise heat detectors shall be provided in Janitor's closets with sinks.
21. Conduit for the alarm system will be a minimum of ¾" and be pre-painted red for concealed conditions. In exposed areas, the conduit shall be site painted to match the back ground color with only the junction box covers being painted red.
22. Conduits shall use only compression type connectors and be sized for a maximum 30% fill in new or renovation projects.
23. All wiring shall be color coded as to function as stated in the separate Northwestern University Design Standards book. Color codes shall be continuous from the fire alarm control panel to and through the last device. Initiating loops on addressable systems are an exception to the requirements.
24. Provide a Minimum 14 AWG stranded wire for all addressable circuits.
25. Provide a Minimum 12 AWG stranded wire for all AV circuits.
26. The lighter color shall always be used to indicate the positive wire. Earth ground wires shall always be identified by a green wire with a yellow stripe. These grounds are to be supplied and wire per manufacturer's specifications.
- 27..Tags on wiring shall be of a permanent means and shall be subject to University approval. Stick-on wire tags are not acceptable as a means of permanent marking.
- 28..The address of each initiating device shall be recorded on the fixed, non-removable base.
- 29..The audio amplifiers shall be labeled as to each speaker zone and channel being supplied.
30. All electrical equipment rooms shall have combination heat/smoke detector devices installed in them.
31. Provide rate of rise heat detectors at any microwave locations.
32. When making general announcements, strobes shall flash throughout the structure.

33. Flow switches shall be replaced and re-timed of all as a part of all fire alarm replacement projects and whenever an individual FS zone is more than 50% reconfigured.
34. Smoke detectors inside the construction zone boundary and any other adjacent areas shall be changed temporarily to heat detectors for the duration of the construction period.
35. Fire alarm shut down and testing procedures are to be included in the section 01-5000 and 01-1000 sections of the specifications.
36. In addition to regular exit signs, low level exit signs shall be considered for all residential buildings.

Design and Shop Drawing Review Process

1. All projects will be reviewed with the Building Department and the Fire Prevention Bureau at the schematic design stage.
2. Large projects will be reviewed by the University insurance carrier at the Schematic, Design Development and Construction Document levels.
3. Temporary FA system layout for renovations during the construction period will be designed or sketched by the existing FA manufacturer or general contractor. It is best if this sketch can be included in the renovation design drawings for permit. If it is not in the bid package, the sketch will be reviewed and approved by both the NU Electrical Shop and Risk Management. Upon approval, the sketch will be forwarded to EFD for approval. The temporary system will be tested by the Electrical Shop and witnessed by Risk Management. Once the temporary system layout which may include fire extinguishers, mast mounted pull stations, audio/visual devices and heat detectors (may be similar to the air wired "safety station" below) is tested the existing FA and FS systems can be taken out of service. The temporary system must be active until the final FA and FS systems have been tested and approved. The Electrical Shop will confirm the removal of the temporary system with a copy to EFD.
4. FA and FS shop drawings will be reviewed by NU Electrical Shop and Risk management prior to submission to EFD.
5. Submit FA and FS drawings to EFD. Allow 2 weeks for review.
6. Submit FA and FS drawings to the University insurance carrier for information.

Testing Requirements

(Review sections 01-1000 and 01-5000 of the specification)

Fire Alarm installation testing is comprised of three steps. The installing contractor shall test all equipment and the entire operation of the system. The contractor then shall certify to the Office of Risk Management and the Facilities Management Chief Electrician that the system performs as designed and that it is in full compliance with the permitted work and relevant codes. The Contractor shall then make an appointment with the Office of Risk Management to test the entire system with University electricians and Office of Risk Management personnel. After completion, Risk Management will then advise the Fire Marshal that the system is approved for Fire Department testing. The contractor shall then make an appointment with the Fire Prevention Bureau (through the Evanston "311 request system" or by calling 847-448-4311 outside of Evanston) for acceptance testing. When the appointment is made the contractor shall notify the electric shop and Risk Management of the date and time. The contractor shall provide a minimum of 2 alarm personnel with radio communications and all necessary equipment to provide complete testing of each alarm system device at each test. In addition, the contractor shall provide 3 copies of a list of initiating devices, with device nomenclature for each test.

Special noise limiting testing precautions must be taken in and around residential spaces, CCM areas, classroom schedules and clinic schedules.

EVANSTON LIST OF POSSIBLE TESTS AND INSPECTIONS

Fire Sprinkler

- Pressure -hydro tests
- Loop tie -Ins
- Roof shot
- Sprinkler Coverage /head locations
- Flows and tampers
- Pre-action system
 - Air /pressure
 - Devices
 - Trip
- Dry Systems
 - Air /pressure
 - Devices
 - Trip (Less than 1 minute)

Fire and Smoke Dampers

- Operational test

Fire Alarm

- Fire Alarm devices - manual pulls, strobes, horns, smokes, heats, etc.
 - Strobes have to be synchronized
 - Doors on magnetic hold opens work properly
 - Devices report correctly to the FA panel and are labeled with correct room ID's
 - Main panel talks to the ADT panel
 - ADT panel talks to University police

Electrical

- Power drop
 - Transfer switches
 - Emergency lighting
 - Exit lights

Communications

- Area of rescue
- EFD radio coverage

Oxygen Depletion Alarm

- Test connection to ADT

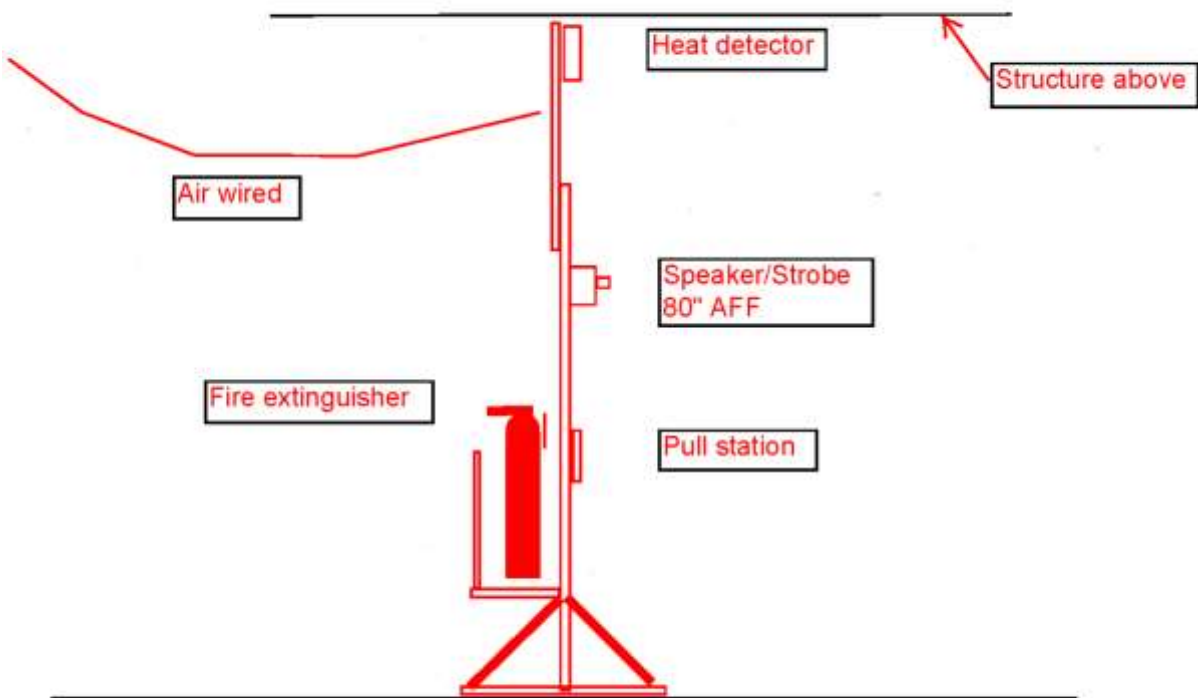
Atriums

- Smoke Evacuation HVAC system
 - Full functional test to see if the system does what is designed to do
- Fire Alarm activation
- Devices - beam detectors, smoke detectors, dampers
- Pre-action system
- Hot smoke test

General

- Fire Shutter operation
- Fire extinguishers tags
- Final Room Signage
- Rated Doors latch and close

Safety Station



This is an example of a temporary fire alarm "Safety Station". These stations will be placed at a rate of not less than one for every 2,500 square feet of renovation area.

NU DDC Standards



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Point Naming Conventions

Point names shall be the combination of several identifying elements that are represented by a list of standard abbreviations. Within a point name, the following attributes shall be identified:

- Chicago campus, Evanston campus, or off-campus building (denoted by "C", "E", "O") , "F" for Fraternity, "S" for Sorority, "H" for Housing
- Building (four letter abbreviation)
- Equipment tag (if applicable)
- Point identifier (setpoint, command, alarm, etc)

Attributes shall be separated by "_" and will go from the building name (four letter abbreviation) down to point type (ending in _STP, _CMD, etc where applicable). Equipment tags shall not contain "-" or "/", and shall be double-digits (i.e. AHU-1 is AHU01 in point name).

The naming convention shall be slightly modified depending on if the point is for a piece of equipment, virtual point, meter, etc

Examples:

CAMPUS_BUILDING_EQUIPMENTTAG_POINTIDENTIFIER_POINTTYPE

E_COOK_AHU01_DA_TMP_STPT

E_COOK_AHU01_VAV020100:XXX

VAV Box point names shall include AHU tag serving the VAV box (or EF tag for exhaust VAV boxes)

FOR VAV'S THE FIRST TWO DIGITS AFTER "VAV" WILL REPRESENT THE FLR NUMBER, FOLLOWED BY A FOUR DIGIT ROOM NUMBER. WHERE MORE THAN ONE VAV BOX SERVE A SINGLE ROOM THE VAV TAG SHALL END IN "A", "B", "C", ETC FOR EACH BOX. WHERE A VAV BOX SERVES MULTIPLE ROOMS, THE ROOM NUMBER SHALL BE THE LOCATION OF THE THERMOSTAT.

Will all equipment tags other than VAVs be two digit number (i.e. AHU01, CHLR02, etc)?

General Abbreviations

The below abbreviations shall be used for all naming, including:

- Point names
- Graphics
- Wiring diagrams
- Equipment labeling
- Device labeling
- Wire labeling
- Design documents

DESCRIPTION	ABBREVIATION
AIRFLOW MEASURING STATION	AFMS
AIR-HANDLING UNIT	AHU
ALARM (Virtual)	ALM
BOILER	BLR
BREAK TANK	BRK_TANK
BROWN WATER	BRNW
CABINET UNIT HEATER (HOT WATER)	CUH
CHILLED WATER	CHW
CHILLED WATER RETURN	CHWR
CHILLED WATER SUPPLY	CHWS
CHILLER	CHLR
CHW COOLING COIL	CC
COLD DECK	CD
COMMAND (Analog Output)	CMD
COMPRESSOR	COMP
COMPUTER ROOM AIR CONDITIONER	CRAC
CONDENSATE PUMP	CS_PMP
CONDENSER WATER	CW
CONDENSER WATER PUMP	CW_PMP
CONDENSER WATER RETURN	CWR
CONDENSER WATER SUPPLY	CWS
CONDENSING UNIT	CU
CONTROL VALVE	VLV
COOLING	CLG
COOLING TOWER	CT
CROSS CONNECT DAMPER	XC_DMPR
CROSS CONNECT VALVE	XC_VLV
DEHUMIDIFICATION UNIT	DHU
DE-IONIZED WATER	DI
DEW POINT	DEWP
DIFFERENTIAL (e.g., PRESSURE)	DIFF

DISABLE (Binary Output)	DIS
DISCHARGE AIR (out of AHU to terminal device)	DA
DISCHARGE STATIC PRESSURE	DA_PRS
DOMESTIC COLD WATER	DCW
DOMESTIC HOT WATER HEATER	DHW_HX or DHW_HTR
DOMESTIC HOT WATER PUMP	DHW_PMP
DOMESTIC HOT WATER RETURN	DHWR
DOMESTIC HOT WATER SUPPLY	DHWS
DOMESTIC WATER BOOSTER PUMP	DCW_PMP
DUCT STATIC PRESSURE	DUCT_PRS
DX COOLING COIL	DX
ECONOMIZER MODE	ECON
ELECTRIC DUCT HEATER	EL_DH
ENABLE (Binary Output)	ENA
ENERGY-RECOVERY UNIT	ERU
ENTHALPY	ENTH
EXHAUST AIR	EA
EXHAUST AIR DAMPER	EA_DMP
EXHAUST FAN (GENERAL)	EF
FAN COIL UNIT	FCU
FAN POWERED BOX	FPB
FILTER	FLTR
FINAL FILTER	FNL_FLTR
FLOW (AIR)	CFM
FLOW (HYDRONIC)	GPM
FREQUENCY	FREQ
FUME HOOD	FH
FUME HOOD CONTROLLER	FHC
GEO THERMAL	GEO
GRAY WATER	GRYW
HAND-OFF-AUTO	HOA
HEAT EXCHANGER	HX
HEAT PUMP	HT_PMP
HEATING	HTG
HEATING COIL	HC
HEAT-RECOVERY CHILLER	HRC
HEAT-RECOVERY EXHAUST FAN	HR_EF
HEPA FILTER	HEPA_FLTR
HIGH STATIC SWITCH	HI_STAT_ALM
HOT DECK	HD
HOT WATER	HW
HOT WATER PUMP	HW_PMP
HOT WATER RETURN	HWR
HOT WATER SUPPLY	HWS
HUMIDIFIER	HUM
ISOLATION EXHAUST FAN	ISO_EF

ISOLATION	ISO
KITCHEN EXHAUST FAN	KIT_EF
LAB EXHAUST FAN	LAB_EF
LEVEL	LVL
LOW LIMIT / FREEZESTAT	FRZ
LOW STATIC SWITCH	LOW_STAT_ALM
MAKE-UP AIR UNIT	MAU
METER	MTR
MINIMUM OA DAMPER	MIN_OA_DMP
MIXED AIR	MA
MIXED AIR PRESSURE	MA_PRS
OCCUPIED	OCC
OUTSIDE AIR	OA
OUTSIDE AIR DAMPER	OA_DMP
OVERRIDE	OVRD
PACKAGED TERMINAL AIR CONDITIONER	PTAC
PERIMETER HOT WATER	PERIM_HW
POSITION	POS
PRE-FILTER	PRE_FLTR
PREHEAT COIL	PHC
PRESSURE	PRS
PRESSURE REDUCING VALVE	PRV
PRIMARY CHILLED WATER PUMP	CHW_PMP
PROCESS CHILLED WATER	PCHW
PUMP	PMP
REHEAT COIL	RHC
REHEAT RETURN WATER	RHTWR
REHEAT SUPPLY WATER	RHTWS
RELATIVE HUMIDITY	RH
RELIEF AIR DAMPER	RLF_DMP
RELIEF FAN	RLF
RETURN AIR	RA
RETURN AIR DAMPER	RA_DMP
RETURN AIR PRESSURE	RA_PRS
RETURN FAN	RF
REVERSE OSMOSIS WATER	RO
ROOF-TOP UNIT	RTU
SECONDARY CHILLED WATER	SCHW
SECONDARY CHILLED WATER PUMP	SCHW_PMP
SECONDARY HOT WATER	SHW
SECONDARY HOT WATER PUMP	SHW_PMP
SETPOINT (Virtual point)	STPT – if more than one setpoint due to reset schedule abbreviate with _low, _mid, _high, i.e. DA_TMP_STPT_LOW, DA_TMP_STPT_HIGH
SMOKE DETECTOR	SMK
SNOW MELT	SNOW_MELT

STAGE	STG
STATUS (Binary Input)	STS
STEAM	STM
SUPPLY AIR (out of terminal device to space)	SA
SUPPLY FAN	SF
SYSTEM STATIC PRESSURE	SYS_PRS
TANK	TNK (NUMBER IF APPLICABLE)
TEMPERATURE (DRY BULB)	TMP
THERMAL STORAGE	TS
TOILET EXHAUST FAN	TLT_EF
TOTAL DISSOLVED SOLIDS	TDS
TOTAL HARDNESS	TH
ULTRA VIOLET FILTER	UFLT_FLTR
UNIT HEATER (HOT WATER)	UH
UNIT VENTILATOR	UV
UNOCCUPIED	UNOCC
VARIABLE AIR VOLUME BOX	VAV
VARIABLE FREQUENCY DRIVE	VFD
VIBRATION SENSOR	VIB
WATER SOURCE HEAT PUMP	WSHP
WET BULB	WB
WIND SPEED	WIND_SPD
ZONE DAMPER	ZN_DMPR (NOTE: FOR MULTI-ZONE ZN1-DMPR, ZN2_DMPR, ETC)
ZONE PRESSURE	ZN_PRS
ZONE TEMPERATURE	ZN_TMP

Building Abbreviations

Building #	Building Description	Address	Four Character Abbreviation
8830	Majorie Ward Marshall Dance Center	10 Arts Circle Drive	DNCE
8785	Josephine Louis Theater	20 Arts Circle Drive	JLTH
8732	Ethel M. Barber Theater	30 Arts Circle Drive	BARB
8831	Mary & Leigh Block Museum of Art	40 Arts Circle Drive	BLOK
3105	Pick-Staiger Concert Hall	50 Arts Circle Drive	PICK
8728	Regenstein Hall of Music	60 Arts Circle Drive	REGS
1806	Boat House	1823 Campus Drive	BOAT
8737	Kresge Underground	1840 Campus Drive	UNDG
8784	Evanston Garage	1847 Campus Drive	EVSG
8716	Locy Hall	1850 Campus Drive	LOCY
8714	Crowe Hall	1860 Campus Drive	CROW
8837	McCormick Tribune Center	1870 Campus Drive	TRIB

Building #	Building Description	Address	Four Character Abbreviation
8785	John J. Louis Hall	1877 Campus Drive	LUIS
8714	Kresge Centennial Hall	1880 Campus Drive	KRSG
8731	Annie May Swift Hall	1920 Campus Drive	AMSW
8732	Theatre and Interpretation Center	1949 Campus Drive	THTR
8739	University Library	1970 Campus Drive	ULIB
8723	Norris University Center	1999 Campus Drive	NORR
8782	Central Utility Plant	2026 Campus Drive	ECUP
8789	Walter Annenberg Hall	2120 Campus Drive	ANNB
5784	James L. Allen Center	2169 Campus Drive	ALLN
8835	Center for Nanofabrication and Molecular Self-Assembly, Ryan Hall	2190 Campus Drive	RYNH
8836	Arthur & Gladys Pancoe – Evanston Northwestern Healthcare Life Sciences Pavilion	2200 Campus Drive	PANC
8786	William A. & Gayle Cook Hall	2220 Campus Drive	COOK
8707	Frances Searle Building	2240 Campus Drive	FSRL
1816	Henry Crown Sports Pavilion, Dellora A. & Lester J. Norris Aquatics Center, Combe Tennis Center	2311 Campus Drive	SPAC
8607	Ayers College of Commerce & Industry	2324 Campus Drive	AYER
8655	Slivka Hall	2332 Campus Drive	SLVK
8650	Kemper Hall	2420 Campus Drive	KMPR
2244	Chi Phi	550 Lincoln	2244 (BLDG #)
8597	562 Lincoln	562 Lincoln	8597 (BLDG #)
2255	Pi Kappa Alpha	566 Lincoln	2255 (BLDG #)
2261	Theta Chi	572 Lincoln	2261 (BLDG #)
2265	Zeta Beta Tau	576 Lincoln	2265 (BLDG #)
2254	584 Lincoln	584 Lincoln	2254 (BLDG #)
8711	Fisk Hall	1845 Sheridan	FISK
8578	East Fairchild	1855 Sheridan	EFCH
8579	West Fairchild	1861 Sheridan	WFCH
8712	Harris Hall	1881 Sheridan	HARR
8738	University Hall	1897 Sheridan	UHAL
8709	Charles Deering Library	1937 Sheridan	DEER
8719	Arthur Andersen/Donald Jacobs Center: Leverone Hall	2001 Sheridan	JACB
8708	Cresap Hall Laboratory	2021 Sheridan	CRES
8734	Swift Hall	2029 Sheridan	SWFT
8730	Shanley Pavilion	2031 Sheridan	SHLY
8717	Lunt Hall	2033 Sheridan	LUNT
8715	Garrett – Evangelical Theological Seminary	2121 Sheridan	GART

Building #	Building Description	Address	Four Character Abbreviation
8847	Ford Motor Company Engineering Design Center	2133 Sheridan	FORD
8735	Technological Institute – A Wing	2145 Sheridan	TIAW
8735	Technological Institute – B Wing	2145 Sheridan	TIBW
8735	Technological Institute – C Wing	2145 Sheridan	TICW
8735	Technological Institute – D Wing	2145 Sheridan	TIDW
8735	Technological Institute – E Wing	2145 Sheridan	TIEW
8735	Technological Institute – F Wing	2145 Sheridan	TIFW
8735	Technological Institute – G Wing	2145 Sheridan	TIGW
8735	Technological Institute – H Wing	2145 Sheridan	TIHW
8735	Technological Institute – K Wing	2145 Sheridan	TIKW
8735	Technological Institute – L Wing	2145 Sheridan	TILW
8735	Technological Institute – M Wing	2145 Sheridan	TIMW
8735	Technological Institute – N Wing	2145 Sheridan	TINW
8735	Technological Institute – BC Wing	2145 Sheridan	TIBC
8735	Technological Institute – AB Wing	2145 Sheridan	TIAB
8735	Technological Institute – FG Wing	2145 Sheridan	TIFG
8585	Sargent Hall	2245 Sheridan	SARG
2253	Phi Kappa Psi	2247 Sheridan	2253 (BLDG #)
2258	Sigma Chi	2249 Sheridan	2258 (BLDG #)
2249	Kappa Sigma	2251 Sheridan	2249 (BLDG #)
8573	Foster House	2253 Sheridan	8573 (BLDG #)
8593	2303 Sheridan	2303 Sheridan	8593 (BLDG #)
8569	Bobb Hall	2305 Sheridan	BOBB
2247	Delta Upsilon	2307 Sheridan	2247 (BLDG #)
8580	Lindgren House	2309 Sheridan	LNGR
2245	Chi Psi	2313 Sheridan	2245 (BLDG #)
8581	McCulloch Hall	2315 Sheridan	MCLH
2246	Delta Tau Delta	2317 Sheridan	2246 (BLDG #)
8575	Goodrich	2321 Sheridan	GOOD
2241	2325 Sheridan	2325 Sheridan	2241 (BLDG #)
2252	Phi Gamma Delta	2331 Sheridan	2252 (BLDG #)
2259	Sigma Nu	2335 Sheridan	2259 (BLDG #)
2250	Lamda Chi Alpha	2339 Sheridan	2250 (BLDG #)
2239	Sigma Phi Epsilon	2341 Sheridan	2239 (BLDG #)
8608	Phi Delta Theta	2347 Sheridan	8608 (BLDG #)
2243	Beta Theta Pi	2349 Sheridan	2243 (BLDG #)
1812	Patten Gymnasium	2407 Sheridan	PATT
8724	Dearborn Observatory	2131 Tech Drive	DBRN
8845	Center for Catalysis & Surface Science	2137 Tech Drive	CATL
8713	O.T. Hogan Biological Sciences Building	2205 Tech Drive	HOGN
8720	Seeley G. Mudd Library	2233 Tech Drive	MUDD
1808	Anderson Hall	2701 Ashland	ANDS

Building #	Building Description	Address	Four Character Abbreviation
1811	McGaw Memorial Hall	2705 Ashland	MGAW
1817	Tennis Bubble	2707 Ashland	TRIE
1809	Byron S. Coon Sports Center/Nicolet Football	2707 Ashland	COON
8743	639 Central	639 Central	8743 (BLDG #)
8744	1808 Chicago	1808 Chicago	8744 (BLDG #)
8745	1809 Chicago	1809 Chicago	8745 (BLDG #)
8746	1810/1812 Chicago	1810/1812 Chicago	8746 (BLDG #)
8747	1815 Chicago	1815 Chicago	8747 (BLDG #)
8567	Allison Hall	1820 Chicago	ALLI
8588	1838 Chicago	1838 Chicago	8588 (BLDG #)
8427	Traffic Institute	405 Church	8427 (BLDG #)
R123	1007 Church	1007 Church	R123 (BLDG #)
8748	515 Clark	515 Clark	8748 (BLDG #)
8832	555 Clark	555 Clark	8832 (BLDG #)
8704	619 Clark	619 Clark	8704 (BLDG #)
8803	624 Clark	624 Clark	8803 (BLDG #)
8727	Rebecca Crown Center	633 Clark	CRWN
8804	618 Colfax	618 Colfax	8804 (BLDG #)
2283	Delta Chi	619 Colfax	2283 (BLDG #)
8805	624 Colfax	624 Colfax	8805 (BLDG #)
8749	625 Colfax	625 Colfax	8749 (BLDG #)
8802	628 Colfax	628 Colfax	8802 (BLDG #)
8750	629 Colfax	629 Colfax	8750 (BLDG #)
8806	617 Dartmouth	617 Dartmouth	8806 (BLDG #)
8751	627 Dartmouth	627 Dartmouth	8751 (BLDG #)
8752	630 Dartmouth	630 Dartmouth	8752 (BLDG #)
8721	Music Administration Building	711 Elgin Road	MADM
8729A	Cahn Auditorium	600 Emerson	CAHN
2273	Delta Gamma	618 Emerson	2273 (BLDG #)
8753	619 Emerson	619 Emerson	8753 (BLDG #)
8568	626 Emerson	626 Emerson	8568 (BLDG #)
8577	Hobart House	630 Emerson	HBRT
8733	Health Service	633 Emerson	HLTH
2279	Pi Beta Phi	636 Emerson	2279 (BLDG #)
2275	Gamma Phi Beta	640 Emerson	2275 (BLDG #)
8583	North Mid-Quads	650 Emerson	NMQD
8595	710 Emerson	710 Emerson	8595 (BLDG #)
8594	720 Emerson	720 Emerson	8594 (BLDG #)
8825	Chambers Hall	600 Foster	CHAM
1807	Blomquist Recreation Center	617 Foster	BLOM
8872	605-615 Garrett	605-615 Garrett	8872 (BLDG #)
8873	621-623 Garrett	621-623 Garrett	8873 (BLDG #)
8788	618 Garrett	618 Garrett	8788 (BLDG #)

Building #	Building Description	Address	Four Character Abbreviation
8826	Charles Dawes House	225 Greenwood	CDAW
8560	600 Haven	600 Haven	8560 (BLDG #)
8754	617 Haven	617 Haven	8754 (BLDG #)
8755	625 Haven	625 Haven	8755 (BLDG #)
8838	1801 Hinman	1801 Hinman	8838 (BLDG #)
8756	1810 Hinman	1810 Hinman	8756 (BLDG #)
8757	1812 Hinman	1812 Hinman	8757 (BLDG #)
8839	1813 Hinman	1813 Hinman	8839 (BLDG #)
8758	1818 Hinman	1818 Hinman	8758 (BLDG #)
8840	1819 Hinman	1819 Hinman	8840 (BLDG #)
8589	1835 Hinman	1835 Hinman	8589 (BLDG #)
8814	1620 Judson	1620 Judson	8814 (BLDG #)
8760	617 Library	617 Library	8760 (BLDG #)
8821	Family Institute	618 Library	FMLY
8808	619 Library	619 Library	8808 (BLDG #)
8761	620 Library	620 Library	8761 (BLDG #)
8762	626 Library	626 Library	8762 (BLDG #)
8590	600 Lincoln	600 Lincoln	8590 (BLDG #)
8599	610 Lincoln	610 Lincoln	8599 (BLDG #)
2256	Career Services	620 Lincoln	2256 (BLDG #)
8566	630 Lincoln	630 Lincoln	8566 (BLDG #)
8920	1801 Maple	1801 Maple	1801
8502	1890 Maple	1890 Maple	8502 (BLDG #)
8598	Engelhart Hall	1915 Maple	ENGH
8809	616 Noyes	616 Noyes	8809 (BLDG #)
8763	617 Noyes	617 Noyes	8763 (BLDG #)
8810	624 Noyes	624 Noyes	8810 (BLDG #)
8764	625 Noyes	625 Noyes	8764 (BLDG #)
8765	629 Noyes	629 Noyes	8765 (BLDG #)
R124	1603 Orrington	1603 Orrington	R124 (BLDG #)
8601	McManus Living-Learning Center	1725 Orrington	MCMN
8610	1856 Orrington	1856 Orrington	8610 (BLDG #)
2270	Chi Omega	1870 Orrington	2270 (BLDG #)
2278	Kappa Kappa Gamma	1871 Orrington	2278 (BLDG #)
8819	1900 Orrington	1900 Orrington	8819 (BLDG #)
8574	Foster-Walker Complex	1927 Orrington	FSWK
8815	1941 Orrington	1941 Orrington	8815 (BLDG #)
8823	1948 Ridge	1948 Ridge	8823 (BLDG #)
8844	2020 Ridge	2020 Ridge	2020
8817	1616 Sheridan	1616 Sheridan	8817 (BLDG #)
8767	John Evans Alumni Center	1800 Sheridan	8767 (BLDG #)
8592	1820 Sheridan	1820 Sheridan	8592 (BLDG #)
8706	Alice S. Millar Chapel and Religions Center	1870 Sheridan	MLLR

Building #	Building Description	Address	Four Character Abbreviation
8768	1902 Sheridan	1902 Sheridan	8768 (BLDG #)
8822	1908 Sheridan	1908 Sheridan	8822 (BLDG #)
8769	1914 Sheridan	1914 Sheridan	8769 (BLDG #)
8770	1918 Sheridan	1918 Sheridan	8770 (BLDG #)
8771	1922 Sheridan	1922 Sheridan	8771 (BLDG #)
8772	1936 Sheridan	1936 Sheridan	8772 (BLDG #)
8773	1940 Sheridan	1940 Sheridan	8773 (BLDG #)
8774	2000 Sheridan	2000 Sheridan	8774 (BLDG #)
8775	2006 Sheridan	2006 Sheridan	8775 (BLDG #)
8776	2010 Sheridan	2010 Sheridan	8776 (BLDG #)
8777	2016 Sheridan	2016 Sheridan	8777 (BLDG #)
8778	2040 Sheridan	2040 Sheridan	8778 (BLDG #)
8779	2046 Sheridan	2046 Sheridan	8779 (BLDG #)
8865	Seabury-Western Theological Seminary	2122 Sheridan	SEAB
8572	Elder Hall	2400 Sheridan	ELDR
8766	2870 Sheridan Place	2870 Sheridan	8766 (BLDG #)
8722	Music Practice Building	1823 Sherman	MUPR
8587	Willard Hall	1865 Sherman	WILL
8854	1800 Sherman	1800 Sherman	1800
8729	Scott Hall	601 University Place	SCOT
2276	Kappa Alpha Theta	619 University Place	2276 (BLDG #)
2272	Delta Delta Delta	625 University Place	2272 (BLDG #)
8586	Shepard Residential College	626 University Place	SHEP
2266	Alpha Chi Omega	637 University Place	2266 (BLDG #)
8584	Rogers House	647 University Place	ROGR
8582	South Mid-Quads	655 University Place	SMQD
8718	Lutkin Hall	700 University Place	LTKN
2269	Alpha Phi	701 University Place	2269 (BLDG #)
2277	Kappa Delta	711 University Place	2277 (BLDG #)
2274	Delta Zeta	717 University Place	2274 (BLDG #)
8725	Human Resources	720 University Place	HRCS
2248	Evans Scholars	721 University	EVAN

Building #	Building Description	Address	Four Character Abbreviation
		Place	
8570	Chapin Hall	726 University Place	CHAP
8780	906 University Place	906 University Place	8780 (BLDG #)
8780	910 University Place	910 University Place	8780 (BLDG #)
8780	920 University Place	920 University Place	8780 (BLDG #)
	Visitors Center	TBD	VCTR
	Kellogg Building	TBD	KELG
	Bienen School of Music	TBD	BIEN
Chicago Campus			
P102	Chestnut Parking Garage, E-Lot	275 E Chestnut	ELOT
P100	Huron Parking Lot, C-Lot	222 E Huron	CLOT
P101	Erie Parking Lot, D-Lot	321 E Erie	DLOT
8816	Rubloff	375 E Chicago	RUBL
8798	Gary Law Library	357 E Chicago	GARY
8796	Levy Mayer	357 E Chicago	LVMY
8797	McCormick Hall	350 E Superior	MCMK
8795	Wieboldt	340 E Superior	WBLT
8794	Searle	320 E Superior	SRLE
8793	Morton	310 E Superior	MORT
8792	Ward	303 E Chicago	WARD
8791	Tarry	300 E Superior	TARY
8602	Abbott	710 N Lake Shore	ABBT
0511	Heating Plant	410 E Huron	CCUP
8846	Lurie	303 E Superior	LURE
8799	Olson	240 E Huron	OLSN

Standard Units, Significant Digits, and Change of Value

The below units, significant digits, and change of value standards shall be used for displaying values in graphics. For example, a static pressure reading displayed on the graphic shall change whenever the sensor reading changes by a value of 0.1, but it shall display two decimal significant digits (i.e. 0.01 significant digits). If a sensor is reading 1.642" w.c., the display shall show 1.64" w.c., and the value on the screen shall not change until the reading changes by 0.1" w.c. (i.e. when the sensor reading changes to a value that can be rounded to 1.54" w.c. or 1.74" w.c.).

Description	Units	Significant Digits	Change of Value
Air Flow	CFM	1	1% of Max
Air Static Pressure or Differential Pressure	in/w.c.	0.01	0.01
Air Velocity	FPM	1	1% of Max
Building Pressure	in/w.c.	0.001	0.005
CO2 Level	PPM	5	10
Damper Command and Position	% Open	1	1
Damper Command and Position (F/B damper)	% Face	1	1
Differential Pressure (water systems)	Psig	0.1	0.1
Electric Consumption	kWh	1	1% of Max
Electric Current	Amps	0.1	1% of Max
Electric Demand	kW	1	1% of Max
Electric Potential	V	1	1% of Max
Energy	BTU	1	1% of Max
Filter Status	Clean/Dirty	-	-
Frequency	Hz	0.1	1
Gas Consumption	Therms	1	1% of Max
Percent Output	% Full	0.1	1
Relative Humidity	%RH	1	1
Runtime	Hours	1	1
Speed (motor)	RPM	1	1
Speed (fan or pump)	%	1	1
Status (pump, fan, etc)	On/Off	-	-
Temperature – Critical Spaces	°F	0.1	0.1
Temperature – Non-Critical Spaces	°F	0.1	0.5
Valve (modulating) Command & Position	% Open	1	1
Valve (2-pos) Command & Position	Open/Closed	-	-
Water Flow	GPM	1	1% of Max
Water Quality	pH	0.01	0.1

Alarm Standards

Alarm Levels

Type	Delay (into alarm)	Delay (out of alarm)	Alarm Class
Air-Handling Units			
Freezestat	None (immediate)	None (immediate)	Emergency
Fan Status does not match command	5 min.	None (immediate)	Critical
Hi Static Pressure	None (immediate)	None (immediate)	Critical
Smoke Detector	None (immediate)	None (immediate)	Emergency
Discharge temperature (5°F deviation from setpoint)	5 min.	2 min.	Non-critical
Duct static pressure (0.5" wc deviation from setpoint)	5 min.	2 min.	Non-critical
Converters			
Supply HW temp (10°F deviation from setpoint)	5 min	5 min.	Non-critical
Chiller System			
Pump Status does not match command	5 min.	None (immediate)	Non-critical
Diff. water pressure (5 psig deviation from setpoint)	5 min.	5 min.	Non-critical
Chiller status does not match command	5 min.	None (immediate)	Non-critical
Chiller Alarm	None (immediate)	None (immediate)	Critical
Refrigerant alarm	None (immediate)	None (immediate)	Emergency
CHWS Temp (5°F deviation from setpoint when chiller enabled)	30 min.	15 min.	Non-critical
Boiler System			
Boiler status does not match command	5 min.	None (immediate)	Non-critical
Boiler Alarm	None (immediate)	None (immediate)	Critical

Type	Delay (into alarm)	Delay (out of alarm)	Alarm Class
Secondary HW loop temp (10°F deviation from setpoint when boilers enabled)	30 min.	15 min.	Non-critical
Low Steam Pressure Alarm (5 psig below setpoint)	1 min.	1 min.	Emergency
Labs			
Space pressure	1 min.	1 min.	Critical
Exhaust fan status does not match command	5 min.	None (immediate)	Critical
Space Temperature			
Space Temperature (4°F deviation from setpoint)	30 min. (tied to occupied mode, not optimal start)	10 min.	Alert
Critical Space Temperature (1°F deviation from setpoint)	30 min. (tied to occupied mode, not optimal start)	5 min.	Critical
VFDs			
VFD in hand mode or bypass	None (immediate)	None (immediate)	Critical

Alarm message shall include timestamp, type of alarm, full point name, and value of point (including units) causing alarm.

Alarm Class

Link users to alarm type acknowledgement

Alarm Class (in order of least to most critical)	Notified User Group	Alarm Routing
Alert	DDC Technician	Logfile on server
Non-critical	DDC Technician	Console
Critical*	DDC Technician, DDC Foreman	E-mail, Pager, and Console
Emergency*	DDC Technician, DDC Foreman	E-mail, Pager, and Console
Nuclear*	DDC Technician, DDC Foreman, Facilities Director	E-mail, Pager, and Console

*Critical, Emergency, and Nuclear alarms shall pop-up on any screen the user is logged into

COORDINATE ALARM ROUTING W/OWNER TO DETERMINE PERSONNEL ASSIGNMENTS TO DIFFERENT USER GROUPS. ROUTE PER CAMPUS, ENGINEERING GROUP, AND MANAGEMENT.

Trending Standards

All trends shall be instantaneous trends, not averaging

AHU Trends	
Description	Trend Interval
Discharge Air Temperature	10 min., Boolean points shall be COV
Mixed Air Temperature	
Return Air Temperature	
Exhaust Air Temperature	
Return Air Humidity	
Discharge Air Humidity	
Damper Commands	
Duct Static	
Fan Speed	
Valve Position Command	
Valve Position Feedback (if available)	
Coil Entering/Leaving Water Temperature	
Occupied/Unoccupied Mode	COV
Fan Status	
Heating Coil Pump Status	

VAV Trends	
Description	Trend Interval
Zone Temperature	30 min., Boolean points shall be COV
Airflow	
Airflow Setpoint	
Damper Position	
Perimeter Valve Position	
Reheat Valve Position	
Leaving Air Temperature	
Occupied/Unoccupied Mode	COV

Steam/Hot Water Converter Trends	
Description	Trend Interval
Hot Water Entering Temperature	10 min., Boolean points shall be COV
Hot Water Leaving Temperature	
Hot Water Temperature Setpoint	
Water Differential Pressure	
Steam Valve Command	
Steam Valve Position (feedback, if available)	
Pump Speed	
Pump Enable/Unable Command	COV
Pump Status	

Chiller Trends	
Description	Trend Interval
Chiller CHWS Temperature	10 min., Boolean points shall be COV
Chiller CHWR Temperature	
CHWS Setpoint	
Chiller CWS Temperature	
Chiller CWR Temperature	
CW Setpoint	
System CHWS Temperature	
System CHWR Temperature	
Secondary CHWS Temperature	
Secondary CHWR Temperature	
Chiller CHW Flow (GPM)	
Chiller CW Flow (GPM)	
System CHW Flow (GPM)	
System CW Flow (GPM)	
Tower Fan Speed	
3-way Bypass Valve Position	
Indoor Sump Temperature	
Chiller %RLA	
Tower Fan Status	COV
Chiller Status	
System Differential Pressure	
CHW Pump Status	
CW Pump Status	

Boiler Trends	
Description	Trend Interval
Boiler HWS Temperature	10 min., Boolean points shall be COV
Boiler HWR Temperature	
System HWS Temperature	
System HWR Temperature	
HWS Temperature Setpoint	
Boiler % Fire or High/Low Fire (where applicable)	
System HWS Flow (GPM)	
3-way Mixing Valve Position	
HW Pump Speed	
System Differential Pressure	COV

Graphic Standards

The graphic hierarchy will be as follows:

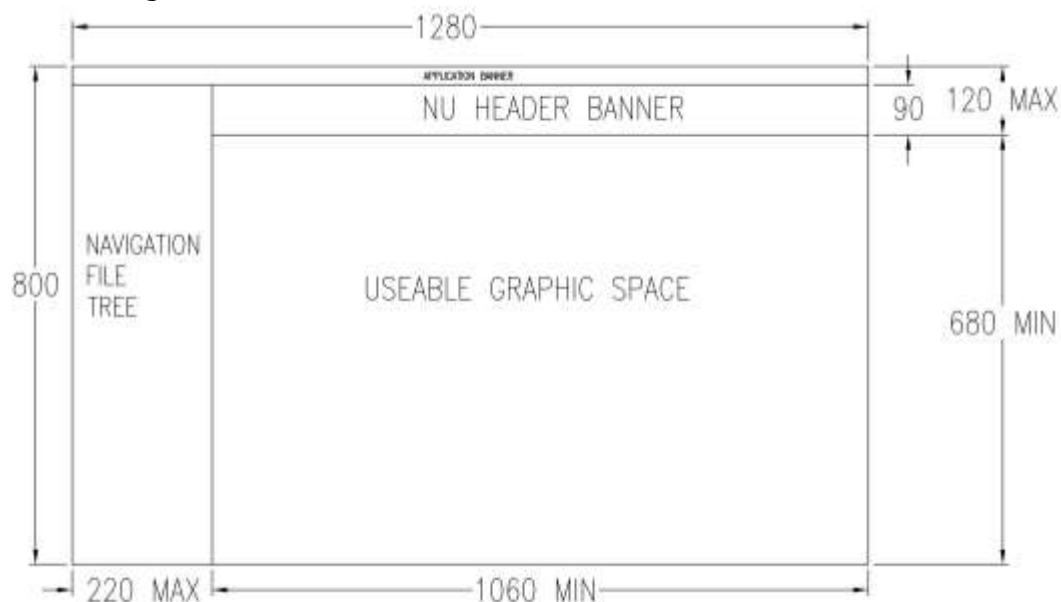
- NU Home Screen (Opening screen with picture of NU Campus and links to Evanston, Chicago, and Off-Campus)
 - Evanston Campus (points beginning with "E", "F", "S", and "H")
 - List of buildings by type (Science, Academic, Athletic, Housing, Fraternity, Sorority, Utilities)
 - Individual Building Home Screen (Dashboard for: instantaneous meter data, alarm statuses, outside air temp/humidity/enthalpy)
 - Floor Plan Graphic
 - Detailed Floor Plan Graphic
 - Dynamic space temperature
 - Occupancy Status (where applicable)
 - Link to VAV graphic
 - Equipment Graphics (boilers, chillers, converters, AHUs, etc.)
 - Detailed Meter Graphic
 - AHU status table (valve positions, discharge temps, damper positions, fan speeds, etc.)
 - VAV status table(s) (valve position, damper position, airflow, discharge air temp)
 - "Other" Graphics
 - Misc. equipment
 - Utilities
 - Evanston CUP Home Screen (status only)
 - System Meters Screen
 - One-line diagrams (CHW, Steam, Condensate, etc)
 - Chicago Campus (points beginning with "C")
 - List of buildings by type (FSM, Law, Academic, Utilities)
 - Individual Building Home Screen (Dashboard for: instantaneous meter data, alarm statuses, outside air temp/humidity/enthalpy)
 - Floor Plan Graphic
 - Detailed Floor Plan Graphic
 - Dynamic space temperature
 - Occupancy Status (where applicable)
 - Link to VAV graphic
 - Equipment Graphics (boilers, chillers, converters, AHUs, etc.)
 - Detailed Meter Graphic
 - AHU status table (valve positions, discharge temps, damper positions, fan speeds, etc.)
 - VAV status table(s) (valve position, damper position, airflow, discharge air temp)
 - "Other" Graphics
 - Misc. equipment

- Utilities
 - Chicago CUP Home Screen (status only)
 - System Meters Screen
 - One-line diagrams (CHW, Steam, Condensate, etc)
- Off-Campus (points beginning with "O")
 - List of buildings
 - Individual Building Home Screen (Dashboard for: instantaneous meter data, alarm statuses, outside air temp/humidity/enthalpy)
 - Floor Plan Graphic
 - Detailed Floor Plan Graphic
 - Dynamic space temperature
 - Occupancy Status (where applicable)
 - Link to VAV graphic
 - Equipment Graphics (boilers, chillers, converters, AHUs, etc.)
 - Detailed Meter Graphic
 - AHU status table (valve positions, discharge temps, damper positions, fan speeds, etc.)
 - VAV status table(s) (valve position, damper position, airflow, discharge air temp)
 - "Other" Graphics
 - Misc. equipment

Universal Graphic Standards

Formatting

- The default font for words in graphics shall be Tahoma. The minimum font size shall be 12 pt.
- Graphic background color shall not be white/shall be lighter color to contrast graphics (coordinate with Owner)
- Commandable points shall have a background color (rather than transparent); non-commandable points shall be transparent
- Any points in override mode shall appear in different color on the graphic (coordinate with Owner)
- At campus-level screens, display status of campus-wide emergency fan shut-down, chiller plant load shedding program, power loss (via "pop-up" alarm status)
- Piping shall be color-coded
 - HWS: bright red
 - HWR: darker red
 - CHWS: bright blue
 - CHWR: darker blue
 - Steam: white
 - Condensate: orange
 - CWS: bright green
 - CWR: darker green
- Graphics shall be designed for screen resolution of 1280x800 (most commonly issued laptop in FM). Useable graphic area will be smaller due to the space needed for the graphic header, upper window bar, and left navigation tree. See below for recommended maximum pixels for graphic header, upper window bar, tabs, and left navigation tree:



- Future graphics: graphic for tablets shall be designed using HTML, not Java

Appearance/Layout

- Setpoint the operator can change should appear as a button (defined by user access)
- Main header – top of screen (banner)
 - NU logo
 - OA conditions (temp, %RH, enthalpy)
 - Building Name/Equipment tag/Plant description/Service/Location (where applicable) – located center of banner
 - Standard Drop-down menu to links
 - Link to NU BAS home screen
 - Link to NU Campus home screens
 - Link to NU Building abbreviations
 - Link to NU Std. Point Names
 - Secondary Drop-down menu (personalized to user)
- All setpoints shall be located in upper right corner
- All alarm points shall be shown on graphic next to associated device (freeze, hi-static, smoke detector)
- Units shall be shown next to all values using the Standard Units outlined earlier in this document
- All points being trended (per Trend Standards) shall have small graphical image of a line chart next to point value that is a button linking the user to 24-hr trends for that point.
- Descriptions for points will be typed into background, similar to JCI graphic
- All equipment graphics (including terminal equipment) shall include a link to:
 - Sequence of Operation in .pdf format
 - Equipment O&M manuals in .pdf format
 - Wiring diagram and parts list in .pdf format
- Piping graphics shall be 2D, not isometric
- NO VENDOR LOGOS
- User shall have ability to leave text notes on graphic
- Graphic shall display correct type of equipment (centrifugal chiller vs screw chiller, counter-flow vs. cross-flow cooling tower, inline vs. base-mounted pump, etc)
- Equipment with VFDs shall have VFD button on graphic that links user to VFD table showing information available from VFD via BACNET. The VFD table shall include the following parameters:
 - Speed Input (%)
 - Output Speed (RPM)
 - Output Frequency (Hz)
 - DC Bus Voltage (V)
 - Output Voltage (V)
 - Current (A)
 - Fault Status
 - Drive Ready Status
 - Run Enable Status
 - Drive Run Status
 - Drive Mode
 - Runtime (hr)

NU Home Screen Graphic

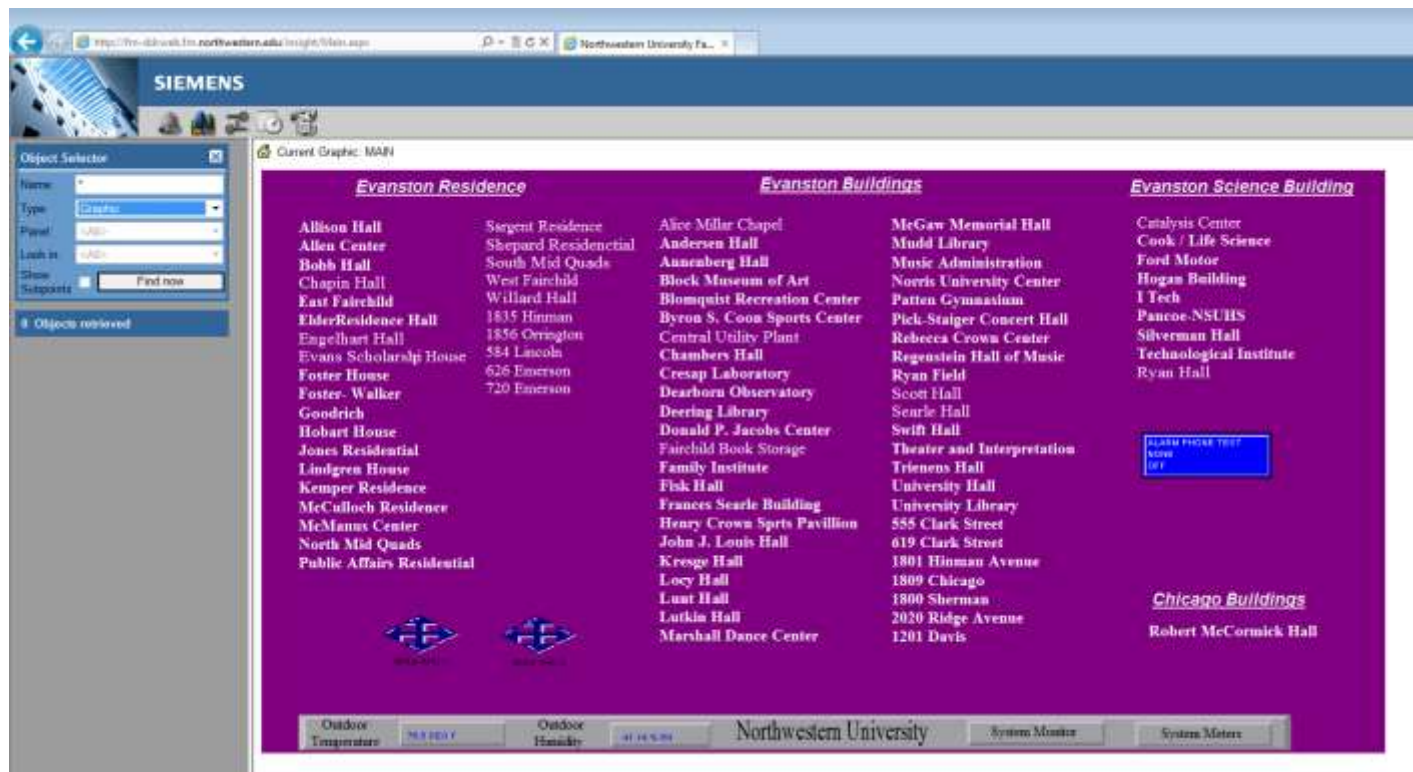


Figure 1: Example Home Screen Graphic

The NU home screen graphic will be similar to the existing Siemen's NU home screen graphic shown above. The NU home screen graphic will include links to Evanston, Chicago, and Off-campus graphics that each have a list of the buildings associated with that campus.

1. The Evanston home screen graphic shall have alphabetical lists of buildings by the following building types: Science, Academic, Athletic, Housing, Fraternity, Sorority, Utilities
2. The Chicago home screen graphic shall have alphabetical lists of buildings by the following building types: FSM, Law School, Academic, Utilities
3. The Off-campus building home screen shall have a single alphabetical list of all off-campus buildings

Individual Building Home Screen Graphic



Figure 2: Example Individual Building Home Screen Graphic

Individual building's home screen graphics will be similar to Norris's existing home screen graphic. Per the graphic hierarchy, there shall be links to:

- Each Floor Plan Graphic (not shown on Norris example above)
- Equipment Graphics
- AHU Status Table Graphic (not shown on Norris example above)
- VAV Status Table Graphic (not shown on Norris example above)
- Detailed Meter Graphics
- "Other" Graphics (where applicable)

The building home screen graphic shall include a dashboard showing current utility meter readings for that building, along with current outside air temperature/humidity conditions. The graphic shall include a picture of the building, and display the address of the building.

- Overall floor plan shall be color-coded/hatched by AHU zones (see Figure 3 below).
- There shall be a legend with a list of the AHU tags and associated color.
- If user clicks on the AHU tag (in the legend), it shall route them to that AHU graphic. If user clicks on AHU region in floor plan it shall take them to detailed floor plan (see Figure 4 on pg. 26) of that AHU service area.
- If area served by an AHU is large and must be split up into several detailed floor plan graphics, then all zones served shall remain one color, but there shall be a boundary (showing the detailed floor plan graphic boundary) that highlights when the user places their mouse in the zones that link to a given detailed floor plan graphic.
- Link to as-built floor plan of ductwork/piping

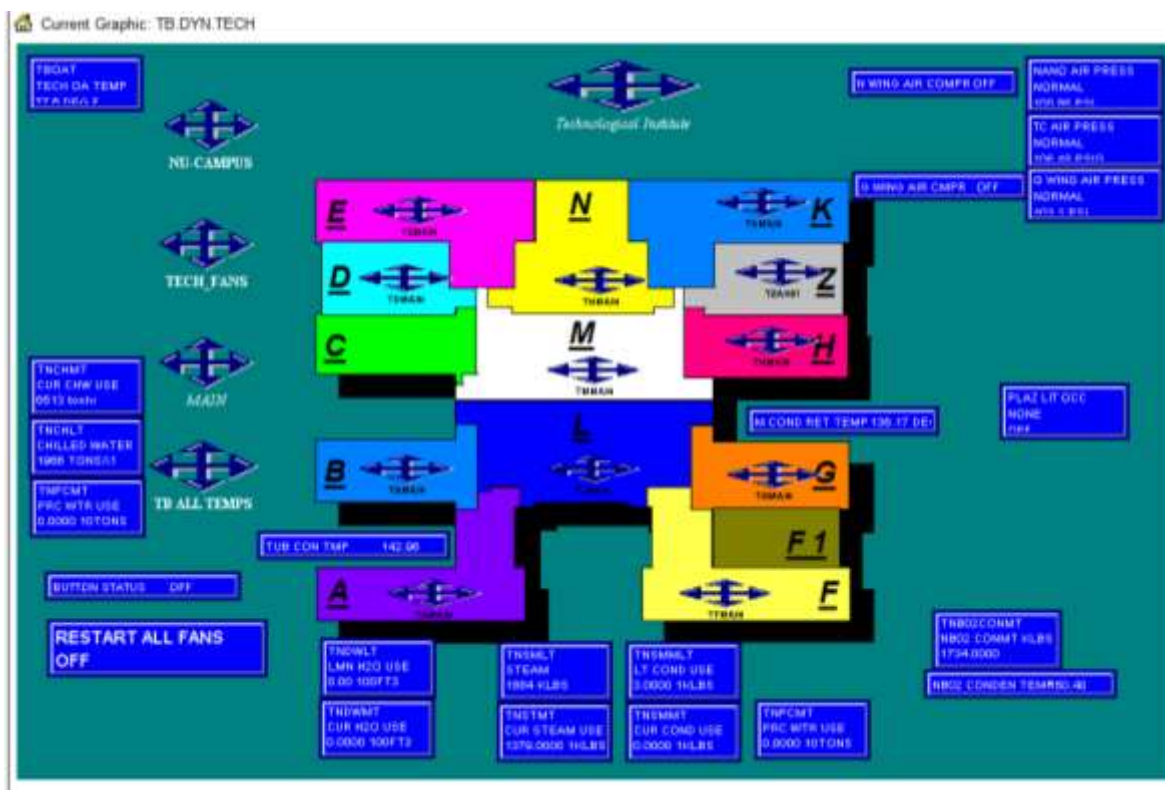


Figure 3: Floor Plan Graphic Example

The above floor plan graphic example shows AHU service zones color-coded by AHU (existing Tech Building graphic). Per this standard, the above graphic will also have a legend showing AHU tag and associated color. If the user clicks on the AHU tag in the legend it shall route them to the AHU graphic. If the user clicks on the AHU service zone in the hatching it shall take them to a detailed floor plan graphic displaying VAV service zones, room temp/humidity.

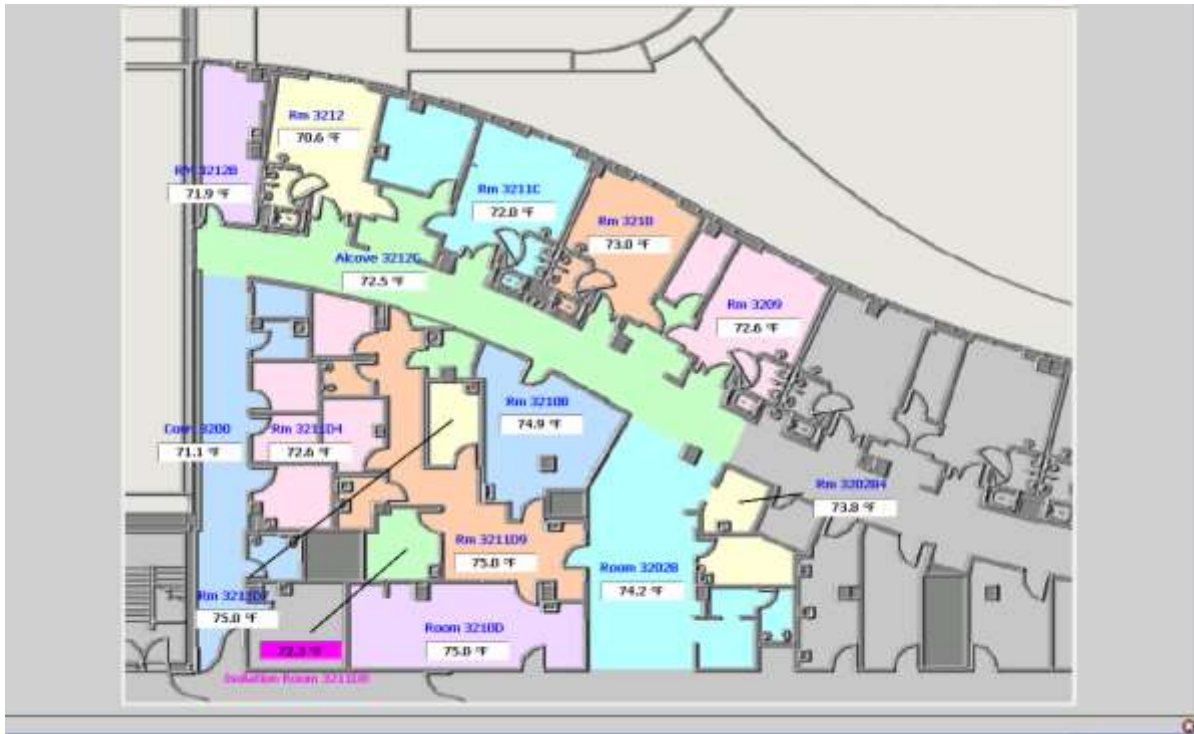


Figure 4: Detailed Floor Plan Graphic Example

The above detailed floor plan graphic example shows VAV service zones color-coded by VAV box. The detailed floor plan graphic shall display:

- Space temperature
- Relative humidity (where applicable)
- Occupancy status
- Space Pressure sensor probe location (where applicable)

If space temp, relative humidity (where applicable), or space pressure (where applicable), is out of range, the background color of the point value box shall turn red.

If the user clicks on the VAV service zone it shall route them to the VAV graphic.

Plant Graphics

- Animation on cooling tower fans, pumps, (based on status, not output)
- One graphic showing combination of all chillers (per existing Chicago)
- Design for large screen (per existing Chicago)
- Condenser water and chilled water-side shown on separate graphics with link on graphic to navigate between the two

Converter Graphics

- Flow arrows shall be included on piping
- Isolation valves shall not be shown; control valves only
- Graphic shall display correct type of converter (i.e. shell & tube)
- Graphic shall display correct type of pump (in-line, base-mounted)

AHU Graphics

- Setpoints in upper right corner (main virtual points, occupied mode, reset schedules). Clicking on occupied mode or reset schedules shall take user to additional graphic showing AHU occupancy schedule or reset schedule.
- Graphic shall include override buttons for related to terminal equipment served by the AHU that allows user to:
 - Override all terminal equipment heating valves fully open
 - Override all VAV dampers fully open
 - Override all VAV dampers to max scheduled airflow
 - Override all VAV dampers to min scheduled airflow
 - Override all VAV dampers closed
- Animation on fans (based on status, not output), not on dampers
- For systems that are interconnected (energy recovery, EFs, DOAS, etc), but do not all fit on one graphic, include link on graphic to interconnected system's graphic
- Supply and return airflow shall always be shown from right-edge of graphic (include label)
- Exhaust and outside airflow shall always be shown from left-edge of graphic (include label)
- Transfer button shown for terminal device graphics
- Transfer button for related plant equipment (local chiller, boiler, pumps, converters, etc)
- Graphic shall display both command and feedback points
- Use standard units and point names described in sections above
- Each facility shall have a link to an AHU status table. The table shall contain (at minimum) the following columns (given in order from left to right):
 - AHU tag (clicking on this shall link to AHU graphic)
 - Area Served (i.e. Bio Labs, Chem Classrooms, etc)
 - Supply/Return/Relief Fan Status – all systems
 - Supply/Return/Relief Fan Speed – variable volume systems only
 - Mixed Air Temperature
 - Damper Position (applicable all dampers at AHU)
 - Valve position (applicable all HW/CHW/Steam valves)
 - Discharge Air Temp
 - Duct Static Pressure

If AHU has multiple supply fans (i.e. fan row) then the AHU row shall be taller and the cell for the supply fan status shall be split into several rows so that all fan status and speeds can be displayed clearly.

- VAV AHU graphics shall have a link to a VAV status table. This table shall display all VAV boxes served from the AHU with the following columns (in order from left to right)
 - VAV tag (clicking on this shall link to VAV box graphic)
 - Room(s) served
 - Zone temperature setpoint
 - Zone temperature
 - Discharge air temperature
 - Reheat valve position
 - Damper position
 - Airflow setpoint
 - Airflow

Final row of VAV status table shall show minimum and maximum discharge air temperature, minimum and maximum reheat valve position, minimum and maximum damper position, and *total* airflow. If a system is large enough to require multiple VAV status tables, this final row shall be shown at the bottom of each table

VAV Graphics

- Setpoints in upper right corner (main virtual points). Shall include min. heat, min. cool, max heat, max cool CFM, space temperature setpoint (where applicable)
- Room name and number shall be included in the VAV object name. Coordinate final room numbers with owner. Where VAV box serves more than one room, the room number shall be the room where the thermostat is located.
- Where more than one VAV serves a single room there shall be a typical VAV graphic at the top of the screen with a table below showing values for airflow, damper position, discharge air temp, etc. Table shall include room airflow totals at bottom row of the table. Any exhaust dampers associated with a VAV box shall also be shown on the graphic, included in the tables
- Include link to AHU graphic serving VAV box

Northwestern University Scope of BAS Contractor

The purpose of this document is to describe the Enterprise Level Server at Northwestern University, and the separation of roles between the System Integrator and the Building Automation System Contractor.

The Enterprise Server consists of the Honeywell Tridium WebsAX running on three Marathon redundant servers. Two servers are located on the Evanston Campus, and one server is located on the Chicago Campus. Both the JCI and Siemens head end servers currently reside on this Marathon redundant server. The long term plan is these two software packages are used for high level programming only, and will not be used for day to day operations of the JCI or Siemens BAS.

All new DDC system controllers, terminal device controllers, VFDs, and any other intelligent control device shall be BTL Certified and shall communicate using BACNET MS/TP. All network controllers shall communicate to lower level controllers using BACNET MS/TP. Network controllers shall communicate to each other, and BAS Servers, using BACNET/IP.

The control contractor shall provide a complete DDC system, which interfaces with both the control vendors "head end" server, and the Northwestern University Tridium Enterprise Server. The Owners' normal day to day interface will be with the Tridium Enterprise Server. The configuration of graphics for the Tridium Enterprise Server will be done by the Owner's System Integrator. The BAS contractor is responsible for coordinating with the System Integrator to verify all points are properly transmitted to the Enterprise Server including alarm values and links to trend files. Provide sufficient manpower to work with the System Integrator to do a point to point test of alarms, trending, setpoint overrides, etc.

Figure 1 shows a simple schematic of the Enterprise Network.

Northwestern University Scope of BAS Contractor

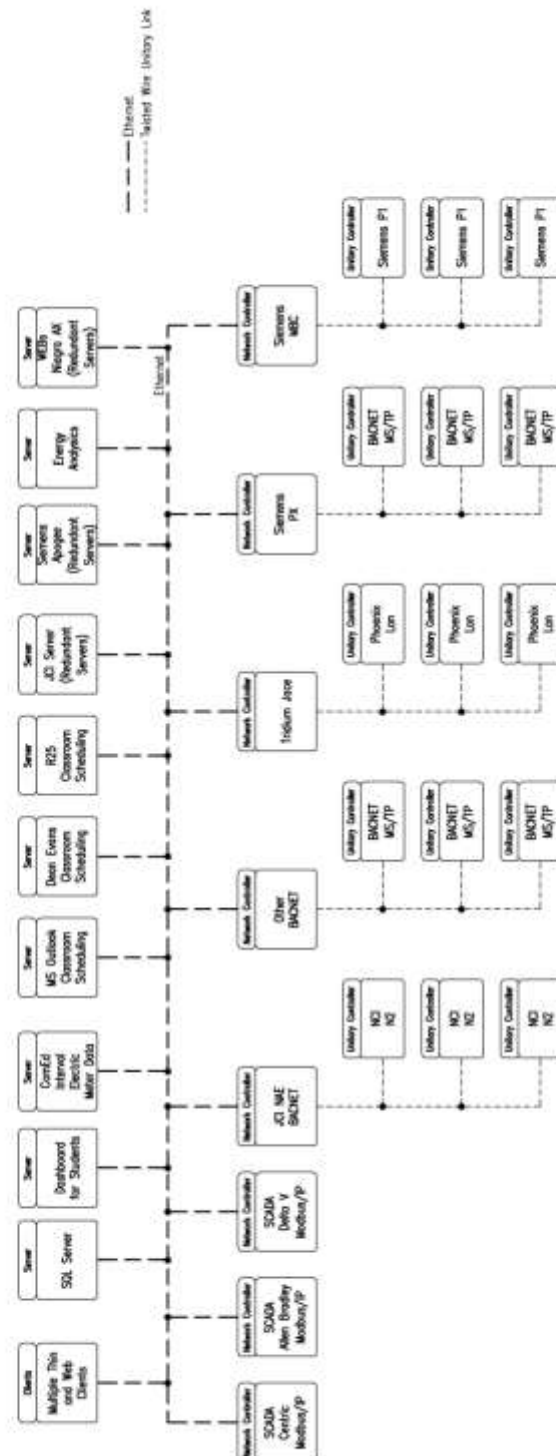


Figure 1: Simplified Riser Diagram

Northwestern University
Scope of BAS Contractor

Role of the Building Automation System Contractor (BASC)

1. Provide the field devices and wiring including DDC controllers, relays, sensors, transducers, control devices, control panels, controller programming, controller programming software, controller input/output and power wiring and controller network wiring to provide a complete working system of the mechanical equipment.
2. Submittals: Provide an electronic copy of the specification sheets for the equipment and DDC controls being provided for the specific project. The drawings shall be drawn in Visio or AutoCAD, and shall include separate sections for the following: index page, a riser diagram, flow diagrams, panel detail, wiring schematics, termination of controllers, full points list including any global or virtual points, any valve schedules and damper schedules.
3. Use the Northwestern University DDC Standard document for point naming structure.
4. Provide as-built drawings and O&M Manuals in electronic form (Visio or MS Word or Adobe pdf format).
5. Provide Network Controllers as required for a project. Coordinate quantity and locations of new network controller with Owner and System Integrator. Acceptable network controllers are manufactured by Siemens, Tridium, Johnson Controls, Delta Controls, and Automated Logic Corporation.
6. Network Controllers:
 - a. Johnson Controls:
 - i. Provide most current Metasys controller compatible with the existing Johnson Controls campus infrastructure.
 - ii. Communication to field control devices shall be through BACNET MS/TP, not JCI N2 unless approved by NU for specific applications.
 - b. Siemens Controls:
 - i. Provide most current Apogee controller compatible with the existing Siemens campus infrastructure. PXC Modular is preferred to PXC Compact.
 - ii. Communications to field control devices shall be through BACNET MS/TP, not Siemens FLN unless approved by NU for specific applications.
 - c. Honeywell Tridium:
 - i. Northwestern University has standardized on the Honeywell WEB-600-O-US NiagaraAX™ Controller, to follow a consistent standard of design and operation supporting overall system conformance standards. Other branded NiagaraAX™ network controllers are unacceptable.
 - ii. All network controller hardware products shall be "Made in the USA" or come through the Tridium Richmond, Virginia shipping facility.

Northwestern University
Scope of BAS Contractor

- iii. All network controllers shall include a lifetime license for free software upgrades.
- iv. The network controllers shall be provided with no connectivity restrictions on which brand stations or tools can interact with the system. The station and tool **"NiCS"** would be as follows:

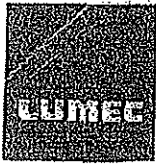
Property	Value
STATION COMPATIBILITY IN	ALL
STATION COMPATIBILITY OUT	ALL
TOOL COMPATIBILITY IN	ALL
TOOL COMPATIBILITY OUT	ALL

- d. Delta Controls:
 - i. Northwestern University does not have a standard developed for Delta Controls at the time of publication.
- e. Automated Logic
 - i. Provide most current controller compatible with existing ALC campus infrastructure.
 - ii. Communications to field control devices shall be through BACNET MS/TP.
- 7. Point to point checkout.
- 8. Verify all physical alarms.
- 9. Setup alarms in the network controller in accordance with the Northwestern University DDC Standards document. Coordinate with Owner on alarm distribution. Work with the SI to make sure the Enterprise Server is receiving the alarms.
- 10. Setup trends in the BASC's associated server in accordance with the Northwestern University DDC Standards document. Work with the SI to make sure the Enterprise Server is receiving the trends.
- 11. Accessing controllers via PCAnywhere, Telnet or similar software is not allowed. Remote access shall be through Northwestern's SSLVPN.
- 12. Any software required for controller configuration shall be included as a leave-behind tool with enough license capability to support the installation. Provide the appropriate quantity of legal copies of all software tools, configuration tools, management tools, and utilities used during system commissioning and installation. All tools shall be generally available in the market. No closed and/or unavailable tools will be permitted. Contractor shall convey all software tools and their legal licenses at project close out.

Northwestern University
Scope of BAS Contractor

Role of the System Integrator (Separate Contract):

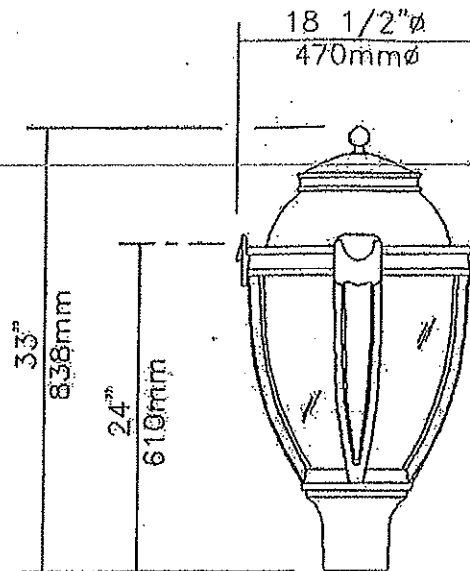
1. The System Integrator (SI), Engineer, Owner and selected Building Automation System Contractor (BASC) meet to review the project so that all programming, design standards and job specific requirements are consistent with the NU DDC Standards.
2. Coordinate with the BASC to ensure point discovery and integration is scheduled at appropriate times during construction.
3. The SI shall be responsible to build/create the graphic layout/background slides in conformance with the Northwestern University DDC Standards document. The graphics shall be resident on the Enterprise Server.
4. Maintain point naming structure. Verify BASC is adhering to the naming convention.
5. Coordinate with the BASC to verify proper alarm input to the Enterprise server, and display on the graphics.
6. Coordinate with the BASC to verify proper link to the trend files on the Enterprise server graphics.
7. Setup event log.
8. Merge project O&M documents, including the control drawings, into a common system O&M manual.
9. Work with the Owners IT Department to establish I/P network addresses with BACnet instance IDs and ensure the appropriate I/P addresses with BACnet instance IDs are used throughout the BAS Enterprise.
10. Maintain the Energy Analytics software on the Marathon redundant server, including all software upgrades.



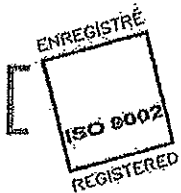
640, Curé-Bélvin
Bolsbriand (Québec)
Canada, J7G 2A7

North Western University

Order N° 78168



Life Science
NWU - 8/2/03



Qty 25 Luminaire 150MH-L80-PC-CS-SE3-QTA/277-SF80-BKTX

Description of Components:

Finial: Decorative cast 356 aluminum, mechanically assembled.

Hood: Cast 356 aluminum dome, mechanically assembled on the luminaire.

Guard: In a round shape with 4 arms, this guard is a one-piece cast 356 aluminum mechanically assembled to the fitter.

Globe: Made of one-piece seamless injected-molded satin clear polycarbonate. The globe is assembled on the access-mechanism.

Lamp: 150 watts metal halide Pulse Start Type (not included), ED 17 bulb, medium base.

Optical System: (SE3), I.E.S. type III (asymmetrical). Cutoff optical system. Multi-faceted hydroformed aluminum reflector brightened and anodized, mechanically assembled on the luminaire.

Ballast: High power factor of 90%. Primary voltage 120/208/240/277 volts, connected to 277 volts. Lamp starting capacity - 20F(-30C) degrees. Assembled on a unlized removable tray with quick disconnect plug.

Access-Mechanism: A cast 356 aluminum frame with latch and hinge. The mechanism shall offer toolfree access to the inside of the luminaire. An embedded memory-retentive gasket shall ensure weatherproofing.

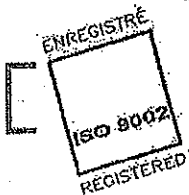
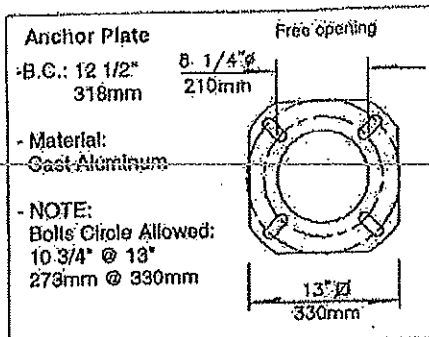
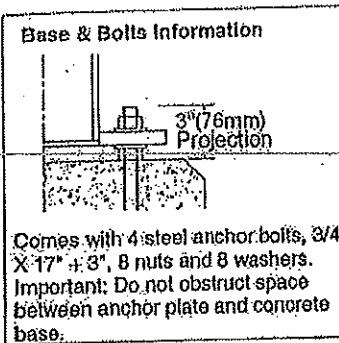
Fitter: Cast 356 aluminum c/w 4 set screws 3/8-16 UNC. Slip-fits on a 4"(102mm) outside diameter x 4" (102mm) long tenon.



640, Curé-Boivin
Boisbriand (Québec)
Canada, J7G 2A7

North Western University

Order N° 78168



Qty	25	Pole	RA61U-12-FS1-BKTX
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Description of Components:

Pole Shaft: Shall be made from a 4" (102mm) round extruded 6061-T6 aluminum tubing, having a 0.266" (6.8mm) wall thickness, welded to the pole base.

Joint Cover: Two-piece round joint cover made from cast 356 aluminum, mechanically fastened with stainless steel screws.

Pole Base: Shall be made from a 8 5/8" (218mm) round extruded 6061-T6 aluminum tubing base having a 0.148" (3.8mm) wall thickness, welded to both the bottom and top of the anchor plate.

Maintenance Opening: The pole shall have a 4" x 10" (102mm x 254mm) maintenance opening centered 25 1/4" (641mm) from the bottom of the anchor plate, complete with a weatherproof cast 356 aluminum cover and a factory assembled copper ground lug.

Base Cover: Two piece round base cover made from cast 356 aluminum, mechanically fastened with stainless steel screws.

Pole Options: (FS1), Single fuse and fuse-holder. Single fuse and fuse-holder.

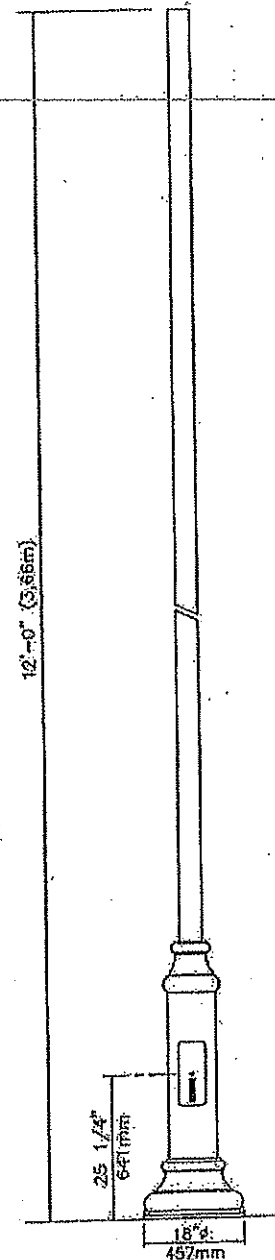
Miscellaneous

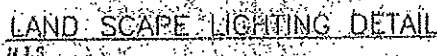
Description of Components:

Wiring: Gauge (#14) TEW wires, 6" (152mm) minimum exceeding from luminaire.

Hardware: All exposed screws will be in stainless steel. All seals and sealing devices are made and/or lined with EPDM and/or silicone.

Finish: Color to be black textured (BKTX). Application of a polyester powder coat paint. (4 mils/100 microns). The chemical composition provide a highly durable UV and salt spray resistant finish in accordance to the ASTM-B117-73 standard and humidity proof in accordance to the ASTM-D2247-68 standard.





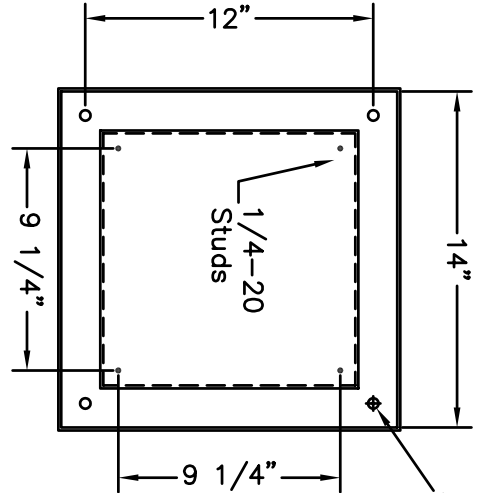
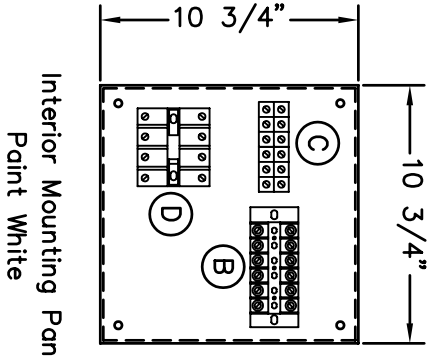
1. DEVELOP TWO (2) SETS OF AS-BUILT DRAWINGS PROVIDE A CDROM OF AS-BUILT DRAWINGS
2. THE ELECTRICAL DRAWINGS INDICATE THE LAYOUT OF THE VARIOUS ITEMS TO BE INSTALLED SHOWN AND/OR DIMENSIONED. THEY DO NOT INDICATE FITTING, ELBOW, TRANSITION, ETC. THE CONTRACTOR SHALL PROVIDE SUCH IN COMPLETE INSTALLATION
3. ALL EQUIPMENT FURNISHED SHALL BE NEW LISTED
4. REMOVE RUBBER AS IT ACCUMULATES
5. FURNISH ALL LABOR, TOOLS, MATERIALS, CONSTRUCTION ACTIVITIES AND SUPPLIES INCIDENTAL TO THE PROPER EXECUTION OF ELECTRICAL WORK AS SHOWN, AND INDICATE THE CONTRACT DRAWINGS AND OTHERWISE THAT THE INSTALLATION SHALL BE COMPLETE READY FOR USE
6. AFTER WIRES AND CABLES ARE IN PLACE AND EQUIPMENT IS INSTALLED, THE SYSTEM SHALL BE TIED TO PROPER GROUNDING AND OTHER SAFETY. PRESENT THE TROUBLE SHALL BE RESOLVED
7. ALL CONDUITS UNDER CONCRETE OR ASPHALT-PAVED TRENCHING MAY BE PERFORMED IN ONLY
8. CONTRACTOR SHALL BACKFILL, COMPACT & REPAIR AREAS DISTURBED DURING THE PROJECT CONDITIONS
9. PROVIDE ALL SUPPLEMENTARY OR MISCELLANEOUS WHICH ARE OBVIOUSLY AND BECAUSE OF THE INSTALLATION AND USUALLY INCLUDED THOUGH NOT SPECIFICALLY MENTIONED IN SUCH ITEMS INCLUDE, BUT ARE NOT LIMITED TO: ANCHORS, HANDERS, BRACKETS, SLEEVES, SPLICES, PULL AND JUNCTION BOXES, AND REQUIRED FOR NEW INSTALLATION AND ALL CONSTRUCTIONS
10. PRIOR TO SUBMITTING THEIR BIDS, CONTRACTORS AND COMPLETELY FAMILIARIZE THEMSELVES AND SURROUNDING PREMISES TO FULLY DO AS DONE AND WHAT MAY HAVE AN IMPACT ON
11. THESE DOCUMENTS DO NOT INCLUDE THE FOLLOWING FOR CONSTRUCTION SAFETY: (SAFETY) CAP COMPLIANCE WITH ALL APPLICABLE FEDERAL RULES AND REGULATIONS REGARDING THE SOLE RESPONSIBILITY OF THE CONTRACTOR
12. USE ADEQUATE NUMBER OF WORKPEOPLE TRAINED AND EXPERIENCED IN THE NECESSARY COMPETENTLY FAMILIAR WITH THE SPECIFIED METHODS NEEDED TO PROPERLY PERFORM THIS DIVISION
13. SUBMITTALS:
1. SHOP DRAWINGS -- SUBMIT SIX (6) SETS, CATALOG CUTS, AND APPLICABLE INST. REVIEW OF ALL EQUIPMENT
2. SUBMIT ALL REQUIRED DRAWINGS, DRAW TO LOCAL AUTHORITIES AND RESPECTIVE AND PERMITTING
3. CONSTRUCTION RECORD DRAWINGS -- 5 REPRODUCIBLE RECORD DRAWINGS
14. WARRANTY: ONE YEAR ON BOTH WORKMANSHIP AND MATERIALS
15. IN LOCATIONS WHERE EXISTING OR NEW WORK IS CAUSING PARTITIONS, THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE LOCATION OF SAME IN COMPLIANCE WITH THE SATISFACTION OF THE ARCHITECT & OWNER
16. LABEL EACH PANEL WITH THE PANEL AND O. IT IS FTD. ALSO STATE THE LOCATION OF AN ENGRAVED LABEL (2" X 4") AT THE BOTTOM
17. THE CONTRACTOR AFTER INSPECTING THE WORK SHALL CALL TO THE ATTENTION OF THE ARCHITECT ANY ELECTRICAL WORK NOT REQUIRED BY THE VARIOUS EQUIPMENT BEING INSTALLED
18. ONLY STEEL ANCHORS OR TIGER BOLTS SUPPORTING EQUIPMENT, PIPE, AND LIGHTS USE OF PLASTIC ANCHORS IS PROHIBITED
19. ELECTRICAL PROJECTS ARE NOT CONSIDERED AS-BUILT DRAWINGS WITH SOME RUNS BY THE UNIVERSITY ARCHITECT OF THE SUPERVISOR
20. THE CONTRACTOR AND/OR SUPPLIER SHALL ANY SPECIFIED ITEMS MUST BE REPLACED OR REPAIRED AT THE CONTRACTOR'S EXPENSE

Construction Notes:

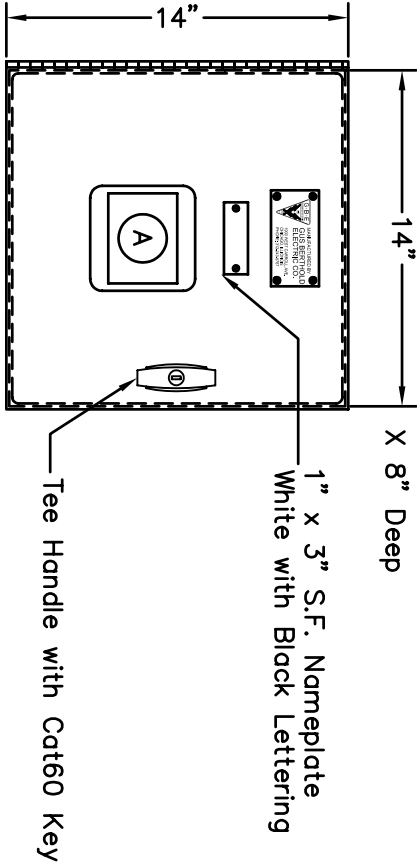
- 1. Enclosure to be constructed from 14Ga. hot-rolled sheet steel, welded construction.
- 2. Front door to be constructed from 14Ga. HR, formed on all sides with concealed hinge. Door to be held closed with locking handle with Cat 60 key.
- 3. Interior pan to be constructed from 14Ga. HR, formed with corners welded and ground smooth. Paint pan white

Components List

Item No.	Quantity ~ Catalog Number	Manuf.	Description
(A)	1~ Electro-Industries Shark200-60-10-V5-D2 INP-100S-X		Shark 200 Multi-Function Digital Meter with Ethernet Port Capability
(B)	1~ Marathon 1604SC		6 Point CT Shorting Block
(C)	1~ USD NDN63-WH		6 Point Terminal Block
(D)	1~ Ferraz-Shawmut 30354		600V, 30A, 4P, Midget Class Fuse Block
(E)	3~ Ferraz-Shawmut ATM 1/10		600V, 1/10A, Fast Acting Midget Class Fuse rated 100KA I.R.
(F)	1~ Ferraz-Shawmut ATQ3		500V, 3A Midget Time Delay Fuse rated 10KA I.R.
(G)	3~ Electro-Industries N/A		See 12-1353-3 for CT Requirements



Interior View



Front Elevation

FOR:

Northwestern University
Evanston Campus

CONTRACTOR: Kelso Burnett

P.O.#

TITLE:

Metering Enclosure Layout
Component Schedule

Gus Berthold Electric Co.

1900 W. CARROLL AVENUE

CHICAGO, ILLINOIS 60612

TELE. 312-243-5767 FAX. 312-243-5811

DRAWN: MSH

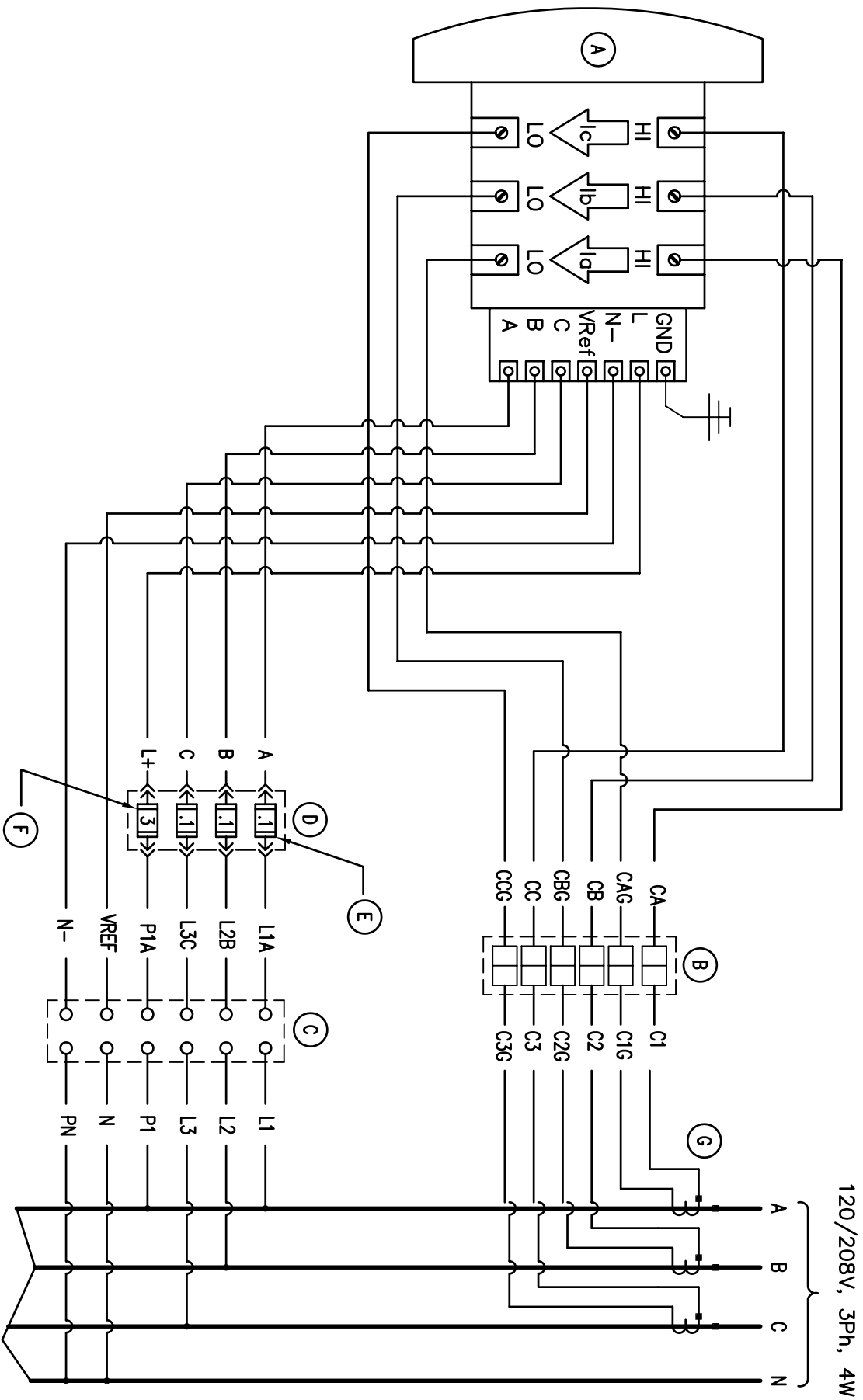
SCALE: 1 1/2"=1'

DRAWING NO.

DATE: 11-08-12

DWG. SIZE: A

12-1353-1



120/208V, 3Ph, 4W

FOR:

Northwestern University
Evanston Campus

CONTRACTOR: Kelso - Burnett

P.O.#

TITLE:

Shark 200 Wiring Diagram

Gus Berthold Electric Co.

1900 W. CARROLL AVENUE
CHICAGO, ILLINOIS 60612

TELE. 312-243-5767 FAX. 312-243-5811

DRAWN: MSH

SCALE: 1:2

DRAWING NO.

DATE: 11-07-12

DWG. SIZE: A

12-1353-2

Spectra® HD Series Network Dome System

HIGH DEFINITION PAN/TILT/ZOOM HIGH-SPEED DOME

Product Features

- Up to 1280 x 960 Resolution
- 4:3 or 16:9 Aspect Ratio; 960p at 20 Images per Second (ips), 720p at 30 ips
- 1.3 Megapixel (MPx), 18X Optical, Wide Dynamic Range (WDR) Camera
- Ability to Control and Monitor Video Over IP Networks
- Built-in Analytics Including AutoTracking and Adaptive Motion Detection
- 2 Simultaneous Video Streams: Dual H.264 and Scalable MJPEG
- 360° Continuous Pan Rotation at 400° per Second
- Supported Protocols: TCP/IP, UDP/IP (Unicast, Multicast IGMP), UPnP, DNS, DHCP, RTP, NTP, and More
- Power over Ethernet (PoE) IEEE 802.3af
- USB Expansion Slots for Alarms and Audio Accessories
- 16 Preset Tours, 255 Dome Presets, 8 Privacy Zones

Network Dome System

Pelco takes its industry-leading Spectra® Series dome into the world of high definition. **Spectra HD** delivers crystal-clear, live streaming images over the Internet using a standard Web browser (Microsoft® Internet Explorer® or Mozilla® Firefox®). With four times the resolution of standard definition domes, **Spectra HD** is an ideal solution to view details such as faces, license plates, tattoos, playing cards (in casinos), or other specific features.

Spectra HD supports High-Profile H.264 compression, a vast improvement in quality over MPEG-4 and 20 times more efficient than M-JPEG. The dome system features open architecture connectivity for third-party software recording solutions allowing integration into virtually any IP-based HD system. It is also compatible with Digital Sentry® video management systems. As with all Pelco IP camera solutions, **Spectra HD** is Endura Enabled™ to record, manage, configure, and view multiple live streams. When connected to an Endura® HD network-based video security system, the dome system has access to EnduraStor™ and EnduraView™ for optimized image quality and bandwidth efficiency.

Spectra HD features the same ease of installation and ease of maintenance that you have come to expect from Spectra. Each dome system consists of a back box, a dome drive, and a lower dome.



Spectra HD includes a choice of four back box models: in-ceiling, environmental in-ceiling, pendant, and environmental pendant. All environmental models meet NEMA Type 4X, IP66 when properly installed.

Built-In Analytics

Pelco Analytics enhance the flexibility and performance of Spectra HD. Eight Pelco behaviors are preloaded and included as standard features. Pelco behaviors can be configured and enabled using a standard Web browser, and they are compatible with Endura or a third-party system that supports Pelco's Analytics API system.

Web Interface

Spectra HD uses a standard Web browser for powerful remote setup and administration. Up to 16 cameras can be viewed on the same network.

Window Blanking

Window blanking is used to conceal user-defined privacy areas that cannot be viewed by an operator. Spectra HD supports up to eight blanked windows. A blanked area will appear on the screen as a solid gray window.

PELCO

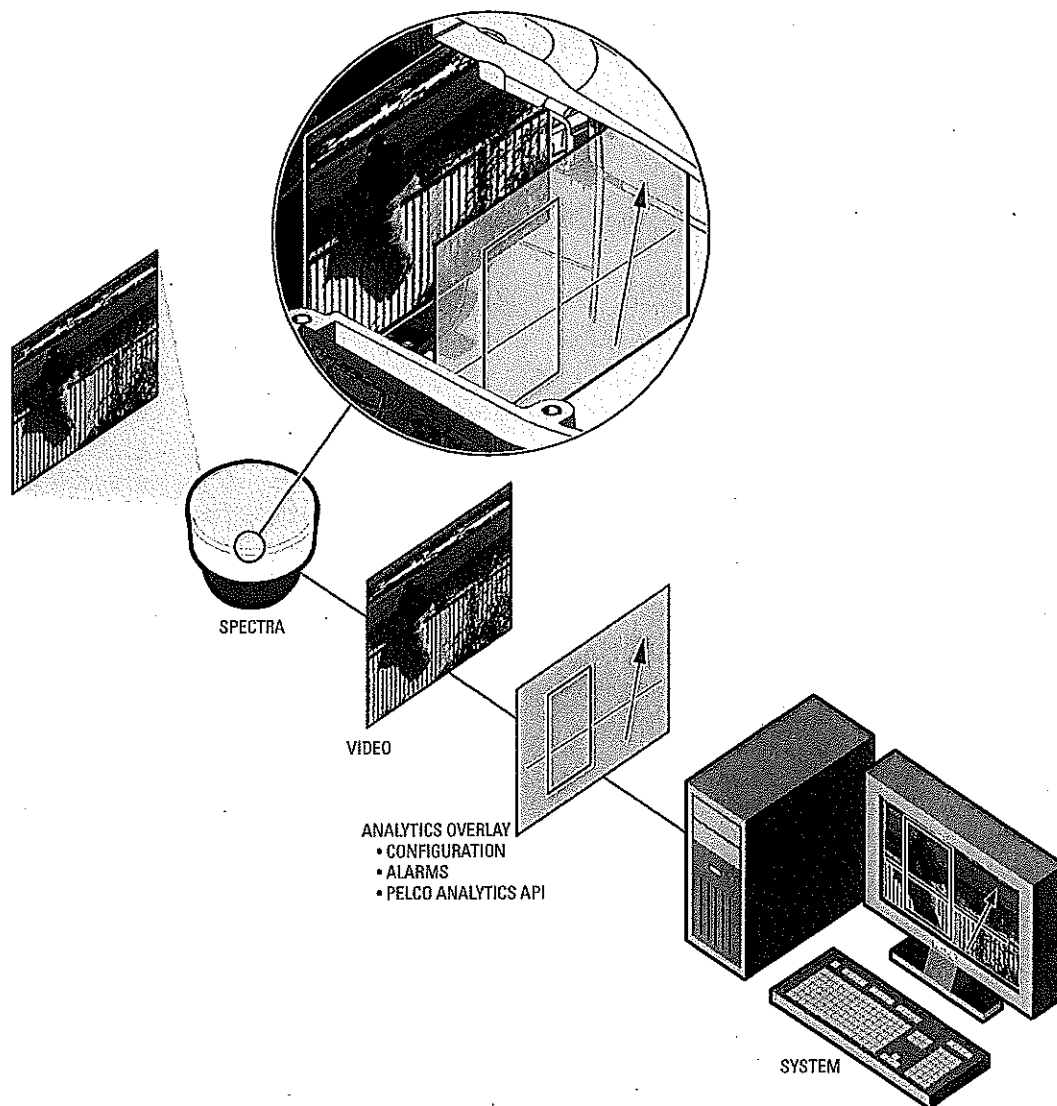
by Schneider Electric

International Standards
Organization Registered Firm
ISO 9001 Quality System
ISO 9001
CERTIFIED

C3470 / REVISED 5-4-11

TECHNICAL SPECIFICATIONS

The following diagram illustrates how the camera system interprets streaming video when embedded analytics are configured and enabled.



IMPORTANT NOTE: PLEASE READ. The network implementation is shown as a general representation only and is not intended to show a detailed network topology. Your actual network will differ, requiring changes or perhaps additional network equipment to accommodate the system as illustrated. Please contact your local Pelco Representative to discuss your specific requirements.

TECHNICAL SPECIFICATIONS

CAMERA

Sensor Type	1/3-inch CCD
Optical Zoom	18X
Maximum Resolution	1280 x 960
Lens	f/1.6 (focal length, 4.7 ~ 84.6 mm optical)
Aspect Ratios	4:3 or 16:9
Light Sensitivity	f/1.6; 2,850°K; SNR >24dB
Color (33 ms)	0.70 lux
Color (250 ms)	0.07 lux
Mono (33 ms)	0.25 lux
Mono (250 ms)	0.02 lux
Day/Night Capabilities	Yes
IR Cut Filter	Yes
IR Trace	Curves 850 nm and 950 nm
Wide Dynamic Range	60 dB
Iris Control	Auto iris with manual override
Backlight Compensation	Yes

VIDEO

Video Encoding	H.264 high, main, or base profile and MJPEG
Video Streams	Up to 2 simultaneous streams; the second stream is variable based on the setup of the primary stream
Frame Rate	Up to 30, 25, 24, 15, 12.5, 12, 10, 8, 7.5, 6, 5, 4, 3, 2.5, 2, 1 (dependent upon coding, resolution, and stream configuration)

Available Resolutions

Resolution				MJPEG		H.264 High Profile (IP GOP structure)	
MPx	Width	Height	Aspect Ratio	Maximum IPS	Recommended Bit Rate (Mbps)	Maximum IPS	Recommended Bit Rate (Mbps)
1.30	1280	960	4:3	20	12.00	20	3.00
0.92	1280	720	16:9	30	12.00	30	2.90
0.49	800	608	4:3	20	5.15	20	1.75
0.31	640	480	4:3	20	3.25	20	1.20
0.23	640	352	16:9	30	3.60	30	1.15
0.18	480	368	4:3	20	1.85	20	0.75
0.13	480	272	16:9	30	2.05	30	0.75
0.08	320	240	4:3	20	0.80	20	0.40
0.06	320	176	16:9	30	0.90	30	0.35

Supported Protocols	TCP/IP, UDP/IP (Unicast, Multicast (IGMP), UPnP), DNS, DHCP, RTP, RTSP, NTP, IPv4, SNMP v2c/v3, QoS, HTTP, HTTPS, LDAP (client), SSH, SSL, SMTP, FTP, and 802.1x (EAP)
Users	
Unicast	Up to 20 simultaneous users depending on resolution settings (2 guaranteed streams)
Multicast	Unlimited users H.264
Security Access	Password protected
Software Interface	Web browser view and setup, up to 16 cameras
Pelco System Integration	Endura 2.0 (or later) Digital Sentry 4.2 (or later)
Open IP Integration	Pelco IP camera API
Minimum System Requirements	
Processor	Intel® Core™ 2 Duo microprocessor, 2.6 GHz
Operating System	Windows® XP, Windows Vista®, or Mac® OS X 10.4 (or later)
Memory	2 GB RAM
Network Interface Card	100 megabits (or greater)
Monitor	Minimum of 1024 x 768 resolution, 16- or 32-bit pixel color resolution
Web Browser*	Internet Explorer 7.0 (or later) or Firefox 3.5 (or later); Internet Explorer 8.0 (or later) is recommended for configuring analytics
Media Player†	Pelco Media Player‡ or QuickTime® 7.6.5 for Windows XP, Windows Vista, or QuickTime 7.6.4 for Mac OS X 10.4

ANALYTICS

Required Systems for Pelco Analytics

Pelco Interface	WS5200 Advanced System Management Software on an Endura 2.0 (or later) system
Open API	Pelco analytics allow streaming information to communicate through Pelco's API Guide for Video Analytics version 0.55.30 (or later), available at Pelco.com/IP

*Internet Explorer is not supported by Mac OS X 10.4.

†This product is not compatible with QuickTime version 7.6.4 for Windows XP or Windows Vista. If you have this version installed on your PC, you will need to upgrade to QuickTime version 7.6.5.

‡Pelco Media Player is recommended for control, smoothness, and reduced latency as compared to QuickTime.

TECHNICAL SPECIFICATIONS

SYSTEM MODEL NUMBERS

Type	Back Box Color	Lower Dome	HD, 1.3 MPx, 18X Color
In-ceiling, indoor	Black with white trim ring	Smoked	S5118-FW0
		Clear	S5118-FW1
In-ceiling, environmental	Black with black trim ring	Smoked	S5118-YB0
		Clear	S5118-YB1
Pendant, standard	Gray	Smoked	S5118-PG0
		Clear	S5118-PG1
	Black	Smoked	S5118-PB0
		Clear	S5118-PB1
Pendant, environmental	Gray	Smoked	S5118-EG0
		Clear	S5118-EG1

COMPONENT MODEL NUMBERS

Back Box		Lower Dome*		Dome Drive	
B5-F	HD, in-ceiling, gray	LDHQF-0	High-quality, smoked, in-ceiling	D5118	HD, 1.3 Mpx, 18X optical zoom
B5-F-E	HD, environmental in-ceiling, gray	LDHQF-1	High-quality, clear, in-ceiling		
B5-PG	HD, pendant, gray	LDHQP-0	High-quality, smoked, pendant		
B5-PB	HD, pendant, black	LDHQP-1	High-quality, clear, pendant		
B5-PG-E	HD, environmental pendant, gray				

*Use the pendant lower domes with the environmental in-ceiling and environmental pendant back boxes.

CERTIFICATIONS/RATINGS/PATENTS

- CE, Class A
- FCC, Class A
- UL/cUL Listed
- C-Tick
- U.S. Patents 5,931,432; 6,793,415 B2; 6,802,656 B2; 6,821,222 B2; 7,161,615 B2
- Meets NEMA Type 4X and IP66 standards when installed properly (B5-F-E and B5-PG-E)

IM10 Series Sarix™ Mini Indoor Fixed Dome

1.3 MEGAPIXEL HIGH DEFINITION INTEGRATED NETWORK CAMERA

Product Features

- Up to 1.3 Megapixel Resolution (1280 x 1024)
- Up to 30 Images per Second (ips) at 1280 x 720
- Compact Size with 3-inch Bubble
- Auto Focus Varifocal 2.8 ~ 10 mm Megapixel Lens
- Easy Installation
- H.264 and MJPEG Compression
- Sensitivity Down to 0.12 lux
- Line-in Audio and Built-in Microphone
- Power over Ethernet (PoE), IEEE 802.3af
- Video Setup Jack Accessible with Dome Installed
- Up to 2 Simultaneous Video Streams
- Web Viewing, up to 16 Cameras Simultaneously
- Open IP Standards

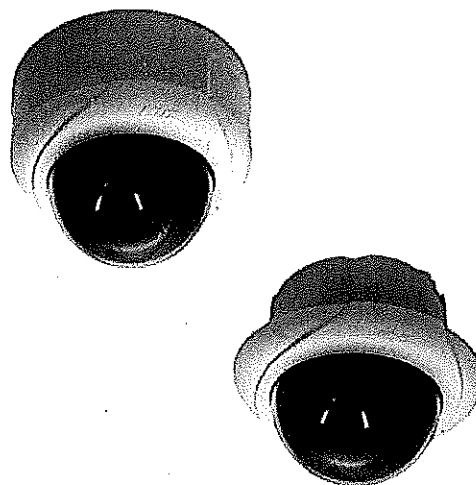
The **IM10 Series with Sarix™ technology** is a 1.3 megapixel (MPx) network indoor fixed dome camera designed with industry-leading image quality and high performance processing power. From back box wiring to focusing the lens, the **IM10 Series** is designed to install quickly and easily.

Sarix technology defines the next generation of video security imaging performance, delivering high definition (HD) resolution, advanced low-light capabilities, consistent color science, and fast processing power. The H.264 compression video files are up to 20 times smaller making HD video more affordable.

Fixed Dome Camera

The **IM10 Series** contains an integrated varifocal 2.8 ~ 10 mm megapixel lens. All models include a camera in a compact indoor enclosure that is ready to install.

The **IM10 Series** supports two simultaneous video streams. The two streams can be compressed in MJPEG and H.264 formats across several resolution configurations. The streams can be configured in a variety of frame rates, bit rates, and group of pictures (GOP) structures for additional bandwidth administration.



Built-In Analytics

The **Pelco Camera Sabotage** behavior is a standard feature of the IM10 Series. This behavior detects contrast changes in the field of view. An alarm is triggered if the lens is obstructed with spray paint, a cloth, or covered with a lens cap. Any unauthorized repositioning of the camera also triggers an alarm.

Web Interface

The **IM10 Series** uses a standard Web browser for powerful remote setup and administration. Up to 16 cameras can be viewed on the same network.

Window Blanking

Window blanking is used to conceal user-defined privacy areas that cannot be viewed by an operator. The **IM10 Series** supports up to four blanked windows. A blanked area will appear on the screen as a solid gray window.

Video Systemization

The **IM10 Series** easily connects to Pelco IP and hybrid systems such as Endura® version 2.0 (or later) and Digital Sentry® version 4.3 (or later). The camera also features open architecture connectivity to third-party software. Pelco offers an application programming interface (API) that enables third-party systems to interface with Pelco's network cameras.



by Schneider Electric

International Standards
Organization Registered Firm
ISO 9001 Quality System



C2972 / REVISED 9-3-10

TECHNICAL SPECIFICATIONS

VIDEO

Video Encoding	H.264 base profile and MJPEG
Video Streams	Up to 2 simultaneous streams; the second stream is variable based on the setup of the primary stream
Frame Rate	Up to 30, 25, 24, 15, 12.5, 12, 10, 8, 7.5, 6, 5, 4, 3, 2, 1 (dependent upon coding, resolution, and stream configuration)

Available Resolutions

Resolution				MJPEG		H.264 Base Profile	
MPx	Width	Height	Aspect Ratio	Maximum IPS	Recommended Bit Rate	Maximum IPS	Recommended Bit Rate
1.3	1280	1024	5:4	20 ips	10.0 Mbps	8.0 ips	2.5 Mbps
1.2	1280	960	4:3	20 ips	9.8 Mbps	8.0 ips	2.4 Mbps
0.9	1280	720	16:9	30 ips	10.0 Mbps	12.5 ips	2.5 Mbps
0.5	800	600	4:3	30 ips	5.8 Mbps	25 ips	2.0 Mbps
0.3	640	480	4:3	30 ips	3.7 Mbps	30 ips	1.6 Mbps
0.1	320	240	4:3	30 ips	0.9 Mbps	30 ips	0.4 Mbps

Additional Resolutions	640 x 512, 640 x 352, 480 x 368, 480 x 272, 320 x 256, and 320 x 176
Supported Protocols	TCP/IP, UDP/IP (Unicast, Multicast IGMP), UPnP, DNS, DHCP, RTP, RTSP, NTP, IPv4, SNMP v2c/v3, QoS, HTTP, HTTPS, LDAP (client), SSH, SSL, SMTP, FTP, mDNS (Bonjour®), and B02.1x (EAP)

Users	
Unicast	Up to 20 simultaneous users depending on resolution settings (2 guaranteed streams)
Multicast	Unlimited users H.264
Security Access	Password protected
Software Interface	Web browser view and setup, up to 16 cameras
Pelco System Integration	Endura 2.0 (or later) or Digital Sentry 4.3 (or later)
Open IP Integration	Pelco IP camera API
Minimum System Requirements	
Processor	Intel® Pentium® 4 microprocessor, 1.6 GHz
Operating System	Microsoft® Windows® XP, Windows Vista®, or Mac® OS X 10.4 (or later)
Memory	512 MB RAM
Network Interface Card	100 megabits, minimum
Monitor	Minimum of 1024 x 768 resolution, 16- or 32-bit pixel color resolution
Web Browser*	Internet Explorer® 7.0 (or later) or Mozilla® Firefox® 3.5 (or later); Internet Explorer® 8.0 (or later) is recommended for configuring analytics
Media Player†	Pelco Media Player or QuickTime® 7.6.5 for Windows XP, Windows Vista, or QuickTime 7.6.4 for Mac OS X 10.4

LENS

Field of View in Degrees		High Resolution Streams (>800 x 600) Aspect Ratio		
		16:9	4:3	5:4
2.8 mm	Horizontal	91	91	91
	Vertical	50	67	72
10.0 mm	Horizontal	25	25	25
	Vertical	14	19	20

Note: For 800 x 600 (or lower) resolutions in 4:3 or 5:4 aspect ratios, the field of view is smaller than listed above. Refer to the installation/operation manual for details.

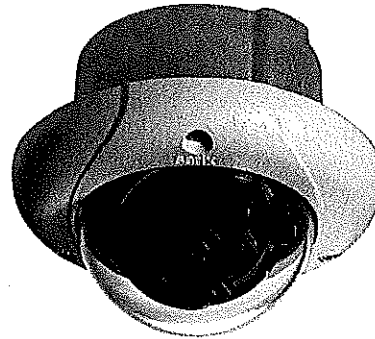
*Internet Explorer is not supported by Mac OS X 10.4.

†This product is not compatible with QuickTime version 7.6.4 for Windows XP or Windows Vista. If you have this version installed on your PC, you will need to upgrade to QuickTime version 7.6.5.

Sarix™ IM10-E Series Environmental Mini Fixed Dome INDOOR/OUTDOOR, NETWORK, 1.3 MEGAPIXEL, HIGH DEFINITION DIGITAL CAMERA

Product Features

- Up to 1.3 Megapixel Resolution (1280 x 1024)
- Up to 30 Images per Second (ips) at 1280 x 720
- Compact Day/Night Camera with 3-Inch Bubble
- Auto Focus Varifocal 2.8 ~ 10 mm Megapixel Lens
- Vandal-Resistant, Indoor/Outdoor, Environmental
- H.264 and MJPEG Compression
- Sensitivity Down to 0.03 lux
- Line-In and Line-Out Audio
- Power over Ethernet (PoE), IEEE 802.3af
- Up to 2 Simultaneous Video Streams
- Web Viewing, up to 16 Cameras Simultaneously
- Open IP Standards



The **Sarix™ IM10-E Series** is a 1.3 megapixel (MPx) network indoor/outdoor fixed dome camera designed with industry-leading image quality. Its sturdy metal design is tamper-resistant and is designed for worry-free use in a wide range of environmental operating conditions. The back box is plenum rated per 2008 NEC article 300.22(C)(2).

Sarix technology defines the next generation of video security imaging performance, delivering high definition (HD) resolution, advanced low-light capabilities, consistent color science, and fast processing power. The H.264 compression video files are considerably smaller making HD video more affordable.

Fixed Dome Camera

The **IM10-E Series** camera is a rugged compact indoor/outdoor enclosure that is ready to install. The camera features an integrated varifocal 2.8 ~ 10 mm MPx lens. Additionally, the **IM10-E Series** is a day/night camera that is equipped with a mechanical IR cut filter for increased sensitivity in low-light installations.

The **IM10-E Series** supports two simultaneous video streams. The two streams can be compressed in MJPEG and H.264 formats across several resolution configurations. The streams can be configured in a variety of frame rates, bit rates, and group of pictures (GOP) structures for additional bandwidth administration.

Built-In Analytics

The **Pelco Camera Sabotage** behavior is a standard feature of the IM10-E Series. This behavior detects contrast changes in the field of view. An alarm is triggered if the lens is obstructed with spray paint, a cloth, or covered with a lens cap. Any unauthorized repositioning of the camera also triggers an alarm.

Web Interface

The **IM10-E Series** uses a standard Web browser for powerful remote setup and administration. Up to 16 cameras can be viewed on the same network.

Window Blanking

Window blanking is used to conceal user-defined privacy areas that cannot be viewed by an operator. The **IM10-E Series** supports up to four blanked windows. A blanked area will appear on the screen as a solid gray window.

Video Systemization

The **IM10-E Series** easily connects to Pelco IP and hybrid systems such as Endura® version 2.0 (or later) and Digital Sentry® version 4.3 (or later). The camera also features open architecture connectivity to third-party software. Pelco offers an application programming interface (API) that enables third-party systems to interface with Pelco's network cameras.

PELCO

by Schneider Electric

International Standards
Organization Registered Firm
ISO 9001 Quality System
ISO 9001
CERTIFIED

C2980 / REVISED 3-7-11

VIDEO

Video Encoding

H.264 base profile and MJPEG

Video Streams

Up to 2 simultaneous streams; the second stream is variable based on the setup of the primary stream

Frame Rate

Up to 30, 25, 24, 15, 12.5, 12, 10, 8, 7.5, 6, 5, 4, 3, 2, 1 (dependent upon coding, resolution, and stream configuration)

Available Resolutions

Resolution				MJPEG		H.264 Base Profile	
MPx	Width	Height	Aspect Ratio	Maximum IPS	Recommended Bit Rate	Maximum IPS	Recommended Bit Rate
1.3	1280	1024	5:4	20 ips	10.0 Mbps	8.0 ips	2.5 Mbps
1.2	1280	960	4:3	20 ips	9.8 Mbps	8.0 ips	2.4 Mbps
0.9	1280	720	16:9	30 ips	10.0 Mbps	12.5 ips	2.5 Mbps
0.5	800	600	4:3	30 ips	5.8 Mbps	25 ips	2.0 Mbps
0.3	640	480	4:3	30 ips	3.7 Mbps	30 ips	1.6 Mbps
0.1	320	240	4:3	30 ips	0.9 Mbps	30 ips	0.4 Mbps

Additional Resolutions

640 x 512, 640 x 352, 480 x 368, 480 x 272, 320 x 256, and 320 x 176

Supported Protocols

TCP/IP, UDP/IP (Unicast, Multicast IGMP), UPnP, DNS, DHCP, RTP, RTSP, NTP, IPv4, SNMP v2c/v3, QoS, HTTP, HTTPS, LDAP (client), SSH, SSL, SMTP, FTP, mDNS (Bonjour®), and 802.1x (EAP)

Users

Unicast

Up to 20 simultaneous users depending on resolution settings (2 guaranteed streams)

Multicast

Unlimited users H.264

Security Access

Password protected

Software Interface

Web browser view and setup, up to 16 cameras

Pelco System Integration

Endura 2.0 (or later) or Digital Sentry 4.3 (or later)

Open IP Integration

Pelco IP camera API

Minimum System Requirements

Processor

Intel® Pentium® 4 microprocessor, 1.6 GHz

Operating System

Microsoft® Windows® XP, Windows Vista®, or Mac® OS X 10.4 (or later)

Memory

512 MB RAM

Network Interface Card

100 megabits, minimum

Monitor

Minimum of 1024 x 768 resolution, 16- or 32-bit pixel color resolution

Web Browser*

Internet Explorer® 7.0 (or later) or Mozilla® Firefox® 3.5 (or later); Internet Explorer® 8.0 (or later) is recommended for configuring analytics

Media Player†

Pelco Media Player or QuickTime® 7.6.5 for Windows XP, Windows Vista, or QuickTime 7.6.4 for Mac OS X 10.4

LENS

Field of View in Degrees		High Resolution Streams (>800 x 600) Aspect Ratio		
		16:9	4:3	5:4
2.8 mm	Horizontal	91	91	91
	Vertical	50	87	72
10.0 mm	Horizontal	25	25	25
	Vertical	14	19	20

Note: For 800 x 600 (or lower) resolutions in 4:3 or 5:4 aspect ratios, the field of view is smaller than listed above. Refer to the installation/operation manual for details.

*Internet Explorer is not supported by Mac OS X 10.4.

†This product is not compatible with QuickTime version 7.6.4 for Windows XP or Windows Vista. If you have this version installed on your PC, you will need to upgrade to QuickTime version 7.6.5.

MODEL

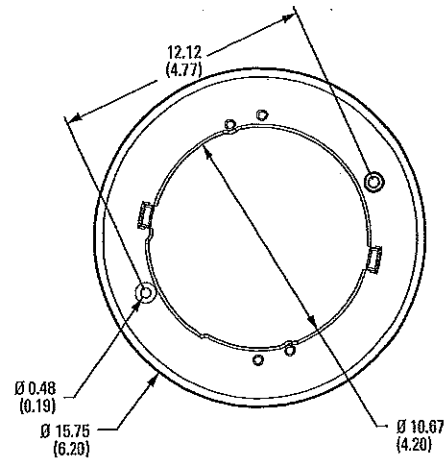
IM10DN10-1E

Sarix environmental, indoor/outdoor mini fixed dome network camera, 1.3 MPx, day/night, 2.8 ~ 10 mm varifocal megapixel lens, clear dome



NOTE: VALUES IN PARENTHESES ARE INCHES; ALL OTHERS ARE CENTIMETERS.

4S ELECTRICAL BOX (DEEP) ADAPTER PLATE (Available as an Accessory)



CERTIFICATIONS/RATINGS/PATENTS

- CE, Class A
- FCC, Class A
- UL/cUL Listed
- C-Tick
- KCC*
- Meets NEMA Type 4 and IP66 standards
- Patents are pending

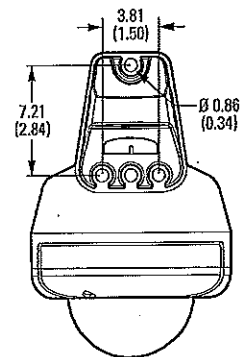
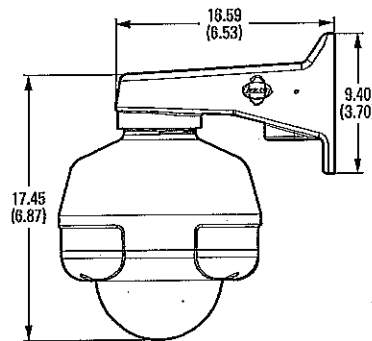
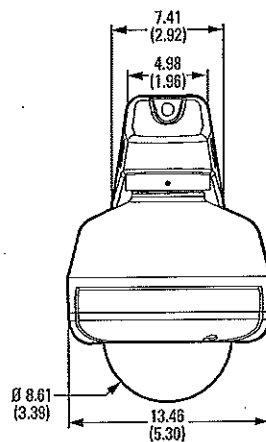
*As of the date of this publication, these certifications are pending. Please consult the factory, our Web site at www.pelco.com, or the most recent B.O.S.S.® update for the current status of certifications.

OPTIONAL ACCESSORIES

LDIMVE-0	Smoked bubble
IM-VESM	Surface mount ring
IM-VEPM	Pendant mount, light gray
WMVE-SR	Wall mount light, gray
IM-VECM	Corner mount, light gray
IM-VE4S	4S electrical box (deep) adapter plate
POE20U580G	Single port PoE injector
PA101	Pole adapter for use with WMVE-SR wall mount
ALM-1	External alarm accessory

WALL MOUNT

(Available as an Accessory)



Pelco by Schneider Electric
3500 Pelco Way, Clovis, California 93612-5699 United States
USA & Canada Tel (800) 289-9100 Fax (800) 289-9150
International Tel +1 (559) 292-1981 Fax +1 (559) 348-1120
www.pelco.com

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GENERAL

Imaging Device	1/3-inch (effective)
Imager Type	CMOS
Imager Readout	Progressive scan
Maximum Resolution	1280 x 1024
Signal-to-Noise Ratio	50 dB
Auto Iris Lens Type	DC drive
Electronic Shutter Range	1 ~ 1/100,000 sec
Wide Dynamic Range	60 dB
White Balance Range	2,000° to 10,000°K
Sensitivity	f/1.3; 2,850°K; SNR >24 dB
Color (1x/33 ms)	0.5 lux
Color SENS (15x/500 ms)	0.12 lux
Mono (1x/33 ms)	0.25 lux
Mono SENS (15x/500 ms)	0.03 lux
Dome Attenuation	Clear dome, zero light loss
Construction	
Back Box	Alodine aluminum
Bubble	Polycarbonate plastic
Finish	Light gray powder coat
Weight	
Unit	0.6 kg (1.4 lb)
Shipping	1.0 kg (2.2 lb)
Available Languages	Chinese, English, French, German, Italian, Portuguese, Russian, Spanish, and Turkish

ELECTRICAL

Port	RJ-45 connector for 100Base-TX Auto MDI/MDI-X
Cable Type	Cat5 or better for 100Base-TX
Power Input	PoE (IEEE 802.3af class 3)
Power Consumption*	7.4 W nominal
Service Port	External 3-connector; 2.5 mm provides NTSC/PAL video output
Accessory Port	Connects Pelco accessories
Audio	
Streaming	Bidirectional: full or half duplex
Input/Output	Line level/external microphone input; 600-ohm differential, 1 Vp-p max signal level
Compression	G.711 PCM 8 bit, 8 kHz mono at 64 kbit/s

*Does not include optional accessories connected to the accessory port.

MECHANICAL

Pan/Tilt Adjustment	Manual
Pan	355°
Tilt	180°
Rotate	220°

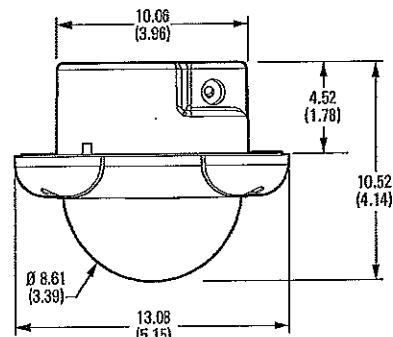
ENVIRONMENTAL

Operational Temperature	-20° to 50°C (-4° to 122°F)
Thermostat Operation	Heater thermostatically controlled to operate below 5°C (41°F)
Operational Humidity	20% to 80%, noncondensing
Impact Resistance	IK10++ per EN62262 (50J)
Shock and Vibration	Meets EN50155 Category 1, Class B; IEC60068: 2-6 and 2-27



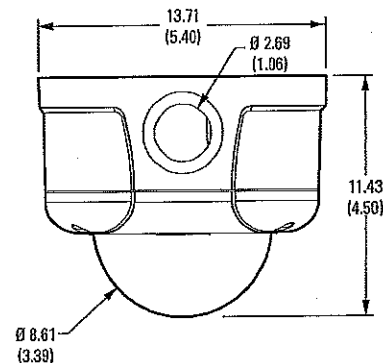
NOTE: VALUES IN PARENTHESES ARE INCHES; ALL OTHERS ARE CENTIMETERS.

IN-CEILING



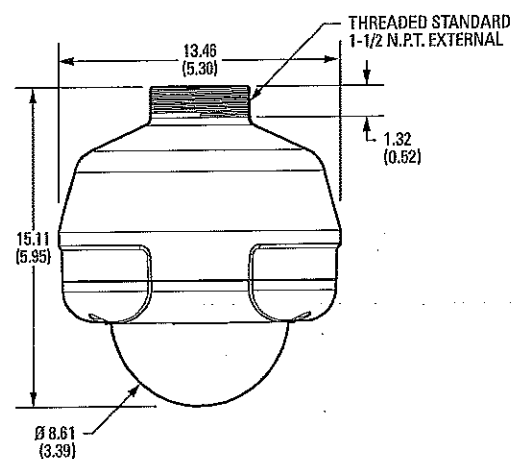
SURFACE

(Mounting Ring is Available as an Accessory)



PENDANT

(Mount is Available as an Accessory)



TECHNICAL SPECIFICATIONS

MODELS

IM10C10-1

Sarix mini indoor fixed dome network camera,
1.3 megapixel, color, 2.8 ~ 10 mm varifocal
megapixel lens, white trim ring, clear dome

IM10C10-B1

Sarix mini indoor fixed dome network camera,
1.3 megapixel, color, 2.8 ~ 10 mm varifocal
megapixel lens, black trim ring, clear dome

CERTIFICATIONS/RATINGS/PATENTS

- CE, Class B
- FCC, Class B
- UL/cUL Listed
- C-Tick
- Patents Pending

OPTIONAL ACCESSORIES

IM-PMWT

Pendant mount white

IM-PMBL

Pendant mount black

IM-WMWT

Integrated wall mount white

IM-WMBL

Integrated wall mount black

LDIM-O

White lower dome with smoked bubble

LDIM-B0

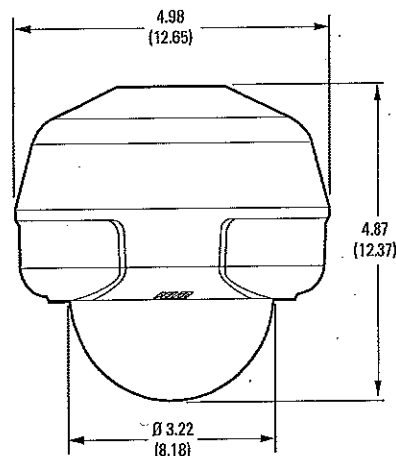
Black lower dome with smoked bubble

IX-SC

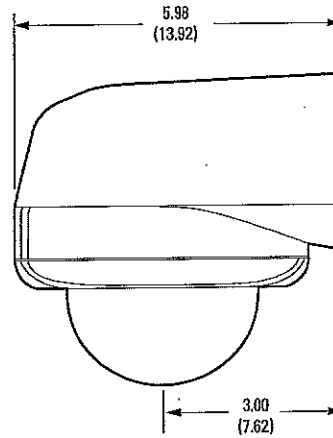
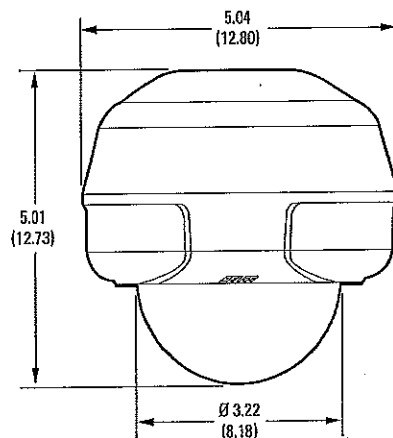
4-foot service/monitor cable, compatible with
any standard monitor BNC connector

POE20U560G

Single port PoE injector



PENDANT (MOUNT AVAILABLE AS ACCESSORY)



INTEGRATED WALL MOUNT (AVAILABLE AS ACCESSORY)

NOTE: VALUES IN PARENTHESIS ARE CENTIMETERS; ALL OTHERS ARE INCHES.

Pelco, Inc. Worldwide Headquarters:

3500 Pelco Way, Clovis, California 93612-5699 USA

USA & Canada Tel: (800) 289-9100 • FAX: (800) 289-9150

International Tel: +1 (559) 292-1981 • FAX: +1 (559) 348-1120

www.pelco.com

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TECHNICAL SPECIFICATIONS

GENERAL

Imaging Device	1/3-inch (effective)
Imager Type	CMOS
Imager Readout	Progressive scan
Maximum Resolution	1280 x 1024
Signal-to-Noise Ratio	50 dB
Auto Iris Lens Type	DC drive
Electronic Shutter Range	1 ~ 1/100,000 sec
Wide Dynamic Range	60 dB
White Balance Range	2,000° to 10,000°K
Sensitivity	f/1.3; 2,850°K; SNR >24 dB
Color (1x/33 ms)	0.5 lux
Color SENS (15x/500 ms)	0.12 lux
Dome Attenuation	
Clear	Zero light loss
Smoked	f/1.0 light loss
Construction	
Back-box	Cast aluminum and polycarbonate plastic
Trim ring	Polycarbonate plastic
Bubble	Acrylic plastic
Finish	White/Black
Weight	
Unit	0.77 lb (0.35 kg)
Shipping	2.00 lb (0.91 kg)
Available Languages	Chinese, English, French, German, Italian, Portuguese, Russian, Spanish, and Turkish

ELECTRICAL

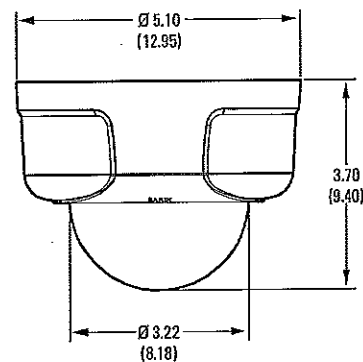
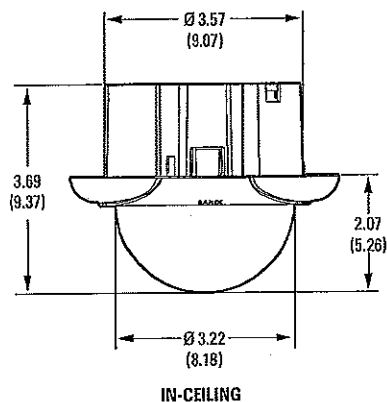
Port	RJ-45 connector for 100Base-TX Auto MDI/MDI-X
Cable Type	Cat5 or better for 100Base-TX
Power Input	PoE (IEEE 802.3af class 3)
Power Consumption	<6 W
Current Consumption	
PoE	<200 mA maximum
Service Port	External 3-connector, 2.5 mm provides NTSC/PAL video output
Accessory Port	Connects Pelco accessories
Audio	
Streaming	Bidirectional: full or half duplex
Input/Output	Line level/external microphone input; 600-ohm differential, 1 Vp-p max signal level; built-in microphone
Compression	G.711 PCM 8 bit, 8 kHz mono at 64 kbit/s

MECHANICAL

Pan/Tilt Adjustment	Manual
Pan	355°
Tilt	180°
Rotate	220°

ENVIRONMENTAL

Operational Temperature	32° to 122°F (0° to 50°C)
Operational Humidity	20% to 80%, noncondensing



NOTE: VALUES IN PARENTHESIS ARE CENTIMETERS;
ALL OTHERS ARE INCHES.



COMPACT SIZE. EASY TO INSTALL.

TECHNICAL SPECIFICATIONS

RECOMMENDED MOUNTS

In-Ceiling Domes

SD5-P	2' x 2' drop ceiling panel, aluminum construction; replaces 2' x 2' ceiling tile
SCA1	Support rails for B5-F; for use in ceiling tile applications

Pendant Domes

BB5-PCA-BK	Pendant conduit adapter, black
BB5-PCA-GY	Pendant conduit adapter, gray
IWM Series	Wall mount, with or without integral 24 VAC, 100 VA transformer; black or gray finish; can be adapted for corner, parapet or pole application
MRCA	Ceiling mount, black
PP4348	Parapet roof mount
PP350/PP351	Parapet wall/roof mount
SWM Series	Compact wall mount, black or gray finish; can be adapted for corner or pole applications

RECOMMENDED POWER SUPPLIES

MCS Series	Indoor, 24 VAC power supply
WCS Series	Outdoor, 24 VAC power supply

Refer to individual power supply specifications for more information.

Pelco by Schneider Electric

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TECHNICAL SPECIFICATIONS

GENERAL

Construction	Aluminum
Back Box	Aluminum, thermo plastic
Dome Drive	Acrylic
Lower Dome	
Light Attenuation	
Smoked	f/0.5 light loss
Clear	Zero light loss
Cable Entry (back box)	
In-Ceiling	0.75-inch conduit fitting
Pendant	Through 1.5-inch NPT pendant mount
Weight (approximate)	Unit Shipping
In-Ceiling	5.2 lb (2.4 kg) 8 lb (3.6 kg)
Environmental In-Ceiling	6.2 lb (2.8 kg) 10 lb (4.5 kg)
Standard Pendant	6.5 lb (3.0 kg) 11 lb (5.0 kg)
Environmental Pendant	7.6 lb (3.5 kg) 12 lb (5.4 kg)
Environment	
In-Ceiling	Indoor
Environmental In-Ceiling	Outdoor
Pendant, Standard, and Environmental	Indoor/outdoor
Operating Temperature	
In-Ceiling	32° to 122°F (0° to 50°C)
Standard Pendant	(Assumes no wind chill factor)
Maximum	113°F (45°C) absolute maximum; 95°F (35°C) sustained maximum
Minimum	25°F (-4°C) sustained minimum
Environmental In-Ceiling	
Environmental Pendant	(Assumes no wind chill factor)
Maximum	140°F (60°C) absolute maximum; 122°F (50°C) sustained maximum
Minimum	-60°F (-51°C) absolute minimum; prevents icing at sustained minimum of -22°F (-30°C); de-ices 0.1 inch (2.5 mm) within 3 hours after power-up at -22°F (-30°C)
Effective Projected Area (EPA)	20.5 square inches (without mount), 47 square inches (with IWM Series mount)

MECHANICAL

(Dome Drive Only)

Variable Speed	0.1° to 400°
Preset Accuracy	±0.1°
Pan Movement	360° continuous pan rotation
Vertical Tilt	+0° to -30°
Manual Pan/Tilt Speeds	
Pan	0.1° to 80°/sec manual operation, 150°/sec Turbo
Tilt	0.1° to 40°/sec manual operation
Preset Speeds	
Pan	400°/sec
Tilt	160°/sec

ELECTRICAL

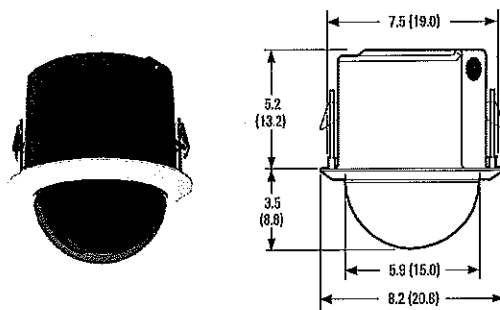
Ports	RJ-45 connector for 100Base-TX Auto MDI/MDI-X Autonegotiate/Manual setting
Cabling Type	Cat5 or better for 100Base-TX
Input Voltage	18 to 32 VAC; 24 VAC nominal 22 to 27 VDC; 24 VDC nominal
Input Power	24 VAC
	24 VDC
PoE	23 VA nominal (without heater); 73 VA nominal (with heater)
Fuse	0.7 A nominal (without heater); 3 A nominal (with heater)
	IEEE802.3af (without heater)
	1.25 A

TECHNICAL SPECIFICATIONS

SOFTWARE FEATURES

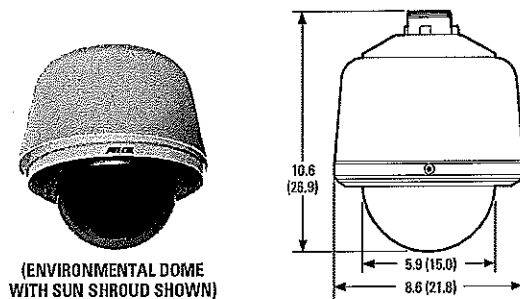
- 255 Presets
- 16 Tours
- $\pm 0.1^\circ$ Preset Accuracy
- Multilingual Menus (English, Spanish, Portuguese, Italian, German, French, Russian, Polish, and Turkish)
- Password Protection
- 400°/sec Pan Preset Speed and 200°/sec Tilt Preset Speed
- Rotating Discreet Liner with Sealed Fixed Bubble
- 8 Privacy Zones, Configurable in Size
- "Auto Flip" Feature Rotates Dome 180° at Bottom of Tilt Travel
- Configurable Park with Actions
- Proportional Pan/Tilt Continually Decreases Pan/Tilt Speeds in Proportion to Depth of Zoom

BACK BOX FEATURES



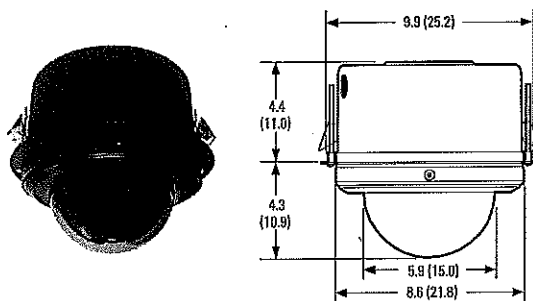
In-Ceiling (Indoor)

- Single Back Box for Suspended or Hard Ceiling Applications
- Requires 5.25-Inch Space Above Ceiling and 3.25 Inches Below
- Minimum Ceiling Thickness 0.5-Inch; Maximum 1.75 Inches
- Quick Disconnect to Dome Drive
- Aluminum Construction
- Suitable for Use in Environmental Air Handling Spaces



Standard and Environmental Pendant

- Standard and Environmental Models
- Standard Pendant Available in Black or Gray Finish; Environmental Pendant Available in Gray Finish Only
- Quick Disconnect to Dome Drive
- Aluminum Construction
- Environmental Model Includes Sun Shield, Fan, and Heater



Environmental In-Ceiling

- Single Back Box for Hard Ceiling Applications
- Requires 4.4-Inch Space Above Ceiling and 4.3 Inches Below
- Includes Heater and Fan
- Minimum Ceiling Thickness 0.5-Inch; Maximum 1.75 Inches
- Quick Disconnect to Dome Drive
- Aluminum Construction

NOTE: VALUES IN PARENTHESES ARE CENTIMETERS; ALL OTHERS ARE INCHES.

TECHNICAL SPECIFICATIONS

PELCO ANALYTICS

Spectra HD Series includes eight user-configurable behaviors. The camera is capable of running up to three behaviors at the same time; although, the number of behaviors is limited to the available processing power of the camera and the type of analytic being used.

Note: Available processing power is determined by the settings for compression standards, resolution, image rate, bit rate, and analytic configuration.

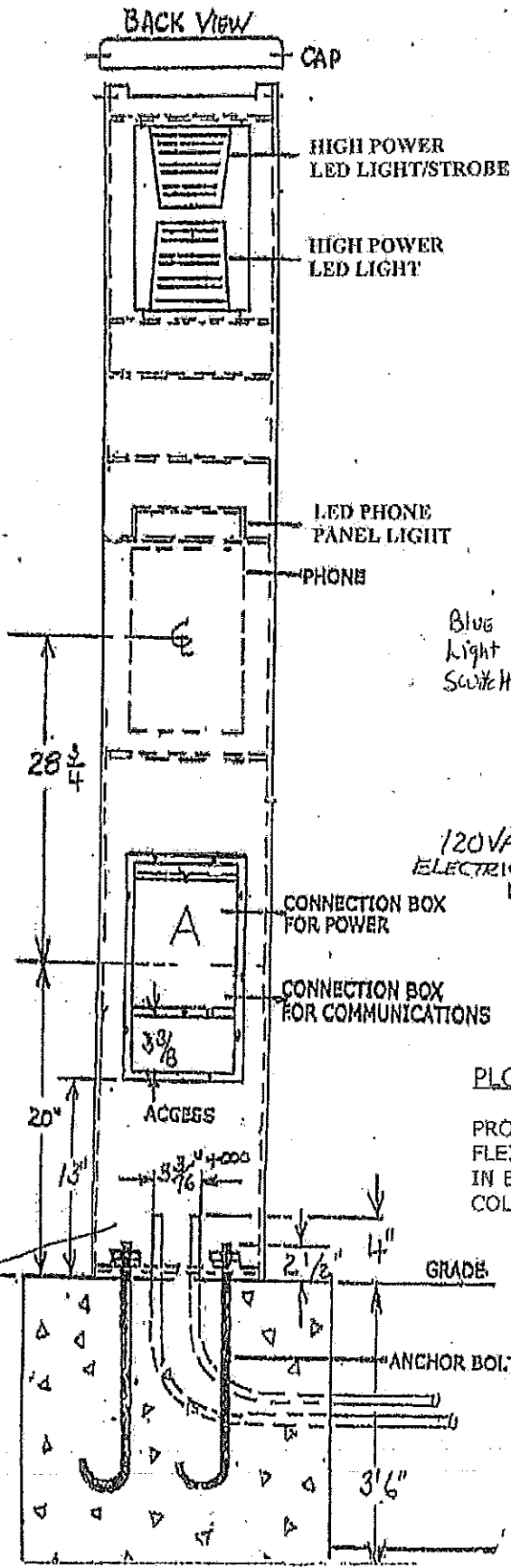
For each behavior, you can create several custom profiles that contain different camera settings. With these profiles, you can set up different scenarios for the behavior, which will automatically detect and trigger alarms when specific activity is detected.

Pelco Analytics are configured and enabled using a standard Web browser, and Pelco behaviors are compatible with Endura® or a third-party system that supports Pelco's Analytics API system.

Multiple Pelco behaviors can be scheduled to work during a certain time or condition. For example, during the day, a camera can be configured with Object Counting to count the number of people that enter a lobby door. At night, the operator can change the profile to Camera Sabotage to trigger an alarm if a camera is moved or obstructed. Available Pelco behaviors include:

- **Abandoned Object:** Detects objects placed in a defined zone and triggers an alarm if the object remains in the zone longer than the user-defined time allows. An airport terminal is a typical installation for this behavior. This behavior can also detect objects left behind at an ATM, signaling possible card skimming.
- **Adaptive Motion:** Detects and tracks objects that enter a scene and then triggers an alarm when the objects enter a user-defined zone. This behavior is primarily used in outdoor environments with light traffic to reduce the number of false alarms caused by environmental changes.
- **AutoTracking:** Detects and tracks movement in the camera's field of view. When the AutoTracking behavior is configured, the system will automatically pan and tilt to follow the moving object until the object stops or disappears from the monitored area.
- **Camera Sabotage:** Detects contrast changes in the field of view. An alarm is triggered if the lens is obstructed with spray paint, a cloth, or a lens cap. Any unauthorized repositioning of the camera also triggers an alarm.
- **Directional Motion:** Generates an alarm in a high traffic area when a person or object moves in a specified direction. Typical installations for this behavior include an airport gate or tunnel where cameras can detect objects moving in the opposite direction of the normal flow of traffic or an individual entering through an exit door.
- **Loitering Detection:** Identifies when people or vehicles remain in a defined zone longer than the user-defined time allows. This behavior is effective in real-time notification of suspicious behavior around ATMs, stairwells, and school grounds.
- **Object Counting:** Counts the number of objects that enter a defined zone or cross a tripwire. This behavior might be used to count the number of people at a store entrance/exit or inside a store where the traffic is light. This behavior is based on tracking and does not count people in a crowded setting.
- **Object Removal:** Triggers an alarm if an object is removed from a defined zone. This behavior is ideal for customers who want to detect the removal of high value objects, such as a painting from a wall or a statue from a pedestal.
- **Stopped Vehicle:** Detects vehicles stopped near a sensitive area longer than the user-defined time allows. This behavior is ideal for airport curbside drop-offs, parking enforcement, suspicious parking, traffic lane breakdowns, and vehicles waiting at gates.

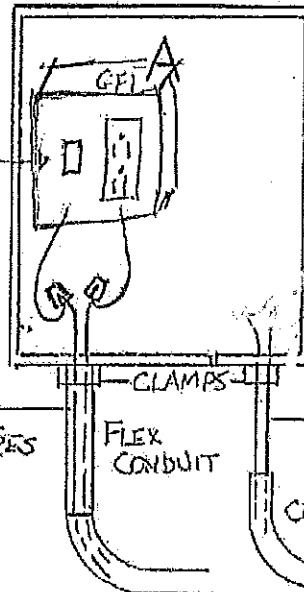
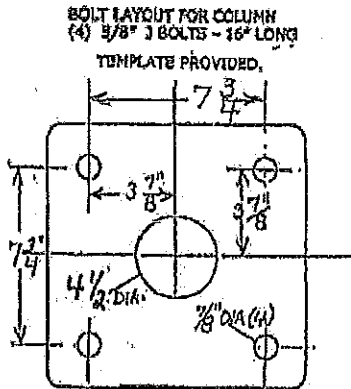
9'



POWER CONSUMPTION

200 WATTS - 120 VAC

300 WATTS - WITH HEATER ←



USE WIRE NUTS FOR ELECTRICAL

1 - COAT Balden 533945

2 - CATSE Balden 7997A

PLC 8 11" Sq. S.S. COLUMN

PROVIDE ABOUT 18" LENGTH OF PVC COATED FLEXIBLE CONDUIT FROM ELECTRICAL CONDUIT IN BASE TO CONNECTION BOX IN COLUMN. COLUMN IS PRE-WIRED.

RAMTEL CORP,
115 Railroad Ave,
Johnston, R.I. 02919
401-231-3340

20" SQ. CONCRETE COLUMN BASE SHALL BE SURROUNDED BY UNDISTURBED SOIL OR BACK FILL COMPACTED TO 95% DENSITY OF SURROUNDING UNDISTURBED SOIL.

RAMTEL CORP.
115 Railroad Ave.
Johnston, RI 02919
401-231-3340

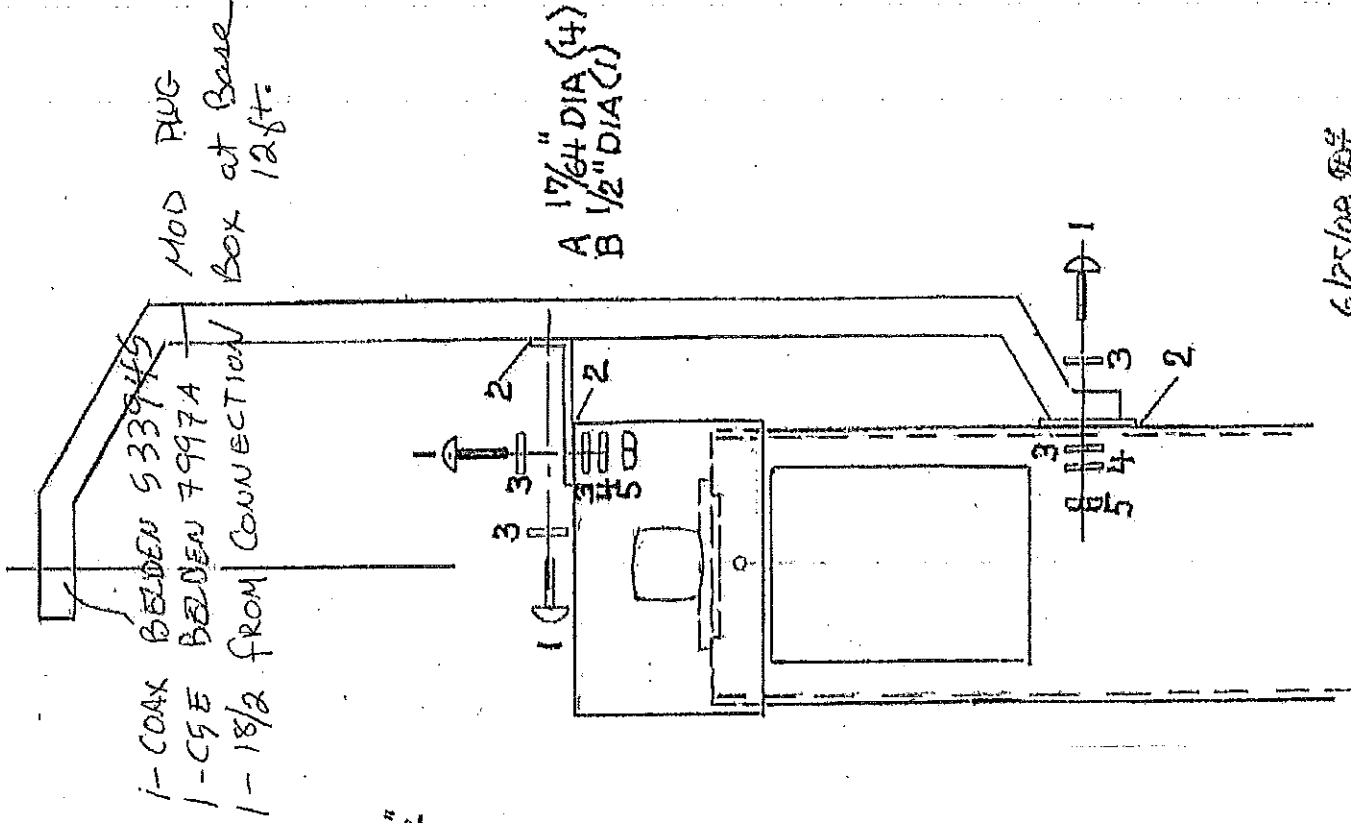
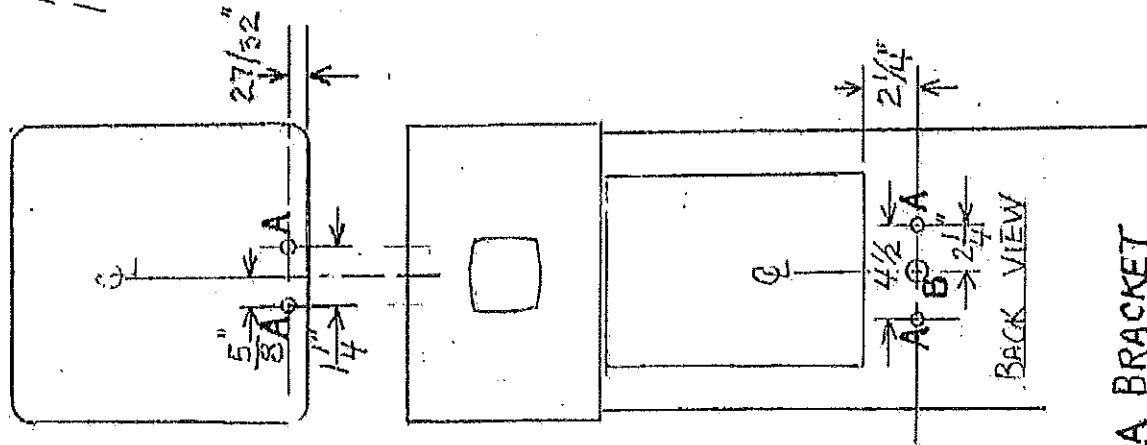
To Assemble Camera Bracket:

- 1) Remove Column Cap (2 screws)
- 2) Lift out Area Light Assembly
- 3) Remove 4 screws that hold Strobe Light plate to Column (Strobe light stays assembled to plate)
- 4) Camera Mount attaches below Strobe Light (2 screws)
- 5) Angle Bracket
2" X 5 3/4" Screws (4) to
Cap & Camera Mount with Gaskets.

- 1 1/4-20 TAMPER PROOF
SCREWS (6)
- 2 RUBBER GASKETS (3)
- 3 WASHERS (10)
- 4 LOCK WASHERS (4)

800-1127

**PLC 8 ACA CAMERA BRACKET
ASSEMBLY**



**TL1**

HeartStation RescueCase AED Cabinets

The **original, patented** AED cabinet unsurpassed in quality, features, and value.

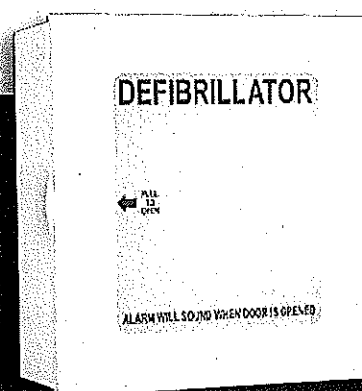
TrimLine Series TL1 Features

- Traditional HeartStation quality and value
- Accommodates EVERY major AED on the market
- Molded side handle is flush, preventing accidental openings and damage
- KEYLESS ALARM can be controlled from outside or inside the cabinet
- Alarm is ultra small so it doesn't waste cabinet space yet produces 90 decibels
- Magnetic door latch provides solid closure and trouble-free opening
- Entire cabinet front swings open to allow easy access
- Powder coat finish provides durable protection
- Welded 20 gauge steel throughout (20% thicker than 22 gauge)
- Impact resistant acrylic window - 9 1/4" W x 10 5/8" H
- Height 15", Width 14", Depth 6 3/4", Weight 10 lbs
- Shipped fully assembled in protective foam packaging
- One year limited warranty
- Private labeling and specialty colors available

Note: "FOR USE BY TRAINED RESPONDERS" is no longer printed on cabinet. Decal is included if required in your area.

Available Option:

Strap to elevate and hold AED in place.

**TL1**

Provides AED Protection
Innovative Features
Economical Price
Trim Design

MSRP \$199.00

**HeartStation AED
Cabinets are in service in
public and private venues
around the world:**

Medical Facilities	Factories
Schools	Retail Stores
Airports	Office Buildings
Shopping Malls	Churches
Govt. Agencies	Health Clubs
Sports Arenas	Nursing Homes
Disaster Relief Organizations	Retirement Centers

Woodbench Specifications

Gretchen Bench

Available backed or backless. Backed version available with two armrest styles — loop or ornamental. Offered in 72" or 96" lengths. Freestanding, surface mounted, or wall mounted styles offered. Available in a variety of woods or PolySite™ recycled timbers (PolySite not offered in 96" length).

Gretchen Picnic Table

Wheelchair accessible from either end. Available in a variety of woods or PolySite™ recycled timbers. Freestanding or surface mounted. Umbrella hole available. ADA compliant style available. Contact Landscape Forms for details.

Gretchen Litter Receptacle and Ash Urn

Large 30-gallon capacity receptacle with liner. Choose from side or top opening receptacle styles. Sand pan available for side opening receptacle. Available in a variety of woods or PolySite™ recycled timbers. Coordinating ash urn available.

Balustrade

Constructed of 2" x 3" wood rails individually fastened to steel bands. Available backed or backless. Backed bench offered in 72" and 96" lengths, backless in 72" only. End loop arm available on backed bench. Freestanding, embedded, surface mounted or wall mounted styles offered. Available in a variety of woods or PolySite™ recycled timbers (PolySite™ not offered in 96" length).

Palisade and Shadowline

Backless benches are constructed of solid wood, fastened together with internal steel rods. Available in 72" and 96" lengths. Palisade is freestanding, and offered in a variety of woods. Anchor clips available. Shadowline offered in a variety of woods. May be surface mounted, embedded, freestanding or wall mounted.

Our Purpose Is To Enrich Outdoor Spaces

We believe in the power of design and its ability to elevate experience and help create a sense of place in public environments. Our high quality products and outstanding customer service have earned us a reputation as one of the world's premier designers and manufacturers of outdoor commercial furnishings.

Finishes

Interior woods are finished with Landscape Forms' exclusive LF-80 wood finish, a clear, catalyzed acrylic catalyzed acrylic lacquer.

Exterior woods are unfinished and will weather to a soft pewter gray, requiring no future maintenance.

Metal is finished with Landscape Forms' proprietary Pangard II® polyester powercoat, a hard yet flexible finish that resists rusting, chipping, peeling and fading. Call for standard color chart. A wide array of optional colors may be specified for an upcharge.

Consult Landscape Forms price list for complete specifying information. Visit landscapeforms.com; click Design Tools, Materials/Colors link for standard offerings, including FSC wood options.



Cover Photo: Shadowline Bench

Specifications are subject to change without notice.
Woodbench collection is manufactured in U.S.A.
Location Photography : Kalamazoo Institute of Arts
Landscape Forms supports the LAF at the Second Century level.
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Metal is the world's most recycled material and is fully recyclable. Powdercoat finish on metal parts contains no heavy metals, is HAPS-free and has extremely low VOCs. Consult our website for recycled content for this product.



Landscape Forms is proud to specify FSC and Green-e certified paper. This paper meets the Forest Stewardship Council's standards for responsible forest management and is made using certified renewable energy.

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model no:

BL100N, BL101N, BL105N
BL106N



BIKE RACKS

36" BIKE LOOP & CARROUSEL BIKE RACK
INGROUND AND SURFACE MOUNT

**BROWN JORDAN
INTERNATIONAL**

© Wabash Valley Manufacturing, Inc.

customer service:

ASSEMBLERS: If you find any parts missing or damaged, or if you're having difficulty assembling your furniture/equipment, call us at:

* Before calling, have your product model number available:

1-800-253-8619 (Inside U.S.A.)

260-352-2102 (Outside U.S.A.)

Monday thru Friday,
8:00 AM - 4:30 PM Eastern Time
(EXCEPT HOLIDAYS)

Any correspondence concerning our product should be sent directly to our Customer Service Manager at:

Wabash Valley Manufacturing, Inc.
505 E. Main Street
P.O. Box 5
Silver Lake, IN 46982 U.S.A.
FAX: 260-352-2160

maintenance:

Regular inspection and maintenance of all parts, and fasteners is necessary. Tighten all bolts and nuts. Inspect Tops, Seats, Legs, Braces and Fasteners periodically for wear or vandalism. Replace broken or worn parts immediately or take equipment out of service until repairs are made. Use genuine Wabash Valley replacement parts.

To restore plastic coating to its luster after prolonged use, wash/rinse/dry and use Armor-All® or similar quality vinyl protector.

KEEP THIS ASSEMBLY/SPECIFICATION SHEET FOR FUTURE REFERENCE.

specifications:

NOTE: We reserve the right to change specifications without notice.

Heat fused poly-vinyl coating, finished on inner-metal structure, to an approximate 3/16" thickness. Framework assemblies are finished with powder coating; electrostatically applied and oven cured according to powder manufacturer's specifications. Fasteners are stainless steel to resist corrosion.

FRAME:

Bike loops consist of 1/2" x 1 1/2" steel flat bar. The inground bike loops use a 5/16" diameter rod, to add support towards the bottom ends. The carousel bike rack uses 2 7/8" galvanized tube with 5/8-11-UNC stud welded to 1/4" plate welded into frame tube. The surface mount base plate consists of 3/8" plate.

CARROUSEL:

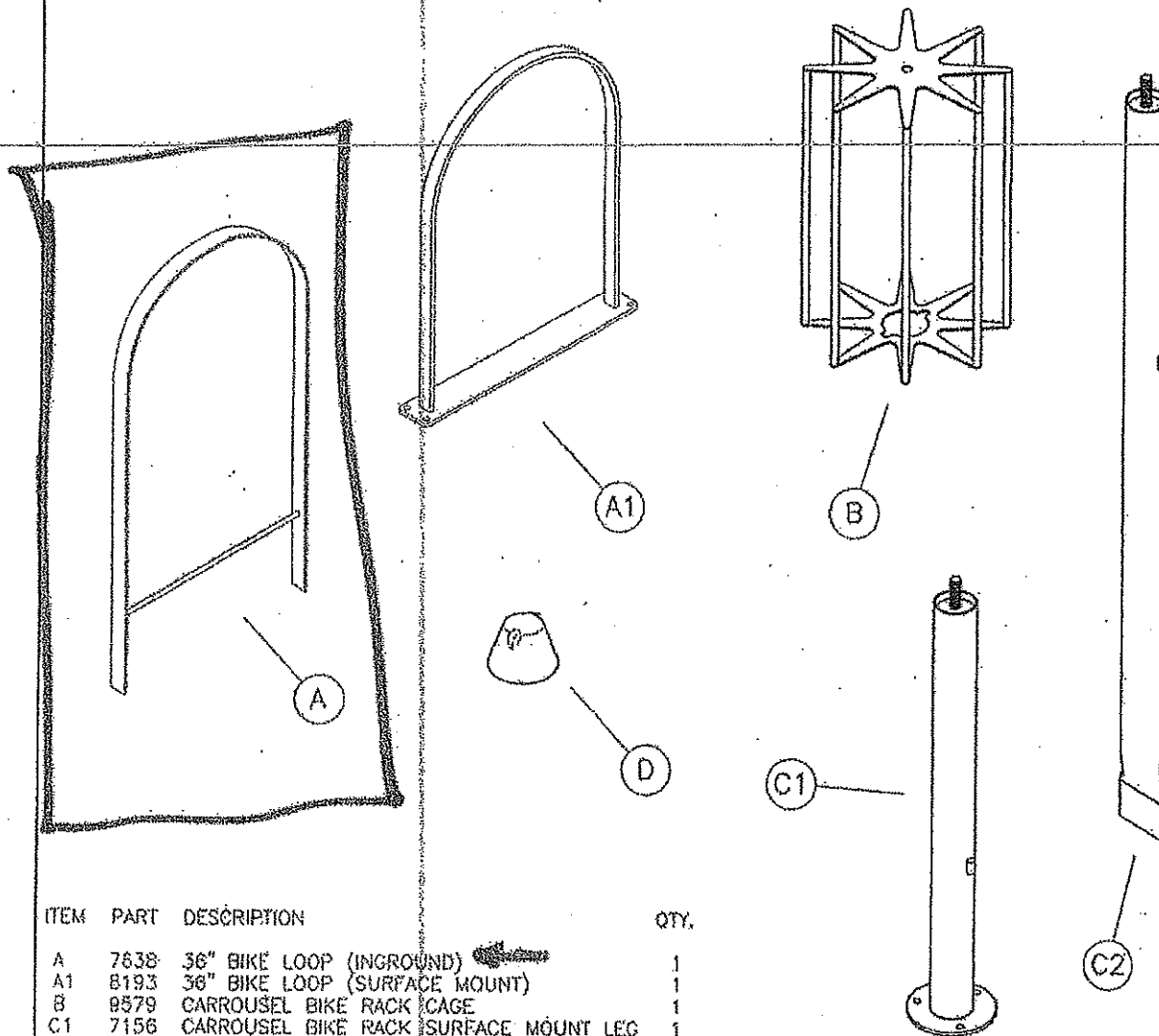
Carousel is made of 10 gage sheet metal and 1/2" diameter rod and held onto the frame with a cast aluminum nut.

GENERAL:

Ground space requirements for bike loop are 1 3/4" x 25 7/8". For carousel bike rack ground space requirements are 35 1/2" x 14 1/2" diameter.

SPACING ?

parts identification:



ITEM	PART	DESCRIPTION	QTY.
A	7838	36" BIKE LOOP (INGROUND)	1
A1	8193	36" BIKE LOOP (SURFACE MOUNT)	1
B	9579	CARROUSEL BIKE RACK CAGE	1
C1	7156	CARROUSEL BIKE RACK SURFACE MOUNT LEG	1
C2	7157	CARROUSEL BIKE RACK INGROUND LEG	1
D	7158	CAST NUT	1

hardware identification:

assembly procedures: IMPORTANT: Assemblers should be reasonably skilled in the assembly of commercial grade/heavy duty fabricated steel equipment.

To ensure proper assembly, it is suggested that you take adequate time to locate and identify each part. To prevent scratching of the finished pieces, we recommend this unit to be assembled on a clean, flat, solid, surface with a drop cloth, allowing plenty of working room. Also please read the instructions and study the sketches very carefully. A little extra time spent before assembly will be well worth it in performing a complete, proper assembly. Please note that all parts have been precut and pre-drilled.

During the assembly process leave all bolts and nuts "finger tight", until the entire unit is completely assembled. This allows room for movement to level or adjust all seats, tops, benches, framework and braces if necessary. After final adjustment and leveling, permanently tighten all nuts, bolts and fasteners.

CARROUSEL BIKE RACK

STEP 1

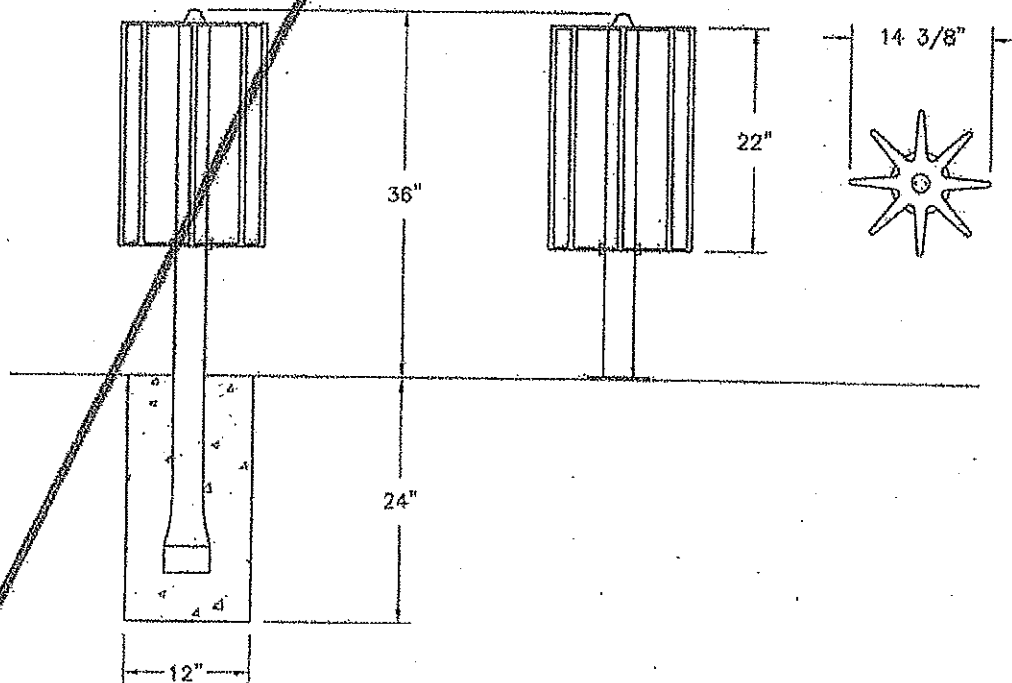
The carousel bike rack is assembled when received. Proceed to step 2 to complete installation.

STEP 2

For the carousel inground bike rack, prepare a foundation hole as shown below. Place the bike rack in its foundation hole. For the surface mount carousel bike rack, locate and using base plate as template drill holes and secure to concrete.

Before pouring concrete or tightening fasteners, make sure the bike rack holds 36" to the top of the bike rack nut and is level horizontally as well as vertically.

Pour concrete and let cure for 48 hours.



installation: WARNING: The proper installation for Wabash Valley products may depend upon many factors unique to the site, location, or use of a particular product. Consult with your contractor or other professional to determine your specific installation requirements.

product dimensions:

36" BIKE LOOP — Inground

STEP 1

Prepare two foundation holes as shown below.

STEP 2

Place the bike loop in its foundation holes and block as shown in FIG. 1.

Before pouring concrete, make sure the bike loop holds 36" to the top of the bike loop and is level horizontally as well as vertically.

Pour concrete and let cure for 48 hours.

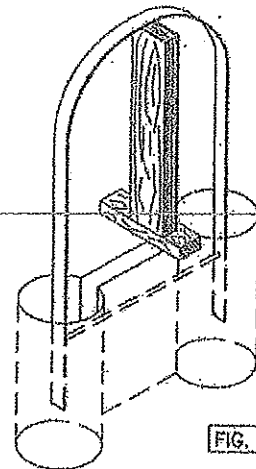


FIG. 1

36" BIKE LOOP — Surface Mount

STEP 1

For the surface mount bike rock, determine location and using holes in base plate as a template, drill holes and secure in concrete. See FIG. 2.

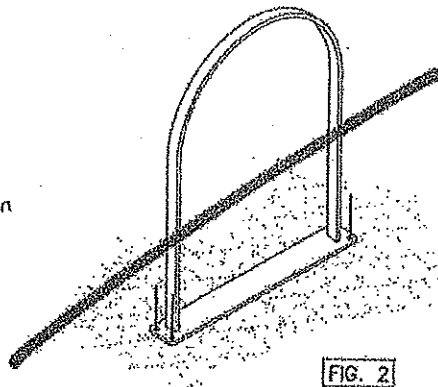
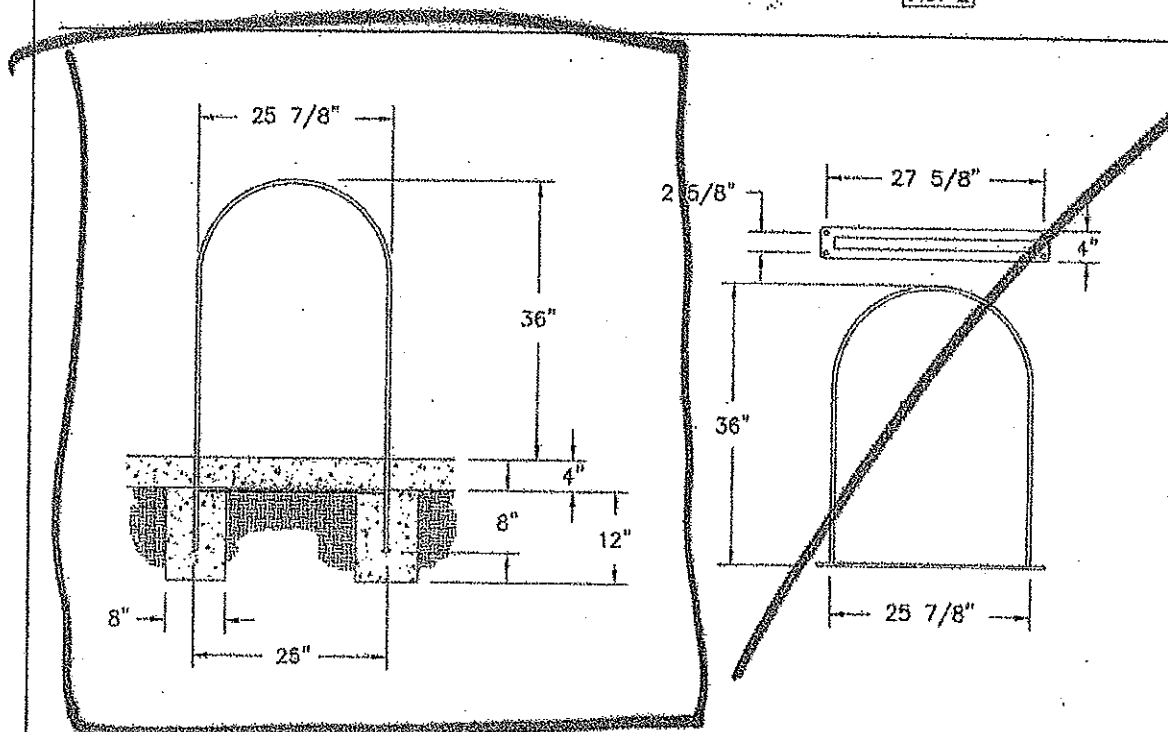


FIG. 2

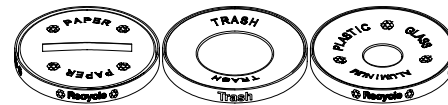
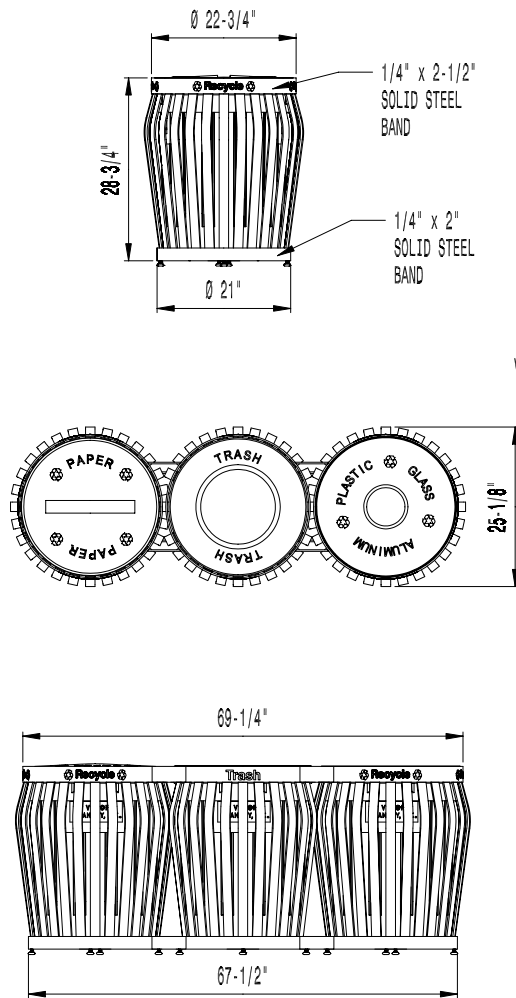




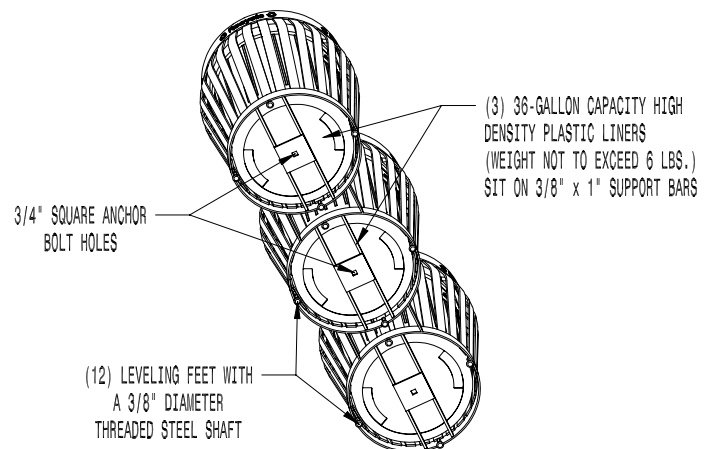
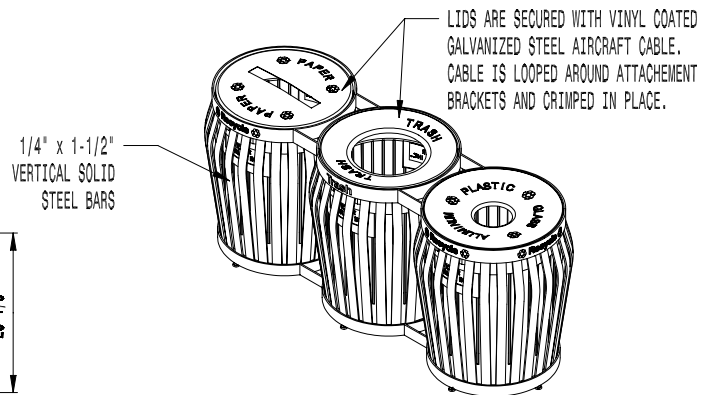
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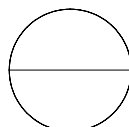


AVAILABLE WITH ANY SEQUENCE OF DECALED LID AND TOP BAND



NOTES:

1. DRAWINGS NOT TO SCALE. DO NOT SCALE DRAWINGS.
2. ALL FABRICATED METAL COMPONENTS ARE STEEL SHOTBLASTED, ETCHED, PHOSPHATIZED, PREHEATED, AND ELECTROSTATICALLY POWDER-COATED WITH T.G.I.C. POLYESTER POWDER COATINGS. PRODUCTS ARE FULLY CLEANED AND PRETREATED, PREHEATED AND COATED WHILE HOT TO FILL CREVICES AND BUILD FILM COATING. COATED PARTS ARE THEN FULLY CURED TO COATING MANUFACTURER'S SPECIFICATIONS. THE THICKNESS OF THE RESULTING FINISH AVERAGES 8-10 MILS (200-250 MICRONS).
3. THIS VICTOR STANLEY, INC. PRODUCT MUST BE PERMANENTLY AFFIXED TO THE GROUND. CONSULT YOUR LOCAL CODES FOR REGULATIONS.
4. VICTOR STANLEY, INC., PLASTIC INNER LINERS ARE MOLDED ON TOOLING DESIGNED FOR AND OWNED BY VICTOR STANLEY, INC. THEY OFFER MAXIMUM CAPACITY AND STRENGTH WITH LIGHTWEIGHT CONSTRUCTION USING CRITICAL MOLDED RIBS, INTEGRAL HANDHOLDS, AND HIGH-STRENGTH MATERIALS. THIS MINIMIZES HANDLING DIFFICULTY AND FACILITATES EASY EMPTYING AND STORAGE WHILE AFFORDING LONG SERVICE LIFE.
5. ANCHOR BOLT(S) NOT PROVIDED BY VICTOR STANLEY, INC.
6. FOR HIGH SALT ABUSIVE CLIMATES, HOT DIP GALVANIZING BEFORE POWDER COATING IS AVAILABLE. SEE WRITTEN SPECIFICATIONS FOR DETAILS.
7. ALL SPECIFICATIONS ARE SUBJECT TO CHANGE. CONTACT MANUFACTURER FOR DETAILS.
8. THIS PRODUCT IS SHIPPED FULLY ASSEMBLED.



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