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

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
## 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

### ARCHITECTURAL LAYERS

<table>
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### CIVIL LAYERS

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* 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.

<table>
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<th>Wall Base</th>
<th>Walls</th>
<th>Ceiling</th>
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<td>Review options with NU Project Manager</td>
<td>Review options with NU Project Manager</td>
<td>Acrylic latex paint &lt;br&gt; Low VOC &lt;br&gt; Satin Finish &lt;br&gt; Review alternatives with NU Project Manager</td>
<td>Gypsum ceiling board; &lt;br&gt; Review alternatives with NU Project Manager</td>
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<td>Lobbies</td>
<td>High Volume Traffic &lt;br&gt; Slip Resistance &lt;br&gt; Acoustic Considerations &lt;br&gt; STC 45-50 Separation</td>
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<td>Review options with NU Project Manager</td>
<td>Review options with NU Project Manager</td>
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<td>Corridors</td>
<td>High Volume Traffic &lt;br&gt; Slip Resistance &lt;br&gt; Acoustic Considerations &lt;br&gt; STC 50 Separation</td>
<td>Resilient tile or sheet; &lt;br&gt; Patterned carpet</td>
<td>4-inch high rubber</td>
<td>Acrylic latex paint &lt;br&gt; Low VOC &lt;br&gt; Satin Finish</td>
<td>Suspended acoustic ceiling system &lt;br&gt; 9/16-inch suspended ceiling grid &lt;br&gt; Acoustic ceiling panels 0.65 NRC / 0.85 LRV</td>
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<td>Concrete or terrazzo stair treads &lt;br&gt; Review alternatives with NU Project Manager</td>
<td>Review options with NU Project Manager</td>
<td>Epoxy paint &lt;br&gt; Low VOC &lt;br&gt; Eggshell Finish &lt;br&gt; Wall protection</td>
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<td>Flooring</td>
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<td>4-inch high rubber</td>
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<td>Medium Volume Traffic Acoustic Considerations STC 45-50 Separation Dimmable / Controllable Lighting Slip Resistance / Spills / Chemical Staining</td>
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<td>4-inch high rubber; Integral epoxy wall base</td>
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<td>Design Considerations</td>
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<td>Wall Base</td>
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<td>Patterned carpet</td>
<td>4-inch high rubber</td>
<td>Acrylic latex paint&lt;br&gt;Low VOC&lt;br&gt;Satin Finish</td>
<td>Suspended acoustic ceiling system&lt;br&gt;9/16-inch suspended ceiling grid&lt;br&gt;Acoustic ceiling panels&lt;br&gt;0.65 NRC / 0.85 LRV</td>
</tr>
<tr>
<td>Copy Room</td>
<td>Medium Volume Traffic&lt;br&gt;Acoustic Considerations&lt;br&gt;STC 45-50 Separation&lt;br&gt;Dimmable / Controllable Lighting&lt;br&gt;Chemical Staining</td>
<td>Resilient tile or sheet; Patterned carpet</td>
<td>4-inch high rubber</td>
<td>Acrylic latex paint&lt;br&gt;Low VOC&lt;br&gt;Satin Finish</td>
<td>Suspended acoustic ceiling system&lt;br&gt;9/16-inch suspended ceiling grid&lt;br&gt;Acoustic ceiling panels&lt;br&gt;0.65 NRC / 0.85 LRV</td>
</tr>
<tr>
<td>Storage Room</td>
<td>Low Volume Traffic&lt;br&gt;STC 50 Separation&lt;br&gt;Built-in shelving vs. furniture</td>
<td>Resilient tile or sheet; Patterned carpet</td>
<td>4-inch high rubber</td>
<td>Acrylic latex paint&lt;br&gt;Low VOC&lt;br&gt;Satin Finish</td>
<td>Suspended acoustic ceiling system&lt;br&gt;9/16-inch suspended ceiling grid&lt;br&gt;Acoustic ceiling panels&lt;br&gt;0.65 NRC / 0.85 LRV</td>
</tr>
<tr>
<td>Space Type</td>
<td>Design Considerations</td>
<td>Flooring</td>
<td>Wall Base</td>
<td>Walls</td>
<td>Ceiling</td>
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<td>--------------------------------------</td>
<td>---------------------------------------------------</td>
</tr>
<tr>
<td>Public Restroom</td>
<td>High Volume Traffic</td>
<td>Ceramic Tile; Porcelain Tile; Terrazzo;</td>
<td>Ceramic Tile; Porcelain Tile; Terrazzo;</td>
<td>Ceramic Tile; Porcelain Tile; Terrazzo;</td>
<td>Gypsum ceiling board; Suspended acoustic ceiling system 9/16-inch suspended ceiling grid Acoustic / moisture resistant ceiling panels 0.65 NRC / 0.85 LRV</td>
</tr>
<tr>
<td></td>
<td>STC 50 Separation</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Slip Resistance / Spills</td>
<td></td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Janitors Closet</td>
<td>Low Volume Traffic</td>
<td>Sealed concrete; Resilient tile or sheet</td>
<td>4-inch high rubber</td>
<td>Epoxy paint Low VOC Eggshell Finish Wall protection</td>
<td>Suspended acoustic ceiling system 9/16-inch suspended ceiling grid Acoustic ceiling panels 0.65 NRC / 0.85 LRV</td>
</tr>
<tr>
<td></td>
<td>STC 50 Separation</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td></td>
<td>Slip Resistance / Spills / Chemical Staining</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Mechanical / Electrical Rooms</td>
<td>Low Volume Traffic</td>
<td>Sealed concrete</td>
<td>4-inch high rubber</td>
<td>Epoxy paint Low VOC Eggshell Finish</td>
<td>Exposed construction, painted</td>
</tr>
<tr>
<td></td>
<td>STC 50 Separation</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Review specific requirements in Technical Standards</td>
<td></td>
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</tr>
</tbody>
</table>
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)
<p>| | |</p>
<table>
<thead>
<tr>
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<th></th>
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</thead>
<tbody>
<tr>
<td>2. What rooms of the existing building are involved? (list or provide plan)</td>
<td></td>
</tr>
<tr>
<td>3. How many square feet of renovation or construction are involved?</td>
<td></td>
</tr>
<tr>
<td>4. Are existing exit paths being altered?</td>
<td>YES</td>
</tr>
<tr>
<td>5. Are exterior doors being added?</td>
<td>YES (contact UP)</td>
</tr>
<tr>
<td>6. Age of existing sprinkler heads (20 year life):</td>
<td></td>
</tr>
<tr>
<td>7. Is a non-water fire suppression system involved in the project?</td>
<td>YES</td>
</tr>
<tr>
<td>8. Is a pre-action fire suppression system involved in the project?</td>
<td>YES</td>
</tr>
<tr>
<td>9. Is the existing FS system supported every 12’ to structure properly?</td>
<td>YES</td>
</tr>
<tr>
<td>10. Are there any smoke evacuation systems (atriums) in the project?</td>
<td>YES</td>
</tr>
<tr>
<td>11. Is any existing gas detection system getting modified?</td>
<td>YES</td>
</tr>
<tr>
<td>12. Are any areas of refuge getting modified?</td>
<td>YES</td>
</tr>
<tr>
<td>13. Are any existing emergency phones getting modified?</td>
<td>YES</td>
</tr>
<tr>
<td>14. Are any fossil fuels being used in the project area?</td>
<td>YES</td>
</tr>
<tr>
<td>15. Will streets/fire department vehicle access lanes be changed or blocked?</td>
<td>YES</td>
</tr>
<tr>
<td>16. Will fire department connections or fire hydrants be changed for this project?</td>
<td>YES</td>
</tr>
<tr>
<td>17. Are there adjacent occupied buildings within 30 feet of the new building?</td>
<td>YES</td>
</tr>
<tr>
<td>18. Are the areas adjacent to the renovation occupied?</td>
<td>YES</td>
</tr>
<tr>
<td>19. What is the rating of the construction zone boundary walls?</td>
<td>1hr</td>
</tr>
<tr>
<td>20. Will the HVAC system be turned off in the construction zone?</td>
<td>YES</td>
</tr>
<tr>
<td>21. Are the adjacent and vertically adjacent FA zone strobes visible and do they need to be synched to the renovation area?</td>
<td>YES</td>
</tr>
</tbody>
</table>
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 background 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.
  o Strobes have to be synchronized
  o Doors on magnetic hold opens work properly
  o Devices report correctly to the FA panel and are labeled with correct room ID's
  o Main panel talks to the ADT panel
  o ADT panel talks to University police

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

Communications
- Area of rescue
- EFD radio coverage

Oxygen Depletion Alarm
- Test connection to ADT

Atriums
- Smoke Evacuation HVAC system
  o 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
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:

- 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)


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

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<th>DESCRIPTION</th>
<th>ABBREVIATION</th>
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<td>AIRFLOW MEASURING STATION</td>
<td>AFMS</td>
</tr>
<tr>
<td>AIR-HANDLING UNIT</td>
<td>AHU</td>
</tr>
<tr>
<td>ALARM (Virtual)</td>
<td>ALM</td>
</tr>
<tr>
<td>BOILER</td>
<td>BLR</td>
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<tr>
<td>BREAK TANK</td>
<td>BRK_TANK</td>
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<tr>
<td>BROWN WATER</td>
<td>BRNW</td>
</tr>
<tr>
<td>CABINET UNIT HEATER (HOT WATER)</td>
<td>CUH</td>
</tr>
<tr>
<td>CHILLED WATER</td>
<td>CHW</td>
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<tr>
<td>CHILLED WATER RETURN</td>
<td>CHWR</td>
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<tr>
<td>CHILLED WATER SUPPLY</td>
<td>CHWS</td>
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<tr>
<td>CHILLER</td>
<td>CHLR</td>
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<tr>
<td>CHW COOLING COIL</td>
<td>CC</td>
</tr>
<tr>
<td>COLD DECK</td>
<td>CD</td>
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<tr>
<td>COMMAND (Analog Output)</td>
<td>CMD</td>
</tr>
<tr>
<td>COMPRESSOR</td>
<td>COMP</td>
</tr>
<tr>
<td>COMPUTER ROOM AIR CONDITIONER</td>
<td>CRAC</td>
</tr>
<tr>
<td>CONDENSATE PUMP</td>
<td>CS_PMP</td>
</tr>
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<td>CONDENSER WATER</td>
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Note: 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
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<td>ZN_DMPR (NOTE: FOR MULTI-ZONE ZN1-DMPR, ZN2_DMPR, ETC)</td>
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**Building Abbreviations**

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<th>Four Character Abbreviation</th>
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<tbody>
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<td>Majorie Ward Marshall Dance Center</td>
<td>10 Arts Circle Drive</td>
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<td>Josephine Louis Theater</td>
<td>20 Arts Circle Drive</td>
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<tr>
<td>8732</td>
<td>Ethel M. Barber Theater</td>
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<tr>
<td>8831</td>
<td>Mary &amp; Leigh Block Museum of Art</td>
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<td>Pick-Staiger Concert Hall</td>
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<td>Boat House</td>
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<td>1970 Campus Drive</td>
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<td>Norris University Center</td>
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<td>2277 (BLDG #)</td>
</tr>
<tr>
<td>2274</td>
<td>Delta Zeta</td>
<td>717 University Place</td>
<td>2274 (BLDG #)</td>
</tr>
<tr>
<td>8725</td>
<td>Human Resources</td>
<td>720 University Place</td>
<td>HRCS</td>
</tr>
<tr>
<td>2248</td>
<td>Evans Scholars</td>
<td>721 University Place</td>
<td>EVAN</td>
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<tr>
<td>Building #</td>
<td>Building Description</td>
<td>Address</td>
<td>Four Character Abbreviation</td>
</tr>
<tr>
<td>-----------</td>
<td>------------------------------</td>
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<tr>
<td>8570</td>
<td>Chapin Hall</td>
<td>726 University Place</td>
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<tr>
<td>8780</td>
<td>906 University Place</td>
<td>906 University Place</td>
<td>8780 (BLDG #)</td>
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<tr>
<td>8780</td>
<td>910 University Place</td>
<td>910 University Place</td>
<td>8780 (BLDG #)</td>
</tr>
<tr>
<td>8780</td>
<td>920 University Place</td>
<td>920 University Place</td>
<td>8780 (BLDG #)</td>
</tr>
<tr>
<td></td>
<td>Visitors Center</td>
<td>TBD</td>
<td>VCTR</td>
</tr>
<tr>
<td></td>
<td>Kellogg Building</td>
<td>TBD</td>
<td>KELG</td>
</tr>
<tr>
<td></td>
<td>Bienen School of Music</td>
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**Chicago Campus**

<table>
<thead>
<tr>
<th>Building #</th>
<th>Building Description</th>
<th>Address</th>
<th>Four Character Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>P102</td>
<td>Chestnut Parking Garage, E-Lot</td>
<td>275 E Chestnut</td>
<td>ELOT</td>
</tr>
<tr>
<td>P100</td>
<td>Huron Parking Lot, C-Lot</td>
<td>222 E Huron</td>
<td>CLOT</td>
</tr>
<tr>
<td>P101</td>
<td>Erie Parking Lot, D-Lot</td>
<td>321 E Erie</td>
<td>DLOT</td>
</tr>
<tr>
<td>8816</td>
<td>Rubloff</td>
<td>375 E Chicago</td>
<td>RUBL</td>
</tr>
<tr>
<td>8798</td>
<td>Gary Law Library</td>
<td>357 E Chicago</td>
<td>GARY</td>
</tr>
<tr>
<td>8796</td>
<td>Levy Mayer</td>
<td>357 E Chicago</td>
<td>LVMY</td>
</tr>
<tr>
<td>8797</td>
<td>McCormick Hall</td>
<td>350 E Superior</td>
<td>MCMK</td>
</tr>
<tr>
<td>8795</td>
<td>Wieboldt</td>
<td>340 E Superior</td>
<td>WBLT</td>
</tr>
<tr>
<td>8794</td>
<td>Searle</td>
<td>320 E Superior</td>
<td>SRLE</td>
</tr>
<tr>
<td>8793</td>
<td>Morton</td>
<td>310 E Superior</td>
<td>MORT</td>
</tr>
<tr>
<td>8792</td>
<td>Ward</td>
<td>303 E Chicago</td>
<td>WARD</td>
</tr>
<tr>
<td>8791</td>
<td>Tarry</td>
<td>300 E Superior</td>
<td>TARY</td>
</tr>
<tr>
<td>8602</td>
<td>Abbott</td>
<td>710 N Lake Shore</td>
<td>ABBT</td>
</tr>
<tr>
<td>0511</td>
<td>Heating Plant</td>
<td>410 E Huron</td>
<td>CCUP</td>
</tr>
<tr>
<td>8846</td>
<td>Lurie</td>
<td>303 E Superior</td>
<td>LURE</td>
</tr>
<tr>
<td>8799</td>
<td>Olson</td>
<td>240 E Huron</td>
<td>OLSN</td>
</tr>
</tbody>
</table>
### 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.).

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

## Alarm Levels

<table>
<thead>
<tr>
<th>Type</th>
<th>Delay (into alarm)</th>
<th>Delay (out of alarm)</th>
<th>Alarm Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air-Handling Units</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freezestat</td>
<td>None (immediate)</td>
<td>None (immediate)</td>
<td>Emergency</td>
</tr>
<tr>
<td>Fan Status does not match command</td>
<td>5 min.</td>
<td>None (immediate)</td>
<td>Critical</td>
</tr>
<tr>
<td>Hi Static Pressure</td>
<td>None (immediate)</td>
<td>None (immediate)</td>
<td>Critical</td>
</tr>
<tr>
<td>Smoke Detector</td>
<td>None (immediate)</td>
<td>None (immediate)</td>
<td>Emergency</td>
</tr>
<tr>
<td>Discharge temperature (5°F deviation from setpoint)</td>
<td>5 min.</td>
<td>2 min.</td>
<td>Non-critical</td>
</tr>
<tr>
<td>Duct static pressure (0.5” wc deviation from setpoint)</td>
<td>5 min.</td>
<td>2 min.</td>
<td>Non-critical</td>
</tr>
<tr>
<td>Converters</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supply HW temp (10°F deviation from setpoint)</td>
<td>5 min</td>
<td>5 min.</td>
<td>Non-critical</td>
</tr>
<tr>
<td>Chiller System</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pump Status does not match command</td>
<td>5 min.</td>
<td>None (immediate)</td>
<td>Non-critical</td>
</tr>
<tr>
<td>Diff. water pressure (5 psig deviation from setpoint)</td>
<td>5 min.</td>
<td>5 min.</td>
<td>Non-critical</td>
</tr>
<tr>
<td>Chiller status does not match command</td>
<td>5 min.</td>
<td>None (immediate)</td>
<td>Non-critical</td>
</tr>
<tr>
<td>Chiller Alarm</td>
<td>None (immediate)</td>
<td>None (immediate)</td>
<td>Critical</td>
</tr>
<tr>
<td>Refrigerant alarm</td>
<td>None (immediate)</td>
<td>None (immediate)</td>
<td>Emergency</td>
</tr>
<tr>
<td>CHWS Temp (5°F deviation from setpoint when chiller enabled)</td>
<td>30 min.</td>
<td>15 min.</td>
<td>Non-critical</td>
</tr>
<tr>
<td>Boiler System</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boiler status does not match command</td>
<td>5 min.</td>
<td>None (immediate)</td>
<td>Non-critical</td>
</tr>
<tr>
<td>Boiler Alarm</td>
<td>None (immediate)</td>
<td>None (immediate)</td>
<td>Critical</td>
</tr>
<tr>
<td>Type</td>
<td>Delay (into alarm)</td>
<td>Delay (out of alarm)</td>
<td>Alarm Class</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td>--------------------</td>
<td>----------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>Secondary HW loop temp (10°F deviation from setpoint when boilers enabled)</td>
<td>30 min.</td>
<td>15 min.</td>
<td>Non-critical</td>
</tr>
<tr>
<td>Low Steam Pressure Alarm (5 psig below setpoint)</td>
<td>1 min.</td>
<td>1 min.</td>
<td>Emergency</td>
</tr>
</tbody>
</table>

**Labs**

<table>
<thead>
<tr>
<th>Type</th>
<th>Delay (into alarm)</th>
<th>Delay (out of alarm)</th>
<th>Alarm Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>Space pressure</td>
<td>1 min.</td>
<td>1 min.</td>
<td>Critical</td>
</tr>
<tr>
<td>Exhaust fan status does not match command</td>
<td>5 min.</td>
<td>None (immediate)</td>
<td>Critical</td>
</tr>
</tbody>
</table>

**Space Temperature**

<table>
<thead>
<tr>
<th>Type</th>
<th>Delay (into alarm)</th>
<th>Delay (out of alarm)</th>
<th>Alarm Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>Space Temperature (4°F deviation from setpoint)</td>
<td>30 min.</td>
<td>10 min.</td>
<td>Alert</td>
</tr>
<tr>
<td>Critical Space Temperature (1°F deviation from setpoint)</td>
<td>30 min.</td>
<td>5 min.</td>
<td>Critical</td>
</tr>
</tbody>
</table>

**VFDs**

<table>
<thead>
<tr>
<th>Type</th>
<th>Delay (into alarm)</th>
<th>Delay (out of alarm)</th>
<th>Alarm Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>VFD in hand mode or bypass</td>
<td>None (immediate)</td>
<td>None (immediate)</td>
<td>Critical</td>
</tr>
</tbody>
</table>

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

**Alarm Class**

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

**Link users to alarm type acknowledgement**

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

**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

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

## VAV Trends

<table>
<thead>
<tr>
<th>Description</th>
<th>Trend Interval</th>
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</thead>
<tbody>
<tr>
<td>Zone Temperature</td>
<td></td>
</tr>
<tr>
<td>Airflow</td>
<td></td>
</tr>
<tr>
<td>Airflow Setpoint</td>
<td></td>
</tr>
<tr>
<td>Damper Position</td>
<td></td>
</tr>
<tr>
<td>Perimeter Valve Position</td>
<td>30 min., Boolean points shall be COV</td>
</tr>
<tr>
<td>Reheat Valve Position</td>
<td></td>
</tr>
<tr>
<td>Leaving Air Temperature</td>
<td></td>
</tr>
<tr>
<td>Occupied/Unoccupied Mode</td>
<td>COV</td>
</tr>
</tbody>
</table>

## Steam/Hot Water Converter Trends

<table>
<thead>
<tr>
<th>Description</th>
<th>Trend Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hot Water Entering Temperature</td>
<td></td>
</tr>
<tr>
<td>Hot Water Leaking Temperature</td>
<td></td>
</tr>
<tr>
<td>Hot Water Temperature Setpoint</td>
<td></td>
</tr>
<tr>
<td>Water Differential Pressure</td>
<td>10 min., Boolean points shall be COV</td>
</tr>
<tr>
<td>Steam Valve Command</td>
<td></td>
</tr>
<tr>
<td>Steam Valve Position (feedback, if available)</td>
<td></td>
</tr>
<tr>
<td>Pump Speed</td>
<td></td>
</tr>
<tr>
<td>Pump Enable/Unable Command</td>
<td>COV</td>
</tr>
<tr>
<td>Pump Status</td>
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</table>
# Chiller Trends

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

# Boiler Trends

<table>
<thead>
<tr>
<th>Description</th>
<th>Trend Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boiler HWS Temperature</td>
<td>10 min., Boolean points shall be COV</td>
</tr>
<tr>
<td>Boiler HWR Temperature</td>
<td></td>
</tr>
<tr>
<td>System HWS Temperature</td>
<td></td>
</tr>
<tr>
<td>System HWR Temperature</td>
<td></td>
</tr>
<tr>
<td>HWS Temperature Setpoint</td>
<td></td>
</tr>
<tr>
<td>Boiler % Fire or High/Low Fire (where applicable)</td>
<td></td>
</tr>
<tr>
<td>System HWS Flow (GPM)</td>
<td></td>
</tr>
<tr>
<td>3-way Mixing Valve Position</td>
<td></td>
</tr>
<tr>
<td>HW Pump Speed</td>
<td></td>
</tr>
<tr>
<td>System Differential Pressure</td>
<td>COV</td>
</tr>
</tbody>
</table>
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
  o Chicago CUP Home Screen (status only)
  o System Meters Screen
  o One-line diagrams (CHW, Steam, Condensate, etc)
  o 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)
    o Floor Plan Graphic
      ▪ Detailed Floor Plan Graphic
      • Dynamic space temperature
      • Occupancy Status (where applicable)
      • Link to VAV graphic
    o Equipment Graphics (boilers, chillers, converters, AHUs, etc.)
    o Detailed Meter Graphic
    o AHU status table (valve positions, discharge temps, damper positions, fan speeds, etc.)
    o VAV status table(s) (valve position, damper position, airflow, discharge air temp)
    o “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:

![Diagram of graphic design dimensions]

- 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**

![ NU Home Screen Graphic Image ](image)

**Figure 1: Example Home Screen Graphic**

The NU home screen graphic will be similar to the existing Siemens’ 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’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.
Floor Plan Graphic

- 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

![Floor Plan Graphic Example](image)

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)
  o VAV tag (clicking on this shall link to VAV box graphic)
  o Room(s) served
  o Zone temperature setpoint
  o Zone temperature
  o Discharge air temperature
  o Reheat valve position
  o Damper position
  o Airflow setpoint
  o 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.
Figure 1: Simplified Riser Diagram
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.
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:

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>STATION COMPATIBILITY IN</td>
<td>ALL</td>
</tr>
<tr>
<td>STATION COMPATIBILITY OUT</td>
<td>ALL</td>
</tr>
<tr>
<td>TOOL COMPATIBILITY IN</td>
<td>ALL</td>
</tr>
<tr>
<td>TOOL COMPATIBILITY OUT</td>
<td>ALL</td>
</tr>
</tbody>
</table>

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.
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.
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 watt 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 20°F(-30°C) degrees. Assembled on a utilized 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-flats on a 4"(102mm) outside diameter x 4" (102mm) long tenon.
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-D2247-88 standard.
### Components List

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Catalog Number</th>
<th>Quantity &amp; Mount</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>6 Point Terminal Block</td>
<td>NDN63-WH</td>
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<tr>
<td>8</td>
<td>6 Point CT Shunt Block</td>
<td>16045C</td>
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</tr>
<tr>
<td>5</td>
<td>Smart 200 Multi-Function Digital Meter</td>
<td>INP-1505-X</td>
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<td></td>
<td></td>
</tr>
<tr>
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<td>Ferraz-Shawmut</td>
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<td>200V, 30A</td>
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</tr>
</tbody>
</table>

### Notes
- 1 & 2. Front door to be constructed from 14GA hot-rolled sheet steel, welded concealed hinges, door to be held closed with locking handle with 14GA HR, formed on all sides with concealed hinges, 14GA HR, formed with corner brackets welded and ground smooth. Point pan white paint.
- 3. Interior pan to be constructed from 14GA HR, formed with corner brackets welded and ground smooth. Point pan white paint.
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), 16X 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 EnduraStore™ 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.
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: 16x
Maximum Resolution: 1280 x 960
Lens: 1/f1.6 (focal length, 4.7 - 84.5 mm optical)
Aspect Ratios: 4:3 or 16:9
Light Sensitivity: 1/1.6, 2750'K; SNR>34dB
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 Torso: Correx 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 (dependant upon coding, resolution, and stream configuration)

Available Resolutions

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<th>MPx</th>
<th>Width</th>
<th>Height</th>
<th>Aspect Ratio</th>
<th>Maximum IPS</th>
<th>Recommended Bit Rate (Mbps)</th>
<th>Maximum IPS</th>
<th>Recommended Bit Rate (Mbps)</th>
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</thead>
<tbody>
<tr>
<td>1.30</td>
<td>1280</td>
<td>960</td>
<td>4:3</td>
<td>20</td>
<td>12.00</td>
<td>20</td>
<td>3.00</td>
</tr>
<tr>
<td>0.92</td>
<td>1280</td>
<td>720</td>
<td>16:9</td>
<td>30</td>
<td>12.00</td>
<td>30</td>
<td>2.50</td>
</tr>
<tr>
<td>0.49</td>
<td>800</td>
<td>600</td>
<td>4:3</td>
<td>20</td>
<td>5.15</td>
<td>20</td>
<td>1.25</td>
</tr>
<tr>
<td>0.31</td>
<td>640</td>
<td>480</td>
<td>4:3</td>
<td>20</td>
<td>3.25</td>
<td>20</td>
<td>1.20</td>
</tr>
<tr>
<td>0.23</td>
<td>640</td>
<td>352</td>
<td>16:9</td>
<td>30</td>
<td>3.90</td>
<td>30</td>
<td>1.50</td>
</tr>
<tr>
<td>0.18</td>
<td>480</td>
<td>368</td>
<td>4:3</td>
<td>20</td>
<td>1.85</td>
<td>20</td>
<td>0.75</td>
</tr>
<tr>
<td>0.13</td>
<td>480</td>
<td>272</td>
<td>16:9</td>
<td>30</td>
<td>2.65</td>
<td>30</td>
<td>0.75</td>
</tr>
<tr>
<td>0.08</td>
<td>320</td>
<td>240</td>
<td>4:3</td>
<td>20</td>
<td>0.60</td>
<td>20</td>
<td>0.40</td>
</tr>
<tr>
<td>0.06</td>
<td>320</td>
<td>176</td>
<td>16:9</td>
<td>30</td>
<td>0.50</td>
<td>30</td>
<td>0.35</td>
</tr>
</tbody>
</table>

Supported Protocols: TCP/IP, UDP/IP, Unicast, Multicast (IGMP), UPnP, DNS, DHCP, RTP, RTSP, NTP, IP4, SNMPv2c/v3, OoS, HTTP, HTTPS, LDAP, SSL, S/MIME, FTP, and 802.1x (EAP)

Users
Unicast: Up to 32 simultaneous users depending on resolution settings (2 guaranteed streams)
Multicast: Unlimited users

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, 2.5 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 24-bit pixel color resolution
Web Browser*: Internet Explorer 8.0 (or later), Firefox 3.5 (or later), Internet Explorer 9.0 (or later) is recommended for configuring analytics
Media Player*: Pelco Media Player® or QuickTime® 7.8.5 for Windows XP, Windows Vista, or QuickTime 7.6.4 for Mac OS X 10.4

ANALYTICS
Required Systems for Pelco Analytics
Pelco Interface: WSS2000 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 0.55.39 (or later), available at Pelco.com/AP

*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

<table>
<thead>
<tr>
<th>Type</th>
<th>Back Box Color</th>
<th>Lower Dome</th>
<th>HD, 1.3 Mpx, 18x Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>In-ceiling, indoor</td>
<td>Black with white trim ring</td>
<td>Smoked</td>
<td>SS118-FV11</td>
</tr>
<tr>
<td>In-ceiling, environmental</td>
<td>Black with black trim ring</td>
<td>Clear</td>
<td>SS118-FV12</td>
</tr>
<tr>
<td>Pendant, standard</td>
<td>Gray</td>
<td>Smoked</td>
<td>SS118-PG0</td>
</tr>
<tr>
<td>Pendant, environmental</td>
<td>Black</td>
<td>Clear</td>
<td>SS118-PG1</td>
</tr>
<tr>
<td></td>
<td>Gray</td>
<td>Smoked</td>
<td>SS118-PG0</td>
</tr>
<tr>
<td></td>
<td>Black</td>
<td>Clear</td>
<td>SS118-PG1</td>
</tr>
</tbody>
</table>

#### COMPONENT MODEL NUMBERS

<table>
<thead>
<tr>
<th>Back Box</th>
<th>Lower Dome*</th>
<th>Dome Drive</th>
</tr>
</thead>
<tbody>
<tr>
<td>BS-F</td>
<td>LDHQF-0 High-quality, smoked, in-ceiling</td>
<td>DS118 HD, 1.3 Mpx, 18x optical zoom</td>
</tr>
<tr>
<td>BS-F-E</td>
<td>LDHQF-1 High-quality, clear, in-ceiling</td>
<td></td>
</tr>
<tr>
<td>BS-PG</td>
<td>LDHQFB-0 High-quality, smoked, pendant</td>
<td></td>
</tr>
<tr>
<td>BS-PB</td>
<td>LDHQFB-1 High-quality, clear, pendant</td>
<td></td>
</tr>
<tr>
<td>BS-PG-E</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*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/ULC Listed
- C-Tick
- U.S. Patents 5,931,432; 6,763,415 B2; 6,833,656 B2; 6,921,222 B2; 7,191,815 B2
- Meets NEMA Type 4X and IP66 standards when installed properly (BS-F-E and BS-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 (fps) 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.
## 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, 9, 7.5, 6.5, 5, 4, 3, 2, 1 (dependent upon coding, resolution, and stream configuration)

<table>
<thead>
<tr>
<th>Resolution</th>
<th>MJPEG</th>
<th>H.264 Base Profile</th>
</tr>
</thead>
<tbody>
<tr>
<td>MPx</td>
<td>Width</td>
<td>Height</td>
</tr>
<tr>
<td>1.3</td>
<td>1280</td>
<td>1024</td>
</tr>
<tr>
<td>1.2</td>
<td>1280</td>
<td>960</td>
</tr>
<tr>
<td>0.9</td>
<td>1280</td>
<td>720</td>
</tr>
<tr>
<td>0.5</td>
<td>640</td>
<td>600</td>
</tr>
<tr>
<td>0.3</td>
<td>640</td>
<td>480</td>
</tr>
<tr>
<td>0.1</td>
<td>320</td>
<td>240</td>
</tr>
</tbody>
</table>

**Additional Resolutions**
640 x 360, 320 x 240, 160 x 120

**Supported Protocols**
ICMP, UDP, RTP, TCP, HTTP, HTTPS, HTTP-HTTPS, SIP, SIPALG (client), SSL, TLS, SMTP, FTP, TFTP, DNS (Bonjour), and 802.1x (EAP)

**Users**
Unicast
Up to 20 simultaneous users depending on resolution settings &/or 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 (for lonetor) or Digital Surutry 4.3 (for 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

<table>
<thead>
<tr>
<th>Field of View in Degrees</th>
<th>High Resolution Streams &gt; 800 x 600</th>
<th>Aspect Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>16:9</td>
<td>4:3</td>
</tr>
<tr>
<td>2.8 mm</td>
<td>Horizontal</td>
<td>91</td>
</tr>
<tr>
<td></td>
<td>Vertical</td>
<td>50</td>
</tr>
<tr>
<td>10.0 mm</td>
<td>Horizontal</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>Vertical</td>
<td>14</td>
</tr>
</tbody>
</table>

Note: For 800 x 600 (or lower) resolutions in 4:3 or 6:4 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 (fps) 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 301.22(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 Systenization

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.
VIDEO

Video Encoding
H.264 baseline 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, 10, 8, 7.5, 6.5, 4, 3.5, 3, 2.5, 1 (dependent upon coding, resolution, and stream configuration)

Available Resolutions

<table>
<thead>
<tr>
<th>Resolution</th>
<th>MJPEG</th>
<th>H.264 Baseline Profile</th>
</tr>
</thead>
<tbody>
<tr>
<td>MPx</td>
<td>Width</td>
<td>Height</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.3</td>
<td>1280</td>
<td>1024</td>
</tr>
<tr>
<td>1.2</td>
<td>1280</td>
<td>960</td>
</tr>
<tr>
<td>0.9</td>
<td>1280</td>
<td>720</td>
</tr>
<tr>
<td>0.5</td>
<td>640</td>
<td>480</td>
</tr>
<tr>
<td>0.3</td>
<td>640</td>
<td>480</td>
</tr>
<tr>
<td>0.1</td>
<td>320</td>
<td>240</td>
</tr>
</tbody>
</table>

Additional Resolutions
640 x 810, 640 x 360, 480 x 360, 480 x 272, 320 x 256, and 320 x 176

Supported Protocols
TCP/IP, UDP/IP (Unicast, Multicast IGMP), IPv4, DNS, DHCP, HTTP, RTSP, RTP, IPv6, SNMP v2c/v3, SSL, SSH, FTP, rlogin, telnet, 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 setup, up to 19 concurrent

Polo System Integration
Endura 2.0, or Digital Sentry 4.3 (or later)

Open IP Integration
Polco IP camera API

Minimum System Requirements
Processor
Intel® Pentium® 4 Microprocessor, 1.8 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, Firefox® 3.0 or later, and QuickTime® 7.6 is recommended for configuring analytics

Media Player*
QuickTime® 7.5.5 or later

LENS

Field of View in Degrees

<table>
<thead>
<tr>
<th>Field of View</th>
<th>High Resolution Streams (&gt;640 x 600) Aspect Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>16:9</td>
</tr>
<tr>
<td>Horizontal</td>
<td>90</td>
</tr>
<tr>
<td>Vertical</td>
<td>60</td>
</tr>
</tbody>
</table>

| Horizontal | 25 | 25 | 25 |
| Vertical | 14 | 19 | 20 |

*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 7.8.5.
MODEL
IM10010-1E

Savix 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.

40 ELECTRICAL BOX (DEEP) ADAPTER PLATE
(Available as an Accessory)

CERTIFICATIONS/RATINGS/PATENTS
- C2, Class A
- FCC, Class A
- UL, cUL Listed
- C-tick
- KCC
- Meets INEMRA 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.S.S.S.® update for the current status of certifications.

OPTIONAL ACCESSORIES
LDIMWE-D
IM-VISM
IM-VISPM
WMVE-SR
IM-VISC
IM-VISAS
PO200U5600
PA101
ALM-1

Smoked bubble
Surface mount ring
Pendant mount, light gray
Wall mount light gray
Corner mount, light gray
4S electrical box (deep) adapter plate
Single port PoE injector
Pole adapter for use with WMVE-SR wall mount
External alarm accessory

WALL MOUNT
(Available as an Accessory)
GENERAL
Imaging Device: 1/3-inch (effective)
Image Type: CMOS
Image Readout: Progressive scan
Maximum Resolution: 1280 x 1024
Signal-to-Noise Ratio: 50 dB
Auto Iris Lens Type: 0.0 drive
Electronic Shutter Range: 1 - 1/100,000 sec
Wide Dynamic Range: 60 dB
White Balance Range: 2,000°K to 10,000°K
Sensitivity:
  - Color (1x/33 ms) 0.5 lux
  - Color SENS (15x/500 ms) 0.17 lux
  - Mono (1x/33 ms) 0.25 lux
  - Mono SENS (15x/500 ms) 0.03 lux
Denois Attenuation: Clear drone, zero light loss

Construction
  - Back Box: Aluminum
  - Bubble: Polycarbonate plastic
  - Finish: Light gray powder coat

Weight
  - Unit: 0.5 kg (1.1 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: Cat5e 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 B/Al, 8 kHz mono or 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:
  - Operating: -20° to 50°C (-4° to 122°F)
  - Storage: -40° to 60°C (-40° to 140°F)
Operational Humidity:
  - Automatic: 20% to 80%, noncondensing
Impact Resistance:
  - IK10 (3m drop, 1950 or 6000)
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.
TECHNICAL SPECIFICATIONS

MODELS
IM10C18-1
Saxix mini indoor fixed dome network camera, 1.3 megapixel, color, 2.8 - 10 mm varifocal megapixel lens, white trim ring, clear dome

IM10C18-81
Saxix 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 61008.1 Listed
- C-Tick
- Patents Pending

OPTIONAL ACCESSORIES
IM-PMWL
Pendant mount white

IM-PMBL
Pendant mount black

IM-MWMWT
Integrated wall mount white

IM-MWMBL
Integrated wall mount black

LDIM-0
White lower dome w/ smoked bubble

LDIM-BB
Black lower dome w/ smoked bubble

IX-SC
4-foot service/monitor cable, compatible with any standard monitor DVI connector

POE20L280G
Single port PoE injector

PENDANT MOUNT AVAILABLE AS ACCESSORY

INTEGRATED WALL MOUNT (AVAILABLE AS ACCESSORY)

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

### GENERAL

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Imaging Device</td>
<td>1/3-inch (effective)</td>
</tr>
<tr>
<td>Image Type</td>
<td>CMOS</td>
</tr>
<tr>
<td>Image Readout</td>
<td>Progressive scan</td>
</tr>
<tr>
<td>Maximum Resolution</td>
<td>1280 x 1024</td>
</tr>
<tr>
<td>Signal-to-Noise Ratio</td>
<td>50 dB</td>
</tr>
<tr>
<td>Auto Iris Lens Type</td>
<td>DC drive</td>
</tr>
<tr>
<td>Electronic Shutter Range</td>
<td>1 - 1/100,000 sec</td>
</tr>
<tr>
<td>White Balance Range</td>
<td>2,000°K to 10,000°K</td>
</tr>
<tr>
<td>Sensitivity</td>
<td>1/1.3; 2.859°K; SNR &gt; 24 dB</td>
</tr>
<tr>
<td>Color (1x/33 ms)</td>
<td>0.5 lux</td>
</tr>
<tr>
<td>Color SENS (15x/500 ms)</td>
<td>0.12 lux</td>
</tr>
<tr>
<td>Dome Attenuation</td>
<td>Zero light loss</td>
</tr>
<tr>
<td>Construction</td>
<td>Cast aluminum and polycarbonate plastic</td>
</tr>
<tr>
<td>Weight</td>
<td>0.77 lb (0.35 kg)</td>
</tr>
<tr>
<td>Available Languages</td>
<td>Chinese, English, French, German, Italian, Portuguese, Russian, Spanish, and Turkish</td>
</tr>
</tbody>
</table>

### ELECTRICAL

- **Port:** RJ-45 connector for 100Base-TX
- **Cable Type:** Cat5 or better for 100Base-TX
- **Power Input:** PoE (IEEE 802.3af class 3)
- **Current Consumption PoE:** <0 W
- **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; 800-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: 360°
  - Tilt: 180°
  - Rotate: 220°

### ENVIRONMENTAL

- **Operational Temperature:** 32° to 122°F (0° to 50°C)
- **Operational Humidity:** 20% to 90%, noncondensing
## TECHNICAL SPECIFICATIONS

### RECOMMENDED MOUNTS

**In-Ceiling Domes**
- SSE-P: 2' x 2' drop ceiling panel, aluminum construction, replaces 2' x 2' ceiling tile
- SCA1: Support rails for SSE-F, for use in ceiling tile applications

**Pendant Domes**
- BB5-PCA-BK: Pendant conduit adapter, black
- BB5-PCA-GY: Pendant conduit adapter, gray
- NWM 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

**MIC Series**
- Ceiling mount, black

**PP Series**
- Parapet roof mount
- PP365/PP361: 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.
### GENERAL

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Construction</strong></td>
<td>Aluminum</td>
</tr>
<tr>
<td><strong>Dome Drive</strong></td>
<td>Aluminum, thermo plastic</td>
</tr>
<tr>
<td><strong>Lower Dome</strong></td>
<td>Acrylic</td>
</tr>
<tr>
<td><strong>Light Attenuation</strong></td>
<td>1/0.5 light loss</td>
</tr>
<tr>
<td><strong>Smoked</strong></td>
<td>Clear</td>
</tr>
<tr>
<td><strong>Cable Entry (back box)</strong></td>
<td>0.75-inch conduit fitting</td>
</tr>
<tr>
<td><strong>Pendant</strong></td>
<td>Through 1.5-inch NPT pendant mount</td>
</tr>
<tr>
<td><strong>Weight (approximate)</strong></td>
<td>Unit: Shipping</td>
</tr>
<tr>
<td><strong>In-Ceiling</strong></td>
<td>5.2 lb (2.4 kg)</td>
</tr>
<tr>
<td><strong>Environmental In-Ceiling</strong></td>
<td>6.2 lb (2.8 kg)</td>
</tr>
<tr>
<td><strong>Standard Pendant</strong></td>
<td>9.5 lb (4.3 kg)</td>
</tr>
<tr>
<td><strong>Environmental Pendant</strong></td>
<td>7.5 lb (3.5 kg)</td>
</tr>
<tr>
<td><strong>Environment</strong></td>
<td>Indoor/Outdoor</td>
</tr>
<tr>
<td><strong>In-Ceiling, Environmental In-Ceiling, Pendant, Standard, and Environmental</strong></td>
<td>Indoor/Outdoor</td>
</tr>
<tr>
<td><strong>Operating Temperature</strong></td>
<td>32° to 122°F (0° to 50°C)</td>
</tr>
<tr>
<td><strong>Maximun</strong></td>
<td>113°F (45°C) absolute maximum; 95°F (35°C) sustained maximum</td>
</tr>
<tr>
<td><strong>Minimum</strong></td>
<td>28°F (−2°C) sustained minimum</td>
</tr>
<tr>
<td><strong>Environmental In-Ceiling, Environmental Pendant</strong></td>
<td>Assumes no wind chill factor</td>
</tr>
<tr>
<td><strong>Maximun</strong></td>
<td>140°F (60°C) absolute maximum; 122°F (50°C) sustained maximum</td>
</tr>
<tr>
<td><strong>Minimum</strong></td>
<td>−68°F (−5°C) absolute minimum; prevents icing at sustained minimum of −22°F (−30°C)</td>
</tr>
<tr>
<td><strong>Effective Projected Area (EPA)</strong></td>
<td>20.5 square inches (without mount), 47 square inches (with WMM Sirius mount)</td>
</tr>
</tbody>
</table>

### ELECTRICAL

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ports</strong></td>
<td>RJ-45 connector for 100Base-TX</td>
</tr>
<tr>
<td><strong>Cabling Type</strong></td>
<td>Auto MDV/MD1-K</td>
</tr>
<tr>
<td><strong>Input Voltage</strong></td>
<td>Cat5 or better for 100Base-TX</td>
</tr>
<tr>
<td><strong>Input Power</strong></td>
<td>18 to 32 VAC; 24 VAC nominal</td>
</tr>
<tr>
<td><strong>22 to 27 VDC; 24 VAC nominal</strong></td>
<td>24 VAC</td>
</tr>
<tr>
<td><strong>PvE</strong></td>
<td>23 VA nominal (without heater); 73 VA nominal (with heater)</td>
</tr>
<tr>
<td><strong>Fuse</strong></td>
<td>0.7 A nominal (without heater); 3 A nominal (with heater)</td>
</tr>
<tr>
<td><strong>IEEE802.3af (without heater)</strong></td>
<td>1.26 A</td>
</tr>
</tbody>
</table>

### MECHANICAL

(Dome Drive Only)

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Variable Speed</strong></td>
<td>0.1° to 400°</td>
</tr>
<tr>
<td><strong>Preset Accuracy</strong></td>
<td>±0.1°</td>
</tr>
<tr>
<td><strong>Pan Movement</strong></td>
<td>360° continuous pan rotation</td>
</tr>
<tr>
<td><strong>Vertical Tilt</strong></td>
<td>±6° to ±89°</td>
</tr>
<tr>
<td><strong>Manual Pan/Tilt Speeds</strong></td>
<td>Pan: 0.1° to 80°/sec manual operation, 150°/sec Turbo; Tilt: 0.1° to 40°/sec manual operation</td>
</tr>
<tr>
<td><strong>Preset Speeds</strong></td>
<td>Pan: 400°/sec; Tilt: 160°/sec</td>
</tr>
</tbody>
</table>
SOFTWARE FEATURES
- 255 Presets
- 16 Tours
- ±0.1° 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.
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 Endure® 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 tripline. 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 airports, outside drop-offs, parking enforcement, suspicious parking, traffic lane breakdowns, and vehicles waiting at gates.
Power Consumption
9,000 Watts -- 120 VAC
3,600 Watts -- With Heater

Bolt Layout for Column
(4) 3/8" x 3 Bolts - 16" Long
Terminal Provided.

Use Wire Nuts for Electrical
1 - Coat Balden 533745
2 - Cat 5E Balden 7947A

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.

Ramthil Corp.
118 Railroad Ave.
Johnston, RI. 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.
**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)**
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 ¼" W x 10 ⅝" H
- Height 15", Width 14", Depth 6 ¾", 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.
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.

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.

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.
model no:

BL100N, BL101N, BL105N
BL106N

BIKE RACKS

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

customer service:

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

- Before calling, have your product model number available:
  1-800-253-8819 (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 46872 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 Taps, 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 plastisol coating to like new after prolonged use, wash/dry/rinse and do not use Armor-All® or similar quality vinyl protectant.

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 carrousel 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:

Carrousel is made of 10 gauge sheet metal and 1 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 carrousel bike rack ground space requirements are 35 1/2" x 14 1/2" diameter.
### Parts Identification

<table>
<thead>
<tr>
<th>ITEM</th>
<th>PART</th>
<th>DESCRIPTION</th>
<th>QTY.</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>7638</td>
<td>36&quot; BIKE LOOP (INGROUND)</td>
<td>1</td>
</tr>
<tr>
<td>A1</td>
<td>8193</td>
<td>36&quot; BIKE LOOP (SURFACE MOUNT)</td>
<td>1</td>
</tr>
<tr>
<td>B</td>
<td>8579</td>
<td>CARROUSEL BIKE RACK CAGE</td>
<td>1</td>
</tr>
<tr>
<td>C1</td>
<td>7156</td>
<td>CARROUSEL BIKE RACK SURFACE MOUNT LEG</td>
<td>1</td>
</tr>
<tr>
<td>C2</td>
<td>7157</td>
<td>CARROUSEL BIKE RACK INGROUND LEG</td>
<td>1</td>
</tr>
<tr>
<td>D</td>
<td>7158</td>
<td>CAST NUT</td>
<td>1</td>
</tr>
</tbody>
</table>

### Hardware Identification

---

(page 2)
assembly procedures:

To ensure proper assembly, it is suggested that you take adequate time to locate and identify each part. To prevent stretching of the finished pieces, we recommend this unit be assembled on a clean, flat, solid surface with a clean 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 pre-cut 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 angles, 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 mounted 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.

36" BIKE LOOP - Surface Mount

STEP 1
For the surface mount bike rack, determine location and using holes in base plate as a template, drill holes and secure in concrete. See FIG. 2.
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 VALUED ON TOOLING DESIGNED FOR AND OWNED BY VICTOR STANLEY, INC. THEY OFFER MAXIMUM CAPACITY AND STRENGTH WITH LIGHTWEIGHT CONSTRUCTION USING CRITICAL VITAL RIGID, INTERNAL HANDLES, 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 ENVIRONMENTS, 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.
DYN-342 and DYN-242 Dynasty Series™
MegaCan Recycling Stations and Litter Receptacles
Patents Pending