APPENDIX A

BMS GRAPHICS STANDARDS

Page 1: Main Page

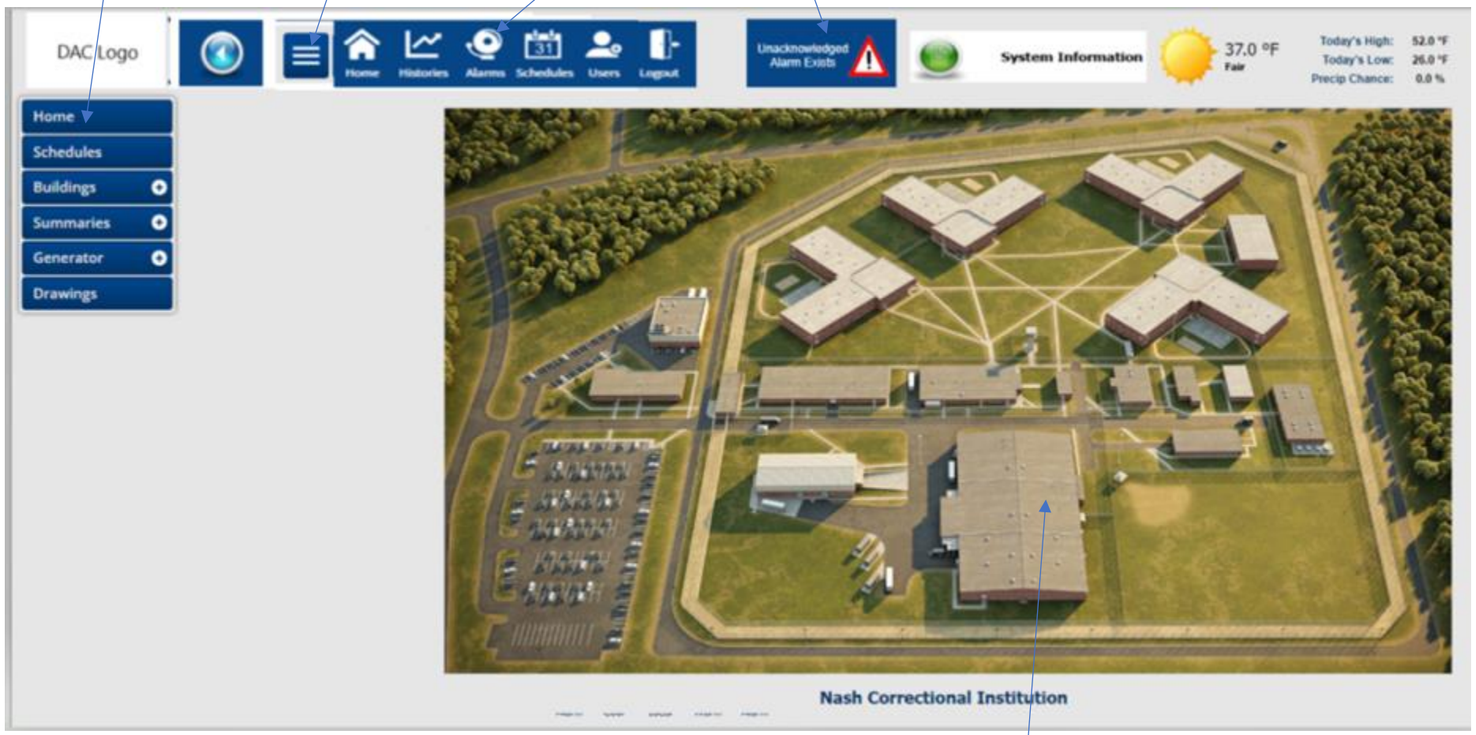
Side drop down menu. Typical all graphics. See **Page 2**

Selecting the menu button hides or displays the **Side drop down menu**

Menu across the top (typical all graphics): Background should be gray to match the overall background color for the graphic. Icons and letters should be blue to match the side menu

Both menus are standard on all web pages

Rename System Communication Status: Green: all modules communicating, Red, one or more are not communicating



Important Note! The standard or "canned" graphics that are provided with Tridium Niagara do not meet the level of detail and clarity for our standard graphics. Therefore they do not comply and are unacceptable.

Scale for 1920 x 1080 resolution

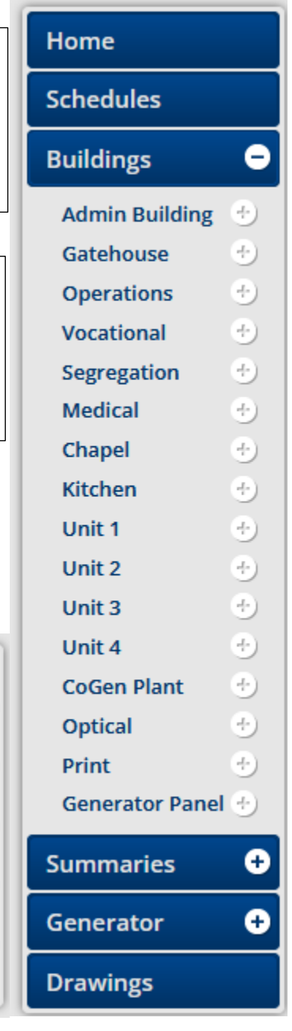
You can select a building to access the floor plans. Each floor of that building shall be selectable. Each floor level shall highlight when hovering over it indicating it is selectable and will bring up the related floorplan thermograph. See example **Page 3**

Page 2: Typical drop down menus

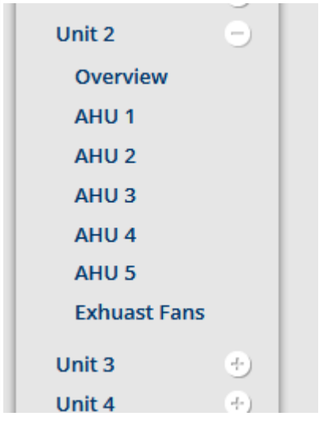
All Buildings and special systems (in this example the Generator Panel, but it could be electrical or water metering, etc.) will be listed whether included in the current system or not for future use.

Selecting a menu option with a "+" sign indicates a drop down menu with additional features

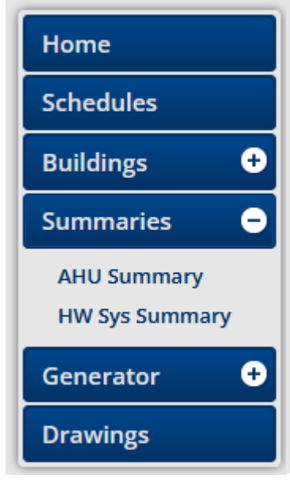
See Page 15 for Schedule Summary (all buildings)



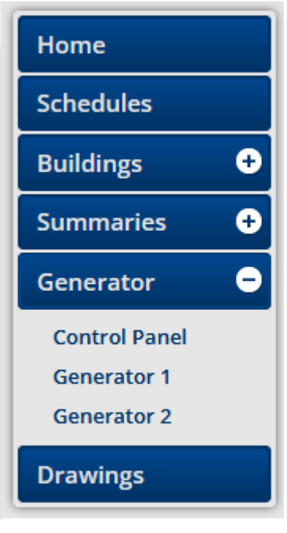
Note a typical drop down menu for a building. This would include other systems as applicable such as heating and cooling plants.



See **Pages 10 & 11** for a typical system summaries

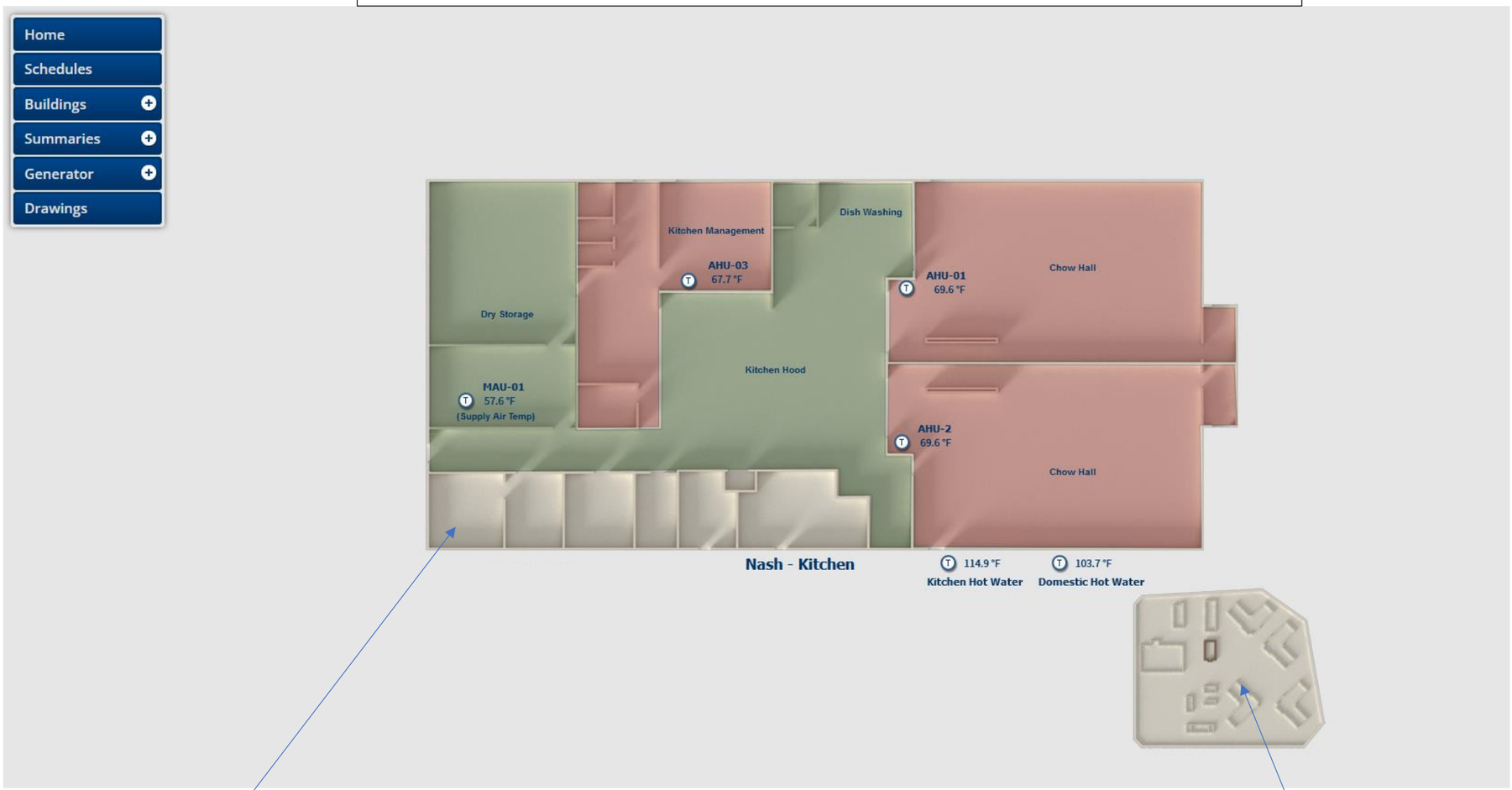


The Drawings page will pull up the shop drawing in their entirety. A separate document will be provided for O&M manuals for the BMS system, and, for the HVAC systems



Page 3: (Typical Floorplan)

Note temperature sensor details, and temperature values. Selecting **anywhere** in a zone will link you to that zone HVAC system. See **Page 4** for a typical system. Zones shall be clearly delineated between each other (provide a border around each zone)



Note the site map indicating the building at which you are looking. Currently this is a static graphic

Note typical floor plan color (tan). Ignore the green and red colors (that is a Tier 2 graphic requirement)

Page 4: Typical Equipment System (ex: AHU)

Each mouse button icon with right button depressed indicates this point can be adjusted.

Note Secondary Menu. Typical all equipment system pages

The top menu does not fully reflect all options. Refer to Page 1

Schedules relevant to this system. See **Page 16**

Provide horizontal menu as shown and discussed on this page. However, For Tier 1 graphics, perform the following: Gray out **Points** (no link to another page)

See **Page 6** for typical Sequence graphic

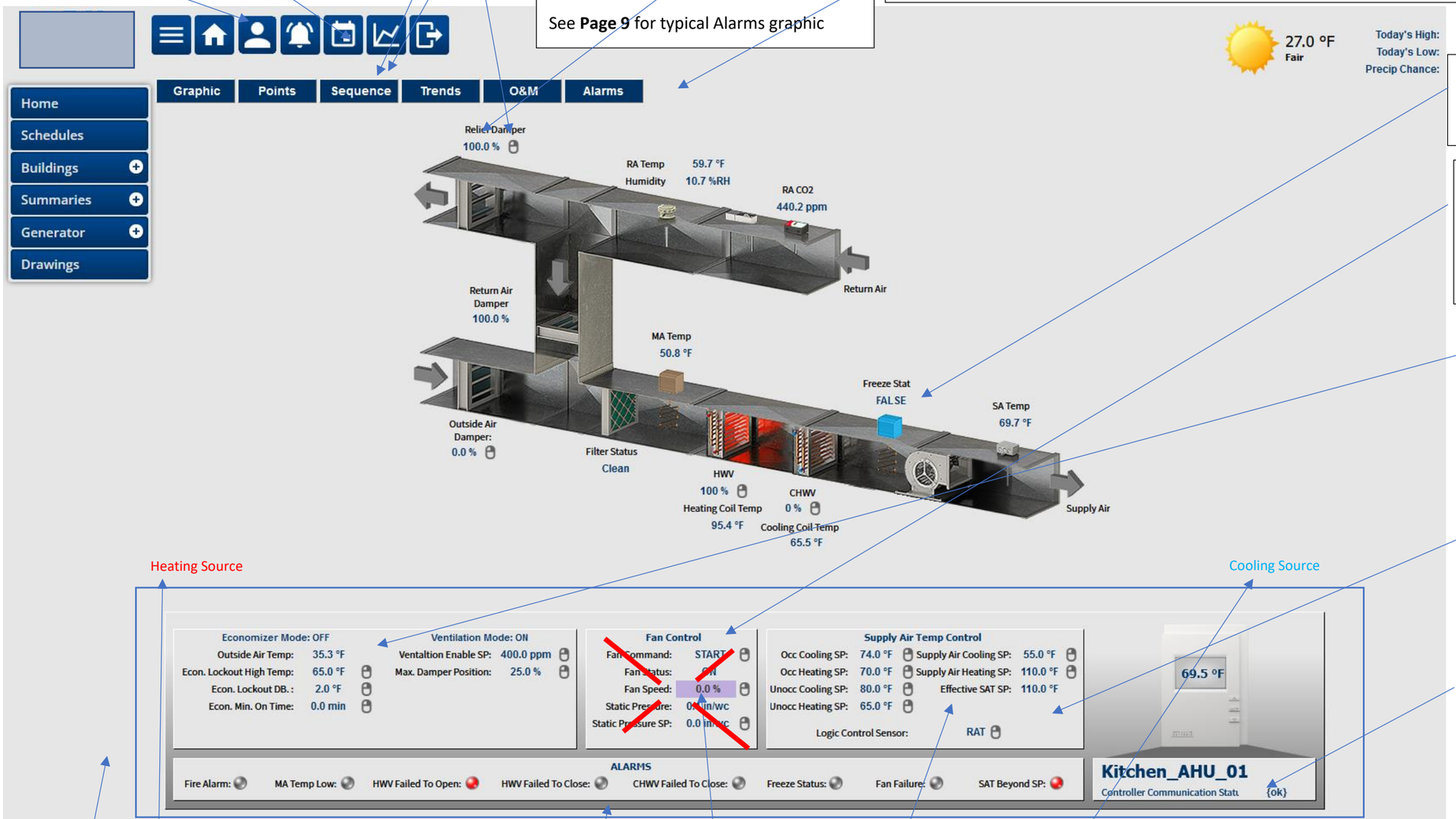
See **Page 7** for typical Trends graphic

See **Page 8** for typical O&M graphic

See **Page 9** for typical Alarms graphic

Note 1: There are several items not currently shown on the graphic that shall be provided: As applicable, setpoints will be noted below the actual value. Valve and damper positions shall also reflect NO (normally open) and NC (normally closed) positions. Fan Command and Fan Status should be immediately beneath or above the fan. The position will also indicate position. Example: Relief damper shall indicate 100% **open.** The items above are typical all graphs

Provide another menu after "**Alarms"** called "Help" (Page 12) and "**Analytics**". ~~See Page 18 for details~~ (gray out **Analytics** (no link to another page)



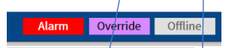
Units for "Freeze" should be "Normal" or "Freeze Condition"

See Note 1 above Eliminate this section or use for other information as identified herein

Use this section to describe sequence status such as Economizer, Ventilation, Humidity mode, etc.

Use this section to list operating parameters. Note: Site user will not be able to change all these variables. Contact ECG/Energy Mgmnt to discuss

Use the Icon below in lieu of "Controller Communications Status" Units to be "Good" or Off-line"



Provide location for this key (typ)

Note that all data/text is floating. Note conservative use of colors and how boxed framing is presented

Tier 1: This area to be for alarms only – no analytics

Provide a key for the Niagara colors used to denote overridden values, etc.

Do NOT use "**Effective**". Use "**Active**"

Note: Include links to the **heating source**, and **cooling source** below the graphic. Background color of link to match the overall graphic background color (transparent).

Page 5: Typical Points Page (N/A: Tier 2 requirement)

Page 6: Sequence of Operations:

Provide a typed Sequence of Operations specific to this equipment system

Page 7: Typical Trends Page

Note a minimum of four standing trends. These are populated with standard points to assist the user in determining issues. Having to manually enter this information to create charts is not acceptable. However, you will be able to delete or add to the standing trends. Every setpoint and the data point associated with that setpoint shall be displayed in one of the trends below. Note you may want to group binary/digital, and, analog points separately. Final selection of points to be Central Engineering's (the owner's) choice

Note the options for each trend from the drop down menu as illustrated below

Note the bottom section which is repeated from the (AHU) system graphic

The trends can be 4 to a page, or one to a page and scroll down for other pages. The controls contractor is to coordinate with the DAC Energy Manager regarding what points will be trended in each graph

Page 8: Typical O&M Page

Provide a link to the O&M manual here. Provide a link to the Shop drawings specific to this equipment system here

Page 9: Typical Alarms Page

Alarms shall be specific to that system

Time Range ? to ?

57 Source(s) / 366 Alarm(s)

	Info	Timestamp	Source	Message Text	Source State	Priority	Ack State	Alarm Class
☐		24-Jan-23 12:51:37 PM EST	Boiler2Alarm HW_Plant	Chiller Has Returned To Normal!	Normal	255	0 Acked / 11 Unacked	CriticalAlarmClass
☐		24-Jan-23 12:49:46 PM EST	Boiler2_Alarm HW_Plant	Chiller Has Returned To Normal!	Normal	255	0 Acked / 14 Unacked	CriticalAlarmClass
☐		24-Jan-23 6:59:10 AM EST	Boiler1_Alarm HW_Plant	Chiller Has Returned To Normal!	Normal	255	0 Acked / 37 Unacked	CriticalAlarmClass
☐		24-Jan-23 6:00:53 AM EST	HWST_Alarm HW_Plant	Chiller Has Returned To Normal!	Normal	255	0 Acked / 1 Unacked	CriticalAlarmClass
☐		24-Jan-23 5:36:47 AM EST	Boiler1Alarm HW_Plant	Chiller Has Returned To Normal!	Normal	255	0 Acked / 36 Unacked	CriticalAlarmClass
☐		20-Jan-23 4:41:03 PM EST	CHWST_Alarm CHWPlant	Chiller Has Returned To Normal!	Normal	255	0 Acked / 3 Unacked	CriticalAlarmClass
☐		20-Jan-23 2:45:41 PM EST	CHWP3_Alarm CHWPlant	Chiller Has Returned To Normal!	Normal	255	0 Acked / 2 Unacked	CriticalAlarmClass
☐		19-Jan-23 2:06:56 PM EST	Polk_CI_J1:AHU_A_04 BAC-5051E_0056a5 Network 11000	Ping Success	Normal	255	0 Acked / 4 Unacked	Default Alarm Class
☐		19-Jan-23 2:06:43 PM EST	Polk_CI_J1:AHU_A_04 FPB_4_02	Ping Success	Normal	255	0 Acked / 3 Unacked	Default Alarm Class
☐		19-Jan-23 2:06:31 PM EST	Polk_CI_J1:AHU_A_04 FPB_4_01	Ping Success	Normal	255	0 Acked / 4 Unacked	Default Alarm Class
☐		17-Jan-23 12:48:15 PM EST	CDWP2_Alarm CHWPlant	Chiller Has Returned To Normal!	Normal	255	0 Acked / 2 Unacked	CriticalAlarmClass
☐		17-Jan-23 12:48:15 PM EST	CDWP1_Alarm CHWPlant	Chiller Has Returned To Normal!	Normal	255	0 Acked / 2 Unacked	CriticalAlarmClass
☐		13-Jan-23 6:06:49 AM EST	Roxboro, Person County Airport, NC	Special Weather Statement	Normal	255	0 Acked / 3 Unacked	Default Alarm Class
☐		12-Jan-23 10:44:15 AM EST	TowerFanRelayHigh Chiller2	Chiller Has Returned To Normal!	Normal	255	0 Acked / 2 Unacked	CriticalAlarmClass
☐		12-Jan-23 10:42:07 AM EST	TowerFanRelayLow Chiller2	Chiller Has Returned To Normal!	Normal	255	0 Acked / 2 Unacked	CriticalAlarmClass
☐		12-Jan-23 10:01:48 AM EST	FanAlarm AHU_C_13	Fan Has Returned To Normal!	Normal	255	0 Acked / 3 Unacked	CriticalAlarmClass
☐		12-Jan-23 9:34:18 AM EST	FanAlarm AHU_C_12	Fan Has Returned To Normal!	Normal	255	0 Acked / 2 Unacked	CriticalAlarmClass
☐		11-Jan-23 2:27:03 PM EST	FanAlarm AHU_C_11	Fan Has Returned To Normal!	Normal	255	0 Acked / 2 Unacked	CriticalAlarmClass
☐		11-Jan-23 2:03:23 PM EST	FanAlarm AHU_C_10	Fan Has Returned To Normal!	Normal	255	0 Acked / 1 Unacked	CriticalAlarmClass
☐		11-Jan-23 12:11:16 PM EST	Polk_CI_J1:NiagaraNetwork Polk_CI	Ping Success	Normal	255	0 Acked / 3 Unacked	Default Alarm Class
☐		11-Jan-23 6:58:04 AM EST	Freezestat AHU_A_03	Freeze Status Has Returned To Normal!	Normal	255	0 Acked / 2 Unacked	CriticalAlarmClass
☐		26-Dec-22 12:27:21 PM EST	Polk_CI_J1:AHU_A_10 FPB_10_21	Ping Success	Normal	255	0 Acked / 2 Unacked	Default Alarm Class
☐		26-Dec-22 12:26:57 PM EST	Polk_CI_J1:AHU_A_10 FPB_10_20	Ping Success	Normal	255	0 Acked / 2 Unacked	Default Alarm Class
☐		24-Dec-22 11:55:53 AM EST	Freezestat AHU_D_12	Freeze Status Has Returned To Normal!	Normal	255	0 Acked / 3 Unacked	CriticalAlarmClass
☐		24-Dec-22 10:37:58 AM EST	Freezestat AHU_D_05	Freeze Status Has Returned To Normal!	Normal	255	0 Acked / 180 Unacked	CriticalAlarmClass

Acknowledge Hyperlink Notes Silence Filter Show Recurring

Page 10: Typical Summaries Page Typical Equipment Summary Pages: The tables below are representative in nature. The vast array of equipment systems will dictate which points are to be listed. There could be more, or, less. Coordinate with the Electronic Controls Group and the Energy Management Team to finalize this list. Units of measure are included for each variable. Final UOM are open to discussion.

System ID	Supply Air Temp	Supply Air Temp Setpt	Mixed Air Temp	CHW Coil Discharge Temp	Return Air Temp	Return Air Humidity	OA Damper Position	CHW Valve Position	CHW Coil Delta Temp	HW Valve Position	HW Coil Delta Temp	Fan Command	Fan Status	VFD Speed	Airflow	Duct Static Pressure	Duct Static Setpt	AHU Status	Heating Plant Status	HW Supply Temp	Cooling Plant Status	CHW Supply Temp
	°F	°F	°F	°F	°F	% rh	% Open	% Open	°F	% Open	°F	On/Off/ Hand	On/Off/ Hand/Fail	%	cfm	in	in	On/Off/ Hand/Fail	On/Off/ Hand/Fail	°F	On/Off/ Hand/Fail	°F
AHU_1																						
AHU_2																						

System ID	Zone Status	Room Temp	Room Setpt Heating	Room Setpt Cooling	Heating Setback Setpt	Cooling Setback Setpt	Room Setpt Adj	Active Room Setpt	Fan Induction Box Status	Reheat Vlv Position	VAV Discharge Temp	Reheat Delta T	VAV AIrflowCFM	VAV Airflow Setpt		AHU Status	AHU Static Press	AHU Static Press SP		HWS Temp	HWR Temp	HW Delta
	Occupied/ Unoccupied/ Override	°F	°F	°F	°F	°F	°F	°F	On/Off/ Fail	% Open	°F	°F	cfm	cfm		On/Off/ Hand/Fail	in	in		°F	°F	°F
VAV_1																						
VAV_2																						

System ID	Exhaust Command	Exhaust Status
	On/Off	On/Off/Hand /Fail
Exhaust Fan 1		
Exhaust Fan 1		

Page 11: Typical Equipment Summary Pages: The tables below are representative in nature. The vast array of equipment systems will dictate which points are to be listed. There could be more, or, less. Coordinate with the Electronic Controls Group and the Energy Management Team to finalize this list. Units of measure are included for each variable. Final UOM are open to discussion

System ID	Chiller Command	Chiller Status	Chilled Water Return	Chilled Water Supply	Chilled Water Supply Setpt	Chilled Water Delta T	Design Delta T	Other relevant chiller data as determined by Central Engineering Electronic Controls Group & Energy Management and available BACnet data	Chiller Primary Pump Command	Chiller Primary Pump Status	CHW Second-ary Supply Temp	CHW Secondary Delta Temp
	On/Off	On/Off/Hand/Fail	°F	°F	°F	°F	°F		On/Off	On/Off/Hand/Fail	°F	
Chiller 1												
Chiller 2												

System ID	Boiler Command	Boiler Status	Boiler Water Return	Boiler Water Supply	Boiler Water Supply Setpt	Boiler Water Delta T	Design Delta T	Other relevant boiler data as determined by Central Engineering Electronic Controls Group & Energy Management and available BACnet data	Boiler Primary Pump Command	Boiler Primary Pump Status	HW Second-ary Supply Temp	HW Secondary Delta Temp
	On/Off	On/Off/Hand/Fail	°F	°F	°F	°F	°F		On/Off	On/Off/Hand/Fail	°F	
Boiler 1												
Boiler 2												

Page 12: Help graphic

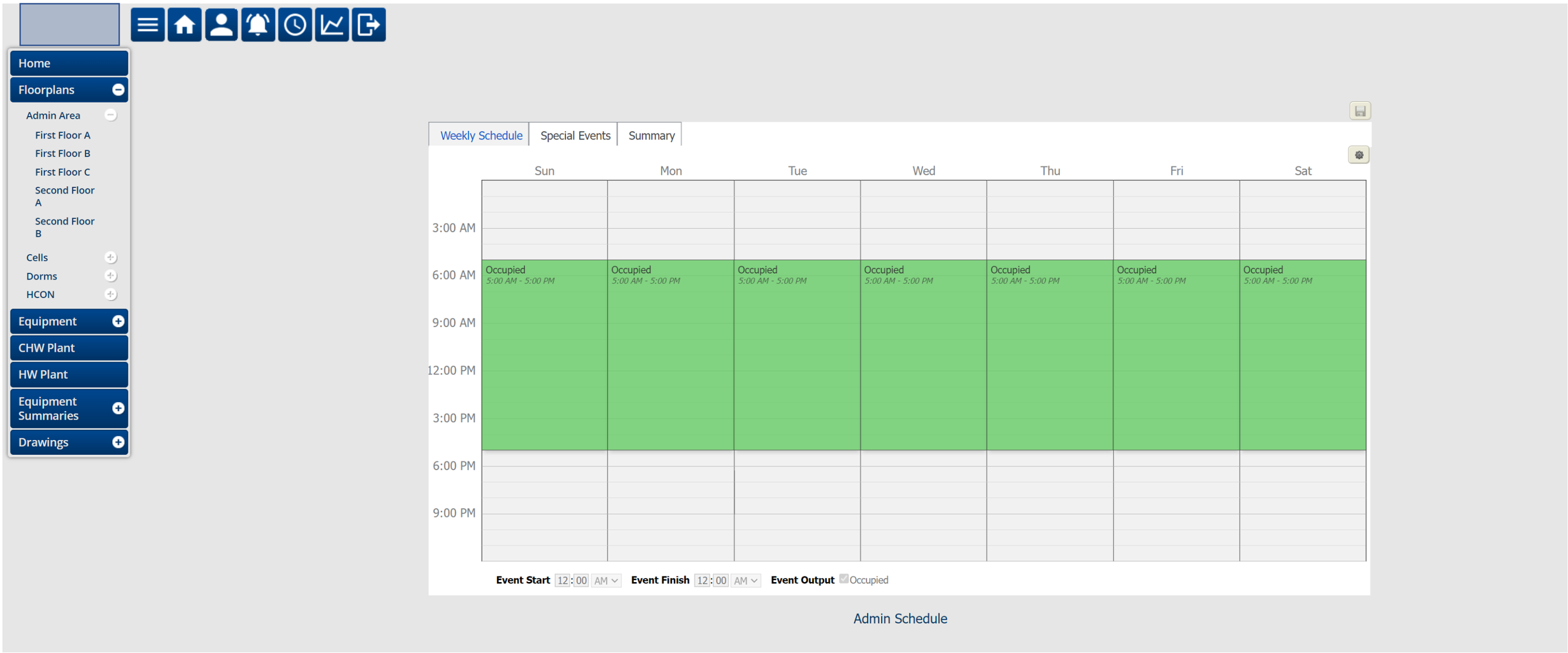
1. Provide a list of all point names (because they are typically abbreviated), the spelled-out name and purpose/function.
2. List each energy efficient sequence of operation (Optimal Start/Stop, Demand Limiting, Demand Ventilation, etc.). Provide a description here of that function, how it works, associated parameters (in the case of optimal start stop as an example: use of outside air temperature, building cooling capacity and building heating capacity (as a theoretical example). The owner will provide this information

Page 13: Diagnostics Page (Future – Not a current requirement of this project)

1. This should include a flowchart (provided by the consultant) for typical issues and how to resolve them. This could be BMS related (sensor failure), or a mechanically related failure.

Page 14: Network Page (Do Not Use: Tier 2 requirement)

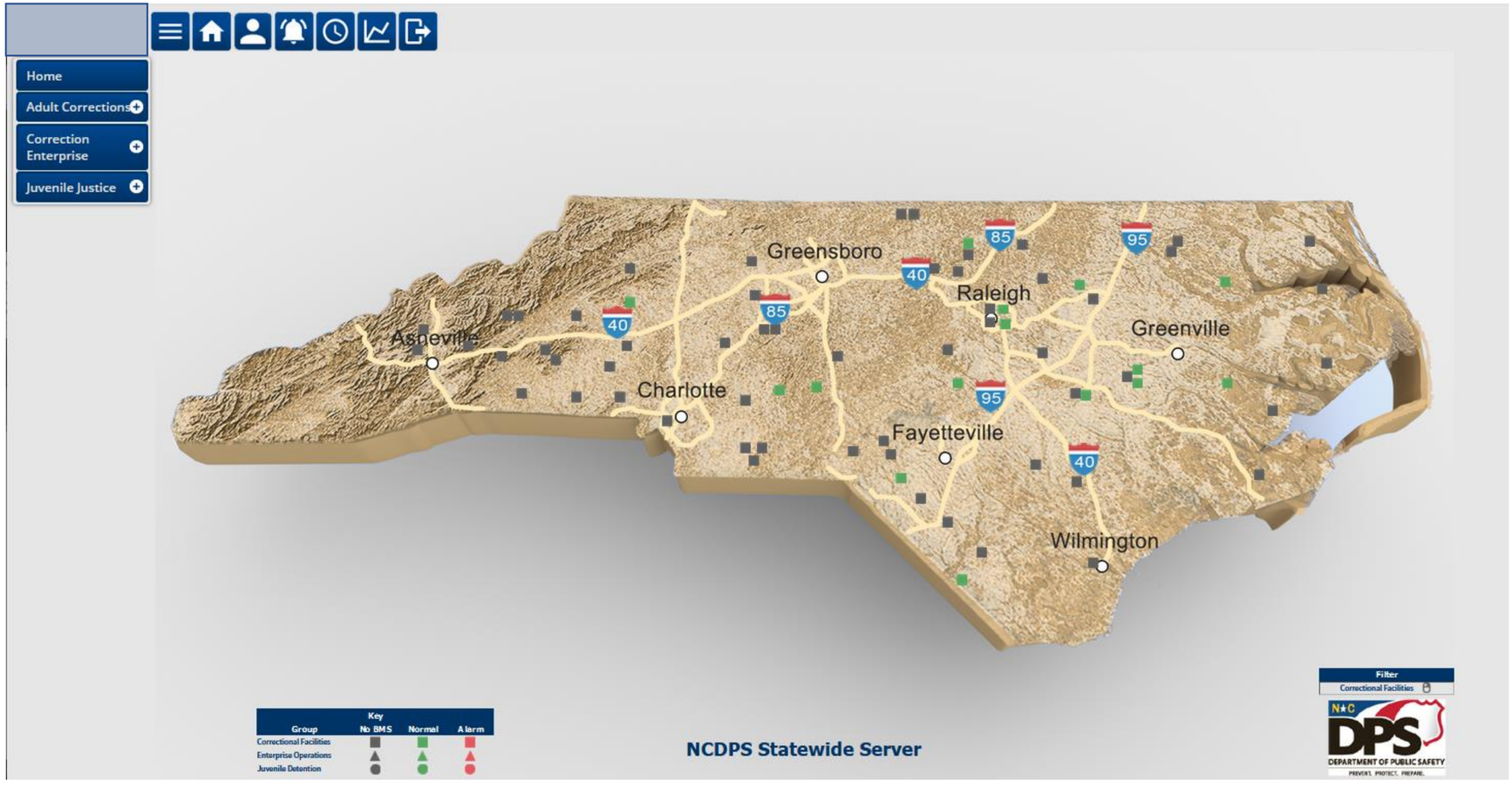
Page 15: Schedule Summary: Specific to the system/area/building:



Admin Schedule

Page 16: Schedules for individual systems (Do not Use: Tier 2 Requirement)

Page 17: Statewide Map



Last update 12/12/2022

Page 18: Analytics:

a. Not applicable to Tier 1 graphics

Revisions:

1/31/23: Page 4: Added key for alarm, override, offline. Added note that alarm section for Tier 1 is only alarms