Attachment J-1 – NAVCC Documentation Standards (v1.2)

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NAVCC Documentation Package Standards

Version 1.2

Modified Date: 9/19/2024

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Version History

Version Number	Date	Description of Change(s)	Edited By
1.0	4/4/19	Initial Version	Mike Perez
1.1	9/13/19	Updates incorporating NAVCC staff comments	Mike Perez
1.2	9/19/2024	Change in contact email	Nick Doshi

1 Overview

The National Audio Visual Conservation Center (NAVCC) is charged with managing a robust and diverse set of systems and technologies to fulfill its mission. Ensuring that these systems are documented comprehensively, consistently and accurately allows NAVCC staff and contractors to understand, maintain, and enhance these systems over time. The purpose of this document is to define the standards utilized to document the NAVCC systems.

Following these standards is required on all NAVCC projects, and will be referenced in all system integration (SI) contracts, to ensure that consistency is promoted in the documentation process. However, this document details the current standards and not all older drawings will adhere to these standards. It is imperative that users follow these standards and not mimic the methods that were used in past drawings. Additionally, wherever possible, outdated drawings should be updated to conform to the new standards. If there is any uncertainty about a standard or lack thereof, NAVCC authorized personnel should be consulted to define the approach.

1.1 Reference to Position Titles

This document contains several references to the position title "NAVCC Senior Media Facilities Engineer." As of the date of this publication (see Version History), this position is not filled. Please use the following contact information:

- Nick Doshi | ndos@loc.gov

1.2 Document Change Control

All drawing authors, including contactors (i.e., system integrators) must adhere to the standards and protocols defined herein.

The LOC encourages feedback from both internal staff and contractors regarding these standards. The NAVCC will duly consider all feedback received as part of our document change control process, and will issue periodic version updates based on approved changes.

For contractors with active contracts that may be impacted by revisions (i.e., systems integration contracts), NAVCC will share proposed changes for review prior to adopting revisions. As part of the review process, NAVCC will provide a timeline for all commentary. Officially revised standards will be made available upon approval of all changes. In the case of contractors, revised versions will be made available to contractor(s) via a COR's technical directive (if there are no cost or time implications) or via administrative contract modification (if there are cost or time implications).

Feedback on the existing, approved version of this document may be submitted by internal staff or by contractors at any time during the period of performance. All feedback must be in writing and must always be addressed to the COR (individual varies by contract) and the NAVCC Senior Media Facilities Engineer. The content of the feedback must include the following:

- Reference to the document version
- Reference to the page number(s) associated with the feedback being given
- A description of the issue, question, or concern being raised

- Reference to any engineering drawings affected by the issue, question, or concern being raised
- Recommended change(s) to the language of the standard and/or recommended change(s) to the policy inherent in the standard
- Any other information that the contractor wishes the NAVCC to consider as it relates to the feedback

All version updates will be noted in the Version History table found at the beginning of this document.

1.3 Document Organization

The remainder of this document is organized into the following sections.

- Drawing Types – This section provides an overview of the various drawing types that exist within the NAVCC drawing package.
- Drawing Standards – This section provides standards that should be adhered to when creating and updating/maintaining NAVCC drawings.
- Drawing Management – This section provides guidance on the review and approval cycle, as well as the drawing numbering process.
- Master Equipment List (MEL) and Integration Master Equipment List (IMEL) – This section includes information on the MEL and IMEL documents that are created based on approved drawings.
- Cabling Standards - This section provides standards that apply to cable number assignment and management.
- Specific Industry Standards – This section provides a broad overview of the industry standards that are followed by the NAVCC.

2 Drawing Types

NAVCC has several classifications of drawings that are used to represent the systems and supporting infrastructure of the building. These drawing classifications include:

- Functional Drawings
- Physical Drawings
- Architectural Drawings
- Conceptual Drawings
- High-Level System Documentation

Within each classification, NAVCC has codes assigned to the drawing types which are used in the drawing numbering schema (refer to Section 4.4 Drawing Numbers for additional detail) to provide an indication what type of drawing is depicted. The following sections provide a general description of the classifications, and a listing of the codes and associated descriptions for each classification.

2.1 Functional Drawings

Functional drawings are signal flow diagrams that are specific, precise, and represent how things are actually installed and cabled. Exhibit 1 below provides a listing of the functional drawing types currently in use at the NAVCC or anticipated for use in the future.

Exhibit 1: Functional Drawing Types

Code	Type	Description
A	Audio	Functional drawing that contains the details for audio-only connectivity between various devices.
AV	Audio Visual	Functional drawing that contains the details for audio and video connectivity between various devices. AV drawings may also contain other types of connectivity as noted on the specific drawings.
V	Video	Functional drawings that contain the details for video-only connectivity between various devices.
TC	Time Code	Functional drawings that contain the details for timecode-only connectivity between various devices.
D	Data	Functional drawings depicting devices that have data device only connectivity (e.g., encoders, servers).
E	Ethernet	Functional drawings dedicated to Ethernet connectivity.
P	Pulse and Reference	Functional drawings encompassing all sync, word clock, and other timing signals and equipment.

Code	Type	Description
C	Control	Functional drawings dedicated to control, and health and welfare functionalities (e.g., KVM related, serial control, UPS systems, etc.)
T	Telecommunications	Functional drawings that depict telecommunications/tie lines showing connectivity between communication closets and client rooms, or disparate rooms.
RF	Radio Frequency	Functional drawings that contain the details for radio frequency-only connectivity between various devices (e.g., coax cable, antennas, satellite, etc.).
DT	Data/Telecom	Functional drawings that define telecommunication links between a communication closet and destination room(s).
F	Fiber	Functional drawings that contain the details for fiber-only connectivity between various devices, including fiber tie lines between patch panels.
EL	Electrical	Functional drawings that describe how the power to and power in the rack is wired, including any UPS and auto shutdown equipment.
I	Intercom	Functional drawings that describe the intercom systems (currently includes the Packard Theater, Capitol Hill, and R1).

2.2 Physical Drawings

Physical drawings represent physical space including floor plan layout, rack elevations, furniture designs, and physical objects (e.g., patch panels & mechanical drawings of connector panels). Exhibit 2 provides a listing of the physical drawing types in use, or anticipated, at NAVCC.

Exhibit 2: Physical Drawing Types

Code	Type	Description
J	Jackfields	Physical drawings of any patch panel (also referred to as jackfield), which can include normalled, half-normalled, or terminated.
L	Layout	Physical drawings representing the horizontal layout such that it provides a top down **view** of a room, set of rooms, or building floor (i.e., the physical implementation).
R	Rack Elevation	Physical drawings representing the vertical layout such that it provides a vertical view of a rack, set of racks, consoles that contain racks, walls that have devices and cabling attached to them, or building elevation.

M	Mechanical	Physical drawings of any physical device or connector panel which is NOT a jackfield.

2.3 Architectural Drawings

Architectural drawings show the actual building environs, either in whole or part (e.g., rooms, groupings of rooms, or a section of the building, etc.). Architectural drawings are not typically a product of the NAVCC; they usually come from the Architect of the Capitol (AOC). However, these drawings will be consulted and could be the basis for certain NAVCC drawings types (particularly layout ("L") and rack ("R") drawings.)

2.4 Conceptual Drawings

Conceptual drawings provide a graphical representation of a system at a high-to-medium detail level, but not with the specificity of a functional drawing. Exhibit 3 provides a listing of the conceptual drawing types in use, or anticipated, at NAVCC.

Exhibit 3: Conceptual Drawing Types

Code	Type	Description
Z	AutoCAD	Conceptual drawings created in AutoCAD format and representing the system's conceptual design as a means to provide information to facilitate project approvals. ***Note:*** *These were only produced during the 2006 Ascent Media design process; new "Z" drawings are not anticipated.*
{None}	Visio	Conceptual drawings created in Visio format representing a system's conceptual design as a means to provide information to facilitate project approvals.

2.5 High-Level System Documentation

On occasion the NAVCC uses Visio drawings to provide high-level system documentation. These drawings provide a representation of how the system pieces fit and work together. While not used significantly at NAVCC, there are several examples such as the Capitol Hill Video Transmission or the PC Technical Vision. The template for Visio drawings is attached below.

LOC Visio template master 130425TH.vsc

3 Drawing Standards

NAVCC has defined standards that shall be followed to ensure consistency across drawings. Any deviations from the standards defined herein should be discussed with the appropriate NAVCC personnel. The standards are presented in the following sections:

- General Drawing Standards – applies to all drawings regardless of type
- Functional Drawing Standards – applies to functional drawings
- Physical Drawing Standards – applies to all physical drawings
- Conceptual – applies to all conceptual drawings

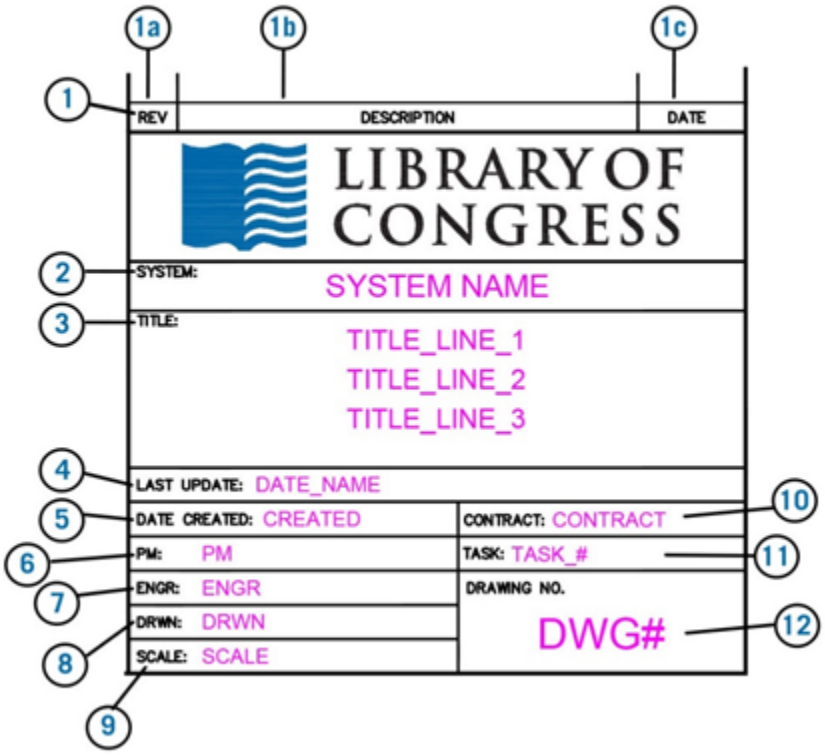
Note: *Standards for Architectural drawings have not been defined since NAVCC does not generate these drawings in house.*

3.1 General Drawing Standards

The following standards apply to all drawings created for NAVCC.

3.1.1 NAVCC Title Block Formatting

All NAVCC drawings will include a Title Block that follows the guidelines below.



Number	Section
1	Revision Letter Block ***Note:*** *The revision letter block is an AutoCAD block that is anchored to the Title Block. The revision text is inserted in to the AutoCAD revision block; not the Title Block itself. The graphic above is for visual anchor purposes only.* • The initial revision row should be "Rev. 0" denoting the first version • A new Revision Letter Block will appear for each additional revision above the previous row • A revision letter will NOT be added until the drawing is accepted by the NAVCC Senior Media Facilities Engineer. For drawings produced by contractors, Senior Media Facilities Engineer acceptance will be communicated through the COR.
1a	REV • Assigned revision letter
1b	DESCRIPTION • Description of change
1c	DATE • Date drawing was accepted in MM/DD/YYYY format
2	SYSTEM • System Name • Located just below the Library of Congress Logo • Will contain the System name if it is more than one location • If in a specific room, the format will be Room number + System name ***Note:*** *There will be only one system depicted on each drawing.*
3	TITLE • System Title *This is the descriptive text for the individual drawing.* • Located below the System Name • Three lines available for the title (The NAVCC Senior Media Facilities Engineer will review to ensure that the nomenclature and descriptions used in the title block are consistent across drawings and with NAVCC needs.) • First line is the device depicted in the drawing • Second line is the description of drawing • Third line is additional descriptive information, if needed
4	LAST UPDATE *This is the date and person who last edited the document for any reason. This allows NAVCC to track who made updates between major revisions.* • Located below Title block • Date format is MM/DD/YYYY • Full name of person who made the update appears in parentheses after the date ○ *Example: 09/11/2024 (Nick Doshi)*
5	DATE CREATED *This is the date this specific drawing was first created.* • Located on in left column below Last Update

Number	Section
	• Date the drawing was first created • Should not be updated • Date format is MM/DD/YYYY
6	PM • Located in the left column below Date Created • Contains name of original Project Manager • Should not be updated
7	ENGR • Located in the left column below PM • Contains name of original engineer ○ Name shall be spelled out with first initial and full last name • Should not be changed unless it is an entire system replacement
8	DRWN • Located in the left column below ENGR • Contains the name of the original drawing creator ○ Name shall be spelled out with first initial and full last name • Should not be changed unless it is an entire system replacement
9	SCALE • Located in the left column below DRWN • Contains the scale of the drawing and is either NTS (Not to Scale) or defines the scale (in the case of functional drawings there is generally no scale)
10	CONTRACT • Located in the right column below Last Update • Populated with the LOC contract number under which the drawing was created; if the drawing was created internally by LOC personnel “LOC” should be placed in this field • Does not change unless the entire drawing contents are replaced
11	TASK • Located in the right column below Contract • Populated with the task number if the drawing was created under an IDIQ task order. If the drawing was under a stand-alone contract, the contract number should be repeated. • Does not change unless the entire drawing contents are replaced
12	DRAWING NO. • Located in the right column below Task • Contains the Unique identifying number for the drawing

3.1.2 Notes Fields

NAVCC drawings shall include notes fields as needed to provide additional information relevant to the drawing.

- Categories of notes include:
    - Make and model of connectors used
    - Adaptors specified by type of adaptor or adaptor cable, manufacturer and model number
    - Makes and models of cable types. specified by cable type, manufacturer and cable model number: coax, Belden 1694A
    - Any other information that cannot be easily conveyed in the drawing itself

NOTES:

1. UNLESS OTHERWISE NOTED, ALL ANALOG AUDIO AND TIME CODE CONNECTORS ARE 3PIN XLR. ALL VIDEO AND DIGITAL AUDIO CONNECTORS ARE 75Ω BNC.
2. —[VS] REFERS TO PIN–OUT DETAIL ON DWG NO. [PROJECT NO. – Mxx] "VS" INDICATES CABLE ASSEMBLY SUPPLIED BY EQUIPMENT VENDOR.

(3) TEKTRONIX OPTION 01 REQUIRED TO ACTIVATE THIS CONNECTOR.

Exhibit 4: Example Notes Field from P0V01 Rev. C

Note: Only items that are relevant to the drawing should be included in the Notes field.

NOTES:
1. EACH RACK RECEIVES AT LEAST ONE (1) 20 AMP 110 VOLT CIRCUIT.
2. EACH ROOM HAS NINE TECHNICAL POWER CIRCUITS.
3. EACH MACHINE RECEIVES ONE (1) 20 AMP CIRCUIT, VOLTAGE AS REQUIRED (110V/208V).
4. ALL POWER TO BE ORIENTED TO THE FRONT OF THE RACKS.
5. WHEN INSTALLING RACKS, MAINTAIN NOMINAL 24" FROM REAR OF RACK TO WALL; USE 18" ONLY BEHIND RK V24. MAINTAIN SPACING BETWEEN ROOMS TO ENSURE FUNCTION OF MOVEABLE WALL SEGMENTS.
6. REFER TO RACK ELEVATION DRAWINGS FOR EQUIPMENT ARRANGEMENT IN ALL RACKS.
7. GROUND WIRE TO BE RUN FROM EACH RACK TO NEAREST V1 ROOM TECH POWER GROUND PLATE.

Exhibit 5: Example Notes Field from L0V01 Rev. 0

The Notes field may be placed in different locations depending on where there is sufficient room on the drawing. Where possible in the lower right-hand corner next to the title block, unless it is not graphically appropriate there. Examples of items to include in the Notes field include:

NOTES:
1. EACH RACK RECEIVES AT LEAST ONE (1) 20 AMP 110 VOLT CIRCUIT.
2. EACH ROOM HAS NINE TECHNICAL POWER CIRCUITS.
3. EACH MACHINE RECEIVES ONE (1) 20 AMP CIRCUIT, VOLTAGE AS REQUIRED (110V/208V).
4. ALL POWER TO BE ORIENTED TO THE FRONT OF THE RACKS.
5. WHEN INSTALLING RACKS, MAINTAIN NOMINAL 24" FROM REAR OF RACK TO WALL; USE 18" ONLY BEHIND RK V24. MAINTAIN SPACING BETWEEN ROOMS TO ENSURE FUNCTION OF MOVEABLE WALL SEGMENTS.
6. REFER TO RACK ELEVATION DRAWINGS FOR EQUIPMENT ARRANGEMENT IN ALL RACKS.
7. GROUND WIRE TO BE RUN FROM EACH RACK TO NEAREST V1 ROOM TECH POWER GROUND PLATE.

3.1.3 Device Nomenclature

The NAVCC uses a consistent nomenclature for referring to devices within drawings. In general, devices will include a prefix and suffix. They are:

- Prefix – The prefix represents the type of device (e.g., PC (PC), SVR (Server), JF (Jackfield)).
    - Appendix C: Device Prefix Standards provides a list of the commonly used prefixes within the current NAVCC drawing packages. If new device prefixes are required, they shall be provided by authorized NAVCC personnel.
- Suffix – The suffix is comprised of the rack number and device number.

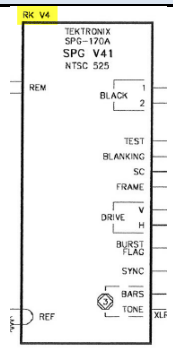
3.2 Functional Drawings

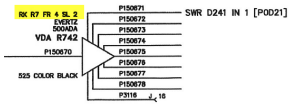
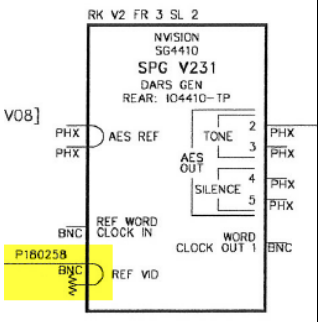
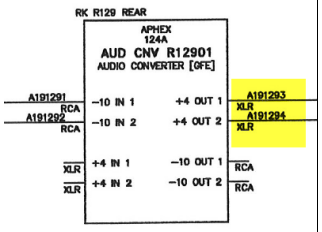
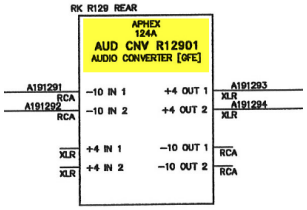
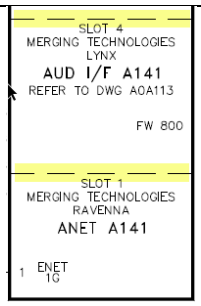
The following standards apply to all functional drawings (refer to Exhibit 1: Functional Drawing Types) created for NAVCC.

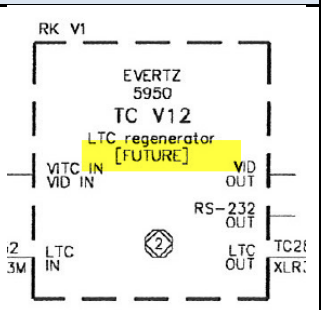
3.2.1 General Functional Drawing Standards

The standards defined below are consistent across all functional drawings. Font types and sizes for all new drawings shall match those used in the current drawings.

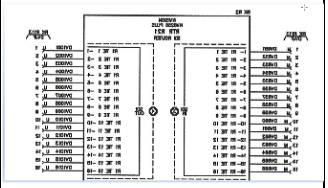
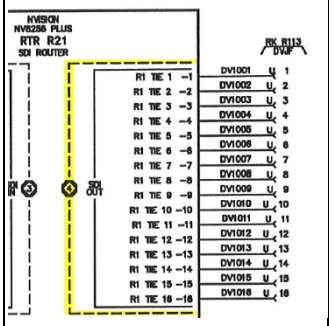
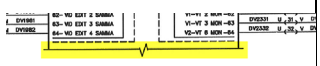
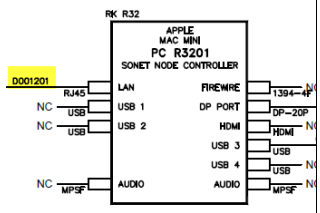
3.2.1.1 Equipment Block

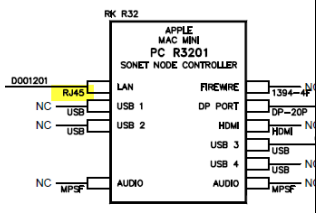
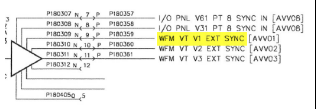
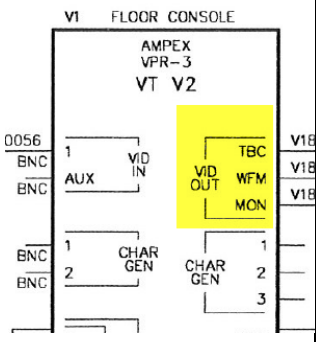
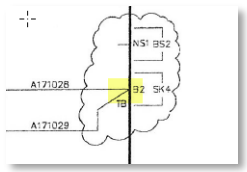
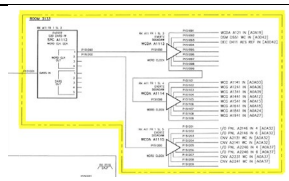
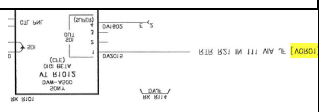
Element	Formatting Specification	Example
Rack Number/Location	• Appears on the left-hand side, outside the equipment block. • If there is no rack number, location of the device should be used.	

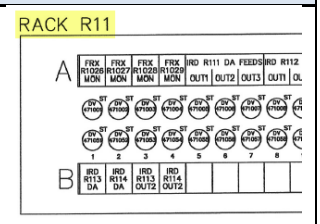
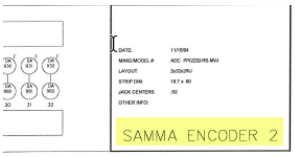
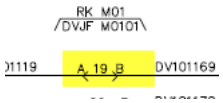
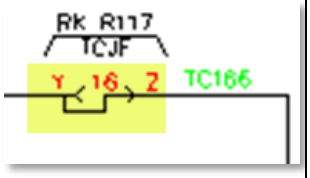
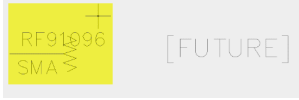
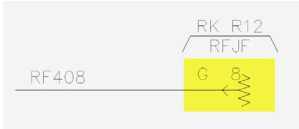
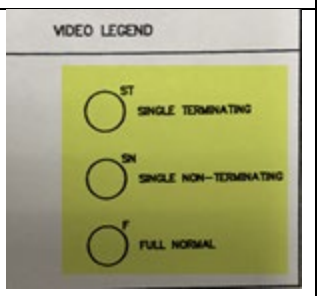
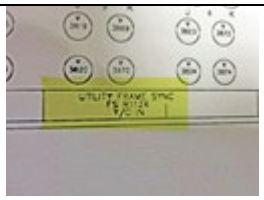
Element	Formatting Specification	Example
Frame Slots	• Appears on the upper right or left, outside the box	
Inputs	• Depicted on the left side of the equipment block • Includes the cable number above the line • Includes the connector type below the line	
Outputs	• Depicted on the right side of the equipment block • Includes the cable number above the line • Includes the connector type below the line	
Device Name	• Formatted in this order: ○ Line 1 – Manufacturer ○ Line 2 – Model ○ Line 3 – Device Name based on Device Nomenclature standard (note this is a larger font and bold) ○ Line 4 – Abbreviated note on functionality, if needed	
Add-in Card for a standalone device (e.g., a computer with expansion slots; not a card cage)	• Denoted with an all long dotted line	

Element	Formatting Specification	Example
Future State Equipment Block	• Denoted with a dashed line • Includes [FUTURE] in Equipment Block title	

3.2.1.2 Other Drawing Elements

Element	Formatting Specification	Example
Card Cage	• Configured left to right on the card slots • Frame and slot number(s) appear on the right-hand side, outside the equipment block.	
Card inside a Card Cage	• Depicted with a 3-sided dotted box	
Heartbeat Line	• Indicates that the equipment below drawing continues (A note above or below to reference another drawing if the continuation of the device is not on the same drawing)	
Cable Number Reference	• Noted above the cable connector line • Appendix A: Cable provides a listing of cable prefixes and types in use at NAVCC	

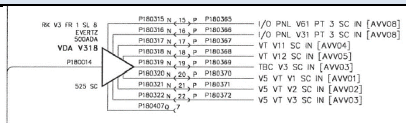
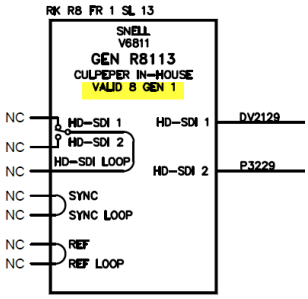
Element	Formatting Specification	Example
Cable Connector	• Noted below the cable connector line • Appendix B: Connector Standards provides a listing of connector prefixes and types in use at NAVCC	
Device Reference	• References to devices should use the device name defined in the equipment block • If it is a jackfield, the device reference must also specify the specific patch point (e.g., RTR T41 OUT 94 VIA JF T3D-30)	
Related Signals	• Brackets to denote relationship • Bracket around on the block side saying what they are: e.g. [VID OUT] • If outside the box, it is an external component (i.e., you would see it) • If inside the box (i.e., internal), draw it inside the equipment box	
Two Cables Landing on the Same Spot	• This is rare but examples of this occurring are: Two audio cables land on the same terminal, Splitter on a BNC out or in	
Groupings	• Depicted with a short-short-long dashed line	
Uninterruptable Power Supply (UPS)	• Notation included at the bottom to define the UPS rating	UPS CAPACITY: 2200VA UPS LOAD: WATTS: 400 AMPS: 3.4
External drawing reference	• Reference to the other drawing is provided in square brackets (e.g., RTR T41 OUT 94 VIA JF T3D-30 [VOTO1])	

Element	Formatting Specification	Example
Jackfield Denotation	• Rack is referenced on top left • In all circumstances, Jackfield description is provided on the bottom right	 
Normalled Patch Panel Connection	• Depicted with a straight through line	
Half-Normalled Patch Panel Connection	• Depicted with a trough *(**Note:** Video and digital audio cannot be half-normalled, although Timecode can)*	
Non-Normalled/Terminating Patch Panel Connection	• Depicted with a jagged line and a gap	 
Jackfield Legend	• Description of jackfield types added to the top left of jackfield drawings	
Component Video Patch Panel	• Patch panel for component video, located only in R1 and the “V” Rooms • RGBS configuration and is normalled • Also used for YC connections	

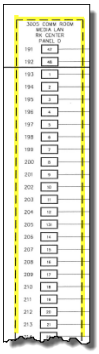
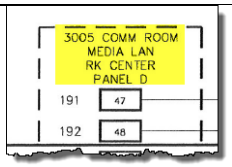
3.2.2 Specific Functional Drawing Types Standards

Some of the NAVCC functional drawing types contain specialized elements or formats relevant only to those drawing types. Additional elements/notations have been indicated for the Pulse and Reference (“P”), Data/Telecom (“DT”), and Fiber (“F”) drawings as described below.

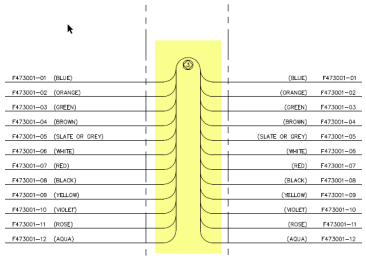
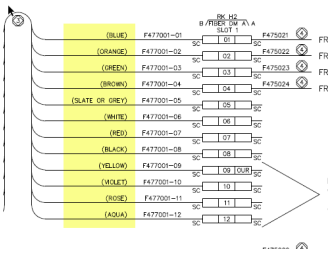
3.2.2.1 Pulse and Reference (“P”)

Element	Formatting Specification	Example
Distribution Amplifier Equipment Block	• Right hand pointing triangle is the universal symbol for amplifier • Information is on the left-hand side • Lower text of amplifier lists the signal type being distributed • Output cables on right • Input on the left • NC is used for 'not connected' • May also be denoted on A, AV, V drawing types	
Equipment Block	• Updated to include additional information about the signal or option selected for the card	

3.2.2.2 Data/Telecom ("DT")

Element	Formatting Specification	Example
Functional Unit	• Dashed line around the unit	
Functional Unit Description	• Includes the room, name of the room, location, and device	

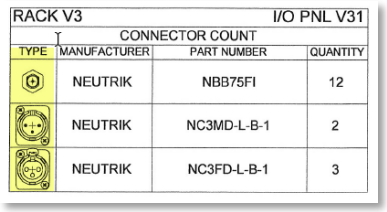
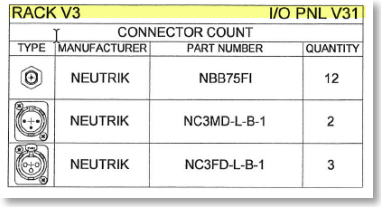
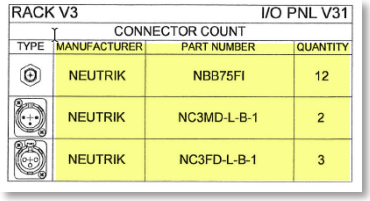
3.2.2.3 Fiber ("F")

Element	Formatting Specification	Example
Multi-conductor cable coming out to another	• Curved hump	
Multi-conductor cable to pigtail	• Specification forthcoming in future version. Consult with Senior Media Facilities Engineer.	Example forthcoming in future version. Consult with Senior Media Facilities Engineer.
Cable Reference	• The color is referenced after the number on the left (input) side (not shown here); The color is referenced before the number on the right (output) side (shown here).	

3.3 Physical Drawings

The following standards apply to all physical drawings (refer to Exhibit 2: Physical Drawing Types) created for NAVCC. In general, these drawings should look like “what you see”.

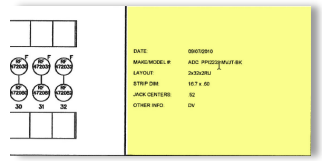
3.3.1 General Physical Drawing Standards

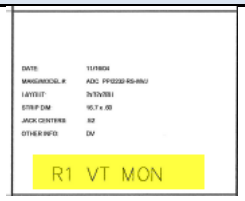
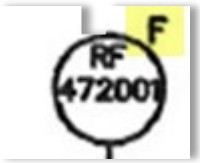
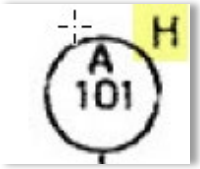
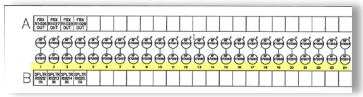
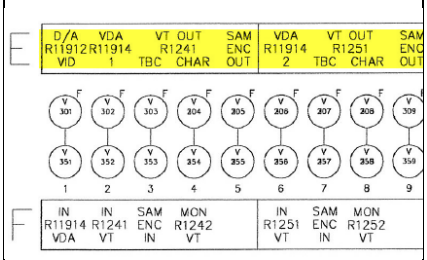
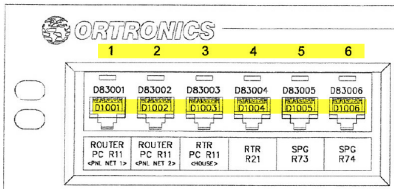
Element	Formatting Specification	Example
Connectors	• Use the icons or manufacturer provided connector drawings	
Panels	• Location upper left outside the box • Name of the panel right hand side outside the box	
Notes (Connector Count)	• Includes make, model, and quantity	

3.3.2 Specific Physical Drawing Types Standards

Some of the NAVCC physical drawing types contain specialized elements or formats relevant only to those drawing types. Additional elements/notations have been indicated for the Jackfield (“J”), Layout (“L”), Rack (“R”), and Mechanical (“M”) drawings as described below.

3.3.2.1 Jackfield ("J") Drawings

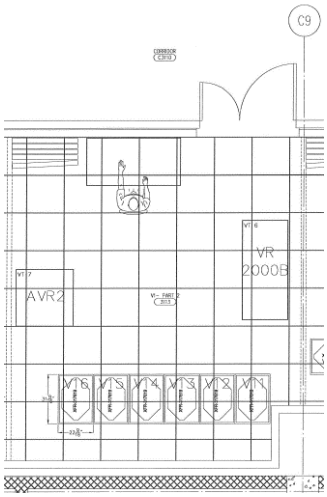
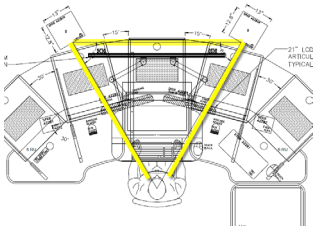
Element	Formatting Specification	Example
Jackfield Description	• Make, model, data appear on the right-hand side of the jackfield • In certain instances, the functionality of the jackfield will be included	

Element	Formatting Specification	Example
		
Full-Normalled Connection	• Depicted with a “F”	
Half-Normalled Connection	• Depicted with a “H”	
Non-normalled Connection	• Depicted with a “ST” (single terminating) • Virtually all ST connections are RF at NAVCC	
Numbering	• The jackfield number is based on the input and output section; it is numbered sequentially within a section from left to right	
Labeling	• Labeling for jackfields is dependent on the amount of space. That is, each label type has different amounts of space and the labels should be applied accordingly	
Ethernet	• Jackfield drawings are typically supplied by the manufacturer • The jackfield numbers are above • Switchblade port number is below	

Note: *Some of the older NAVCC systems have incorrectly numbered jackfield drawings (as shown below). Any system update or enhancement that requires touching an incorrectly numbered patch panel, will require that the numbering be updated to conform to the standard defined above.*

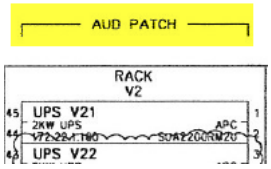
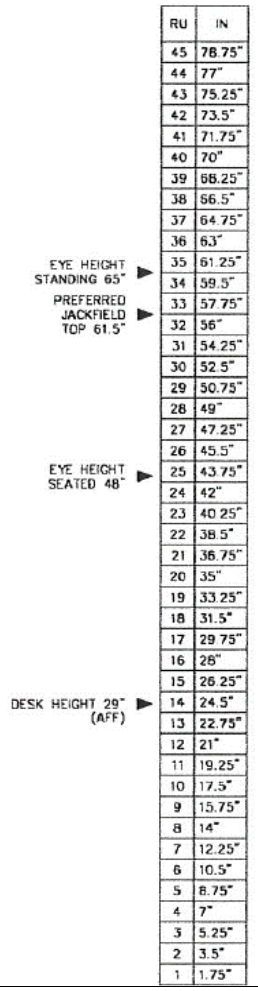
3.3.2.2 Layout ("L") Drawings

Layout drawings have a top-down view (i.e., it looks like a piece of architectural drawing has been lifted out and placed on the drawing). The audio room layout diagrams do not show floor tiles but other areas which have standard 2 x 2 raised floor tiles the drawings should include the tile grid. In some of the existing drawings the Layout and Rack drawings were combined. However, the goal for future iterations of the drawings would be to separate them.

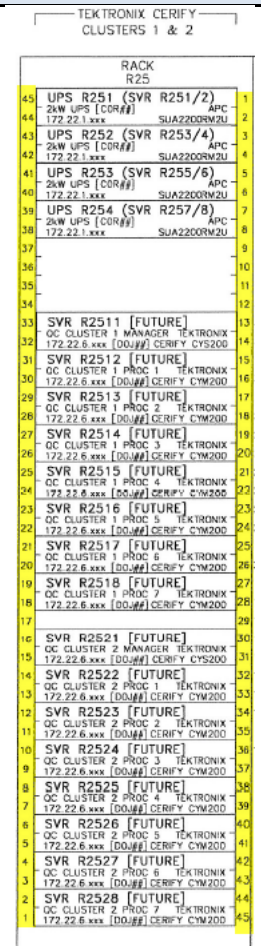
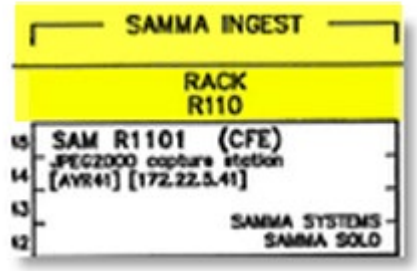
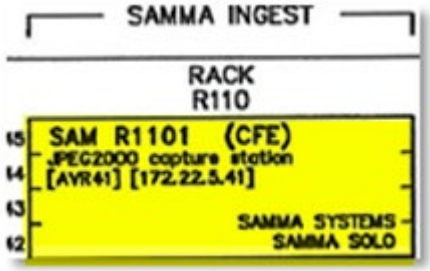
Element	Formatting Specification	Example
Floor View	• Building floor view	
Room View	• Include lines to indicate if it is a zoomed in view of the room	

3.3.2.3 Rack ("R") Drawings

Element	Formatting Specification	Example
Power Rating, UPS number and Load Capacities	• Total wattages and amperage are listed under the server as the first line item. • Total UPS capacity is provided as the second item (*Note: UPS number should always be less than power number*.)	WATTS: 2820 AMPS: 25.7 UPS CAPACITY: 4400VA UPS LOAD: WATTS: 2090 AMPS: 19

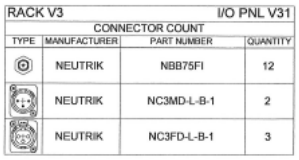
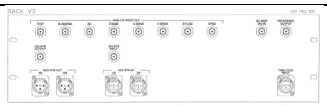
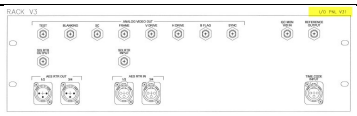
Element	Formatting Specification	Example
Description	• Include a description of what is in the rack in brackets	
Rack elevation	• Tabular format with the measurement (i.e., this format shows the visual of the rack elements in inches and is not always include in rack drawings)	

RU	IN
45	78.75"
44	77"
43	75.25"
42	73.5"
41	71.75"
40	70"
39	68.25"
38	66.5"
37	64.75"
36	63"
35	61.25"
34	59.5"
33	57.75"
32	56"
31	54.25"
30	52.5"
29	50.75"
28	49"
27	47.25"
26	45.5"
25	43.75"
24	42"
23	40.25"
22	38.5"
21	36.75"
20	35"
19	33.25"
18	31.5"
17	29.75"
16	28"
15	26.25"
14	24.5"
13	22.75"
12	21"
11	19.25"
10	17.5"
9	15.75"
8	14"
7	12.25"
6	10.5"
5	8.75"
4	7"
3	5.25"
2	3.5"
1	1.75"

Element	Formatting Specification	Example
Rack elevation	• Sides ascending on the left and descending on the right, with number 1 at the bottom left (this format is always included in rack drawings)	
Rack number	• Top - system letter + rack number • Rack function is denoted with label above (unless it is a composite function rack)	
Equipment Blocks	• Match the size of the equipment or blank (if equip is 4RU the space is 4RU) • Device name is in the upper left • Functional descriptive info is under the device name • Lower right make, model, device descriptive (as needed)	

Element	Formatting Specification	Example

3.3.2.4 Mechanical ("M") Drawings

Element	Formatting Specification	Example
Make, Model Block	• Right hand side (generally)	
Notes field	• Include who fabricated	
Connectors	• Includes a graphic of the connector & the make and model	
Device Name	• Upper right-hand corner	
Rack Location	• Upper left-hand corner	[Graphic to be inserted later]

3.4 Conceptual Drawings

Conceptual drawings are intended to be a high- to mid-level representation of how the system will work. The NAVCC drawing package has some conceptual drawings (refer to *Exhibit 3: Conceptual Drawing Types*); however, these are not typically used. If it is determined that a conceptual drawing is needed, NAVCC has a Visio template that could be provided.

3.5 Future Equipment and Cables in Drawings

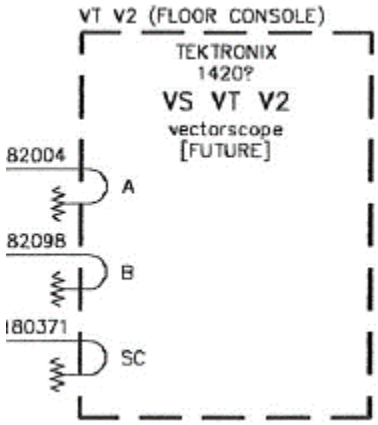
The NAVCC system designs may include equipment or cabling that is not actually implemented when the overall system is installed. It is expected that NAVCC drawings will continue to have future elements and cables denoted on drawings. Any item that is future shall be indicated by a dotted line, and if the graphic allows text (such as in AutoCAD text blocks) should include the word future in brackets: [FUTURE]. In the case of equipment that has not been purchased but has been cabled (i.e., the cables exist but the equipment does not) the equipment block lines shall be dotted and the word [FUTURE] inserted in to the text of the block. Cables that have been installed but the equipment not installed and where the cables are expected to pass signal, at the point where the cables are barreled together there should be a note graphic and, in the notes field, an entry stating the barrel type used to connect the cables. Cables expected to be added in the future, shall be indicated by dotted lines.

For FUTURE equipment that has already been specified (i.e., make and model number is identified) that make and model number shall be included in the dotted line block. For items where the equipment FUNCTION is known but the specific type of equipment is not identified, the equipment function text

shall specify the correct function intended and the device name, but the MAKE and MODEL fields shall have the acronym “TBD” inserted.

Note: *If the entire drawing is intended for future implementation, a “Future” label layer will be inserted diagonally across the drawing.*

Exhibit 6: Example Future Equipment



4 Drawing Management

4.1 Drawing Process Flow Statuses

The NAVCC follows a standard process to manage the evolution of drawings and ensure that the appropriate reviews and approvals are taking place. The process is governed by a common set of statuses so that all parties understand where the drawing is in its lifecycle. NAVCC utilizes the following three statuses for drawings:

- **Draft Approval to Build** – this status represents the drawings that are being developed as part of the system design phase and could be considered working version(s) of drawings for proposed systems or updates to existing systems.
- **Approved to Build** – this status represents that the system design has been approved and may now enter the build phase using these drawings as a guide for the build process.
- **As Built** - this status represents a true and accurate depiction of the constructed system.

Additional details on how drawings progress through these statuses are in the sections below. A visual depiction of the process flow is located below.

4.1.1 Draft Approval to Build Drawings

Drawing Status	Step	Description
Draft Approval to Build	1	A new drawing or update to an existing drawing is identified
	2a	If this is an existing drawing, the drawing revision letter should be requested and received from the NAVCC Senior Media Facilities Engineer and move to step 2b. If not an existing drawing, request and receive drawing number (rev letter in this case is "0") from NAVCC Senior Media Facilities Engineer and move to step 3. ***Note:*** *All drawing numbers and rev. letters are assigned by NAVCC.*
	2b	The bubble (i.e., update) layer should be inserted and named as assigned Rev letter. ***Note:*** *The Rev letter is NOT applied to title block until final approval*
	2c	The previous status layers should be turned off (if applicable).
	3	The following drawing layers should be turned on: Draft (located diagonally across drawing) Approval to Build (located mid-right)
	4	The drawing should be updated if existing or created if new. ***Note:*** *Users who modify the drawing during this period shall update the "LAST UPDATE" field to include their FULL NAME and the date they last edited the drawing. Years shall always be FOUR DIGITS (e.g., "2019").*

Drawing Status	Step	Description
	5	The contractor should request any necessary cables number depicted in drawing. Please see the Cable Number Request Process for the specifics.
	6	The contractor shall submit drawing to authorized NAVCC personnel for review.
	7a	If approved, the drawing moves to "Approved to Build" status (see Approved to Build section below) ***Note:*** *Approval requires signature of both the* Senior Media Facilities Engineer *and the COR.*
	7b	If rejected, it returns back to the update drawing step to incorporate NAVCC personnel feedback and then resubmit for NAVCC approval. (Steps 4 and 5 above)

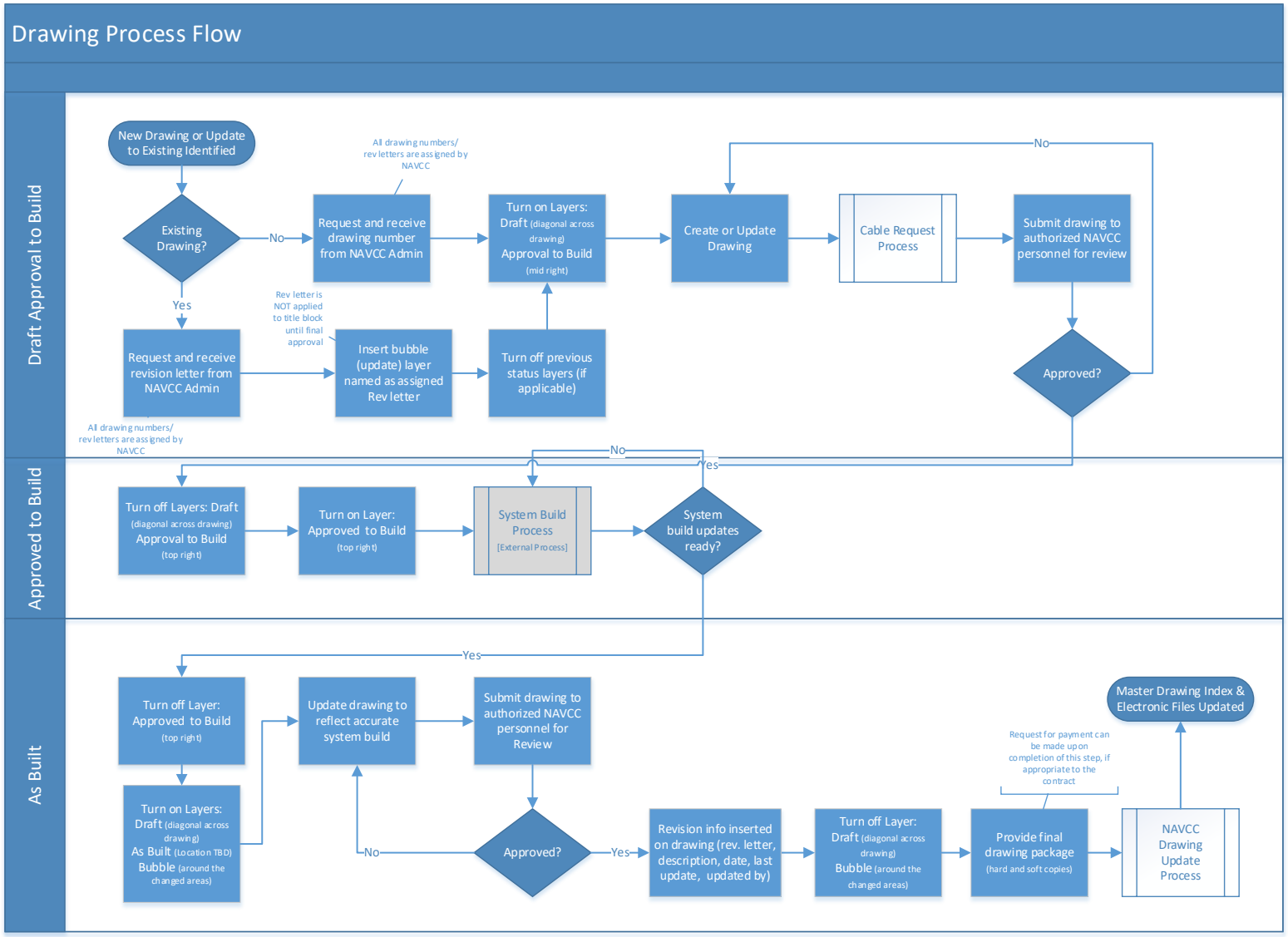
4.1.2 Approved to Build Drawings

Drawing Status	Step	Description
Approved to Build	1	The contractor should turn off Layers: • Draft (diagonal across drawing) • Approved to Build (top right)
	2	The contractor should turn on the Approved to Build layer (top right)
	3	The system will be constructed based on the specific drawings.
	4	Once the system build process is completed and accepted by the NAVCC, proceed to the “As Built” status steps

4.1.3 As Built Drawings

Drawing Status	Step	Description
As Built	1	The contractor shall turn off the Approved to Build Layer (top right).
	2	The contractor shall turn on the following layers: • Draft As Built (diagonal across drawing) • "Draft As Built" bubble (around the changed areas) ***Note:*** *If the entire drawing has changed, a bubble layer should be placed around the entire drawing.*
	3	The contractor shall update the drawing to reflect accurate system build.
	4	The contractor shall submit the updated drawing to authorized NAVCC personnel for review. ***Note:*** *Approval requires signature of both the* Senior Media Facilities Engineer *and the COR.*
	5a	If approved, the revision info is inserted on drawing (rev. letter, description, date, last update, updated by)
	5b	If rejected, the drawing is updated to incorporate NAVCC feedback and then resubmitted for approval. (steps 3 and 4)
	6	Following approval, the revision info shall be inserted on drawing revision block (rev. letter, description, date, last update, updated by)
	7	The contractor shall turn off the following layers: (1) Draft As Built (diagonal across drawing) (2) Draft As Built bubble (around the changed areas)
	8	The contractor shall provide final drawing package (2 - 11 x 17 printed copies and 2-soft copies 1- Auto CAD, 1- black and white PDF) The detailed requirements for package submission are located below. ***Note:*** *Request for payment can be made upon completion of this step (if appropriate to the contract).*

4.1.4 Process Flow Diagram



4.1.5 Revisions

Revisions shall be indicated by incrementing a letter. The first version shall always be "0", with the sequence of revisions being "A", "B", "C", etc.

Each letter revision shall contain 3 layers within the AutoCAD drawing:

1. "REV 'A'" layer: the layer that the changes to the drawing were actually made on
2. "REV 'A' bubbles" layer: bubble around the items that were added or changed on the drawing
3. "REV 'A' removed" layer: the items from the previous version that were removed in the current revision.

4.1.6 Layering Conventions

Layering is meant to indicate current and previous versions of the drawing. The layers reflect the Rev letter that they belong to. (***Note:*** *Layers could also indicate planning for future components.*)

- "Draft" layer will be utilized throughout the review process of the Draft Approval to Build statuses.
- "Draft" layer is turned off only when drawing is accepted by the NAVCC Senior Media Facilities Engineer as "Approved to Build."
- The "Approved to Build" layer is turned on when the drawing is approved to build and turned off at the beginning of the As Built approval process.
- The "Draft As Built" layer is turned on when the drawing is in the As Built approval process and turned off when the drawing is approved.
- Each letter revision to a drawing shall contain 3 layers within the AutoCAD drawing:

4.2 Master Drawing Index

The NAVCC assigns drawing numbers to each drawing. To ensure that drawing numbers are unique and that there is a comprehensive inventory of all drawings, NAVCC maintains a master drawing index. The master drawing index is the authoritative guide on the assignment of drawing numbers at NAVCC. In addition to numbers for existing drawings, there may also be sequences for future drawings already been assigned. The master drawing index utilizes color codes to signify where a given drawing number is in the process.

Color	Translation
Light Blue	Reservation assignment (Planning placeholder, number still fluid)
Light Green	In service

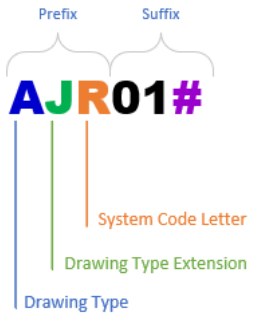
Color	Translation
Light Yellow	Reservation (Number is static)
Yellow	Awaiting work (Number has been assigned and work may or may not have begun on the drawing and the status is currently unknown)
Green	Available for assignment
Red	DO NOT USE
Orange	Available for assignment
Pink	Superseded (see new sequences)

4.3 Drawing Number Request Process

At the outset of a new system project or a system upgrade, contractors will be expected to assess the system and determine what drawings are needed or which existing drawings will require modifications. ***Note:*** *NAVCC will provide any relevant existing drawings for review at the beginning of the project.* The contractor will provide a drawing number request to the NAVCC Senior Media Facilities Engineer and COR. The drawing number request shall utilize the template provided in Appendix D: Drawing Number Request Template. The NAVCC Senior Media Facilities Engineer will issue the requested drawing numbers. ***Note:*** *Contractors shall not self-assign drawing numbers.*

4.4 Drawing Numbers

Drawing numbers are assigned a five to seven character name as shown in the following example, broken down into a "prefix" and "suffix" as shown in the following image. ***Note:*** *Drawing numbers are assigned only by NAVCC; contractors shall not create drawing numbers (even temporary ones).*



4.4.1 Prefix

The “prefix” is comprised of three to four characters.

- Character One: Drawing Type
- Character Two: Drawing Type Extension
- Character Three: System Code Letter

Valid values and the associated description for each of the characters are provided in the following tables.

4.4.1.1 Drawing Type

Prefix	Description
L	Horizontal layout drawing
R	Vertical layout drawing (including rack elevations or building elevations)
A	Audio only drawing
V	Video only drawing
AV	Combined audio & video on the same drawing
P	Pulse & reference drawings
D	Data device drawing (i.e., computers, servers or other data devices)
E	Ethernet: any drawing dedicated to Ethernet or TCP/IP connectivity
EL	Electrical
RF	Radio frequency signal (RF) cabling (IE cable TV, antennas)
TC	Timecode
Z	Conceptual drawing – not commonly used in this package (exists in the original Ascent drawing packages)

4.4.1.2 Drawing Type Extension

Extension	Description
0 (the number zero)	Any drawing not including the following:
J	Jackfield: this is any patch panel/jackfield
T	Telecommunications/tie line drawing
V	Joint audio/visual drawing (only used with prefix A)

4.4.1.3 System Prefix

System Prefix	Description
A	Audio
B	Moving Image curatorial viewing areas (film & video) & Recorded Sound curatorial audio listening areas
C	Conference rooms and office systems
D	Electronic Film Lab systems (Datacine, MP Sound Transfer, etc.)
E	Video editing systems
F	Currently unassigned
G	Born Digital
H	Live Capture
I	Not used since it looks too similar to the number one (1)
J	Room 3115 (Building Operations Center & QC)
K	Maintenance shop
L	Curatorial Audio Listening Room (room 1024)
M	Multipurpose Room (room 1010)
N	Currently unassigned
O	Not used since it looks too similar to the number zero (0)
P	Antenna pad
Q	Quality Control
R	Room 3110 (“R1”) – Technical Operations Center & video mass migration room
S	Screening Rooms one and two (rooms 3269, 3270 & 3271)
T	Packard Theater
U	Currently unassigned
V	Video migration rooms 3112 (V1), 3113 (V2) & 3114 (V3)
W	Currently unassigned
X	Main lobby pre-function areas
Y	IRENE
Z	Communications closets (rooms 1027, 1220, 2024, 2206, 3005, 3143B, 3124, 3xxx)

4.4.2 Suffix

The suffix is assigned based on what is most appropriate to the system. If it is a new system, the NAVCC Senior Media Facilities Engineer will make the determination of the appropriate suffix as part of the

drawing number assignment process. Modifications to existing systems will utilize existing suffixes unless otherwise directed by the NAVCC Senior Media Facilities Engineer.

Note: *In the case of audio rooms, the first two digits of the suffix can be used to determine the location of the audio room (each audio room is considered a system) as described below.*

- Room name is reflected in the drawing number:
    - A1.1 (3130): xxx11#
    - A1.2 (3131): will become xxx12#
    - A1.3 (3136): will become xxx13#
    - A1.4 (3134): will become xxx14#
    - A1.5 (3139): will become xxx15#
    - A1.6 (3122): will become xxx16#
    - A1.8 (3126): will become xxx18#
    - A1.9 (3127): will become xxx19#
    - A2.1 (3117): would become xxx21#
    - A2.2 (3116): would become xxx22#
    - A3 (3123): will become xxx30#
- For the audio support rooms:
    - 3125 – Audio Support Room 1: xxx31#
    - 3133 – Audio Support Room 2: xxx32#
    - 3138 – Audio Support Room 3: xxx33#

Since the actual functional drawings for these support rooms are assigned by the individual Audio Preservation Room, the only drawings for these rooms using the numbering sequences are the rack elevations (R0A###), the room layouts (L0A###) and shared systems such as Ethernet Patch panels (E0A###) and the design drawings for the future audio router.

4.5 File Naming Conventions

NAVCC drawing files follow a consistent naming convention to provide the user basic information as to the content of the drawing without the need to open the file. The naming convention is as follows:

- Drawing Number – Assigned by NAVCC (additional detail on drawing numbers follows)
- Rev Letter – If it's a new drawing the revision is denoted as Rev. 0 (***Note:*** *This is the number zero; not the capital letter "O"*); otherwise the NAVCC Senior Media Facilities Engineer will provide the revision letter
- Date last updated – Uses the format (year-month-day) (this is the date the last change was made to the drawing; NOT the last official revision date)
- Old drawing number – Only used if the drawing is replacing an existing drawing using a different number. The format is denoted as (x-drawing number)

- Descriptive Name – Assigned by NAVCC as part of drawing number assignment
- Number – Used when the drawing must span multiple drawing files. Uses the format 1 of x, where x is the total number of related drawings.
- (unreleased) – Only used in instance where the drawing was never approved

Exhibit 7: Example File Names

Examples	File Name
New System Drawing	AVR19 Rev. 0 (2013-7-10) SAMMA robot 1 AV
Revised Drawing	C0R23 Rev. C (2012-1-26) UPS 3
Replaces an Existing Drawing	AVR63 Rev. C (2010-5-28) (x-AVR63-1) VT R1031 S-VHS
Multiple Related Drawings	AVR70 Rev. A (2006-11-19) Utility AV cards 1 of 2 AVR71 Rev. C (2010-5-28) Utility AV cards 2 of 2
Unreleased	D0R01 Rev. E (2012-1-25) (xAVR41) ENC R1101 R1102

4.6 Drawing Package Submission

At the time of delivery, contractors will need to submit a complete digital as well as printed drawing package. NAVCC requires that drawing packages be submitted using the following standards.

4.6.1 Printed Drawing Package

In general, all printed drawings should adhere to a standard drawing size of 11x17. However, there may be specific circumstances that dictate different sizes which will be handled on a case-by-case basis.

Two copies of the printed drawing package should be provided in the following order.

1. “L” drawings – horizontal layout drawings
2. “R” drawings – vertical layout drawings
3. Audiovisual functional drawings in alphabetical order:
    a. “A” – audio only
    b. “AV” – audiovisual
    c. “V” – video only
4. “C” – control drawings
5. “D” – data device drawings
6. “E” – Ethernet drawings
7. “EL” – electrical drawings
8. “F” – fiber optic drawings
9. “M” – mechanical drawings

10. “P” – pulse & reference drawings
11. “RF” – radio frequency drawings
12. “TC” – timecode drawings
13. Jackfield drawings (i.e., middle letter “J” with prefix letters) in alphabetical order:
    a. “A” – audio including analog, digital and IP
    b. “C” – control including serial, parallel, USB, etc.
    c. “D” – data non-content based such as Ethernet
    d. “TC” – timecode
    e. “V” – video including analog, digital and IP

4.6.2 Digital Drawing Package

The digital drawing package should include both the .dwg drawing file and a pdf version. All AutoCAD drawing files must be provided as AutoCAD version 13 files. The drawings should be provided in alphabetical order within the digital drawing package.

4.6.3 Final Submission Activities

Upon final submission, the NAVCC Senior Media Facilities Engineer will update the Master Drawing Index & Electronic Files with the new drawings as follows. ***Note:*** *If a prior approved “As Built” drawing exists, NAVCC will follow the standard Deprecation Process.*

- The drawing is moved to Master Drawing folder on Engineering share drive (navccnas1.loc.gov) & engineering workstations
- The two hard copies provided by the contractor are placed in the NAVCC Master Binders.

4.6.3.1 Deprecation Process

When a new drawing replaces an existing drawing, the hard copy of the old drawing will remain in the NAVCC Master Binders. An orange slash shall be placed across the Title Block to indicate that it is an outdated drawing. The soft copies of the deprecated drawings will remain in the Master Drawing folder with no changes; the name, rev. letter, and date will be used to indicate the most current version of the drawings thereby providing a complete history of the drawing over time.

5 Master Equipment List (MEL) and Integration Master Equipment (IMEL)

The Master Equipment List (MEL) contains a listing of all equipment necessary to implement the system. The term IMEL is also used at the NAVCC with the "I" standing for integration and including all equipment, supplies, and hardware necessary to wire and mount the system into the NAVCC environment. ***Note:*** *Some organizations refer to this as the Bill of Materials (BOM); however, this term is not acceptable for use at the Library.*

5.1 MEL Format

The NAVCC does not have a required format; the contractor may use their own tool to generate the MEL. If the contractor elects to include Government Furnished Equipment (GFE) or supplies, it shall be clearly denoted. At a minimum the contractor must include the following fields in the MEL:

- Quantity
- Manufacturer
- Item Number
- Model Number
- Description
- Client Unit Cost
- Client Total Cost
- Subtotal Section (if relevant)
- Prewired Future (if relevant)

5.2 IMEL Format

The NAVCC does not have a required format; the contractor may use their own tool to generate the IMEL. At a minimum the IMEL shall include all contractor provided material. If the contractor elects to include Government Furnished Equipment (GFE) or supplies, it shall be clearly denoted. The contractor must include the following fields in the IMEL:

- Quantity
- Manufacturer
- Item Number
- Model Number
- Description
- Client Unit Cost
- Client Total Cost
- Subtotal Section (if relevant)

- Prewired Future (if relevant)

5.3 Delivery Timeline

The delivery timeframe for the MEL and IMEL is typically provided in the task order or contract. If the timeframe is not contractually defined, the MEL or IMEL must be delivered not less than 14 calendar days prior to the order deadline.

5.4 File Naming Convention

The MEL and IMEL files shall be named as follows.

Submitted as Individual Files

- Task Order/Contract Number [Project Name] MEL
- Task Order/Contract Number [Project Name] IMEL

Submitted as a Consolidated File

- Task Order/Contract Number [Project Name] MEL-IMEL

5.5 Review Process

Contractors are expected to submit the MEL to the COR and NAVCC Senior Media Facilities Engineer simultaneously. The NAVCC Senior Media Facilities Engineer will review the MEL or IMEL to ensure that it matches the approved drawings, and will work with the contractor to resolve any discrepancies. After review, the NAVCC Senior Media Facilities Engineer will make a recommendation to the COR for approval of the deliverable. The COR has responsibility for providing the final approval to the contractor. *The MEL or IMEL must be approved by the COR prior to placing any equipment orders. If equipment is ordered without COR approval the NAVCC will not be responsible for payment of those items and any associated invoice will be rejected.*

During the course of the project, the MEL and IMEL files are stored in the project file and then eventually moved into the system folder.

6 Cabling Standards

Cables are assigned a cable number that provides information on their location as well as the function served. Cables are also color coded based on their use. Authorized NAVCC personnel are responsible for assigning both the cable number and cable color per the defined standards below.

6.1 Cable Number Management

NAVCC authorized personnel will assign new cable numbers as needed to support the system(s). New cable numbers will be added as new entries to the cable database. When a cable number is updated, the original record shall be edited (no duplicate records shall be created) to reflect the new information. When a cable is removed from service, the record shall be updated to reflect that it is no longer connected by using "NC" in both the source and destination device field. The date of removal and the drawing number(s) and rev. letter of the last drawing(s) where the cable appeared shall be put into the notes field.

6.1.1 Historical Cable Numbering Patterns

NAVCC does not have a specific pattern that is used for cable numbering. The NAVCC Senior Media Facilities Engineer will be responsible for identifying the proper format and numbering schema for the system as part of the cable number request process. However, there are some historical formats that are helpful to understand and may guide the numbering schema.

6.1.1.1 Communications closets at NAVCC

The cable standards for the communication closets follow a different pattern than other cables and have the following specific formats. (***Note:*** *The D prefix below denotes data device.*)

- Primary network switches/demarcs: cable numbers have a sequence of D+4 digits
- Small Ethernet switches: cable numbers have a sequence of D+5 digits
- Communication closet patch cables: demarc to switches: cable numbers have a sequence ofD+6 numbers
- The digit sequence has the following meaning:
    - 1st digit is 9 for all
    - 2nd digit is the floor (1, 2 and 3)
    - 3rd digit is the communication closet: 1 for Phase 1, 1 for south closet, 2 for north closet, 3 & 4 for others south to north.
    - Remaining digits are the number of the cable
    - Cable numbers are assigned starting with the lowest cable number with the lowest input number

6.1.1.2 Capitol Hill Video Transmission System Cable Numbering Standards

The Capitol Hill Video Transmission System follows a slightly different pattern for cable numbers as well. For this system, the cable numbers are assigned reflecting the same node prefix that the drawing

numbers use. Functional prefixes remain the same ("D", "C", "DV" etc.). Six digit numbers are used following the functional prefix letter. The first number is the node number. The nodes are numbered as follows:

- Culpeper terminus: 0 (zero)
- Madison: 1
- Rayburn: 2
- House CVC: 3
- Senate CVC: 4
- Russell SRB-26 (AOC headend): 5

6.2 Grounding Cables

Technical grounds exist at NAVCC, different from electrical grounds, and when separate grounding cables are run to the technical ground in the building they shall be documented. These technical grounds have typically documented on either the electrical drawings or the rack drawings. In the future, a third type of drawing, dedicated specifically to documenting technical ground connections such as in the audio rooms, will be created with the GNx prefix. The grounding cables are always colored GREEN (as specified in international standards and the US Electrical Code) and ground is also known as an "earth" or "earthing".

6.3 Cable Label Standards

All cables installed at NAVCC must be labeled such that they correlate back to the assigned number on the drawing. The cable labels will use the following guidelines:

- Label will be 2" in size
- Label will be white with a clear protective cover over top
- Cable number will be printed in black using a legible size font
- Cable number will be repeated on multiple lines as many times as possible in the printable area

NAVCC may also request a second label to be included on the cable that would provide a functional shorthand indicating the cable's source and destination. This will be determined on a case-by-case basis. If requested, this will be a second label placed beside the cable number label (i.e., the cable number and functional shorthand are <u>not</u> to be combined on the same label).

6.4 Cable Color Codes

The following cable color codes are used throughout NAVCC.

Exhibit 8: Coaxial Cable Color Codes

Color	Translation
Green	Composite Video
Yellow	SDI, HD-SDI, ASI, 3G SDI, 12G SDI
Brown	Digital Audio (both 110 ohm balanced and 75 ohm unbalanced)
Gray	Composite/Tri-level Sync (H & V)
Black	Blackburst
Orange	RF
Violet	MADI
Component Video Cabling	
Red	Red/Pr Channel
Green	Green/Y channel
Blue	Blue/Pb channel
Yellow	Horizontal Sync (5-channel component analog video) or Composite Sync (represents both horizontal and vertical sync together; 4-channel component analog video)
White	Vertical Sync (5-channel component analog video)

Exhibit 9: Ethernet Cable Color Codes

Utilizes 10G copper cables, both patch cables and raw cabling.

Color	Translation
Red	10G Born Digital “Red Zone”
Yellow	10G Born Digital “Yellow Zone”
Green	10G Born Digital “Green Zone”
White	1G or 10G Born Digital ties to the OCIO network
Blue	10/100/Gig-E demarc panel to computer patch cables and demarc panel to switch in comm closets

Exhibit 10: Audio Balanced Cable Color Codes

Color	Translation
Black	Analog Audio
White	Time Code
Brown	Digital Audio (110 ohm balanced)

Exhibit 11: NAVCC Power Color Codes

Color	Translation
Red	Not generator protected, not UPS protected
Yellow	Not generator protected: UPS protected

Color	Translation
Blue	Generator protected, UPS protected, A leg (R1)
Orange	Generator protected, UPS protected, B leg (R1)

6.5 Cable Request Process

The NAVCC tracks all cables and connectors in their Cable Database. Ownership of the Cable Database lies with the NAVCC Senior Media Facilities Engineer or other authorized NAVCC personnel. (A separate duplicate instance of the Cable Database will be provided on a local machine at NAVCC for the contractor to reference.) All cable number requests, and if necessary, cable modifications must go through the process defined below. This process will be followed during system design (in order to arrive at the "approved to build" drawings) and again after the system is built to ensure that the cable database matches the "as built" drawings.

Due to the iterative nature of this process, all cable requests must be provided to the NAVCC Senior Media Facilities Engineer as far as ahead of time as possible but no less than 14 calendar days prior to when the numbers are needed. This will ensure that the involved parties have adequate time to collaborate and resolve any questions that may arise. ***Note:*** *The NAVCC* Senior Media Facilities Engineer *will be responsible for assigning numbers; under no circumstances shall numbers be assigned by contractors. For draft drawings, if a contractor would like to represent a placeholder number in the drawing the convention shall be X##### for new cable numbers. For reuse of the existing cable numbers, that have information that will be changing, those cable numbers shall be denoted in italics. Any existing cable numbers that are not changing are presented as normal.*

To promote consistency, the NAVCC utilizes standard nomenclature for the cable names and the connector names. Appendix A: Cable Standards contains the cable name standards and Appendix B: Connector Standards contains the connector standards. If a convention does not exist or there are multiple variations for the cable or connector type, the NAVCC Senior Media Facilities Engineer shall be consulted and will have the final say on the convention to be used.

The following tables define the roles and steps in the Cable Number Request process.

Role	Step
Design Phase	
Design Engineer	Identify the cables that are needed as the functional drawing(s) are created or modified
Design Engineer	Determine if the cables are new or modify existing cables
Design Engineer	If existing cables will be modified, obtain a listing of the cables impacted from the cable database.
Design Engineer	Complete the NAVCC Cable Number Request template (Refer to Appendix E: Cable Number Request Template)

Role	Step
	• If the cables being requested are new, the Cable # column will be left blank and highlighted in yellow (i.e., the cell background color shall be yellow) • If the cables are being modified, any modifications should be highlighted in yellow (i.e., the cell background color shall be yellow) • The cables should be sorted such that new cables are on top and modified cables follow, both in alpha order by cable number. ***Note:*** *NAVCC has standard conventions for cable and connector types that must be used for the request. If a convention does not exist or there are multiple variations for the cable or connector type, the NAVCC* Senior Media Facilities Engineer *shall be consulted and will have the final say on the convention to be used.*
Design Engineer	Save the file using the following naming convention: Task Order Number [Project Name] Cable Number Request – Approved to Build-#.xls For multiple requests the number (#) of the request shall be inserted at the end of the file name.
Design Engineer	Submit the NAVCC Cable Number Request in conjunction with the drawings to the NAVCC Senior Media Facilities Engineer and the COR for number assignment. NAVCC requires submission of the cable number request a minimum of 14 calendar days in advance of when the numbers are needed.
Senior Media Facilities Engineer	Review the submitted NAVCC Cable Number Request form against the drawing(s): • Confirm modifications noted in the request • Modify cable nomenclature as needed to meet NAVCC conventions Assign new cable numbers
Senior Media Facilities Engineer	Import the spreadsheet data to the NAVCC cable database
Senior Media Facilities Engineer	Return the revised Cable Number Request to the Design Engineer for their records. ***Note:*** *The NAVCC* Senior Media Facilities Engineer *will provide any updates to the contractor in red.*
After System Build	
Design Engineer	Update the Cable Number Request with any deviations from the original design/original cable number request. All modifications should be denoted in highlighted yellow (i.e., the cell background color shall be yellow). ***Note:*** *Deviations in numbering/naming should be discussed with the NAVCC* Senior Media Facilities

Role	Step
	Engineer *to ensure that all implementation details match NAVCC standards.*
Design Engineer	Submit the updated NAVCC Cable Number Request in conjunction with the as-built drawings to NAVCC Senior Media Facilities Engineer using the following naming convention. Task Order Number [Project Name] Cable Number Request – As Built.xls
NAVCC Senior Media Facilities Engineer	Acknowledge receipt of the updated NAVCC Cable Number Request
NAVCC Senior Media Facilities Engineer	Conduct a final review of the updated NAVCC Cable Number Request. If there are updates needed, provide them back to the contractor. Otherwise upload the spreadsheet data to the NAVCC cable database.

7 Specific Industry Standards

NAVCC conforms to industry standards whenever possible for their initiatives. Organizations that provide such standards include:

- Audio Engineering Society (AES)
    - AES 67
- Infocomm
- Society of Motion Picture and Television Engineers (SMPTE)
    - Relevant standards include 222, 2110, 259m, 292m, 424/425
- Institute of Electrical and Electronics Engineers (IEEE)
    - Precision Time Protocol - 1588
    - Firewire – 1394
    - Centronics – 1284
- IP Address and Networking standards
    - IPV4
    - IPV6 (in certain circumstances)

All contractors are expected to conform to standards as provided by these organizations as well.

8 Appendix A: Cable Standards

Exhibit 12 provides the current prefix naming conventions for cables used at NAVCC. As a matter of implementation, NAVCC prefers use of Belden cables 1694A and minimum of CAT6 network cable or CAT7 for 10gig connections.

Exhibit 12: Standard Cable Prefixes

Cable Prefix	Description
A	Audio
C	Control
D	Data
DA	Digital Audio
DAP	Digital Audio IP
DE	KVM Data Extender
DF	Data Fiber
DV	Digital Video
DVP	Digital Video IP (e.g., HDBaseT, SMPTE2022, SMTPE 2110)
F	Fiber
I	Intercom
P	Pulse & Reference
RF	Radio Frequency
TC	Timecode
V	Video

9 Appendix B: Connector Standards

Exhibit 13 provides the current naming conventions for connectors used at NAVCC. As a matter of implementation, NAVCC requires use of King Connectors for video cables, and Neutrik (refer to this link to review Neutrik connector models) or Switchcraft connectors (Refer to this link to review Switchcraft connector models) (heavy duty, all metal housing, gold pins) for audio cables.

Exhibit 13: Connector Naming Conventions

Source Connector	Definition
110	110 terminal block
BNC	A miniature quick connect/disconnect coaxial connector can be used for radio frequency (50 ohm), ten based 2 (52 ohm), analog or digital video (75 ohm), digital audio AES unbalanced (110 ohm)
BNC-F	A miniature quick connect/disconnect coaxial connector can be used for radio frequency (50 ohm), ten based 2 (52 ohm), analog or digital video (75 ohm), digital audio AES unbalanced (110 ohm) --Female
BNC-M	A miniature quick connect/disconnect coaxial connector can be used for radio frequency (50 ohm), ten based 2 (52 ohm), analog or digital video (75 ohm), digital audio AES unbalanced (110 ohm) --male
D15M	Standard 15 Pin Parallel Connector --male
D50F	50 pin D-sub connector--Female
D50M	50 pin D-sub connector--Male
DB25	25 pin D-sub connector
DB25F	25 pin D-sub connector--Female
DB25M	25 pin D-sub connector--Male
DB9	9 pin D-sub connector
DVI-D	DVI-D (digital only)
DVI-I	DVI-I (digital and analog)
DVI-IF	DVI-I (digital and analog) Female connector
DVI-IM	DVI-I (digital and analog) male connector
DVI-A	DVI-I (analog only)
HD15	High density connector typically used by monitors
HD15F	High density female connector typically used by monitors
HDMI	HDMI cable (High-Definition Multimedia interface)
LC	Fiber-optic connector
MINI TRS	3.5 mm tip ring sleeve connector

Source Connector	Definition
MINIDIN4	4 Pin Mini-DIN connector
MINIDIN4F	4 Pin Mini-DIN connector--Female
MINIDIN4M	4 Pin Mini-DIN connector--Male
MINIDIN6	6 Pin Mini-DIN connector
MINIDIN6F	6 Pin Mini-DIN connector--Female
MINIDIN6M	6 Pin Mini-DIN connector--Male
MINIDIN8M	8 Pin Mini-DIN connector--Male
MINIDIN9	9 Pin Mini-DIN connector
miniSAS	High speed, multi-lane interconnect for both internal and external solutions, including both receptacles and cable assemblies
RCAF	Plug and a jack designed for use with coaxial cable for frequencies ranging from the very lowest up to several megahertz--Female
RCAM	Plug and a jack designed for use with coaxial cable for frequencies ranging from the very lowest up to several megahertz--Male
RJ11M	A telephone interface that uses a cable of twisted wire pairs and a modular jack with two, four or six contacts--Male
RJ45	8 Pin ethernet connector
RJ45M	8 Pin ethernet connector--male
SAS	Connector which employs serial means of digital data transfer
SC	Fiber-optic cable connector
SC/PC	Subscriber connector/Physical Contact. (Simplex SC connector)
SCSI	25 pin SCSI Connector (Small Computer System Interface)
SCSI II	50 Pin SCSI connector
SCSI III	68 Pin SCSI connector
ST	Fiber-optic cable connector that uses a bayonet plug and socket
USB A	USB-A are typically found on PCs and Laptops
USB-B	USB-B connectors or typically used on larger computer devices like printers, external hard drives, and scanners
VGA/USB	USB to VGA Display Adapter is used to connect a laptop, tablet or desktop (or other USB enabled device) to a VGA-enabled device such as monitor, projector, TV
XLR3F	XLR 3 pin female connector
XLR3M	XLR 3 pin male connector

Source Connector	Definition
XLR-F	XLR connector is a style of electrical connector, primarily found on professional audio, video, and stage lighting equipment--Female

10 Appendix C: Device Prefix Standards

Exhibit 14 provides the current device prefix conventions for equipment used at NAVCC.

Exhibit 14: Device Prefix Standards

Device Prefix	Description
VDA	Analog Video Distribution Amplifier
A/D	Analog to Digital Converter
ACO	Automatic Change Over
ADA	Audio Distribution Amplifier
ADAC	Bi-directional Analog to Digital and Digital to Analog Converter
ADAPT	Adaptor
AMON	Audio Monitor
AMP	Amplifier
ANLYZ	Analyzer
ANT	Antenna
ANT SPLTR	Antenna Splitter
ATR	Analog Tape Recorder
AUD CNV	Audio Converter
AUD CTL	Audio Controller
AUD I/F	Audio Interface
AUD PROC	Audio Processor
AUDIO NAS	Audio Network Attached Storage
BNC/YC CONV	BNC to YC Converter
BREAKOUT CABLE	Breakout Cable
C/Ku DISH	C/Ku Band Dish
CAM	Camera
CASS	Audio Cassette
CCU	Camera Control Unit
CD	Compact Disc
CDR	Recordable Compact Disc
CLEANER	Cleaner
CNV	Converter
CP	Control Panel
CVILLE ANTENNA	Charlottesville Antenna
DA	Distribution Amplifier
DAC	Digital to Analog Converter
DAJF	Digital Audio Jack Field
DAT	Digital Audio Tape
DC ANTENNA	DC Antenna
DEMUX	Demultiplexer
DIRECTV	Direct TV

Device Prefix	Description
DISH TV	Dish Network
DISP	Display
DJF	Data Jackfield
DLY	Delay
DTV DISH	Direct TV Dish
DUAL CASS	Dual Audio Cassette
DV	Digital Video
DVD	Digital Versatile Disc
DVDA	Digital Video Distribution Amplifier
DVD-R	Recordable Digital Versatile Disc
DVI	Digital Video Interface
DVI EXT CABLE	DVI Extender Cable
DVI RCV	DVI Receiver
DVI SEND	DVI send end of extender
DVR	Digital Video Recorder
EDIT	Editor
ENC	Encoder
ENC/DEC	Encoder Decoder
ENET CONV	Ethernet Converter
EO CNV	Electrical to Optical Converter
EQ	Equalizer
ESW	Ethernet Switch
ETH-CUL	Ethernet Switch (OCIO Specific Name)
EXT HDD	External HDD
FBR RX	Fiber Receiver
FBR TX	Fiber Transmitter
FCSW	Fiber Channel Switch
FWL	Firewall
GND	Ground
GPS RCVR	Global Positioning System Receiver
HDD	Hard Disk Drive
House CVC Rtr	House CVC Router
I/O	Input/Output
ICOM RTR	Intercom Return
ICOM	Intercom
IRD	Integrated Receiver Decoder
JF	Jack Field
KK RDR UNIT	Keycode reader
KVM EXT	KVM Extender
KVM RX	KVM Receiver
KVM TX	KVM Transmitter

Device Prefix	Description
KYBD	Keyboard
LEG	Legalizer
LNB	Low Noise Block Downconverter
LOGO	Logo Generator
MIC RX	Microphone Receiver
MIC	Microphone
MON CTL	Monitor Control Panel
MON	Monitor
MSE	Mouse
MSE EXT CABLE	Mouse Extension Cable
MUX	Multiplexor
N/C	No Connection
NEUTRIK BALUN	Neutrik Balun
Oxberry controller	Oxberry controller
Oxberry transport	Oxberry transport
PEDESTAL	Pedestal
PHONE	Phone
PROC	Processor
PSU	Power Supply Unit
QC SVR	Quality Control Server
RAID CTRL	RAID Control
RAID	RAID Drive
RCH ANTENNA	Richmond Antenna
RCVR	Receiver
RDR HEAD	Reader
RELAY	Relay
RF RTR	RF Router
RLY	Relay
RTR	Router
Russell Router	Russell Router
SACD	Super Audio Compact Disc
SAMMA PREP	Prep Cart
SARNOFF TSG	Sarnoff Test Signal Generator
SCAN CNV	Scan Converter
SENATE RTR	Senate Router
SIRIUS / XM ANT	Sirius/XM Antenna
SONET	Synchronous Optical Network
SPDIF O-E CONV	Optical to Electrical Converter
SPKR	Speaker
STEER ANTENNA	Steerable Antenna
STORG	Storage

Device Prefix	Description
SW	Switch
TBC	Time Base Corrector
TC I/F	Timecode Interface
TC	Timecode
TELECINE	Telecine
TONE GEN	Tone Generator
TV ANTENNA	TV Antenna
TV DEMOD	TV Demodulator
TX	Transmitter
UPCONV	Upconverter
UPS	Uninterruptible Power Supply
USB	Universal Serial Bus
USB HUB	Universal Serial Bus Hub
USB RCV	Universal Serial Bus Receiver
USB SEND	USB Extender
VDA	Video Distribution Amplifier
VGA CNV	VGA Converter
VGA DA	VGA Distribution Amplifier
VGA EXT	VGA Extender
VGA EXT CABLE	VGA Extension Cable
VGA RX	VGA Receiver
VGA SW	VGA Switch
VGA TX	VGA Transmitter
VMON	Video Monitor
VT	Video Tape Recorder
VT CTL	Video Tape Controller
WCLK	Word Clock
WFM	Waveform Monitor
WIN ANTENNA	Winchester Antenna
XLR-BNC XFMR	XLR-BNC Transformer
XM ANT	XM Antenna

11 Appendix D: Drawing Number Request Template

The Drawing Number Request Template is an excel template maintained by NAVCC. A sample of the template is provided in Exhibit 15 indicating all required information. A soft copy of the template can be provided by the COR or NAVCC Senior Media Facilities Engineer. ***Note:*** *The referenced Drawing Type, Drawing Type Extension, and System Prefix values can be found in Section 4.4 Drawing Numbers.*

Exhibit 15: Drawing Number Request Template

System:

Drawing #	**Drawing Type***	**Drawing Type Ext.***	**System Prefix***	**Description**

*Approved drawing types, drawing extensions, and system prefixes can be found in the NAVCC Documentation Package Standards.

12 Appendix E: Cable Number Request Template

The Cable Number Request Template is an excel template maintained by NAVCC. A sample of the template is provided in Exhibit 16 indicating all required information. A soft copy of the template can be provided by the COR or NAVCC Senior Media Facilities Engineer.

Exhibit 16: Cable Number Request Template

Cable				Source						Destination						
Cable #	Type	SigTyp	length	Dwg #	Room #	Rack #	Equipment	Connection	Connector	Dwg #	Room #	Rack #	Equipment	Connection	Connector	Remarks

13 Appendix F: Example of a Set of Working Drawings

The drawings prepared as part of the Capitol Hill Video Transmission (CHVT) project provide the best example of working drawings for reference. They can be found at the CHVT Folder on the shared drive. ***Note:*** *As described standards may have changed over time, if there are any discrepancies or questions on the drawings the NAVCC Senior Media Facilities Engineer should be consulted.*