**SECTION 27 41 34**

**WIDEBAND VIDEO DISTRIBUTION SYSTEM**

**BASED ON DFD MASTER SPECIFICATION DATED 09/03/24**

Notes to A/E:

This document addresses in-building distribution. Inter-building connectivity is typically accommodated by the agency or a service provider. Confirm the means by which the building is served and consider that in the specified distribution design.

Instructions to A/E are included throughout the document (italic text; blue if viewed/printed in color). Text should be hidden or deleted for printing. These instructions can be hidden by modifying the MS-WORD Style “A/E Instructions” to use “Hidden Text” as part of the Font type. To display Instructions formatted as “Hidden Test”, configure MS-Word File Options / Display to “Show” Hidden Text on Screen.

Edit all areas as applicable to meet the requirements of the project. Common options or features recognized by the DFD are enclosed in [brackets]. These items are red if viewed/printed in color. The consultant must edit all options.

The document is structured to automatically update the Table of Contents when printed or in response to an “Update Field” command (right mouse click on TOC opens menu) in MS-Word. Confirm that changes to the document outline are reflected in the TOC. TOC entries are Hyperlinks and can be used to navigate the document.

Revision History:

In the on-line “DFD Document Library” under “Master Specifications/Design Guidelines / 27 – Communications” see “Div. 27 Revision History”.

PART 1 - GENERAL

Scope

The work under this section includes passive hardware and active equipment required for a functioning Wideband Video Distribution System (e.g. “Cable TV”). The system will use new and/or existing coaxial cabling as described in other sections.

Included are the following topics:

[PART 1 - GENERAL](#_Toc536685559)

[Scope](#_Toc536685560)

[Related Work](#_Toc536685561)

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[Design Intent](#_Toc536685563)

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[System Performance](#_Toc536685571)

[Coaxial Cable Splitters and Taps](#_Toc536685572)

[Video Distribution Amplifier](#_Toc536685573)

[PART 3 - EXECUTION](#_Toc536685574)

[General](#_Toc536685575)

[Identification and Labeling](#_Toc536685576)

[Testing and Acceptance](#_Toc536685577)

[Documentation](#_Toc536685578)

[Record (As-Built) Drawings](#_Toc536685579)

[Warranty](#_Toc536685580)

Related Work

Applicable provisions of Division 1 govern work under this Section.

Section 01 91 01 or 01 91 02 – Commissioning Process

Section 27 05 53 – Identification for Communications Systems

Section 27 10 00 – Structured Cabling

Section 27 16 19 – Communications Patch Cords, Station Cords, and Cross Connect Wire

References

All work and materials shall conform in every detail to the rules and requirements of the National Fire Protection Association, the Wisconsin Electrical Code and present manufacturing standards.

All materials shall be listed by UL and shall bear the UL label. If UL has no published standards for a particular item, then other national independent testing standards shall apply and such items shall bear those labels. Where UL has an applicable system listing and label, the entire system shall be so labeled.

Other applicable standards are as follows:

* ANSI/IEEE C2 - National Electrical Safety Code
* SPS Chapter 316 – Wisconsin Dept. of Safety and Professional Services Electrical Code
* National Television System Committee (NTSC)
* Federal Communications Commission (FCC)

Design Intent

The system is based on a hierarchy of cables, passive taps and splitters, and amplification.

Refer to Part 2 for system performance requirements.

Work Sequence

During the construction period, coordinate schedule and operations with the DFD Construction Representative and agency.

Submittals

Under the provisions of Section 26 05 00 and Division 1, prior to the start of work, submit:

Manufacturer’s Data covering all products proposed indicating construction, materials, ratings, and all other parameters identified in Part 2 (Products) below.

Manufacturer’s installation instructions.

Include sentence re: Cable TV Provider coordination if applicable. Otherwise, delete.

System Design detailing passive distribution plan (splitters, taps) and amplifier(s). Include schematic, hardware and cable assumptions, and calculations. [(See Part 3, Article “General” regarding coordination with the Agency’s Cable TV Provider.)”]

Additional submittals (Test Plan, Test Results, Documentation, Record Documents, etc.) required during and in follow-up to construction are detailed in Part 3.

Submit record documents per Part 3 of this section.

Work By State and/or User Agency

If there is work to be done by Owner, describe in detail. Providing Cable TV interface at the building entrance (in the form of a fiber optic receiver, for example) is common. Otherwise indicate “None”.

None.

Quality Assurance

The manufacturer(s) of distribution hardware shall be a company specializing in and having a minimum of five years documented experience in producing products similar to those specified in this and related sections.

Drawings

It shall be understood that the electrical and communication details and drawings provided with the bid package are diagrammatic. They are included to show intent and to aid the Contractor in bidding the job. The Contractor shall make allowance in their bid to cover whatever work is required to comply with the intent of the plans and specifications.

Prior to submitting the bid, call to the attention of the Engineer to any materials or apparatus the Contractor believes to be inadequate and to any necessary items of work omitted, within ten (10) days prior to the Bid Due Date.

PART 2 – PRODUCTS

General

The contractor design shall include passive and/or active components identified below and/or in the project drawings.

System Performance

Select hardware and equipment and configure system to provide for a signal level of 0 – 10 dBmV, as measured at the TV (Equipment) Outlet over the frequency range 55 – [550] [750] [860] MHz.

The “TV” Outlet is the coaxial interface at the user/TV location and is typically an F-type connector. Applicable cabling and termination requirements are covered in specification Section 27 10 00 “Structured Cabling”.

Passive Distribution hardware shall support a video bandwidth of 1 GHz.

Active Hardware (e.g. Amplifier; if applicable) shall support a video bandwidth as indicated below.

For UW Madison campus projects, INCLUDE the following paragraph:

The system shall not degrade the incoming signals by more than 3 dB in Carrier-to-Noise Ratio (CN) and 6 dB in Composite Triple Beat (CTB), or more than 3 dB in Modulation Error Ratio (MER). Measurement of incoming signal will be necessary to establish baseline performance to which this comparison is made. Coordinate with agency to ensure that this signal is present as required to perform the specified tests.

Coaxial Cable Splitters and Taps

Splitters shall be Blonder-Tongue indoor “Digital Ready” (DGS) series or equivalent.

Taps shall be Blonder-Tongue indoor “Digital Ready” (DGT) series or equivalent

Video Distribution Amplifier

Check with the agency to confirm (1) system video bandwidth and (2) if bi-directional system design (e.g. for (interactive / two-way services) is required. Example product: Blonder Tongue BBIDA-86B-xx.

Video distribution amplifier shall:

AE Note: Select the highest frequency applicable for the system being added to.

Support a video bandwidth of [550] [750] [860] MHz or higher.

Be a trunk/bridge type with appropriate gain.

Be equipped to include “plug-in” equalization variable slope and gain controls.

One-way operation is typical. Confirm with Agency if two-way operation is required to support sourcing of video content from locations served by the video distribution system.

Be configured for [one-way] [bi-directional / two-way] operation. [Amplifier configured for bi-directional operation shall incorporate built-in diplex filters for standard sub-channel two-way operation with active return.]

Power provided via the incoming trunk line is unusual.

The amplifier shall be powered by [local 120VAC power] [via the incoming trunk line].

Where adding to an existing system, amplifier shall be compatible with existing equipment.

PART 3 - EXECUTION

General

Refer to Project Drawings which indicate Outlet locations, major cable routes and termination location(s) within each building. Coordinate duct allocation with the Agency.

Contractor is responsible for developing a distribution system design (splitters, taps, amplification) which meets the performance requirements identified in Part 2 of this section.

Coordinate with Agency to confirm Signal Level at building entrance or other location which is the source of Wideband Video for the project. This will typically be the output of an agency-provided fiber optic receiver or a backbone coaxial cable.

AE Note: Include the following paragraph if applicable. Some UW-System campuses, for example, utilize the local CATV Provider for campus-wide connectivity and for maintenance of building distribution systems. Otherwise, delete.

Prior to submitting documentation of the proposed system design, review the design with the Agency’s Cable TV Provider [ADD Contact information if available]. Review any recommended changes to the design with Agency staff and DFD Engineer.

Provide all labor and materials necessary to construct the system as described herein and on the project drawings. This includes - but is not limited to - furnishing and installing passive and active components, labeling, testing, and documentation.

It is the contractor's responsibility to survey the site and include all necessary costs to perform the installation as specified.

The contractor will be responsible for identifying and reporting to the DFD Construction Representative any existing damage to walls, flooring, tiles and furnishings in the work area prior to start of work. All damage to interior spaces caused by the installation of cable, raceway or other hardware must be repaired by the Contractor. Repairs must match preexisting color and finish of walls, floors and ceilings. Any contractor-damaged ceiling tiles are to be replaced by the contractor to match color, size, style and texture.

Where unacceptable conditions are found, bring this to the attention of the DFD Construction Representative immediately. A written resolution will follow to determine the appropriate action to be taken.

Beginning installation means contractor accepts existing conditions.

Should it be found by the Engineer that the materials or any portion thereof furnished and installed under this contract fail to comply with the specifications and drawings with the respect or regard to the quality, value of materials, appliances or labor used in the work, it shall be rejected and replaced by the Contractor and all work disturbed by changes necessitated in consequence of said defects or imperfections shall be made good at the Contractor's expense.

Identification and Labeling

For Cabling and TV Outlet labeling, refer to Section 27 05 53 “Identification for Communications Systems”.

Label Taps to indicate ID of TV Outlet to which is connected.

Label Amplifier(s) with ID per Agency standards. Upon completion of system alignment and balancing, mark to indicate selected Gain Setting.

Testing and Acceptance

General

Perform acceptance tests as indicated below for each sub-system (e.g. backbone, station, etc.) as it is completed.

Confirm any special scheduling considerations required to accommodate Agency needs. Schedule may not necessarily be keyed to occupancy. Consider especially owner-furnished / contractor installed hardware.

Conduct acceptance testing according to a schedule coordinated with the DFD and Agency. Representatives of the Owner may be in attendance to witness the test procedures. Provide a minimum of one (1) week advance notice to allow for such participation.

Prior to testing, provide a Test Plan including equipment (makes/models) to be used, set-up, pass/fail limits and results format. A sketch of each test set-up (hand-drawn is OK) and results report examples are encouraged.

Tests related to connected equipment of others shall only be done with the permission and presence of Contractor involved. Confirm testing as required to verify that the wiring connections are correct.

Provide all equipment and personnel necessary to conduct the acceptance tests.

Document all tests.

Provide test results and describe the conduct of the tests including the date of the tests, the equipment used and the procedures followed. At the request of the Engineer, provide copies of the original test results.

Any deficiencies found shall be corrected and revalidated by follow up testing.

Wideband Video Distribution System Performance

Upon completing installation of the system, align and balance the system, and test the system utilizing an approved signal level meter and/or spectrum analyzer to verify performance.

System performance shall be as defined in Part 2 of this Section.

Tests shall include:

1. Signal Level

For UW Madison campus projects, INCLUDE the following paragraph and bulleted items:

1. Carrier-to-Noise Ratio (CN) and Composite Triple Beat (CTB)

or

Modulation Error Ratio (MER)

Perform measurements at the TV Outlet. It is not necessary that unused outlets be terminated in a terminating resistor impedance-matched to the cable.

Test no less than 25% of the installed TV outlets including the shortest and longest lines from each splitter and tap. (If the number of tests related to the shortest and longest lines equals or exceeds 25% of the installed outlets, no further testing is required.).

Perform Signal Level tests at 55 MHz, at one mid-band frequency, and at the highest frequency specified. Additional frequencies may be tested at contractor option.

For UW Madison campus projects, INCLUDE the following:

Perform CTB test at one or more mid-band frequencies.

In addition, perform a visual quality test using a television receiver to observe live video picture quality. Channel selection shall be per frequency requirements for Signal Level as identified above. No evidence of ghosting, noise, beat interference, or cross modulation (analog channels), or pixilation (digital channels) is acceptable.

Documentation

General

Upon completion of the installation, the contractor shall provide three (3) full Documentation Sets to the Engineer for approval. Documentation shall include the items detailed in the sub-sections below.

Interim documentation may be required to accommodate the Owners occupancy needs. Edit section as applicable to meet these needs.

Documentation shall be submitted within ten (10) working days of the completion of each testing phase (e.g. subsystem, cable type, area, floor, etc.). This is inclusive of all test result and *draft* as-built drawings. Draft drawings may include annotations done by hand. Machine generated (final) copies of all drawings shall be submitted within 30 working days of the completion of each testing phase.

To verify documented findings, the owner and/or agency may perform additional field testing on their own or may request that a 10% random field re-test be conducted by the contractor. This re-test shall be at no additional cost. Tests shall be a repeat of those defined above. If findings contradict the documentation submitted by the Contractor, additional testing can be requested to the extent determined necessary by the Engineer, including a 100% re-test. This re-test shall be at no additional cost to the Owner.

Test Results

Document test results. Documentation shall include a record of test set-up, test frequencies, test equipment type, model and serial number, date, and crew member name(s). Results shall include cable (or outlet) I.D. of each location tested. Written confirmation of the visual quality tests shall also be provided.

Submit all documentation in electronic form.

Where documentation provided in electronic form requires unique software (other than Adobe Acrobat Reader) for viewing test results, provide one (1) copy of such software. The software shall run on a Microsoft *Windows*-based personal computer supplied by the Owner. Software shall include license if applicable.

Naming of file(s) and records shall include:

1. DFD Project Number.
2. Building Designation (if more than one building in project).
3. Room and/or cable identifiers per labeling formats used.

Record (As-Built) Drawings

Update schematic and plan (if applicable) drawings to denote as-built information. Document all tap and splitter values and amplifier settings.

Refer to DFD CAD Standards Instruction Manual for drawings standards to be followed.

Outlet locations are identified as defined elsewhere in these documents. Numbering, icons and drawing conventions used shall be consistent throughout all documentation provided.

Each drawing submitted by the Contractor as part of the Project Documentation shall be identified as an "As-built" drawing and include a) the contractor name and/or logo, and b) the date of the drawing.

All documentation, including hard copy and electronic forms shall become the property of the State.

Warranty

See Division 1, GENERAL CONDITIONS, and GENERAL REQUIREMENTS - Guarantee Documents for general requirements.

Minimum Warranty period for the system shall be as follows:

Passive Distribution Hardware – 1-year Manufacturer’s Component Warranty.

Amplifier(s) – 1-year Manufacturer’s Component Warranty.

Wideband Video Distribution System – 1-year System Warranty. Warranty shall include all labor, material, and travel time.

END OF SECTION