PROJECT MANUAL
FOR
DALLAS COUNTY IPTV SYSTEM UPGRADE
PROJECT NUMBER: 2020-DC048-113

DALLAS COUNTY
LEW STERRETT JAIL
DALLAS, TEXAS 75207

ISSUED FOR: ISSUED FOR BID; 03/30/2023

PREPARED BY:
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SECTION 000107
PROFESSIONAL SEALS

1.01 DESIGN PROFESSIONALS OF RECORD

A. Architect:
   1. Name: Jeffrey Brian Simcik.
   2. License #: 22646.
   3. Responsible for: Divisions 01-07 Sections.

B. Communications:
   1. Name: John Rob Hicks.
   2. License #: 200774.
   3. Responsible for: Divisions 27 Sections.
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END OF SECTION  000110
PART 1 GENERAL

1.01 PROJECT

A. Project Name: Dallas County IPTV System Upgrade
B. Owner's Name: Dallas County.
C. Architect's Name: HED.

1.02 CONTRACT DESCRIPTION

A. Contract Type: A single prime contract based on a Stipulated Price as described in Document
   005200 - Agreement Form.

1.03 DESCRIPTION OF ALTERATIONS WORK

A. Scope of demolition and removal work is indicated on Drawings and specified in Section
   024100.
B. Scope of alterations new Work is indicated on Drawings.

1.04 OWNER OCCUPANCY

A. Owner intends to continue to occupy adjacent portions of the existing building during the entire
   construction period.
B. Owner intends to occupy the Project upon Substantial Completion.
C. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.
D. Schedule the Work to accommodate Owner occupancy.

1.05 CONTRACTOR USE OF SITE AND PREMISES

A. Construction Operations: Limited to areas noted on Drawings.
   1. Locate and conduct construction activities in ways that will limit disturbance to site.
B. Arrange use of site and premises to allow:
   1. Owner occupancy.
   2. Work by Others.
   3. Work by Owner.
   4. Use of site and premises by the public.
C. Provide access to and from site as required by law and by Owner:
   1. Emergency Building Exits During Construction: Keep all exits required by code open
class during construction period; provide temporary exit signs if exit routes are temporarily
   altered.
   2. Do not obstruct roadways, sidewalks, or other public ways without permit.
D. Time Restrictions:
   1. Limit conduct of work to the hours between 7:00 am to 4:00 pm weekdays. Weekend hours
      or evening hours may be considered.
E. Utility Outages and Shutdown:
   1. Limit disruption of utility services to hours the building is unoccupied.
   2. Do not disrupt or shut down life safety systems, including but not limited to fire sprinklers
      and fire alarm system, without 7 days notice to Owner and authorities having jurisdiction.
   3. Prevent accidental disruption of utility services to other facilities.

1.06 WORK SEQUENCE

A. Construct Work in phases during the construction period: Contractor to develop Phasing Plan
   for Owner Acceptance.
1. Phase 1: North Tower.
2. Phase 2: Building B.
4. Phase 4: South Tower.

B. Coordinate construction schedule and operations with Owner/Dallas County Facilities Manager.

1.07 SPECIFICATION SECTIONS APPLICABLE TO EVERY CONTRACT

A. Unless otherwise noted, provisions of the sections listed below apply to every contract. Specific items of work listed under individual contract descriptions constitute exceptions.

B. Section 012000 - Price and Payment Procedures.
C. Section 012100 - Allowances.
D. Section 012200 - Unit Prices.
E. Section 012300 - Alternates.
F. Section 012500 - Substitution Procedures.
G. Section 013000 - Administrative Requirements.
H. Section 013114 - Facility Services Coordination.
I. Section 013216 - Construction Progress Schedule.
J. Section 013553 - Security Procedures.
K. Section 014000 - Quality Requirements.
L. Section 014100 - Regulatory Requirements
M. Section 014216 - Definitions.
N. Section 015000 - Temporary Facilities and Controls.
O. Section 015500 - Vehicular Access and Parking.
P. Section 016000 - Product Requirements.
Q. Section 016116 - Volatile Organic Compound (VOC) Content Restrictions.
R. Section 017000 - Execution and Closeout Requirements.
S. Section 017419 - Construction Waste Management and Disposal
T. Section 017800 - Closeout Submittals.
U. Section 017900 - Demonstration and Training

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION 011000
SECTION 012000
PRICE AND PAYMENT PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Procedures for preparation and submittal of applications for progress payments.
B. Documentation of changes in Contract Sum and Contract Time.
C. Change procedures.
D. Correlation of Contractor submittals based on changes.
E. Procedures for preparation and submittal of application for final payment.

1.02 SCHEDULE OF VALUES
A. Use Schedule of Values Form: AIA G703, edition stipulated in the Agreement.
B. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit draft to Architect for approval.
C. Forms filled out by hand will not be accepted.
D. Submit Schedule of Values in duplicate within 15 days after date of Owner-Contractor Agreement.
E. Format: Utilize the Table of Contents of this Project Manual. Identify each line item with number and title of the specification section. Identify site mobilization.
F. Include separately from each line item, a direct proportional amount of Contractor's overhead and profit.
G. Revise schedule to list approved Change Orders, with each Application For Payment.

1.03 APPLICATIONS FOR PROGRESS PAYMENTS
A. Payment Period: Submit at intervals stipulated in the Agreement.
B. Use Form AIA G702 and Form AIA G703, edition stipulated in the Agreement.
C. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit sample to Architect for approval.
D. Forms filled out by hand will not be accepted.
E. For each item, provide a column for listing each of the following:
   1. Item Number.
   2. Description of work.
   4. Previous Applications.
   5. Work in Place and Stored Materials under this Application.
   6. Authorized Change Orders.
   7. Total Completed and Stored to Date of Application.
   9. Retainage.
F. Execute certification by signature of authorized officer.
G. Use data from approved Schedule of Values. Provide dollar value in each column for each line item for portion of work performed and for stored products.
H. List each authorized Change Order as a separate line item, listing Change Order number and dollar amount as for an original item of work.
I. Submit one electronic and three hard-copies of each Application for Payment.
J. When Architect requires substantiating information, submit data justifying dollar amounts in question. Provide one copy of data with cover letter for each copy of submittal. Show application number and date, and line item by number and description.

1.04 MODIFICATION PROCEDURES

A. For minor changes not involving an adjustment to the Contract Sum or Contract Time, Architect will issue instructions directly to Contractor.

B. For other required changes, Architect will issue a document signed by Owner instructing Contractor to proceed with the change, for subsequent inclusion in a Change Order.
   1. The document will describe the required changes and will designate method of determining any change in Contract Sum or Contract Time.
   2. Promptly execute the change.

C. For changes for which advance pricing is desired, Architect will issue a document that includes a detailed description of a proposed change with supplementary or revised drawings and specifications, a change in Contract Time for executing the change with a stipulation of any overtime work required and the period of time during which the requested price will be considered valid. Contractor shall prepare and submit a fixed price quotation within 10 days.

D. Computation of Change in Contract Amount: As specified in the Agreement and Conditions of the Contract.
   1. For change requested by Architect for work falling under a fixed price contract, the amount will be based on Contractor's price quotation.
   2. For change requested by Contractor, the amount will be based on the Contractor's request for a Change Order as approved by Architect.
   3. For pre-determined unit prices and quantities, the amount will based on the fixed unit prices.
   4. For change ordered by Architect without a quotation from Contractor, the amount will be determined by Architect based on the Contractor's substantiation of costs as specified for Time and Material work.

E. Substantiation of Costs: Provide full information required for evaluation.
   1. On request, provide the following data:
      a. Quantities of products, labor, and equipment.
      b. Taxes, insurance, and bonds.
      c. Overhead and profit.
      d. Justification for any change in Contract Time.
      e. Credit for deletions from Contract, similarly documented.
   2. Support each claim for additional costs with additional information:
      a. Origin and date of claim.
      b. Dates and times work was performed, and by whom.
      c. Time records and wage rates paid.
      d. Invoices and receipts for products, equipment, and subcontracts, similarly documented.
   3. For Time and Material work, submit itemized account and supporting data after completion of change, within time limits indicated in the Conditions of the Contract.

F. Execution of Change Orders: Architect will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.

G. After execution of Change Order, promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Sum.

H. Promptly revise progress schedules to reflect any change in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change, and resubmit.
I. Promptly enter changes in Project Record Documents.

1.05 APPLICATION FOR FINAL PAYMENT

A. Prepare Application for Final Payment as specified for progress payments, identifying total adjusted Contract Sum, previous payments, and sum remaining due.

B. Application for Final Payment will not be considered until the following have been accomplished:

   1. All closeout procedures specified in Section 017000.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION 012000
PART 1 GENERAL

1.01 SECTION INCLUDES
A. List of unit prices, for use in preparing Bids.
B. Measurement and payment criteria applicable to Work performed under a unit price payment method.
C. Defect assessment and non-payment for rejected work.

1.02 COSTS INCLUDED
A. Unit Prices included on the Bid Form shall include full compensation for all required labor, products, tools, equipment, plant, transportation, services and incidentals; erection, application or installation of an item of the Work; overhead and profit.

1.03 UNIT QUANTITIES SPECIFIED
A. Quantities indicated in the Bid Form are for bidding and contract purposes only. Quantities and measurements of actual Work will determine the payment amount.

1.04 MEASUREMENT OF QUANTITIES
A. Measurement methods delineated in the individual specification sections complement the criteria of this section. In the event of conflict, the requirements of the individual specification section govern.
B. Take all measurements and compute quantities. Measurements and quantities will be verified by Architect.
C. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.
D. Assist by providing necessary equipment, workers, and survey personnel as required.
E. Measurement by Area: Measured by square dimension using mean length and width or radius.
F. Linear Measurement: Measured by linear dimension, at the item centerline or mean chord.
G. Perform surveys required to determine quantities, including control surveys to establish measurement reference lines. Notify Architect prior to starting work.
H. Contractor's Engineer Responsibilities: Sign surveyor's field notes or keep duplicate field notes, calculate and certify quantities for payment purposes.

1.05 PAYMENT
A. Payment for Work governed by unit prices will be made on the basis of the actual measurements and quantities of Work that is incorporated in or made necessary by the Work and accepted by the Architect, multiplied by the unit price.
B. Payment will not be made for any of the following:
1. Products wasted or disposed of in a manner that is not acceptable.
2. Products determined as unacceptable before or after placement.
3. Products not completely unloaded from the transporting vehicle.
4. Products placed beyond the lines and levels of the required Work.
5. Products remaining on hand after completion of the Work.

1.06 DEFECT ASSESSMENT
A. Replace Work, or portions of the Work, not complying with specified requirements.
B. If, in the opinion of Architect, it is not practical to remove and replace the Work, Architect will direct one of the following remedies:
   1. The defective Work may remain, but the unit price will be adjusted to a new unit price at the discretion of Architect.
   2. The defective Work will be partially repaired to the instructions of the Architect, and the unit price will be adjusted to a new unit price at the discretion of Architect.

C. The individual specification sections may modify these options or may identify a specific formula or percentage price reduction.

D. The authority of Owner to assess the defect and identify payment adjustment is final.

PART 2 PRODUCTS - NOT USED
PART 3 EXECUTION - NOT USED

END OF SECTION 012200
SECTION 012300
ALTERNATES

PART 1 GENERAL
1.01 SECTION INCLUDES
   A. Description of Alternates.
   B. Procedures for pricing Alternates.
   C. Documentation of changes to Contract Price and Contract Time.

1.02 ACCEPTANCE OF ALTERNATES
   A. Alternates quoted on Bid Forms will be reviewed and accepted or rejected at Owner's option. Accepted Alternates will be identified in the Owner-Contractor Agreement.
   B. Coordinate related work and modify surrounding work to integrate the Work of each Alternate.

1.03 SCHEDULE OF ALTERNATES
   A. Alternate No. #1:
      1. Alternate Item: Contractor is to price and include within their scope of work and bid for an additional three (3) displays per floor at a location "to be determined" by Dallas County. These additional three (3) displays are not indicated on the floor plans, there location is "to be determined", final locations will be determined by Dallas County during the build out phase. (North Tower, West Tower, South Tower, and Building B). Refer to Specification section 274116.
   B. Alternate No. #2:
      1. Alternate Item: Contractor is to price replacement of all existing displays (display units only). All racks, equipment, cabling, labor, etc. for the project, at each location as shown and specified is part of the base bid as indicated in the contract documents. (North Tower, West Tower, South Tower, and Building B). Refer to Specification section 274116.sp

PART 2 PRODUCTS - NOT USED
PART 3 EXECUTION - NOT USED

END OF SECTION 012300
PART 1 GENERAL

1.01 SECTION INCLUDES
   A. Procedural requirements for proposed substitutions.

1.02 RELATED REQUIREMENTS
   A. Section 012200 - Unit Prices, for additional unit price requirements.
   B. Section 012300 - Alternates, for product alternatives affecting this section.
   C. Section 013000 - Administrative Requirements: Submittal procedures, coordination.
   D. Section 016000 - Product Requirements: Fundamental product requirements, product options, delivery, storage, and handling.

1.03 DEFINITIONS
   A. Substitutions: Changes from Contract Documents requirements proposed by Contractor to materials, products, assemblies, and equipment.
      1. Substitutions for Cause: Proposed due to changed Project circumstances beyond Contractor's control.
         a. Unavailability.
         b. Regulatory changes.
      2. Substitutions for Convenience: Proposed due to possibility of offering substantial advantage to the Project.
         a. Substitution requests offering advantages solely to the Contractor will not be considered.

1.04 REFERENCE STANDARDS
   A. CSI/CSC Form 1.5C - Substitution Request (During the Bidding/Negotiating Stage) Current Edition.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS
   A. A Substitution Request for products, assemblies, materials, and equipment constitutes a representation that the submitter:
      1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product, equipment, assembly, or system.
      2. Agrees to provide the same warranty for the substitution as for the specified product.
      3. Agrees to provide same or equivalent maintenance service and source of replacement parts, as applicable.
      4. Agrees to coordinate installation and make changes to other work that may be required for the work to be complete, with no additional cost to Owner.
      5. Waives claims for additional costs or time extension that may subsequently become apparent.
      6. Agrees to reimburse Owner and Architect for review or redesign services associated with re-approval by authorities.
   B. A Substitution Request for specified installer constitutes a representation that the submitter:
      1. Has acted in good faith to obtain services of specified installer, but was unable to come to commercial, or other terms.
C. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents. Burden of proof is on Contractor.

1. Show compliance with requirements for substitutions and the following, as applicable.
   a. Statement indicating why specified material or product cannot be provided.
   b. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
   c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
   d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
   e. Samples, where applicable or requested.
   f. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
   g. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
   h. Research/evaluation reports evidencing compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.
   i. Detailed comparison of Contractor’s Construction Schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer’s letterhead, stating lack of availability or delays in delivery.
   j. Cost information, including a proposal of change, if any, in the Contract Sum.
   k. Contractor’s certification that proposed substitution complies with requirements in the Contract Documents and is appropriate for applications indicated.
   l. Contractor’s waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

2. Note explicitly any non-compliant characteristics.

3. Product Presentation: If requested by Architect, conduct a presentation at the Architect’s office to prove appropriateness to the specified product.

D. Content: Include information necessary for tracking the status of each Substitution Request, and information necessary to provide an actionable response.

1. Forms indicated in the Project Manual are adequate for this purpose, and must be used.

E. Limit each request to a single proposed substitution item.

1. Submit an electronic document, combining the request form with supporting data into single document.

3.02 SUBSTITUTION PROCEDURES DURING PROCUREMENT

A. Submittal Time Restrictions:

1. Owner will consider requests for substitutions only if submitted as “Voluntary Substitution” submitted with a bid.

2. Substitutions submitted by Bidders at the time of “Bid Submission” to the Construction Manager as “Voluntary Substitutions” will be considered during the Bidding review. If a substitution is accepted, an Addendum/Bulletin will be issued incorporating such substitution.

B. Submittal Form (before award of contract) to support “Voluntary Substitution” included with bid:
1. Submit substitution requests by completing CSI/CSC Form 1.5C - Substitution Request. See this form for additional information and instructions. Use only this form; other forms of submission are unacceptable.

3.03 SUBSTITUTION PROCEDURES DURING CONSTRUCTION

A. Submittal Form (after award of contract):
   1. Submit substitution requests by completing CSI/CSC Form 13.1A - Substitution Request (After Bidding/Negotiating). See this form for additional information and instructions. Use only this form; other forms of submission are unacceptable.

B. Submit request for Substitution for Cause within 14 days of discovery of need for substitution, but not later than 14 days prior to time required for review and approval by Architect, in order to stay on approved project schedule.

C. Submit request for Substitution for Convenience immediately upon discovery of its potential advantage to the project, but not later than 14 days prior to time required for review and approval by Architect, in order to stay on approved project schedule.
   1. In addition to meeting general documentation requirements, document how the requested substitution benefits the Owner through cost savings, time savings, greater energy conservation, or in other specific ways.
   2. Document means of coordinating of substitution item with other portions of the work, including work by affected subcontractors.
   3. Bear the costs engendered by proposed substitution of:
      a. Owner’s compensation to the Architect for any required redesign, time spent processing and evaluating the request.

D. Substitutions will not be considered under one or more of the following circumstances:
   1. When they are indicated or implied on shop drawing or product data submittals, without having received prior approval.
   2. Without a separate written request.
   3. When acceptance will require revisions to Contract Documents.

3.04 RESOLUTION

A. Architect may request additional information and documentation prior to rendering a decision. Provide this data in an expeditious manner.

B. Architect will notify Contractor in writing of decision to accept or reject request.
   1. Architect’s decision following review of proposed substitution will be noted on the submitted form.

3.05 ACCEPTANCE

A. Accepted substitutions change the work of the Project. They will be documented and incorporated into work of the project by Change Order, Construction Change Directive, Architectural Supplementary Instructions, or similar instruments provided for in the Conditions of the Contract.

3.06 CLOSEOUT ACTIVITIES

A. See Section 017800 - Closeout Submittals, for closeout submittals.

B. Include completed Substitution Request Forms as part of the Project record. Include both approved and rejected Requests.
SECTION 013000
ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL
1.01 SECTION INCLUDES
A. General administrative requirements.
B. Preconstruction meeting.
C. Site mobilization meeting.
D. Progress meetings.
E. Construction progress schedule.
F. Contractor's daily reports.
G. Coordination drawings.
H. Submittals for review, information, and project closeout.
I. Number of copies of submittals.
J. Requests for Information (RFI) procedures.
K. Submittal procedures.

1.02 RELATED REQUIREMENTS
A. Section 013216 - Construction Progress Schedule: Form, content, and administration of schedules.
B. Section 016000 - Product Requirements: General product requirements.
C. Section 017000 - Execution and Closeout Requirements: Additional coordination requirements.
D. Section 017800 - Closeout Submittals: Project record documents; operation and maintenance data; warranties and bonds.

1.03 REFERENCE STANDARDS

1.04 GENERAL ADMINISTRATIVE REQUIREMENTS
A. Comply with requirements of Section 017000 - Execution and Closeout Requirements for coordination of execution of administrative tasks with timing of construction activities.
B. Make the following types of submittals to Architect:
   1. Requests for Information (RFI).
   2. Requests for substitution.
   3. Shop drawings, product data, and samples.
   4. Test and inspection reports.
   5. Delegated Design data.
   6. Manufacturer's instructions and field reports.
   7. Applications for payment and change order requests.
   8. Progress schedules.
   9. Coordination drawings.
   10. Correction Punch List and Final Correction Punch List for Substantial Completion.
   11. Closeout submittals.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION
3.01 PRECONSTRUCTION MEETING
A. Schedule meeting after Notice of Award.
B. Attendance Required:
   1. Owner.
   3. Contractor.

C. Agenda:
   1. Execution of Owner-Contractor Agreement.
   2. Submission of executed bonds and insurance certificates.
   4. Submission of list of subcontractors, list of products, schedule of values, and progress schedule.
   5. Submission of initial Submittal schedule.
   7. Procedures and processing of field decisions, submittals, substitutions, applications for payments, Change Orders, inspection requests, post approval documents and Contract closeout procedures.
   8. Scheduling.

D. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

3.02 SITE MOBILIZATION MEETING

A. Schedule meeting at the Project site prior to Contractor occupancy.

B. Attendance Required:
   1. Contractor.
   2. Owner.
   3. Architect.
   4. Contractor's superintendent.

C. Agenda:
   1. Use of premises by Owner and Contractor.
   2. Owner's requirements.
   3. Construction facilities and controls provided by Owner.
   4. Temporary utilities provided by Owner.
   5. Survey and building layout.
   7. Schedules.
   8. Application for payment procedures.
   9. Procedures for testing and inspections and coordination with field personnel.
   11. Requirements for start-up of equipment.
   12. Inspection and acceptance of equipment put into service during construction period.

D. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

3.03 PROGRESS MEETINGS

A. Schedule and administer meetings throughout progress of the work at maximum bi-monthly intervals.

B. Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.

C. Attendance Required:
   1. Contractor.
   2. Owner.
3. Architect.
4. Special consultants.
5. Contractor's superintendent.

D. Agenda:
1. Review minutes of previous meetings.
2. Review of work progress.
3. Field observations, problems, and decisions.
4. Identification of problems that impede, or will impede, planned progress.
5. Review of submittals schedule and status of submittals.
6. Maintenance of progress schedule.
7. Corrective measures to regain projected schedules.
8. Planned progress during succeeding work period.
10. Effect of proposed changes on progress schedule and coordination.
11. Other business relating to work.

E. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

3.04 CONSTRUCTION PROGRESS SCHEDULE
A. Within 10 days after date of the Agreement, submit preliminary schedule defining planned operations for the first 60 days of work, with a general outline for remainder of work.
B. If preliminary schedule requires revision after review, submit revised schedule within 10 days.
C. Within 20 days after review of preliminary schedule, submit draft of proposed complete schedule for review.
   1. Include written certification that major contractors have reviewed and accepted proposed schedule.
D. Within 10 days after joint review, submit complete schedule.
E. Submit updated schedule with each Application for Payment.

3.05 DAILY CONSTRUCTION REPORTS
A. Include only factual information. Do not include personal remarks or opinions regarding operations and/or personnel.
B. In addition to transmitting electronically a copy to Owner and Architect, submit two printed copies at weekly intervals.
   1. Submit in format acceptable to Owner.
C. Prepare a daily construction report recording the following information concerning events at Project site and project progress:
   1. Date.
   2. High and low temperatures, and general weather conditions.
   3. List of subcontractors at Project site.
   4. List of separate contractors at Project site.
   5. Safety, environmental, or industrial relations incidents.
   6. Meetings and significant decisions.
   7. Stoppages, delays, shortages, and losses. Include comparison between scheduled work activities (in Contractor's most recently updated and published schedule) and actual activities. Explain differences, if any. Note days or periods when no work was in progress and explain the reasons why.
   8. Directives and requests of Authority(s) Having Jurisdiction (AHJ).
   9. Change Orders received and implemented.
10. Testing and/or inspections performed.
11. Signature of Contractor's authorized representative.

3.06 COORDINATION DRAWINGS
A. Provide information required by Project Coordinator for preparation of coordination drawings.
B. Review drawings prior to submission to Architect.

3.07 REQUESTS FOR INFORMATION (RFI)
A. Definition: A request seeking one of the following:
   1. An interpretation, amplification, or clarification of some requirement of Contract Documents arising from inability to determine from them the exact material, process, or system to be installed; or when the elements of construction are required to occupy the same space (interference); or when an item of work is described differently at more than one place in Contract Documents.
   2. A resolution to an issue which has arisen due to field conditions and affects design intent.
B. Whenever possible, request clarifications at the next appropriate project progress meeting, with response entered into meeting minutes, rendering unnecessary the issuance of a formal RFI.
C. Preparation: Prepare an RFI immediately upon discovery of a need for interpretation of Contract Documents. Failure to submit a RFI in a timely manner is not a legitimate cause for claiming additional costs or delays in execution of the work.
   1. Prepare a separate RFI for each specific item.
      a. Review, coordinate, and comment on requests originating with subcontractors and/or materials suppliers.
      b. Do not forward requests which solely require internal coordination between subcontractors.
   2. Prepare in a format and with content acceptable to Owner.
      a. Use AIA G716 - Request for Information.
   3. Combine RFI and its attachments into a single electronic file. PDF format is preferred.
D. Reason for the RFI: Prior to initiation of an RFI, carefully study all Contract Documents to confirm that information sufficient for their interpretation is definitely not included.
   1. Include in each request Contractor's signature attesting to good faith effort to determine from Contract Documents information requiring interpretation.
   2. Unacceptable Uses for RFIs: Do not use RFIs to request the following:
      a. Approval of submittals (use procedures specified elsewhere in this section).
      b. Approval of substitutions (see Section - 016000 - Product Requirements).
      d. Different methods of performing work than those indicated in the Contract Drawings and Specifications (comply with provisions of the Conditions of the Contract).
   3. Improper RFIs: Requests not prepared in compliance with requirements of this section, and/or missing key information required to render an actionable response. They will be returned without a response, with an explanatory notation.
   4. Frivolous RFIs: Requests regarding information that is clearly indicated on, or reasonably inferable from, Contract Documents, with no additional input required to clarify the question. They will be returned without a response, with an explanatory notation.
      a. The Owner reserves the right to assess the Contractor for the costs (on time-and-materials basis) incurred by the Architect, and any of its consultants, due to processing of such RFIs.
E. Content: Include identifiers necessary for tracking the status of each RFI, and information necessary to provide an actionable response.
   1. Official Project name and number, and any additional required identifiers established in Contract Documents.
2. Owner's, Architect's, and Contractor's names.
3. Discrete and consecutive RFI number, and descriptive subject/title.
4. Issue date, and requested reply date.
5. Reference to particular Contract Document(s) requiring additional information/interpretation. Identify pertinent drawing and detail number and/or specification section number, title, and paragraph(s).
6. Annotations: Field dimensions and/or description of conditions which have engendered the request.
7. Contractor's suggested resolution: A written and/or a graphic solution, to scale, is required in cases where clarification of coordination issues is involved, for example; routing, clearances, and/or specific locations of work shown diagrammatically in Contract Documents. If applicable, state the likely impact of the suggested resolution on Contract Time or the Contract Sum.

F. Attachments: Include sketches, coordination drawings, descriptions, photos, submittals, and other information necessary to substantiate the reason for the request.

G. RFI Log: Prepare and maintain a tabular log of RFIs for the duration of the project.
   1. Indicate current status of every RFI. Update log promptly and on a regular basis.
   2. Note dates of when each request is made, and when a response is received.
   3. Highlight items requiring priority or expedited response.
   4. Highlight items for which a timely response has not been received to date.
   5. Identify and include improper or frivolous RFIs.

H. Review Time: Architect will respond and return RFIs to Contractor within 5 working days of receipt. For the purpose of establishing the start of the mandated response period, RFIs received after 12:00 noon will be considered as having been received on the following regular working day.
   1. Response period may be shortened or lengthened for specific items, subject to mutual agreement, and recorded in a timely manner in progress meeting minutes.

I. Responses: Content of answered RFIs will not constitute in any manner a directive or authorization to perform extra work or delay the project. If in Contractor's belief it is likely to lead to a change to Contract Sum or Contract Time, promptly issue a notice to this effect, and follow up with an appropriate Change Order request to Owner.
   1. Response may include a request for additional information, in which case the original RFI will be deemed as having been answered, and an amended one is to be issued forthwith. Identify the amended RFI with an R suffix to the original number.
   2. Do not extend applicability of a response to specific item to encompass other similar conditions, unless specifically so noted in the response.
   3. Upon receipt of a response, promptly review and distribute it to all affected parties, and update the RFI Log.
   4. Notify Architect within seven calendar days if an additional or corrected response is required by submitting an amended version of the original RFI, identified as specified above.

3.08 SUBMITTAL SCHEDULE

A. Submit to Architect for review a schedule for submittals in tabular format.
   1. Submit at the same time as the preliminary schedule.
      a. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
      b. Submit revised submittal schedule to reflect changes in current status and timing for submittals concurrently with the first complete submittal of Contractor's construction schedule.
   2. Coordinate with Contractor's construction schedule and schedule of values.
3. Format schedule to allow tracking of status of submittals throughout duration of construction.
4. Arrange information to include scheduled date for initial submittal, specification number and title, submittal category (for review or for information), description of item of work covered, role and name of subcontractor, and scheduled date of fabrication.
5. Account for time required for preparation, review, manufacturing, fabrication and delivery when establishing submittal delivery and review deadline dates.
   a. For assemblies, equipment, systems comprised of multiple components and/or requiring detailed coordination with other work, allow for additional time to make corrections or revisions to initial submittals, and time for their review.

3.09 SUBMITTALS FOR REVIEW
   A. When the following are specified in individual sections, submit them for review:
      1. Product data.
      2. Shop drawings.
      3. Samples for selection.
      4. Samples for verification.
   B. Submit to Architect for review for the limited purpose of checking for compliance with information given and the design concept expressed in Contract Documents.
   C. Samples will be reviewed for aesthetic, color, or finish selection.
   D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 017800 - Closeout Submittals.

3.10 SUBMITTALS FOR INFORMATION
   A. When the following are specified in individual sections, submit them for information:
      1. Design data.
      2. Sustainability design submittals and reports.
      3. Certificates.
      4. Test reports.
      5. Inspection reports.
      6. Manufacturer’s instructions.
      7. Manufacturer’s field reports.
      8. Qualification data.
      9. Maintenance data.
     10. Other types indicated.
   B. Submit for Architect’s knowledge as contract administrator or for Owner.

3.11 SUBMITTALS FOR PROJECT CLOSEOUT
   A. Submit Correction Punch List for Substantial Completion.
   B. Submit Final Correction Punch List for Substantial Completion.
   C. When the following are specified in individual sections, submit them at project closeout in compliance with requirements of Section 017800 - Closeout Submittals:
      1. Project record documents.
      2. Operation and maintenance data.
      3. Warranties.
     5. Other types as indicated.
   D. Submit for Owner’s benefit during and after project completion.

Dallas County IPTV System Upgrade
Project No.: 2020-DC048-113
03/30/2023
Administrative Requirements
013000 - 6
3.12 NUMBER OF COPIES OF SUBMITTALS

A. Electronic Documents: Submit one electronic copy in PDF format via e-mail; an electronically-marked up file will be returned. Create PDFs at native size and right-side up; illegible files will be rejected.

1. Contractor shall retain one copy of file as an electronic Project record document file at the Project Site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

B. Samples: Submit the number specified in individual specification sections; one of which will be retained by Architect.

1. After review, produce duplicates.
2. Retained samples will not be returned to Contractor unless specifically so stated.

3.13 SUBMITTAL PROCEDURES

A. General Requirements:

1. Use a separate transmittal for each item.
2. Submission of separate specification sections in one submittal is not allowed unless materials specified in separate sections are integral to the submittal.
3. Submit separate packages of submittals for review and submittals for information, when included in the same specification section.
4. Transmit using approved form.

a. Refer to Section 013300.03, "Administrative Requirements, Appendix 03", for a sample transmittal form that contains all information required. The sample transmittal form is available in Microsoft Word format for Contractor's use. Contractor's form may be used if all required information is provided.
5. Sequentially identify each item. For revised submittals use original number and a sequential numerical suffix.
6. Identify: Project; Contractor; subcontractor or supplier; pertinent drawing and detail number; and specification section number and article/paragraph, as appropriate on each copy.
7. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction work, and coordination of information is in accordance with the requirements of the work and Contract Documents.

a. Submittals from sources other than the Contractor, or without Contractor's stamp will not be acknowledged, reviewed, or returned.
8. Deliver or transmit submittal on date noted in submittal schedule, unless an earlier date has been agreed to by all affected parties, and is of the benefit to the project. Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Transmittal must be electronically signed by the Contractor certifying submittal, to the best of the Contractor's knowledge, is in compliance with Contract Documents except as noted. Architect will return without review submittals received from sources other than Contractor.

a. Place a permanent label or title block on each submittal item for identification.
b. Refer to Appendix 013300.02, "Contractor's Submittal Label Information", for sample label. Sample is shown completely filled out for clarification. Size of label is optional but all information shown shall be included and shall be easily read.
c. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
d. Deliver hard copy or sample submittals to Architect at business address; Attention: Contract Administration.
e. Send submittals in electronic format via email to Architect.
9. Schedule submittals to expedite the Project, and coordinate submission of related items. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
   a. For each submittal and re-submittal for review, allow 10 working days excluding delivery time to and from the Contractor.
   b. For sequential reviews involving Architect's consultants, Owner, or another affected party, allow an additional 7 working days.
      1) Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
   c. For sequential reviews involving approval from authorities having jurisdiction (AHJ), in addition to Architect's approval, allow an additional 30 calendar days.
   d. Submittals received by 10:00 am will be marked as received on that day. Submittals received after 10:00 am will be marked as received on the next working day.

10. Identify variations from Contract Documents and product or system limitations that may be detrimental to successful performance of the completed work.

11. Identify options requiring selection by Architect.

12. Provide space on label or beside title block for Contractor review stamps. Include the following information for processing and recording action taken:
   a. Project name.
   b. Architect's project number and Owner's account/project number, if applicable.
   c. Date.
   d. Name and address of Architect.
   e. Name and address of Contractor.
   f. Name and address of subcontractor.
   g. Name and address of supplier.
   h. Name of manufacturer.
   i. Number and title of appropriate Specification Section.
   j. Drawing number and detail references, as appropriate.
   k. Name of drawing preparer not initials.
   l. Name of person and company preparing submittals.
   m. Other necessary identification.

13. When revised for resubmission, identify all changes made since previous submission.
   a. Reviewing of resubmitted Shop Drawings by the Architect shall be limited to required corrections only, and the Contractor or Subcontractor by resubmitting shall be held to represent that the resubmitted Shop Drawings contain no other alterations, additions or deletions. If additional changes have been made, same shall be specifically noted and described on the Shop Drawing and/or in the covering transmittal.
   b. Architect’s services beyond those stipulated in the Owner/Architect Agreement may be a cause for the Owner to impose reimbursement by the Contractor for these additional services performed by the Architect. As a guide to establish limits of these services and provide a base for the Contractor to use in preparing its Bid, the following limits shall apply:
      1) Up to two (2) reviews for each Shop Drawing, Product Data item, Sample and similar submittals.

14. Distribute reviewed submittals. Instruct parties to promptly report inability to comply with requirements.

15. Incomplete submittals will not be reviewed, unless they are partial submittals for distinct portion(s) of the work, and have received prior approval for their use.

16. Submittals not requested will be recognized, and will be returned "Submittal Not Requested (SNR)".
17. Fabrication commenced prior to completion of review by Architect shall be at the sole risk of the Contractor.

B. Product Data Procedures:
1. Submit only information required by individual specification sections.
2. Collect required information into a single submittal.
3. Submit concurrently with related shop drawing submittal unless partial submittals for portions of the Work are indicated on approved submittal schedule.
4. Do not submit (Material) Safety Data Sheets for materials or products.
   a. Submit Material Data Safety Sheets to Owner if requested.
5. Submit sustainable design reporting submittals under separate cover.

C. Shop Drawing Procedures:
1. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting Contract Documents and coordinating related work.
2. Use of reproductions of Contract Documents in digital data form to create shop drawings is only permitted with Architect approval.
3. Generic, non-project-specific information submitted as shop drawings do not meet the requirements for shop drawings.

D. Samples Procedures:
1. Transmit related items together as single package.
2. Identify each item to allow review for applicability in relation to shop drawings showing installation locations.
3. Include with transmittal high-resolution image files of samples to facilitate electronic review and approval. Provide separate submittal page for each item image.

3.14 SUBMITTAL REVIEW

A. Submittals for Review: Architect will review each submittal, and approve, or take other appropriate action.

B. Submittals for Information: Architect will acknowledge receipt, but will take no other action.

C. Architect's actions will be reflected by marking each returned submittal using virtual stamp on electronic submittals.
   1. Refer to Section 013300.01, "Administrative Requirements Appendix 01", for sample action stamp.
   2. Notations may be made directly on submitted items and/or listed on appended Submittal Review cover sheet.

D. Architect's and consultants' actions on items submitted for review:
   1. Authorizing purchasing, fabrication, delivery, and installation:
      a. "Reviewed (R)", or language with same legal meaning.
      1) Proceed on Basis of Information Received.
      b. "Reviewed as Noted (RAN)", or language with same legal meaning.
      1) Proceed on Basis of Revised Information Noted.
      c. "Reviewed and Resubmit for Record (RRR)", or language with same legal meaning.
      1) Resubmit corrected item, with review notations acknowledged and incorporated. Resubmit separately, or as part of project record documents.
      d. "Submittal Not Requested, Not Reviewed (SNR)", or language with same legal meaning.
   2. Not Authorizing fabrication, delivery, and installation:
      a. "Provide as Specified (PAS)".
      1) Work shall not proceed based on non-specified information submitted. Resubmit.
      b. "Revise and Resubmit (RR)".
1) Work shall not proceed based on information submitted. Resubmit.

E. Architect's and consultants' actions on items submitted for information:
   1. Items for which no action was taken:
      a. "Received" - to notify the Contractor that the submittal has been received for record only.
   2. Items for which action was taken:
      a. "Reviewed" - no further action is required from Contractor.

END OF SECTION 013000
SECTION 013000.01 - ADMINISTRATIVE REQUIREMENTS APPENDIX 01

ARCHITECT’S ACTION STAMP SAMPLE

END OF SECTION 013000.01
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SECTION 013000.02 - ADMINISTRATIVE REQUIREMENTS APPENDIX 02

CONTRACTOR'S SUBMITTAL LABEL INFORMATION SAMPLE

<table>
<thead>
<tr>
<th>Project</th>
<th>Project Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Architect's Project No.</td>
<td>XXXX-XXXXX-XXX</td>
</tr>
<tr>
<td>Date</td>
<td>XX/XX/2022</td>
</tr>
<tr>
<td>Architect</td>
<td>HED</td>
</tr>
<tr>
<td></td>
<td>26913 Northwestern Hwy., Suite. 200 Southfield, Michigan 48033</td>
</tr>
<tr>
<td>General Contractor (Construction Manager)</td>
<td>ABC Construction Co.</td>
</tr>
<tr>
<td>Address, phone number</td>
<td>6574 Wings</td>
</tr>
<tr>
<td></td>
<td>Troy, Michigan 48123</td>
</tr>
<tr>
<td></td>
<td>810-666-4321</td>
</tr>
<tr>
<td>Subcontractor</td>
<td>Do-It Right</td>
</tr>
<tr>
<td>Address, phone number</td>
<td>9876 Falls St.</td>
</tr>
<tr>
<td></td>
<td>Orion, Michigan 48233</td>
</tr>
<tr>
<td></td>
<td>810-693-9753</td>
</tr>
<tr>
<td>Supplier/Manufacturer</td>
<td>Good Doors</td>
</tr>
<tr>
<td>Address, phone number</td>
<td>425 Small St.</td>
</tr>
<tr>
<td></td>
<td>Detroit, Michigan 48255</td>
</tr>
<tr>
<td></td>
<td>313-555-4444</td>
</tr>
<tr>
<td>Drawn By (name, not initials)</td>
<td>Jane Doe</td>
</tr>
<tr>
<td>Specification No. and Title</td>
<td>081113, Hollow Metal Doors and Frames</td>
</tr>
<tr>
<td>Drawing No.</td>
<td>A-5 and A-6</td>
</tr>
<tr>
<td>Detail Reference (if applicable)</td>
<td>9/A-5</td>
</tr>
<tr>
<td>Name of person and company preparing submittal</td>
<td>John Smith</td>
</tr>
<tr>
<td></td>
<td>ABC Construction Co.</td>
</tr>
</tbody>
</table>

END OF SECTION 013000.02
PART 1 GENERAL

1.01 SECTION INCLUDES
A. Preliminary schedule.

1.02 RELATED SECTIONS
A. Section 011000 - Summary: Work sequence.

1.03 SUBMITTALS
A. Within 10 days after date of Agreement, submit preliminary schedule.
B. If preliminary schedule requires revision after review, submit revised schedule within 10 days.

1.04 SCHEDULE FORMAT
A. Listings: In chronological order according to the start date for each activity. Identify each activity with the applicable specification section number.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PRELIMINARY SCHEDULE
A. Prepare preliminary schedule in the form of a horizontal bar chart.

3.02 CONTENT
A. Show complete sequence of construction by activity, with dates for beginning and completion of each element of construction.
B. Identify each item by specification section number.
C. Show accumulated percentage of completion of each item, and total percentage of Work completed, as of the first day of each month.
D. Provide legend for symbols and abbreviations used.

3.03 BAR CHARTS
A. Include a separate bar for each major portion of Work or operation.
B. Identify the first work day of each week.

3.04 REVIEW AND EVALUATION OF SCHEDULE
A. Participate in joint review and evaluation of schedule with Architect at each submittal.
B. Evaluate project status to determine work behind schedule and work ahead of schedule.
C. After review, revise as necessary as result of review, and resubmit within 10 days.

3.05 UPDATING SCHEDULE
A. Maintain schedules to record actual start and finish dates of completed activities.
B. Indicate progress of each activity to date of revision, with projected completion date of each activity.
C. Annotate diagrams to graphically depict current status of Work.
D. Identify activities modified since previous submittal, major changes in Work, and other identifiable changes.
E. Indicate changes required to maintain Date of Substantial Completion.
F. Submit reports required to support recommended changes.
3.06 DISTRIBUTION OF SCHEDULE

A. Distribute copies of updated schedules to Contractor's project site file, to subcontractors, suppliers, Architect, Owner, and other concerned parties.

B. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in schedules.

END OF SECTION 013216
SECTION 013553
SECURITY PROCEDURES

PART 1 GENERAL
1.01 SECTION INCLUDES
A. Security measures including entry control, personnel identification, guard service, and miscellaneous restrictions.

1.02 RELATED REQUIREMENTS
A. Section 011000 - Summary: use of premises and occupancy.

1.03 SECURITY PROGRAM
A. Protect Work, existing premises and Owner’s operations from theft, vandalism, and unauthorized entry.
B. Initiate program in coordination with Owner's existing security system at project mobilization.

1.04 ENTRY CONTROL
A. Restrict entrance of persons and vehicles into Project site and existing facilities.
B. Allow entrance only to authorized persons with proper identification.
C. Maintain log of workers and visitors entering into the County premises, make available to Owner on request.
D. All hand tools and personal equipment must be taken by workers, kept safe in a secure and locked space away from easy access, or when leaving the project site.

1.05 PERSONNEL IDENTIFICATION
A. All contractors and sub-contractors workers will need to fill out Dallas County Sheriff's Department Security Check Form
B. Provide identification badge to each person authorized to enter premises.
C. Badge To Include: Personal photograph, name, assigned number, expiration date and employer.
D. Maintain a list of accredited persons, submit copy to Owner on request.
E. Require return of badges at expiration of their employment on the Work.

1.06 GUARD SERVICE
A. Owner to provide Employ uniformed armed guard service to provide watch persons at site during contractor crews working hours.
B. All contractor's crews will need to be escorted at all times.

1.07 RESTRICTIONS
A. Work hours limited between the hours of 7:00 am and 4:00 pm. Monday thru Friday.
B. Do no work on Saturdays or Sundays.

PART 2 PRODUCTS - NOT USED
PART 3 EXECUTION - NOT USED
END OF SECTION 013553
PART 1 GENERAL

1.01 SECTION INCLUDES
A. Submittals.
B. Quality assurance.
C. References and standards.
D. Testing and inspection agencies and services.
E. Contractor's design-related professional design services.
F. Control of installation.
G. Mock-ups.
H. Tolerances.
I. Manufacturers' field services.
J. Defect Assessment.

1.02 RELATED REQUIREMENTS
A. Section 013000 - Administrative Requirements: Submittal procedures.
B. Section 014216 - Definitions.
C. Section 016000 - Product Requirements: Requirements for material and product quality.

1.03 DEFINITIONS
A. Contractor's Quality Control Plan: Contractor's management plan for executing the Contract for Construction.
B. Contractor's Professional Delegated Design Services: Design of some aspect or portion of the project by party other than the design professional of record. Provide these services as part of the Contract for Construction.
   1. Design Services Types Required:
      a. Design-Related: Design services explicitly required to be performed by another design professional due to highly-technical and/or specialized nature of a portion of the project. Services primarily involve engineering analysis, calculations, and design, and are not intended to alter the aesthetic aspects of the design.
   C. Delegated Design Data: Design-related, signed and sealed drawings, calculations, specifications, certifications, shop drawings and other submittals provided by Contractor, and prepared directly by, or under direct supervision of, appropriately licensed design professional.

1.04 CONTRACTOR'S DESIGN-RELATED PROFESSIONAL DESIGN SERVICES
A. Coordination: Contractor's professional design services are subject to requirements of project's Conditions for Construction Contract.
B. Base design on performance and/or design criteria indicated in individual specification sections.
   1. Submit a Request for Interpretation to Architect if the criteria indicated are not sufficient to perform required design services.
C. Scope of Contractor's Professional Design Services: Provide for the following items of work:
   1. Structural Design of Metal Framing: As described in Section 054000 - Cold-Formed Metal Framing.
   2. Structural Design of Metal Fabrications: As described in Section 055000 - Metal Fabrications.
   3. Structural Design of Stairs: As described in Section 055100 - Metal Stairs.
4. Structural Design of Railings: As described in Section 055213 - Pipe and Tube Railings.
5. Structural Calculations: As described in Section 074213.23 - Metal Composite Material Wall Panels.
6. Structural Design: Include physical characteristics, engineering calculations, and resulting dimensional limitations as described in Section 084313 - Aluminum-Framed Storefronts.
7. Structural Design: Include calculations for resisting wind loads, anchor locations, loads at points of attachment to building structure, physical characteristics, resulting dimensional limitations as described in Section 084413 - Glazed Aluminum Curtain Walls.
8. Structural Design: Include calculations for resisting wind loads, anchor locations, loads at points of attachment to building structure, physical characteristics, resulting dimensional limitations as described in Section 084426 - Structural Glass Curtain Walls.
9. Structural Design: Include calculations for resisting wind loads, physical characteristics, resulting dimensional limitations as described in Section 086300 - Metal-Framed Skylights.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Delegated Designer's Qualification Statement: Submit for Architect's knowledge as contract administrator, or for Owner's information.
   1. Include information for each individual professional responsible for producing, or supervising production of, design-related professional services provided by Contractor.
      a. Full name.
      b. Professional licensure information.
      c. Statement addressing extent and depth of experience specifically relevant to design of items assigned to Contractor.

C. Delegated Design Data: Submit for Architect's knowledge as contract administrator for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents, or for Owner's information.
   1. Include calculations that have been used to demonstrate compliance to performance and regulatory criteria provided, and to determine design solutions.
   2. Include required product data and shop drawings.
   3. Include a statement or certification attesting that design data complies with criteria indicated, such as building codes, loads, functional, and similar engineering requirements.
   4. Include signature and seal of design professional responsible for allocated design services on calculations and drawings.

D. Test Reports: After each test/inspection, promptly submit two copies of report to Architect and to Contractor.
   1. Include:
      a. Date issued.
      b. Project title and number.
      c. Name of inspector.
      d. Date and time of sampling or inspection.
      e. Identification of product and specifications section.
      f. Location in the Project.
      g. Type of test/inspection.
      h. Date of test/inspection.
      i. Results of test/inspection.
      j. Compliance with Contract Documents.
      k. When requested by Architect, provide interpretation of results.
2. Test report submittals are for Architect's knowledge as contract administrator for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents, or for Owner's information.

E. Certificates: When specified in individual specification sections, submit certification by the manufacturer and Contractor or installation/application subcontractor to Architect, in quantities specified for Product Data.
   1. Indicate material or product complies with or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
   2. Certificates may be recent or previous test results on material or product, but must be acceptable to Architect.

F. Manufacturer's Instructions: When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, for the Owner's information. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

G. Manufacturer's Field Reports: Submit reports for Architect's benefit as contract administrator or for Owner.
   1. Submit for information for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents.

H. Erection Drawings: Submit drawings for Architect's benefit as contract administrator or for Owner.
   1. Submit for information for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents.

1.06 QUALITY ASSURANCE

A. Testing Agency Qualifications:
   1. Prior to start of work, submit agency name, address, and telephone number, and names of full time registered Engineer and responsible officer.

B. Designer Qualifications: Where professional engineering design services and design data submittals are specifically required of Contractor by Contract Documents, provide services of a Professional Engineer experienced in design of this type of work and licensed in the State in which the Project is located.

1.07 REFERENCES AND STANDARDS

A. For products and workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. Comply with reference standard of date of issue current on date of Contract Documents, except where a specific date is established by applicable code.

C. Obtain copies of standards where required by product specification sections.

D. Maintain copy at project site during submittals, planning, and progress of the specific work, until Substantial Completion.

E. Should specified reference standards conflict with Contract Documents, request clarification from Architect before proceeding.

F. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of Architect shall be altered from Contract Documents by mention or inference otherwise in any reference document.

1.08 TESTING AND INSPECTION AGENCIES AND SERVICES

A. Owner will employ and pay for services of an independent testing agency to perform specified testing.

Dallas County IPTV System Upgrade

Project No.: 2020-DC048-113

Quality Requirements

03/30/2023
B. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.

B. Comply with manufacturers' instructions, including each step in sequence.

C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.

D. Comply with specified standards as minimum quality for the work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Have work performed by persons qualified to produce required and specified quality.

F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.

G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

3.02 MOCK-UPS

A. Before installing portions of the Work where mock-ups are required, construct mock-ups in location and size indicated for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work. The purpose of mock-up is to demonstrate the proposed range of aesthetic effects and workmanship.

B. Accepted mock-ups establish the standard of quality the Architect will use to judge the Work.

C. Integrated Exterior Mock-ups: Construct integrated exterior mock-up as indicated on drawings. Coordinate installation of exterior envelope materials and products as required in individual Specification Sections. Provide adequate supporting structure for mock-up materials as necessary.

D. Room Mock-ups: Construct room mock-ups as indicated on drawings. Coordinate installation of materials, products, and assemblies as required in specification sections; finish according to requirements. Provide required lighting and any supplemental lighting where required to enable Architect to evaluate quality of the mock-up.

E. Notify Architect fifteen (15) working days in advance of dates and times when mock-ups will be constructed.

F. Provide supervisory personnel who will oversee mock-up construction. Provide workers that will be employed during the construction at Project.

G. Tests shall be performed under provisions identified in this section and identified in the respective product specification sections.

H. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.

I. Obtain Architect's approval of mock-ups before starting work, fabrication, or construction.
   1. Architect will issue written comments within seven (7) working days of initial review and each subsequent follow up review of each mock-up.
   2. Make corrections as necessary until Architect's approval is issued.

J. Architect will use accepted mock-ups as a comparison standard for the remaining Work.

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K. Where mock-up has been accepted by Architect and is specified in product specification sections to be removed, protect mock-up throughout construction, remove mock-up and clear area when directed to do so by Architect.

L. Where possible salvage and recycle the demolished mock-up materials.

3.03 TOLERANCES
A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.
B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Architect before proceeding.
C. Adjust products to appropriate dimensions; position before securing products in place.

3.04 TESTING AND INSPECTION
A. See individual specification sections for testing and inspection required.
B. Testing Agency Duties:
   2. Perform specified sampling and testing of products in accordance with specified standards.
   3. Ascertain compliance of materials and mixes with requirements of Contract Documents.
   4. Promptly notify Architect and Contractor of observed irregularities or non-compliance of Work or products.
   5. Perform additional tests and inspections required by Architect.
   6. Submit reports of all tests/inspections specified.
C. Limits on Testing/Inspection Agency Authority:
   1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
   2. Agency may not approve or accept any portion of the Work.
   3. Agency may not assume any duties of Contractor.
   4. Agency has no authority to stop the Work.
D. Contractor Responsibilities:
   1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
   2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
   3. Provide incidental labor and facilities:
      a. To provide access to Work to be tested/inspected.
      b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
      c. To facilitate tests/inspections.
      d. To provide storage and curing of test samples.
   4. Notify Architect and laboratory 24 hours prior to expected time for operations requiring testing/inspection services.
   5. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
   6. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
E. Re-testing required because of non-compliance with specified requirements shall be performed by the same agency on instructions by Architect.
F. Re-testing required because of non-compliance with specified requirements shall be paid for by Contractor.

3.05 MANUFACTURERS' FIELD SERVICES
   A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust, and balance equipment as applicable, and to initiate instructions when necessary.
   B. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

3.06 DEFECT ASSESSMENT
   A. Replace Work or portions of the Work not complying with specified requirements.
   B. If, in the opinion of Architect, it is not practical to remove and replace the work, Architect will direct an appropriate remedy or adjust payment.

END OF SECTION 014000
SECTION 014100
REGULATORY REQUIREMENTS

PART 1 GENERAL

1.01 SUMMARY OF REFERENCE STANDARDS

A. Regulatory requirements applicable to this project are the following:
   E. ICC (IFC) - International Fire Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
   G. ICC (IBC) - International Building Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
   H. ICC (IPC) - International Plumbing Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
   I. ICC (IMC) - International Mechanical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
   J. ICC (IFGC) - International Fuel Gas Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
   K. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.02 RELATED REQUIREMENTS

A. Section 014000 - Quality Requirements.

1.03 QUALITY ASSURANCE

A. Contractor's Designer Qualifications: Refer to Section - 014000 - Quality Requirements.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION 014100
PART 1 GENERAL

1.01 SUMMARY
A. This section supplements the definitions contained in the General Conditions.
B. Other definitions are included in individual specification sections.

1.02 DEFINITIONS
A. Furnish: To supply, deliver, unload, and inspect for damage.
B. Install: To unpack, assemble, erect, apply, place, finish, cure, protect, clean, start up, and make ready for use.
C. Product: Material, machinery, components, equipment, fixtures, and systems forming the work result. Not materials or equipment used for preparation, fabrication, conveying, or erection and not incorporated into the work result. Products may be new, never before used, or re-used materials or equipment.
D. Project Manual: The book-sized volume that includes the procurement requirements (if any), the contracting requirements, and the specifications.
E. Provide: To furnish and install.
F. Supply: Same as Furnish.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION 014216
SECTION 015000
TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Temporary telecommunications services.
B. Security requirements.
C. Waste removal facilities and services.

1.02 RELATED REQUIREMENTS

A. Section 015100 - Temporary Utilities.
B. Section 015213 - Field Offices and Sheds.
C. Section 015500 - Vehicular Access and Parking.
D. Section 015813 - Temporary Project Signage.

1.03 REFERENCE STANDARDS


1.04 QUALITY ASSURANCE

A. Qualifications, Construction Waste Personnel: Workers shall be well trained and oriented in specified construction waste requirements as specified hereinafter.
B. Regulatory Requirements:
   1. Use only disposal sites, recycling facilities, and waste material processors that are properly permitted by the state and local authorities having jurisdiction in which the Project is located.

1.05 TEMPORARY UTILITIES - SEE SECTION 015100

A. Owner will provide the following:
   1. Electrical power, consisting of connection to existing facilities.
B. Provide and pay for all electrical power, lighting, water, heating and cooling, and ventilation required for construction purposes.
C. Existing facilities may be used.
D. Use trigger-operated nozzles for water hoses, to avoid waste of water.

1.06 TELECOMMUNICATIONS SERVICES

A. Provide, maintain, and pay for telecommunications services to field office at time of project mobilization.
B. Telecommunications services shall include:
   1. Windows-based personal computer dedicated to project telecommunications, with necessary software and laser printer.
   2. Telephone Land Lines: One line, minimum; one handset per line.
   3. Internet Connections: Minimum of one; DSL modem or faster.

1.07 TEMPORARY SANITARY FACILITIES

A. Use of existing facilities is permitted.
B. Maintain daily in clean and sanitary condition.
C. At end of construction, return facilities to same or better condition as originally found.
1.08 BARRIERS
A. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public, to allow for owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations and demolition.
B. Provide barricades and covered walkways required by governing authorities for public rights-of-way and for public access to existing building.
C. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

1.09 SECURITY - SEE SECTION 013553
A. Provide security and facilities to protect Work, existing facilities, and Owner's operations from unauthorized entry, vandalism, or theft.
B. Coordinate with Owner's security program.

1.10 VEHICULAR ACCESS AND PARKING - SEE SECTION 015500
A. Coordinate access and haul routes with governing authorities and Owner.
B. Provide and maintain access to fire hydrants, free of obstructions.
C. Provide means of removing mud from vehicle wheels before entering streets.
D. Provide temporary parking areas to accommodate construction personnel. When site space is not adequate, provide additional off-site parking.
E. Existing parking areas may be used for construction parking.

1.11 WASTE REMOVAL
A. See Section 017419 - Construction Waste Management and Disposal, for additional requirements.
B. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.
C. Provide containers with lids. Remove trash from site periodically.
D. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.
E. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

1.12 PROJECT SIGNS - SEE SECTION 015813
1.13 FIELD OFFICES - SEE SECTION 015213
A. Office: Weather tight, with lighting, electrical outlets, heating, cooling equipment, and equipped with sturdy furniture, drawing rack, and drawing display table.
B. Provide space for Project meetings, with table and chairs to accommodate 6 persons.
C. Locate offices a minimum distance of 30 feet (10 m) from existing and new structures.

PART 2 PRODUCTS - NOT USED
PART 3 EXECUTION - NOT USED

END OF SECTION 015000
SECTION 015213
FIELD OFFICES AND SHEDS

PART 1 GENERAL
1.01 SECTION INCLUDES
   A. Temporary field offices for use of Contractor.

1.02 RELATED REQUIREMENTS
   A. Section 011000 - Summary: use of premises and responsibility for providing field offices.
   B. Section 015000 - Temporary Facilities and Controls:
      1. Temporary telecommunications services for administrative purposes.

1.03 USE OF EXISTING FACILITIES
   A. Designated existing spaces may be used for field offices.

PART 2 PRODUCTS
2.01 CONTRACTOR OFFICE AND FACILITIES
   A. Size: For Contractor's needs and to provide space for project meetings.
   B. Telephone: As specified in Section 015000.
   C. Furnishings in Meeting Area: Conference table and chairs to seat at least eight persons; racks and files for Contract Documents, submittals, and project record documents.
   D. Other Furnishings: Contractor's option.

PART 3 EXECUTION
3.01 INSTALLATION
   A. Install office spaces ready for occupancy 15 days after date fixed in Notice to Proceed.

3.02 MAINTENANCE AND CLEANING
   A. Weekly janitorial services for offices; periodic cleaning and maintenance for offices.
   B. Maintain approach walks free of mud, water, and snow.

END OF SECTION 015213
SECTION 015500
VEHICULAR ACCESS AND PARKING

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Access roads.
B. Parking.
C. Existing pavements and parking areas.
D. Permanent pavements and parking facilities.
E. Construction parking controls.
F. Haul routes.
G. Traffic signs and signals.
H. Maintenance.
I. Removal, repair.
J. Mud from site vehicles.

1.02 RELATED REQUIREMENTS
A. Section 011000 - Summary: For access to site, work sequence, and occupancy.

PART 2 PRODUCTS

PART 3 EXECUTION

3.01 ACCESS ROADS
A. Use of existing on-site streets and driveways for construction traffic is permitted.
B. Location as indicated.

3.02 PARKING
A. Use of designated areas of existing parking facilities by construction personnel is permitted.
B. Arrange for temporary parking areas to accommodate use of construction personnel.

3.03 CONSTRUCTION PARKING CONTROL
A. Control vehicular parking to prevent interference with public traffic and parking, access by emergency vehicles, and Owner's operations.
B. Monitor parking of construction personnel's vehicles in existing facilities. Maintain vehicular access to and through parking areas.
C. Prevent parking on or adjacent to access roads or in non-designated areas.

3.04 MAINTENANCE
A. Maintain traffic and parking areas in a sound condition free of excavated material, construction equipment, products, mud, snow, and ice.
B. Maintain existing paved areas used for construction; promptly repair breaks, potholes, low areas, standing water, and other deficiencies, to maintain paving and drainage in original, or specified, condition.

3.05 REMOVAL, REPAIR
A. Repair existing facilities damaged by use, to original condition.
B. Remove equipment and devices when no longer required.
C. Repair damage caused by installation.
3.06 MUD FROM SITE VEHICLES

A. Provide means of removing mud from vehicle wheels before entering streets.

END OF SECTION 015500
SECTION 016000
PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. General product requirements.
B. Re-use of existing products.
C. Transportation, handling, storage and protection.
D. Product option requirements.
E. Substitution limitations.
F. Procedures for Owner-supplied products.
G. Maintenance materials, including extra materials, spare parts, tools, and software.

1.02 RELATED REQUIREMENTS

A. Section 012500 - Substitution Procedures: Substitutions made during procurement and/or construction phases.
B. Section 014000 - Quality Requirements: Product quality monitoring.

1.03 SUBMITTALS

A. Proposed Products List: Submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.
   1. Submit within 15 days after date of Agreement.
   2. For products specified only by reference standards, list applicable reference standards.
B. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
C. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
D. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
   1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

1.04 QUALITY ASSURANCE

A. Regional Materials: Materials that are extracted, harvested, recovered, and manufactured within a radius of 100 miles (160.9 Km) from the Project site.

PART 2 PRODUCTS

2.01 EXISTING PRODUCTS

A. Do not use materials and equipment removed from existing premises unless specifically required or permitted by Contract Documents.
B. Unforeseen historic items encountered remain the property of the Owner; notify Owner promptly upon discovery; protect, remove, handle, and store as directed by Owner.
C. Existing materials and equipment indicated to be removed, but not to be re-used, relocated, reinstalled, delivered to the Owner, or otherwise indicated as to remain the property of the Owner, become the property of the Contractor; remove from site.
D. Specific Products to be Reused: The reuse of certain materials and equipment already existing on the project site is not prohibited.
   1. If applicable, see drawings for list of items required to be salvaged for reuse and/or relocation.

2.02 NEW PRODUCTS
A. Provide new products unless specifically required or permitted by Contract Documents.
B. See Section 014000 - Quality Requirements, for additional source quality control requirements.
C. Use of products having any of the following characteristics is not permitted:
   1. Made using or containing CFC's or HCFC's.
   2. Containing lead, cadmium, or asbestos.

2.03 PRODUCT OPTIONS
A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.
B. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.
C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

2.04 MAINTENANCE MATERIALS
A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.
B. Deliver to Project site; obtain receipt prior to final payment.

PART 3 EXECUTION
3.01 SUBSTITUTION LIMITATIONS
A. See Section 012500 - Substitution Procedures.

3.02 OWNER-SUPPLIED PRODUCTS
A. Owner's Responsibilities:
   1. Arrange for and deliver Owner reviewed shop drawings, product data, and samples, to Contractor.
   2. Arrange and pay for product delivery to site.
   3. On delivery, inspect products jointly with Contractor.
   4. Submit claims for transportation damage and replace damaged, defective, or deficient items.
   5. Arrange for manufacturers' warranties, inspections, and service.
B. Contractor's Responsibilities:
   1. Review Owner reviewed shop drawings, product data, and samples.
   2. Receive and unload products at site; inspect for completeness or damage jointly with Owner.
   3. Handle, store, install and finish products.
   4. Repair or replace items damaged after receipt.

3.03 TRANSPORTATION AND HANDLING
A. Package products for shipment in manner to prevent damage; for equipment, package to avoid loss of factory calibration.
B. If special precautions are required, attach instructions prominently and legibly on outside of packaging.
C. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.

D. Transport and handle products in accordance with manufacturer's instructions.

E. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.

F. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.

G. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.

H. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.04 STORAGE AND PROTECTION

A. Provide protection of stored materials and products against theft, casualty, or deterioration.

B. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication. See Section 017419.
   1. Structural Loading Limitations: Handle and store products and materials so as not to exceed static and dynamic load-bearing capacities of project floor and roof areas.

C. Store and protect products in accordance with manufacturers' instructions.

D. Store with seals and labels intact and legible.

E. Store sensitive products in weathertight, climate-controlled enclosures in an environment favorable to product.

F. For exterior storage of fabricated products, place on sloped supports above ground.

G. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.

H. Comply with manufacturer's warranty conditions, if any.

I. Do not store products directly on the ground.

J. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.

K. Prevent contact with material that may cause corrosion, discoloration, or staining.

L. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

M. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.
SECTION 017000
EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Examination, preparation, and general installation procedures.
B. Requirements for alterations work, including selective demolition, except removal, disposal, and/or remediation of hazardous materials and toxic substances.
C. Pre-installation meetings.
D. Cutting and patching.
E. Surveying for laying out the work.
F. Cleaning and protection.
G. Starting of systems and equipment.
H. Demonstration and instruction of Owner personnel.
I. Closeout procedures, including Contractor's Correction Punch List, except payment procedures.
J. General requirements for maintenance service.

1.02 RELATED REQUIREMENTS

A. Section 013000 - Administrative Requirements: Submittals procedures.
B. Section 014000 - Quality Requirements: Testing and inspection procedures.
C. Section 017419 - Construction Waste Management and Disposal: Additional procedures for trash/waste removal, recycling, salvage, and reuse.
D. Section 017800 - Closeout Submittals: Project record documents, operation and maintenance data, warranties, and bonds.
E. Section 017900 - Demonstration and Training: Demonstration of products and systems to be commissioned and where indicated in specific specification sections
F. Section 024100 - Demolition: Demolition of whole structures and parts thereof; site utility demolition.
G. Section 078400 - Firestopping.

1.03 REFERENCE STANDARDS


1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.
B. Survey work: Submit name, address, and telephone number of Surveyor before starting survey work.
   1. On request, submit documentation verifying accuracy of survey work.
   2. Submit a copy of site drawing signed by the Land Surveyor, that the elevations and locations of the work are in compliance with Contract Documents.
   3. Submit surveys and survey logs for the project record.
C. Demolition Plan: Submit demolition plan as specified by OSHA and local authorities.
   1. Indicate extent of demolition, removal sequence, bracing and shoring, and location and construction of barricades and fences. Include design drawings and calculations for bracing and shoring.
   2. Identify demolition firm and submit qualifications.
3. Include a summary of safety procedures.

D. Cutting and Patching: Submit written request in advance of cutting or alteration that affects:
   1. Structural integrity of any element of Project.
   2. Integrity of weather exposed or moisture resistant element.
   3. Efficiency, maintenance, or safety of any operational element.
   5. Work of Owner or separate Contractor.

1.05 QUALIFICATIONS
   A. For demolition work, employ a firm specializing in the type of work required.
   B. For surveying work, employ a land surveyor registered in the State in which the Project is located and acceptable to Architect. Submit evidence of surveyor’s Errors and Omissions insurance coverage in the form of an Insurance Certificate. Employ only individual(s) trained and experienced in collecting and recording accurate data relevant to ongoing construction activities,
   C. For design of temporary shoring and bracing, employ a Professional Engineer experienced in design of this type of work and licensed in the State in which the Project is located.

1.06 QUALITY ASSURANCE
   A. Do not cut and patch structural work in a manner that could result in a reduction of load-carrying capacity or an increase in the structure’s deflection. Obtain approvals from the Owner, Engineer of Record and Architect before cutting and patching any structural member or assembly.
      1. EXCEPTION: Modifications to structural work done in accordance with specific details included in the Contract Documents stamped by the Engineer of Record and approved by the Authorities Having Jurisdiction in the State in which the Project is located.
   B. Do not cut and patch operational elements or safety related components in a manner resulting in a reduction of capacities to perform in a manner intended or resulting in a decreased operational life, increased maintenance, or decreased safety.

1.07 PROJECT CONDITIONS
   A. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.
   B. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere and over adjacent property.
      1. Provide dust-proof barriers between construction areas and areas continuing to be occupied by Owner.
   C. Noise Control: Provide methods, means, and facilities to minimize noise produced by construction operations.
      1. At All Times: Excessively noisy tools and operations will not be tolerated inside the building at any time of day; excessively noisy includes jackhammers.
   D. Pollution Control: Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations. Comply with federal, state, and local regulations.

1.08 COORDINATION
   A. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.
   B. Notify affected utility companies and comply with their requirements.
C. Verify that utility requirements and characteristics of new operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.

D. Coordinate space requirements, supports, and installation of mechanical and electrical work that are indicated diagrammatically on drawings. Follow routing indicated for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

E. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.

F. Coordinate completion and clean-up of work of separate sections.

G. After Owner occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

PART 2 PRODUCTS

2.01 PATCHING MATERIALS

A. New Materials: As specified in product sections; match existing products and work for patching and extending work.

B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.

C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 016000 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.

B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.

C. Examine and verify specific conditions described in individual specification sections.

D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.

E. Verify that utility services are available, of the correct characteristics, and in the correct locations.

F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

3.02 PREPARATION

A. Clean substrate surfaces prior to applying next material or substance.

B. Seal cracks or openings of substrate prior to applying next material or substance.

C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.03 PREINSTALLATION MEETINGS

A. When required in individual specification sections, convene a preinstallation meeting at the site prior to commencing work of the section.

B. Require attendance of parties directly affecting, or affected by, work of the specific section.
C. Notify Architect four days in advance of meeting date.
D. Prepare agenda and preside at meeting:
   1. Review conditions of examination, preparation and installation procedures.
   2. Review coordination with related work.
E. Record minutes and distribute copies within two days after meeting to participants, with two
   copies to Architect, Owner, participants, and those affected by decisions made.

3.04 LAYING OUT THE WORK
A. Verify locations of survey control points prior to starting work.
B. Promptly notify Architect of any discrepancies discovered.
C. Contractor shall locate and protect survey control and reference points.
D. Control datum for survey is that established by Owner provided survey.
E. Protect survey control points prior to starting site work; preserve permanent reference points
   during construction.
F. Promptly report to Architect the loss or destruction of any reference point or relocation required
   because of changes in grades or other reasons.
G. Replace dislocated survey control points based on original survey control. Make no changes
   without prior written notice to Architect.
H. Utilize recognized engineering survey practices.
I. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar
   appropriate means:
   1. Site improvements including pavements; stakes for grading, fill and topsoil placement;
      utility locations, slopes, and invert elevations.
   2. Grid or axis for structures.
   3. Building foundation, column locations, ground floor elevations.
J. Periodically verify layouts by same means.
K. Maintain a complete and accurate log of control and survey work as it progresses.
L. On completion of foundation walls and major site improvements, prepare a certified survey
   illustrating dimensions, locations, angles, and elevations of construction and site work.

3.05 GENERAL INSTALLATION REQUIREMENTS
A. In addition to compliance with regulatory requirements, conduct construction operations in
   compliance with NFPA 241, including applicable recommendations in Appendix A.
B. Install products as specified in individual sections, in accordance with manufacturer's
   instructions and recommendations, and so as to avoid waste due to necessity for replacement.
C. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.
D. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and
   horizontal lines, unless otherwise indicated.
E. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.
F. Make neat transitions between different surfaces, maintaining texture and appearance.

3.06 ALTERATIONS
A. Drawings showing existing construction and utilities are based on casual field observation and
   existing record documents only.
   1. Verify that construction and utility arrangements are as indicated.
   2. Report discrepancies to Architect before disturbing existing installation.
   3. Beginning of alterations work constitutes acceptance of existing conditions.
B. Keep areas in which alterations are being conducted separated from other areas that are still occupied.
   1. Provide, erect, and maintain temporary dustproof partitions.
   2. Provide sound retardant partitions of construction indicated on drawings.
C. Maintain weatherproof exterior building enclosure except for interruptions required for replacement or modifications; take care to prevent water and humidity damage.
   1. Where openings in exterior enclosure exist, provide construction to make exterior enclosure weatherproof.
   2. Insulate existing ducts or pipes that are exposed to outdoor ambient temperatures by alterations work.
D. Remove existing work as indicated and as required to accomplish new work.
   1. Remove rotted wood, corroded metals, and deteriorated masonry and concrete; replace with new construction specified.
   2. Remove items indicated on drawings.
   3. Relocate items indicated on drawings.
   4. Where new surface finishes are to be applied to existing work, perform removals, patch, and prepare existing surfaces as required to receive new finish; remove existing finish if necessary for successful application of new finish.
   5. Where new surface finishes are not specified or indicated, patch holes and damaged surfaces to match adjacent finished surfaces as closely as possible.
E. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications): Remove, relocate, and extend existing systems to accommodate new construction.
   1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components; if necessary, modify installation to allow access or provide access panel.
   2. Where existing systems or equipment are not active and Contract Documents require reactivation, put back into operational condition; repair supply, distribution, and equipment as required.
   3. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
      a. Disable existing systems only to make switchovers and connections; minimize duration of outages.
      b. Provide temporary connections as required to maintain existing systems in service.
   4. Verify that abandoned services serve only abandoned facilities.
   5. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification; patch holes left by removal using materials specified for new construction.
F. Protect existing work to remain.
   1. Prevent movement of structure; provide shoring and bracing if necessary.
   2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
   3. Repair adjacent construction and finishes damaged during removal work.
G. Adapt existing work to fit new work: Make as neat and smooth transition as possible.
   1. When existing finished surfaces are cut so that a smooth transition with new work is not possible, terminate existing surface along a straight line at a natural line of division and make recommendation to Architect.
   2. Where removal of partitions or walls results in adjacent spaces becoming one, rework floors, walls, and ceilings to a smooth plane without breaks, steps, or bulkheads.
3. Where a change of plane of 1/4 inch (6 mm) or more occurs in existing work, submit recommendation for providing a smooth transition for Architect review and request instructions.

4. Trim existing wood doors as necessary to clear new floor finish. Refinish trim as required.

H. Patching: Where the existing surface is not indicated to be refinished, patch to match the surface finish that existed prior to cutting. Where the surface is indicated to be refinished, patch so that the substrate is ready for the new finish.

I. Refinish existing surfaces as indicated:
   1. Where rooms or spaces are indicated to be refinished, refinish all visible existing surfaces to remain to the specified condition for each material, with a neat transition to adjacent finishes.
   2. If mechanical or electrical work is exposed accidentally during the work, re-cover and refinish to match.
   3. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
      a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
      b. Restore damaged pipe covering to its original condition.
   4. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
      a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
   5. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.

J. Clean existing systems and equipment.

K. Remove demolition debris and abandoned items from alterations areas and dispose of off-site; do not burn or bury.

L. Do not begin new construction in alterations areas before demolition is complete.

M. Comply with all other applicable requirements of this section.

3.07 CUTTING AND PATCHING

A. Whenever possible, execute the work by methods that avoid cutting or patching.

B. See Alterations article above for additional requirements.

C. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.

D. Perform whatever cutting and patching is necessary to:
   1. Complete the work.
   2. Fit products together to integrate with other work.
   3. Provide openings for penetration of mechanical, electrical, and other services.
   4. Match work that has been cut to adjacent work.
   5. Repair areas adjacent to cuts to required condition.
   6. Repair new work damaged by subsequent work.
   7. Remove samples of installed work for testing when requested.
8. Remove and replace defective and non-complying work.

E. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.

F. Employ skilled and experienced installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.

G. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.

H. Restore work with new products in accordance with requirements of Contract Documents.

I. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

J. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with Section 078400, to full thickness of the penetrated element.

K. Patching:
   1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
   2. Match color, texture, and appearance.
   3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

3.08 PROGRESS CLEANING

A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.

B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.

C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.

D. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

E. Collect and remove waste materials, debris, and trash/rubbish from site periodically and dispose off-site; do not burn or bury.

F. Waste Disposal: Do not wash waste materials down sewers or into waterways.

3.09 PROTECTION OF INSTALLED WORK

A. Protect installed work from damage by construction operations.

B. Provide special protection where specified in individual specification sections.

C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.

D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.

E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

F. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.

G. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.
3.10 SYSTEM STARTUP
A. Coordinate schedule for start-up of various equipment and systems.
B. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions that may cause damage.
C. Start all equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
D. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
E. Verify that wiring and support components for equipment are complete and tested.
F. Execute start-up under supervision of applicable Contractor personnel and manufacturer's representative in accordance with manufacturers' instructions.
G. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.
H. Submit a written report that equipment or system has been properly installed and is functioning correctly.

3.11 DEMONSTRATION AND INSTRUCTION
A. See Section 017900 - Demonstration and Training.
B. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owner's personnel in detail to explain all aspects of operation and maintenance.
C. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.

3.12 ADJUSTING
A. Adjust operating products and equipment to ensure smooth and unhindered operation.
B. Testing, adjusting, and balancing HVAC systems: See Section 230593 - Testing, Adjusting, and Balancing for HVAC.

3.13 FINAL CLEANING
A. Use cleaning materials that are nonhazardous.
B. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.
C. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.
D. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
E. Clean filters of operating equipment.
F. Clean debris from roofs, gutters, downspouts, scuppers, overflow drains, area drains, and drainage systems.
G. Clean site; sweep paved areas, rake clean landscaped surfaces.
H. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

3.14 CLOSEOUT PROCEDURES
A. Make submittals that are required by governing or other authorities.
1. Provide copies to Architect and Owner.
B. Accompany Project Coordinator on preliminary inspection to determine items to be listed for completion or correction in the Contractor's Correction Punch List for Contractor's Notice of Substantial Completion.

C. Notify Architect when work is considered ready for Architect's Substantial Completion inspection.

D. Submit written certification containing Contractor's Correction Punch List, that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Architect's Substantial Completion inspection.

E. Conduct Substantial Completion inspection and create Final Correction Punch List containing Architect's and Contractor's comprehensive list of items identified to be completed or corrected and submit to Architect.

F. Correct items of work listed in Final Correction Punch List and comply with requirements for access to Owner-occupied areas.

G. Notify Architect when work is considered finally complete and ready for Architect's Substantial Completion final inspection.

H. Complete Items of work determined by Architect listed in executed Certificate of Substantial Completion.

3.15 MAINTENANCE

A. Provide service and maintenance of components indicated in specification sections.

B. Maintenance Period: As indicated in specification sections or, if not indicated, not less than one year from the Date of Substantial Completion or the length of the specified warranty, whichever is longer.

C. Examine system components at a frequency consistent with reliable operation. Clean, adjust, and lubricate as required.

D. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original component.

E. Maintenance service shall not be assigned or transferred to any agent or subcontractor without prior written consent of the Owner.

END OF SECTION 017000
SECTION 017419
CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 GENERAL

1.01 WASTE MANAGEMENT REQUIREMENTS

A. Owner requires that this project generate the least amount of trash and waste possible.
B. Employ processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors.
C. Minimize trash/waste disposal in landfills; reuse, salvage, or recycle as much waste as economically feasible.
D. Required Recycling, Salvage, and Reuse: The following may not be disposed of in landfills or by incineration:
   1. Aluminum and plastic beverage containers.
   2. Corrugated cardboard.
   3. Wood pallets.
   4. Clean dimensional wood.
   5. Metals, including packaging banding, metal studs, sheet metal, structural steel, piping, reinforcing bars, door frames, and other items made of steel, iron, galvanized steel, stainless steel, aluminum, copper, zinc, lead, brass, and bronze.
E. Contractor shall submit periodic Waste Disposal Reports; all landfill disposal, incineration, recycling, salvage, and reuse must be reported regardless of to whom the cost or savings accrues; use the same units of measure on all reports.
F. Contractor shall develop and follow a Waste Management Plan designed to implement these requirements.
G. The following sources may be useful in developing the Waste Management Plan:
H. Methods of trash/waste disposal that are not acceptable are:
   1. Burning on the project site.
   2. Burying on the project site.
   3. Dumping or burying on other property, public or private.
   4. Other illegal dumping or burying.
I. Regulatory Requirements: Contractor is responsible for knowing and complying with regulatory requirements, including but not limited to Federal, state and local requirements, pertaining to legal disposal of all construction and demolition waste materials.

1.02 RELATED REQUIREMENTS

A. Section 013000 - Administrative Requirements: Additional requirements for project meetings, reports, submittal procedures, and project documentation.
B. Section 016000 - Product Requirements: Waste prevention requirements related to delivery, storage, and handling.
C. Section 017000 - Execution and Closeout Requirements: Trash/waste prevention procedures related to demolition, cutting and patching, installation, protection, and cleaning.

1.03 DEFINITIONS

A. Clean: Untreated and unpainted; not contaminated with oils, solvents, caulk, or the like.
B. Construction and Demolition Waste: Solid wastes typically including building materials, packaging, trash, debris, and rubble resulting from construction, remodeling, repair and demolition operations.
C. Hazardous: Exhibiting the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity or reactivity.
D. Nonhazardous: Exhibiting none of the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity, or reactivity.

E. Nontoxic: Neither immediately poisonous to humans nor poisonous after a long period of exposure.

F. Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product for reuse by others.

G. Recycle: To remove a waste material from the project site to another site for remanufacture into a new product for reuse by others.

H. Recycling: The process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for the purpose of using the altered form. Recycling does not include burning, incinerating, or thermally destroying waste.

I. Return: To give back reusable items or unused products to vendors for credit.

J. Reuse: To reuse a construction waste material in some manner on the project site.

K. Salvage: To remove a waste material from the project site to another site for resale or reuse by others.

L. Sediment: Soil and other debris that has been eroded and transported by storm or well production run-off water.

M. Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become waste.

N. Toxic: Poisonous to humans either immediately or after a long period of exposure.

O. Trash: Any product or material unable to be reused, returned, recycled, or salvaged.

P. Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Submit Waste Management Plan within 10 calendar days after receipt of Notice of Award of Bid, or prior to any trash or waste removal, whichever occurs sooner; submit projection of all trash and waste that will require disposal and alternatives to landfilling.

C. Waste Management Plan: Include the following information:
   1. Analysis of the trash and waste projected to be generated during the entire project construction cycle, including types and quantities.
   2. Landfill Options: The name, address, and telephone number of the landfill(s) where trash/waste will be disposed of, the applicable landfill tipping fee(s), and the projected cost of disposing of all project trash/waste in the landfill(s).
   3. Landfill Alternatives: List all waste materials that will be diverted from landfills by reuse, salvage, or recycling.
   4. Meetings: Describe regular meetings to be held to address waste prevention, reduction, recycling, salvage, reuse, and disposal.
   5. Materials Handling Procedures: Describe the means by which materials to be diverted from landfills will be protected from contamination and prepared for acceptance by designated facilities; include separation procedures for recyclables, storage, and packaging.
   6. Transportation: Identify the destination and means of transportation of materials to be recycled; i.e. whether materials will be site-separated and self-hauled to designated centers, or whether mixed materials will be collected by a waste hauler.

D. Waste Disposal Reports: Submit at specified intervals, with details of quantities of trash and waste, means of disposal or reuse, and costs; show both totals to date and since last report.
1. Submit updated Report with each Application for Progress Payment; failure to submit Report will delay payment.
2. Submit Report on a form acceptable to Owner.
3. Landfill Disposal: Include the following information:
   a. Identification of material.
   b. Amount, in tons or cubic yards (cubic meters), of trash/waste material from the project disposed of in landfills.
   c. State the identity of landfills, total amount of tipping fees paid to landfill, and total disposal cost.
   d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.
4. Incinerator Disposal: Include the following information:
   a. Identification of material.
   b. Amount, in tons or cubic yards (cubic meters), of trash/waste material from the project delivered to incinerators.
   c. State the identity of incinerators, total amount of fees paid to incinerator, and total disposal cost.
   d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.
5. Recycled and Salvaged Materials: Include the following information for each:
   a. Identification of material, including those retrieved by installer for use on other projects.
   b. Amount, in tons or cubic yards (cubic meters), date removed from the project site, and receiving party.
   c. Transportation cost, amount paid or received for the material, and the net total cost or savings of salvage or recycling each material.
   d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.
   e. Certification by receiving party that materials will not be disposed of in landfills or by incineration.
6. Material Reused on Project: Include the following information for each:
   a. Identification of material and how it was used in the project.
   b. Amount, in tons or cubic yards (cubic meters).
   c. Include weight tickets as evidence of quantity.
7. Other Disposal Methods: Include information similar to that described above, as appropriate to disposal method.

PART 2 PRODUCTS

2.01 PRODUCT SUBSTITUTIONS

A. See Section 016000 - Product Requirements for substitution submission procedures.
B. For each proposed product substitution, submit the following information in addition to requirements specified in Section 016000:
   1. Relative amount of waste produced, compared to specified product.
   2. Cost savings on waste disposal, compared to specified product, to be deducted from the Contract Sum.

PART 3 EXECUTION

3.01 WASTE MANAGEMENT PROCEDURES

A. See Section 013000 for additional requirements for project meetings, reports, submittal procedures, and project documentation.
B. See Section 016000 for waste prevention requirements related to delivery, storage, and handling.
C. See Section 017000 for trash/waste prevention procedures related to demolition, cutting and patching, installation, protection, and cleaning.

3.02 WASTE MANAGEMENT PLAN IMPLEMENTATION
A. Manager: Designate an on-site person or persons responsible for instructing workers and overseeing and documenting results of the Waste Management Plan.
B. Communication: Distribute copies of the Waste Management Plan to job site foreman, each subcontractor, Owner, and Architect.
C. Instruction: Provide on-site instruction of appropriate separation, handling, and recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the project.
D. Meetings: Discuss trash/waste management goals and issues at project meetings.
   1. Prebid meeting.
   2. Preconstruction meeting.
   3. Regular job-site meetings.
E. Facilities: Provide specific facilities for separation and storage of materials for recycling, salvage, reuse, return, and trash disposal, for use by all contractors and installers.
   1. Provide containers as required.
   2. Provide adequate space for pick-up and delivery and convenience to subcontractors.
   3. Keep recycling and trash/waste bin areas neat and clean and clearly marked in order to avoid contamination of materials.
F. Hazardous Wastes: Separate, store, and dispose of hazardous wastes according to applicable regulations.
G. Recycling: Separate, store, protect, and handle at the site identified recyclable waste products in order to prevent contamination of materials and to maximize recyclability of identified materials. Arrange for timely pickups from the site or deliveries to recycling facility in order to prevent contamination of recyclable materials.
H. Reuse of Materials On-Site: Set aside, sort, and protect separated products in preparation for reuse.
I. Salvage: Set aside, sort, and protect products to be salvaged for reuse off-site.

END OF SECTION 017419
PART 1 GENERAL

1.01 SECTION INCLUDES
   A. Temporary protective coverings for installed floors, walls, and other surfaces.

1.02 RELATED REQUIREMENTS

1.03 REFERENCE STANDARDS
   A. ANSI A135.4 - Basic Hardboard 2012 (Reaffirmed 2020).

1.04 SUBMITTALS
   A. See Section 013000 - Administrative Requirements for submittal procedures.
   B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes available; and installation instructions.
   C. Shop Drawings: Indicate existing finished surfaces to be protected.

PART 2 PRODUCTS

2.01 GENERAL
   A. Provide materials that are easily removed without damage to the surfaces covered and with the following characteristics:
      1. Water resistant.
      2. Vapor permeable.
      3. Impact resistant.
      4. Slip resistant.
      5. Flame retardant.

2.02 MATERIALS
   A. Sheet Materials:
      2. Recycled paperboard/plastic composite sheet.
      3. Recycled paperboard sheet.
      4. Wood Hardboard: ANSI A135.4, tempered, 1/4 inch (6 mm) thick nominal.
      5. Plywood, 1/2 inch (13 mm) thick nominal.
      6. Fiberboard: ASTM C208, 1/2 inch (13 mm) thick nominal.
      7. Flame Retardance: Meet requirements of NFPA 701.
      8. Surface Burning Characteristics: Maximum flame spread index of 25 and smoke developed index of 450; when system tested in accordance with ASTM E84.

   B. Rolled Materials:
      2. Recycled cellulose fiberboard paper.
      3. Flame Retardance: Meet requirements of NFPA 701.
      4. Surface Burning Characteristics: Maximum flame spread index of 25 and smoke developed index of 450; when system tested in accordance with ASTM E84.

   C. Corner and Door Jamb Protection Materials:
      1. Cardboard, shaped specifically for application.
2. PVC plastic.
   D. Tape: Type recommended by protective covering material manufacturer.

PART 3 EXECUTION

3.01 PREPARATION
   A. Remove dirt and debris from surfaces to be protected.

3.02 INSTALLATION
   A. Install in accordance with manufacturer's instructions.
   B. Trim or overlap sheet materials to fit area to be covered.
   C. Roll out and cut rolled materials to fit area to be covered.
   D. Stretch self-adhering film materials to completely cover surface.

3.03 REMOVAL
   A. Remove protective coverings prior to Date of Substantial Completion. Reuse or recycle
      materials if possible.

END OF SECTION 017610
SECTION 017800
CLOSEOUT SUBMITTALS

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Project record documents.
B. Operation and maintenance data.
C. Warranties and bonds.

1.02 RELATED REQUIREMENTS
A. Section 013000 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.
B. Section 017000 - Execution and Closeout Requirements: Contract closeout procedures.
C. Individual Product Sections: Specific requirements for operation and maintenance data.
D. Individual Product Sections: Warranties required for specific products or Work.

1.03 SUBMITTALS
A. Project Record Documents: Submit documents to Architect with claim for final Application for Payment.
B. Operation and Maintenance Data:
   1. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within ten days after acceptance.
   2. Submit one copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Architect comments. Revise content of all document sets as required prior to final submission.
   3. Submit two sets of revised final documents in final form within 10 days after final inspection.
C. Warranties and Bonds:
   1. For equipment or component parts of equipment put into service during construction with Owner’s permission, submit documents within 10 days after acceptance.
   2. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.
   3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PROJECT RECORD DOCUMENTS
A. Maintain on site one set of the following record documents; record actual revisions to the Work:
   1. Drawings.
   2. Specifications.
   3. Addenda.
   4. Change Orders and other modifications to the Contract.
   5. Reviewed shop drawings, product data, and samples.
   6. Manufacturer's instruction for assembly, installation, and adjusting.
B. Ensure entries are complete and accurate, enabling future reference by Owner.
C. Store record documents separate from documents used for construction.
D. Record information concurrent with construction progress.
E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
   1. Manufacturer’s name and product model and number.
   2. Changes made by Addenda and modifications.
F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
   1. Field changes of dimension and detail.
   2. Details not on original Contract drawings.

3.02 OPERATION AND MAINTENANCE DATA
   A. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.
   B. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.
   C. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

3.03 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES
   A. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

3.04 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS
   A. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

3.05 ASSEMBLY OF OPERATION AND MAINTENANCE MANUALS
   A. Assemble operation and maintenance data into durable manuals for Owner's personnel use, with data arranged in the same sequence as, and identified by, the specification sections.
   B. Where systems involve more than one specification section, provide separate tabbed divider for each system.
   C. Binders: Commercial quality, 8-1/2 by 11 inch (216 by 280 mm) three D side ring binders with durable plastic covers; 2 inch (50 mm) maximum ring size. When multiple binders are used, correlate data into related consistent groupings.
   D. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.
   E. Project Directory: Title and address of Project; names, addresses, and telephone numbers of Architect, Consultants, Contractor and subcontractors, with names of responsible parties.
   F. Tables of Contents: List every item separated by a divider, using the same identification as on the divider tab; where multiple volumes are required, include all volumes Tables of Contents in each volume, with the current volume clearly identified.
   G. Dividers: Provide tabbed dividers for each separate product and system; identify the contents on the divider tab; immediately following the divider tab include a description of product and major component parts of equipment.
   H. Text: Manufacturer's printed data, or typewritten data on 20 pound paper.
   I. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.
3.06 WARRANTIES AND BONDS

A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial completion is determined.

B. Verify that documents are in proper form, contain full information, and are notarized.

C. Co-execute submittals when required.

D. Retain warranties and bonds until time specified for submittal.

END OF SECTION 017800
SECTION 017900
DEMONSTRATION AND TRAINING

PART 1 GENERAL

1.01 SUMMARY

A. Demonstration of products and systems to be commissioned and where indicated in specific specification sections.

B. Training of Owner personnel in operation and maintenance is required for:
   1. All software-operated systems.
   2. HVAC systems and equipment.
   3. Plumbing equipment.
   4. Electrical systems and equipment.
   5. Conveying systems.
   6. Landscape irrigation.

C. Training of Owner personnel in care, cleaning, maintenance, and repair is required for:
   1. Items specified in individual product Sections.

1.02 RELATED REQUIREMENTS

A. Section 017800 - Closeout Submittals: Operation and maintenance manuals.

1.03 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures; except:
   1. Make all submittals specified in this section, and elsewhere where indicated for commissioning purposes, directly to the Commissioning Authority.
   2. Submit one copy to the Commissioning Authority, not to be returned.
   3. Make commissioning submittals on time schedule specified by Commissioning Authority.
   4. Submittals indicated as "Draft" are intended for the use of the Commissioning Authority in preparation of overall Training Plan; submit in editable electronic format, Microsoft Word 2003 preferred.

B. Draft Training Plans: Owner will designate personnel to be trained; tailor training to needs and skill-level of attendees.
   1. Submit to Commissioning Authority for review and inclusion in overall training plan.
   2. Submit not less than four weeks prior to start of training.
   3. Revise and resubmit until acceptable.
   4. Provide an overall schedule showing all training sessions.
   5. Include at least the following for each training session:
      a. Identification, date, time, and duration.
      b. Description of products and/or systems to be covered.
      c. Name of firm and person conducting training; include qualifications.
      d. Intended audience, such as job description.
      e. Objectives of training and suggested methods of ensuring adequate training.
      f. Methods to be used, such as classroom lecture, live demonstrations, hands-on, etc.
      g. Media to be used, such as slides, hand-outs, etc.
      h. Training equipment required, such as projector, projection screen, etc., to be provided by Contractor.

C. Training Manuals: Provide training manual for each attendee; allow for minimum of two attendees per training session.
   1. Include applicable portion of O&M manuals.
   2. Include copies of all hand-outs, slides, overheads, video presentations, etc., that are not included in O&M manuals.
3. Provide one extra copy of each training manual to be included with operation and maintenance data.

1.04 QUALITY ASSURANCE
A. Instructor Qualifications: Familiar with design, operation, maintenance and troubleshooting of the relevant products and systems.
   1. Provide as instructors the most qualified trainer of those contractors and/or installers who actually supplied and installed the systems and equipment.
   2. Where a single person is not familiar with all aspects, provide specialists with necessary qualifications.

PART 2 PRODUCTS - NOT USED
PART 3 EXECUTION
3.01 DEMONSTRATION - GENERAL
A. Demonstrations conducted during system start-up do not qualify as demonstrations for the purposes of this section, unless approved in advance by Owner.
B. Demonstrations conducted during Functional Testing need not be repeated unless Owner personnel training is specified.
C. Demonstration may be combined with Owner personnel training if applicable.
D. Operating Equipment and Systems: Demonstrate operation in all modes, including start-up, shut-down, seasonal changeover, emergency conditions, and troubleshooting, and maintenance procedures, including scheduled and preventive maintenance.
   1. Perform demonstrations not less than two weeks prior to Substantial Completion.
   2. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.
E. Non-Operating Products: Demonstrate cleaning, scheduled and preventive maintenance, and repair procedures.
   1. Perform demonstrations not less than two weeks prior to Substantial Completion.

3.02 TRAINING - GENERAL
A. Commissioning Authority will prepare the Training Plan based on draft plans submitted.
B. Conduct training on-site unless otherwise indicated.
C. Owner will provide classroom and seating at no cost to Contractor.
D. Do not start training until Functional Testing is complete, unless otherwise specified or approved by the Commissioning Authority.
E. Provide training in minimum two hour segments.
F. The Commissioning Authority is responsible for determining that the training was satisfactorily completed and will provide approval forms.
G. Training schedule will be subject to availability of Owner's personnel to be trained; re-schedule training sessions as required by Owner; once schedule has been approved by Owner failure to conduct sessions according to schedule will be cause for Owner to charge Contractor for personnel "show-up" time.
H. Review of Facility Policy on Operation and Maintenance Data: During training discuss:
   1. The location of the O&M manuals and procedures for use and preservation; backup copies.
   2. Typical contents and organization of all manuals, including explanatory information, system narratives, and product specific information.
   3. Typical uses of the O&M manuals.
I. Product- and System-Specific Training:
1. Review the applicable O&M manuals.
2. For systems, provide an overview of system operation, design parameters and constraints, and operational strategies.
3. Review instructions for proper operation in all modes, including start-up, shut-down, seasonal changeover and emergency procedures, and for maintenance, including preventative maintenance.
4. Provide hands-on training on all operational modes possible and preventive maintenance.
5. Emphasize safe and proper operating requirements; discuss relevant health and safety issues and emergency procedures.
6. Discuss common troubleshooting problems and solutions.
7. Discuss any peculiarities of equipment installation or operation.
8. Discuss warranties and guarantees, including procedures necessary to avoid voiding coverage.
9. Review recommended tools and spare parts inventory suggestions of manufacturers.
10. Review spare parts and tools required to be furnished by Contractor.
11. Review spare parts suppliers and sources and procurement procedures.

J. Be prepared to answer questions raised by training attendees; if unable to answer during training session, provide written response within three days.

END OF SECTION 017900
PART 1 GENERAL

1.01 SECTION INCLUDES
A. Selective demolition of built site elements.
B. Selective demolition of building elements for alteration purposes.
C. Salvage of existing items to be reused or recycled.
D. Abandonment and removal of existing utilities and utility structures.

1.02 RELATED REQUIREMENTS
A. Section 011000 - Summary: Limitations on Contractor's use of site and premises.
B. Section 015000 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.
C. Section 016000 - Product Requirements: Handling and storage of items removed for salvage and relocation.
D. Section 017000 - Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products; temporary bracing and shoring.
E. Section 017419 - Construction Waste Management and Disposal: Limitations on disposal of removed materials; requirements for recycling.
F. Mechanical and Electrical Sections (Divisions 21 through 28) for demolition and cutting and patching requirements specified within them.

1.03 REFERENCE STANDARDS
B. ASSE A10.6 - Safety and Health Program Requirements for Demolition Operations 2006 (R2016).

1.04 SUBMITTALS
A. See Section 013000 - Administrative Requirements for submittal procedures.
C. Site Plan: Indicate:
   1. Areas for temporary construction and field offices.
D. Demolition Plan: Submit demolition plan as required by OSHA and local AHJs.
   1. Indicate extent of demolition, removal sequencing, bracing and shoring, and location and construction of barricades and fences.
   2. Identify demolition firm and submit qualifications, including qualifications for refrigerant recovery technician.
E. Pre-demolition Photographs or Video: Show existing conditions of adjoining construction, including finish surfaces, that might be misconstrued as damage caused by demolition operations. Submit before Work begins.
F. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.
G. Warranties: Documentation indicating that existing warranties are still in effect after completion of selective demolition.

H. Inventory: Submit a list of items that have been removed and salvaged.

I. Project Record Documents: Accurately record actual locations of capped and active utilities and subsurface construction.

1.05 QUALITY ASSURANCE
A. Demolition Firm Qualifications: Company specializing in the type of work required.
B. Professional Engineer Qualifications: Comply with Section 014000 - Quality Requirements.
C. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.

1.06 WARRANTY
A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials and using approved contractors so as not to void existing warranties. Notify warrantor before proceeding.
B. Notify warrantor on completion of selective demolition, and obtain documentation verifying that existing system has been inspected and warranty remains in effect. Submit documentation at Project closeout.

PART 2 PRODUCTS -- NOT USED
PART 3 EXECUTION
3.01 DEMOLITION
A. Remove portions of existing building as indicated on the Drawings.
B. Remove other items indicated, for salvage, relocation, and recycling.
C. Fill excavations, open pits, and holes in ground areas generated as result of removals, using specified fill; compact fill as required so that required rough grade elevations do not subside within one year after completion.

3.02 EXAMINATION
A. Verify that utilities have been disconnected and capped before starting selective demolition operations.
B. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.
C. Engage a professional engineer to perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective building demolition operations.
   1. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.
D. Verify that hazardous materials have been remediated before proceeding with building demolition operations.
E. Survey of Existing Conditions: Record existing conditions by use of measured drawings, pre-construction photographs or videos.
   1. Inventory and record the condition of items to be removed and salvaged. Provide photographs or video of conditions that might be misconstrued as damage caused by salvage operations.
3.03 PREPARATION

A. Refrigerant: Before starting demolition, remove refrigerant from mechanical equipment according to 40 CFR 82 and regulations of authorities having jurisdiction.

B. Dangerous materials: Drain, purge, or otherwise remove, collect, and dispose of chemicals, gases, explosives, acids, flammables, or other dangerous materials before proceeding with selective demolition operations.

3.04 GENERAL PROCEDURES AND PROJECT CONDITIONS

A. Comply with requirements in Section 017000.

B. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
   1. Obtain required permits.
   2. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
   3. Comply with applicable requirements of ASSE A10.6 and NFPA 241.
   4. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
   5. Provide, erect, and maintain temporary barriers and security devices.
   6. Use physical barriers to prevent access to areas that could be hazardous to workers or the public.
   7. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
   8. Do not close or obstruct roadways or sidewalks without permits from authority having jurisdiction.
   9. Conduct operations to minimize obstruction of public and private entrances and exits. Do not obstruct required exits at any time. Protect persons using entrances and exits from removal operations.
  10. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon, or limit access to their property.

C. Do not begin removal until receipt of notification to proceed from Owner.

D. Do not begin removal until built elements to be salvaged or relocated have been removed.

E. Protect existing structures and other elements to remain in place and not removed.
   1. Provide bracing and shoring.
   2. Prevent movement or settlement of adjacent structures.
   3. Stop work immediately if adjacent structures appear to be in danger.

F. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.

G. Cover and protect furniture, furnishings, and equipment that have not been removed.

H. Minimize production of dust due to demolition operations. Do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.
   1. Wet mop floors to eliminate trackable dirt and wipe down walls and doors of demolition enclosure. Vacuum carpeted areas.

I. Hazardous Materials:
   1. If hazardous materials are discovered during removal operations, stop work and notify Architect and Owner; hazardous materials include regulated asbestos containing materials, lead, PCBs, and mercury.

J. Perform demolition in a manner that maximizes salvage and recycling of materials.
1. Comply with requirements of Section 017419 - Construction Waste Management and Disposal.
2. Dismantle existing construction and separate materials.
3. Set aside reusable, recyclable, and salvageable materials; store and deliver to collection point or point of reuse.

K. Existing Utilities:
1. Refer to Divisions 21 through 28 Mechanical and Electrical Sections for shutting off, disconnecting, removing, and sealing or capping utilities. Do not start selective demolition work until utility disconnecting and sealing have been completed and verified in writing.
2. Coordinate work with utility companies. Notify utilities before starting work, comply with their requirements, and obtain required permits.
3. Protect existing utilities to remain from damage.
4. Do not disrupt public utilities without permit from authority having jurisdiction.
5. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to Owner.
   a. Owner will arrange to shut off indicated services/systems when requested by Contractor.
6. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 3 days prior written notification to Owner.
   a. Owner will arrange to shut off indicated services/systems when requested by Contractor.
7. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.
8. Remove exposed piping, valves, meters, equipment, supports, and foundations of disconnected and abandoned utilities.
9. Prepare building demolition areas by disconnecting and capping utilities outside the demolition zone. Identify and mark, in same manner as other utilities to remain, utilities to be reconnected.

L. Selective Demolition for Alterations:
1. Existing construction and utilities indicated on drawings are based on casual field observation and existing record documents only.
   a. Verify construction and utility arrangements are as indicated.
   b. Report discrepancies to Architect before disturbing existing installation.
   c. Beginning of demolition work constitutes acceptance of existing conditions that would be apparent upon examination prior to starting demolition.
2. Separate areas in which demolition is being conducted from areas that remain occupied.
   a. Provide, erect, and maintain temporary dustproof partitions.
   b. Provide sound retardant partitions of construction indicated on drawings.
   c. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from authorities having jurisdiction.
3. Maintain weatherproof exterior building enclosure, except for interruptions required for replacement or modifications; prevent water and humidity damage.
4. Remove existing work as indicated and required to accomplish new work.
   a. Remove rotted wood, corroded metals, and deteriorated masonry and concrete; replace with new construction indicated.
   b. Remove items indicated on drawings.
5. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications): Remove existing systems and equipment as indicated.
   a. Maintain existing active systems to remain in operation, and maintain access to equipment and operational components.
1) Maintain fire-protection facilities in service during selective demolition operations.

b. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.

c. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated on Drawings to be removed.
   1) Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
   2) Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material and leave in place.
   3) Equipment to Be Removed: Disconnect and cap services and remove equipment.
   4) Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
   5) Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
   6) Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
   7) Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material and leave in place.

d. Verify that abandoned services serve only abandoned facilities before removal.

e. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings. Remove back to source of supply where possible, otherwise cap stub and tag with identification.

6. Protect existing work to remain.
   a. Prevent movement of structure. Provide shoring and bracing as required.
   b. Perform cutting to accomplish removal work neatly and as specified for cutting new work.
   c. Repair adjacent construction and finishes damaged during removal work.
   d. Patch to match new work.

7. Comply with Owner's requirements for using and protecting elevators, stairs, walkways, loading docks, building entries, and other building facilities during selective demolition operations.

8. Removed and Salvaged Items:
   a. Clean salvaged items.
   b. Pack or crate items after cleaning. Identify contents of containers.
   c. Store items in a secure area until delivery to Owner.
   d. Transport items to Owner's storage area designated by Owner.
   e. Protect items from damage during transport and storage.

9. Removed and Reinstalled Items:
   a. Clean and repair items to functional condition adequate for intended reuse.
   b. Pack or crate items after cleaning and repairing. Identify contents of containers.
   c. Protect items from damage during transport and storage.
   d. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

10. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and reinstalled in their original locations after selective demolition operations are complete.
3.05 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

A. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, and then remove concrete between saw cuts.

B. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, and then remove masonry between saw cuts.

C. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, and then break up and remove.

D. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFC's "Recommended Work Practices for the Removal of Resilient Floor Coverings." Do not use methods requiring solvent-based adhesive strippers.

E. Roofing: Remove no more existing roofing than what can be covered in one day by new roofing and so that building interior remains watertight and weathertight. See Division 7 Sections for new roofing requirements.
   1. Remove existing roof membrane, flashings, copings, and roof accessories.
   2. Remove existing roofing system down to substrate.

3.06 PATCHING AND REPAIRS

A. General: Promptly repair damage to adjacent construction by selective demolition operations.

B. Patching: Comply with Section 017000 - Execution and Closeout Requirements.

C. Repairs: Where material to existing surfaces are required, patch to produce surfaces suitable for new materials.
   1. Completely fill holes and depressions in existing masonry walls that are to remain with an approved masonry patching material applied according to manufacturer’s written recommendations.

D. Finishes: Restore exposed finishes of patched areas and extend restoration into adjoining construction in a manner that eliminates evidence of patching and refinishing.

E. Floors and Walls: Where walls or partitions that are demolished extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish color, texture and appearance. Remove existing floor and wall coverings and replace with new materials if necessary, to achieve uniform color and appearance.
   1. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections of these Specifications.
   2. Where patching occurs over a painted surface, apply primer and intermediate paint coats over patch and apply final paint coat over entire unbroken surface containing patch. Provide additional coats until patch blends with adjacent surfaces.
   3. Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.

F. Ceilings: Patch, repair, or rehang existing ceilings as necessary to provide even-plane surface of uniform appearance.

G. Debris and Waste Removal:
   1. Remove debris, junk, and trash from site.
   2. Remove from site all materials not to be reused on site; do not burn or bury.
   3. Leave site in clean condition, ready for subsequent work.
   4. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION 024100
SECTION 078400
FIRESTOPPING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS
A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to work specified in this section.

1.02 DEFINITIONS
A. Firestopping: Material or combination of materials used to retain integrity of fire-rated construction by maintaining an effective barrier against the spread of flame, smoke, and hot gases through penetrations in, or construction joints between, fire-rated wall and floor assemblies. Firestopping or AHJ-approved equivalent materials may also be required at non-fire-rated construction to resist the free passage of flame and products of combustion.

1.03 GENERAL DESCRIPTION OF THE WORK OF THIS SECTION
A. Firestop systems shall be used in specific locations as follows:
   1. Penetrations for the passage of duct, cable, cable tray, conduit, piping, electrical busways and raceways through fire-rated vertical barriers (walls and partitions), horizontal barriers (floor/ceiling assemblies), and vertical service shaft walls and partitions.
   2. Openings and penetrations in fire-rated walls or partitions containing fire doors.
   3. Openings around structural members which penetrate fire-rated walls and fire-rated floors.
   4. Openings between structurally separate sections of fire-rated walls or fire-rated floors.
   5. Joints between the top of fire-rated walls or partitions and floor or roof assemblies.

B. Expansion and construction joints in fire-rated walls and fire-rated floors.
   1. Voids created at the intersection of floor slabs or fire-rated walls and exterior curtainwalls.
   2. Penetrations at non-fire resistance rated floors in two to five story buildings, except where enclosed in a shaft.

1.04 REFERENCES
A. Test Requirements: ASTM E 814, "Standard Method of Fire Tests of Through Penetration Fire Stops"
B. Test Requirements: UL 1479, "Fire Tests of Through-Penetration Firestops"
D. Underwriters Laboratories (UL) of Northbrook, IL publishes tested systems in their "FIRE RESISTANCE DIRECTORY" that is updated annually.
   1. UL Fire Resistance Directory:
      a. Firestop Devices (XHJI)
      b. Fire Resistance Ratings (BXRH)
      c. Through-Penetration Firestop Systems (XHEZ)
      d. Fill, Voids, or Cavity Material (XHHW)
      e. Forming Materials (XHKU)
      f. Joint Systems (XHBN)
      g. Perimeter Fire Containment Systems (XHDG)
G. Inspection Requirements: ASTM E 2174, "Standard Practice for On-site Inspection of Installed Fire Stops"
K. International Firestop Council Guidelines for Evaluating Firestop Systems Engineering Judgments
L. IBC - International Building Code
N. NFPA 70 - National Electric Code

1.05 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: Provide through-penetration fire stop systems and fire-resistive joint systems that comply with specified requirements of tested systems.
B. Firestop System installation must meet requirements of ASTM E2307 ASTM E814, UL 1479, ASTM E1966 or UL 2079 tested assemblies that provide a fire rating equal to that of construction being penetrated or joined.
C. Proposed fire stop materials and methods shall conform to applicable governing codes having local jurisdiction.
D. Firestop Systems do not reestablish the structural integrity of load bearing partitions/assemblies or support live loads and traffic. Installer shall consult the structural engineer prior to penetrating any load bearing assembly.
E. For those firestop applications that exist for which no qualified tested system is available through a manufacturer, an engineering judgment derived from similar qualified tested system designs or other tests will be submitted to local authorities having jurisdiction for their review and approval prior to installation. Engineering judgment documents must follow requirements set forth by the International Firestop Council.

1.06 SUBMITTALS

A. Product Data: Manufacturer's specifications and technical data for each material including the composition and limitations, documentation of qualified tested firestop systems to be used, and manufacturer's installation instructions.
B. UL or Intertek Classified Assembly Fire Resistance Designs with a table of contents.
C. Manufacturer's engineering judgment identification number and document details when no qualified tested system is available for an application. Engineering judgment must include both project name and contractor's name who will install firestop system as described in document.
D. Qualification Data: For Installer(s).
E. Field Quality-Control Inspection Reports.
F. Submit safety data sheets provided with product delivered to job-site.

1.07 INSTALLER QUALIFICATIONS

A. Engage an experienced Installer who is certified, licensed, or otherwise qualified by the firestopping manufacturer as having been provided the necessary training to install manufacturer’s products per specified requirements. A supplier’s willingness to sell its firestopping products to the Contractor or to an Installer engaged by the Contractor does not in itself confer qualification on the buyer.
B. Installation Responsibility: Assign installation of through-penetration firestop systems and fire-resistive joint systems in Project that require firestop sealants and/or sprays to a single sole source firestop specialty contractor.
C. Firestop installations that require sealants and/or sprays shall be installed by a contractor with at least one of the following qualifications:
   1. FM 4991 Approved Contractor
   2. UL APPROVED CONTRACTOR
   3. MANUFACTURER ACCREDITED FIRE STOP SPECIALTY CONTRACTOR
D. The installer must have no less than 3 years of experience with fire stop installation.

1.08 DELIVERY, STORAGE, AND HANDLING
A. Deliver materials undamaged in manufacturer's clearly labeled, unopened containers, identified with brand, type, and UL label where applicable.
B. Coordinate delivery of materials with scheduled installation date to allow minimum storage time at job-site.
C. Store materials under cover and protect from weather and damage in compliance with manufacturer's requirements, including temperature restrictions.
D. Comply with recommended procedures, precautions or remedies described in material safety data sheets as applicable.
E. Do not use damaged or expired materials.

1.09 PROJECT CONDITIONS
A. Do not use materials that contain flammable solvents.
B. Schedule installation of firestopping after completion of penetrating item installation but prior to covering or concealing of openings.
C. Verify existing conditions and substrates before starting work. Correct unsatisfactory conditions before proceeding.
D. Weather conditions: Do not proceed with installation of firestop materials when temperatures exceed the manufacturer's recommended limitations for installation printed on product label and product data sheet.
E. During installation, provide masking and drop cloths to prevent firestopping materials from contaminating any adjacent surfaces.

PART 2 – PRODUCTS
2.01 PERFORMANCE REQUIREMENTS
A. Provide firestopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service and application, as demonstrated by the firestopping manufacturer based on testing and field experience.
B. Provide components for each firestopping system that are needed to install fill material. Use only components specified by the firestopping manufacturer and approved by the qualified testing agency for the designated fire-resistance-rated systems.
C. Penetrations in Fire Resistance Rated Walls: Provide firestopping with ratings determined in accordance with UL 1479 or ASTM E 814.
   1. F-Rating: Not less than the fire resistance rating of the wall construction being penetrated.
D. Penetrations in Horizontal Assemblies: Provide firestopping with ratings determined in accordance with UL 1479 or ASTM E 814.
   1. F-Rating: Minimum of 1-hour rating, but not less than the fire resistance rating of the floor construction being penetrated.
   2. T-Rating (Where required): Minimum of 1-hour rating, but not less than the required fire-resistance rating of the floor construction being penetrated. Refer to International Building Code for relevant exceptions.
E. Penetrations in Non-Fire Resistance Rated Horizontal Assemblies: Through penetrations in non-fire resistance rated floor or floor/ceiling assemblies in two to five story buildings shall be sealed in accordance with applicable IBC section 714 requirements (except where enclosed in a shaft in accordance with IBC section 713). Annular space must be filled with materials approved by the AHJ or with materials that have been tested and classified for use in through-penetration firestop systems.

F. Penetrations in Smoke Barriers: Provide firestopping with ratings determined in accordance with UL 1479 or ASTM E 814.
   1. L-Rating: Not exceeding 5.0 cfm/sq. ft. of penetration opening at both ambient and elevated temperatures.

G. Joints in or between Fire Resistance Rated Construction: Provide joint firestopping systems with ratings determined per UL 2079 or ASTM E 1966:
   1. F-Rating: not less than the fire resistance rating of the construction they will join.

H. Voids Created at Exterior Curtain Wall / Fire Resistance Rated Floor Intersections: Provide perimeter fire barrier systems with ratings determined per ASTM E 2307:
   1. F-Rating: not less than the fire resistance rating of the floor assembly.

I. Voids Created at Exterior Curtain Wall / Non-Fire Resistance Rated Floor Intersections: To retard the interior spread of fire and hot gases between stories, voids created at the intersection of exterior curtain wall assemblies and non-fire resistance rated floor or floor/ceiling assemblies shall be sealed with materials approved by the AHJ or with materials that have been tested and classified for use in perimeter fire barrier systems per ASTM E 2307.

J. Joints in Smoke Barriers: Provide joint firestopping systems with ratings determined per UL 2079:
   1. L-Rating: Not exceeding 5.0 cfm/ft. of joint at both ambient and elevated temperatures.

K. Joints at Intersection between Fire Resistance Rated Wall Assemblies and Non-Fire Resistance Rated Horizontal Assemblies: Provide joint firestopping systems with ratings determined by ASTM E 2837.

L. Mold Resistance: Provide penetration firestopping with mold and mildew resistance rating of one (1) or less as tested per ASTM G21.

M. Rain and water resistance (Where required): Provide perimeter joint sealant tested in accordance with ASTM D 6904 (Perimeter Joints) with less than 1 hour tack free time as tested in accordance with ASTM C 679.

N. Firestopping Materials are either “cast-in-place” (integral with concrete placement) or “post installed.” Provide cast-in-place firestop devices prior to concrete placement.

202 ACCEPTABLE MANUFACTURERS
   A. Subject to compliance with through penetration firestop systems (XHEZ), joint systems (XHBN), and perimeter firestop systems (XHDG) listed in Volume 2 of the UL Fire Resistance Directory; provide products from a single manufacturer as identified below:
      1. Basis of Design:
         a. Hilti, Inc., Plano, Texas
         b. 800-879-8000
         c. WWW.US.HILTI.COM
      2. Specified Technologies, Inc.
      3. 3M

203 MATERIALS
   A. To maintain clarity of products, specifications are based on specified products manufactured by Hilti, Inc., Plano, TX.
B. Use only firestop products that have been ASTM E2307, UL 1479, ASTM E814, ASTM E1966 or UL 2079 tested for specific fire-rated construction conditions conforming to construction assembly type, penetrating item type, annular space requirements, and fire-rating involved for each separate instance.

C. Pre-formed firestop devices for use with noncombustible and combustible pipes (closed and open systems), conduit, and/or cable bundles penetrating concrete floors the following products are acceptable:
   1. Hilti Cast-In Place Firestop Device (CP 680-P)
      a. Add Aerator Adaptor when used in conjunction with aerator system.
   2. Hilti Cast-In Place Firestop Device (CP 680-M) for use with noncombustible penetrants.
   3. Hilti Cast-in Place Firestop System for Metal Decks (CFS CID MD P) including all components as described by manufacturer for proper installation.
   4. Hilti Cast-in Place Firestop System for Metal Decks (CFS CID MD M) including all components as described by manufacturer for proper installation, for use with noncombustible penetrants.
   5. Hilti Tub Box Kit (CP 681) for use with tub installations.
   6. Hilti Firestop Speed Sleeve (CP 653) for use with cable penetrations.
   7. Hilti Firestop Drop-In Device (CFS-DID) for use with noncombustible and combustible penetrants.
   8. Hilti Firestop Block (CFS-BL)
   9. Hilti Closet Stub (CFS-CID CS)

D. Sealants, caulking materials, or foams for use with non-combustible items including steel pipe, copper pipe, rigid steel conduit and electrical metallic tubing (EMT), the following products are acceptable:
   1. Hilti Intumescent Firestop Sealant (FS-ONE MAX)
   2. Hilti Fire Foam (CP 620)
   3. Hilti Flexible Firestop Sealant (CP 606)
   4. Hilti Firestop Silicone Sealant Gun Grade (CFS-S SIL GG)
   5. Hilti Firestop Silicone Sealant Self Leveling (CFS-S SIL SL)

E. Sealants or caulking materials for use with sheet metal ducts, the following products are acceptable:
   1. Hilti Silicone Sealant Gun Grade (CFS-S SIL GG)
   2. Hilti Firestop Silicone Sealant Self Leveling (CFS-S SIL SL)
   3. Hilti Flexible Firestop Sealant (CP 606)
   4. Hilti Intumescent Firestop Sealant (FS-ONE MAX)

F. Sealants, sprays, or pre-formed materials for use with fire-rated construction joints and other gaps, the following products are acceptable:
   1. Hilti Firestop Top Track Seal (CFS-TTS)
   2. Hilti Firestop Top Track Seal (CFS-TTS MD)
   3. Hilti Firestop Joint Spray (CFS-SP WB)
   4. Hilti Firestop Silicone Joint Spray (CFS-SP SIL)
   5. Hilti Flexible Firestop Sealant (CP 606)
   6. Hilti Firestop Silicone Sealant Gun Grade (CFS-S SIL GG)
   7. Hilti Firestop Silicone Sealant Self Leveling (CFS-S SIL SL)
   8. Hilti Bottom-of-Wall Sealant (CP 605)
   9. Hilti Edge of Slab QuickSeal CFS-EOS QS

G. Pre-formed mineral wool designed to fit flutes of metal profile deck and gap between top of wall and metal profile deck; as a backer for spray material.
   1. Hilti Speed Plugs (CP 777)
   2. Hilti Speed Strips (CP 767)
H. Intumescent sealants, caulking materials for use with combustible items (penetrants consumed by high heat and flame) including insulated metal pipe, PVC jacketed, flexible cable or cable bundles and plastic pipe, the following products are acceptable:
   1. Hilti Intumescent Firestop Sealant (FS-ONE MAX)

I. Foams, intumescent sealants, or caulking materials for use with flexible cable or cable bundles, the following products are acceptable:
   1. Hilti Intumescent Firestop Sealant (FS-ONE MAX)
   2. Hilti Fire Foam (CP 620)
   3. Hilti Flexible Firestop Sealant (CP 606)
   4. Hilti Firestop Silicone Sealant Gun Grade (CFS-S SIL GG)
   5. Hilti Firestop Silicone Sealant Self Leveling (CFS-S SIL SL)

J. Non-curing, re-penetrable intumescent putty or foam materials for use with flexible cable or cable bundles, the following products are acceptable:
   1. Hilti Firestop Putty Stick (CP 618)
   2. Hilti Firestop Plug (CFS-PL)

K. Wall opening protective materials for use with U.L. listed metallic and specified nonmetallic outlet boxes, the following products are acceptable:
   1. Hilti Firestop Putty Pad (CFS-P PA)
   2. Hilti Firestop Putty Pad (CP 617)
   3. Hilti Firestop Box Insert

L. Firestop collar or wrap devices attached to assembly around combustible plastic pipe (closed and open piping systems), the following products are acceptable:
   1. Hilti Firestop Collar (CP 643N)
   2. Hilti Firestop Collar (CP 644)
   3. Hilti Wrap Strips (CP 648-E/648-S)

M. Materials used for large openings and complex penetrations made to accommodate cable trays and bundles, multiple steel and copper pipes, electrical busways in raceways, the following products are acceptable:
   1. Hilti Firestop Block (CFS-BL)
   2. Hilti Composite Sheet (CFS-COS)
   3. Hilti Firestop Mortar (CP 637)
   4. Hilti Fire Foam (CP 620)
   5. Hilti Firestop Board (CP 675T)

N. Non-curing, re-penetrable materials used for large size/complex penetrations made to accommodate cable trays and bundles, multiple steel and copper pipes, electrical busways in raceways, the following products are acceptable:
   1. Hilti Firestop Block (CFS-BL)
   2. Hilti Firestop Board (CP 675T)

O. Re-penetrable, round cable management devices for use with new or existing cable bundles penetrating gypsum or masonry walls, the following products are acceptable:
   1. Hilti Firestop Speed Sleeve (CP 653) with integrated smoke seal fabric membrane.
   2. Hilti Firestop Cable Collar (CFS-CC)
   3. Hilti Firestop Sleeve (CFS-SL SK)
   4. Hilti Retrofit Sleeve (CFS-SL RK) for use with existing cable bundles.
   5. Hilti Gangplate (CFS-SL GP) for use with multiple cable management devices.
   6. Hilti Gangplate Cap (CFS-SL GP CAP) for use at blank openings in gangplate for future penetrations.

P. Sealants or caulking materials used for openings between structurally separate sections of wall and floors, the following products are acceptable:
1. Hilti Firestop Joint Spray (CFS-SP WB)
2. Hilti Flexible Firestop Sealant (CP 606)
3. Hilti Firestop Silicone Sealant Gun Grade (CFS-S SIL GG)
4. Hilti Firestop Silicone Sealant Self-Leveling (CFS-S SIL SL)

Q. For blank openings made in fire-rated wall or floor assemblies, where future penetration of pipes, conduits, or cables is expected, the following products are acceptable:
   1. Hilti Firestop Block (CFS-BL)
   2. Hilti Firestop Plug (CFS-PL)

R. For single or cable bundles up to one inch diameter penetrating gypsum, masonry, concrete walls or wood floor assemblies the following product is acceptable:
   1. Hilti Firestop Cable Disc (CFS-D)

S. Accessories: Provide accessory components of firestopping and perimeter fire barrier systems, including metal supports, primers, packing or forming materials, and mineral wool insulation, that are needed to install system materials and to maintain ratings required. Use only components recommended by the firestopping system manufacturer and approved by the qualified testing agency for systems indicated.

PART 3 - EXECUTION

301 PREPARATION

A. Verification of Conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion.
   1. Verify penetrations are properly sized and in suitable condition for application of materials.
   2. Surfaces to which firestop materials will be applied shall be free of dirt, grease, oil, rust, laitance, release agents, water repellents, and any other substances that may affect proper adhesion.
   3. Provide masking and temporary covering to prevent soiling of adjacent surfaces by firestopping materials.
   4. Comply with manufacturer’s recommendations for temperature and humidity conditions before, during, and after installation of firestopping.
   5. Do not proceed until unsatisfactory conditions have been corrected.

302 COORDINATION

A. Coordinate construction of openings, penetrations and construction joints to ensure that the fire stop systems are installed according to specified requirements.
B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration fire stop systems. Coordinate construction and sizing of joints to ensure that fire-resistive joint systems are installed according to specified requirements.
C. Coordinate fire stopping with other trades so that obstructions are not placed in the way prior to the installation of the fire stop systems.
D. Do not cover up through-penetration fire stop and joint system installations that will become concealed behind other construction until each installation has been examined by the building inspector.

303 INSTALLATION

A. Regulatory Requirements: Install firestop materials in accordance with UL Fire Resistance Directory or Intertek Directory.
B. Securely install systems.
C. Manufacturer’s Instructions: Comply with manufacturer’s instructions for installation of through-penetration and construction joint materials.
   1. Seal all holes or voids made by penetrations to ensure an air and water-resistant seal.
2. Consult with mechanical engineer, project manager, and damper manufacturer prior to installation of UL or Intertek firestop systems that might hamper the performance of fire dampers as it pertains to duct work.
3. Protect materials from damage on surfaces subjected to traffic.

304 FIELD QUALITY CONTROL
A. Examine sealed penetration areas to ensure proper installation before concealing or enclosing areas.
B. Keep areas of work accessible until inspection by applicable code authorities.
C. Perform under this section patching and repairing of firestopping caused by cutting or penetrating of existing firestop systems already installed by other trades.
D. Manufacturer’s Field Services: Contractor to ensure a manufacturer’s direct representative is on-site during initial installation of firestop systems to train appropriate contractor personnel in proper selection and installation procedures. Training will be done per manufacturer’s written recommendations published in their literature and drawing details. During installation, contractor shall have manufacturer’s representative provide periodic visual observations and written documentation of the results. Contact Hilti for support at 800.879.8000.

305 IDENTIFICATION & DOCUMENTATION
A. The firestop contractor is to supply documentation for each single application addressed. This documentation is to identify each penetration and joint location on the entire project.
   1. The Documentation Form for Through Penetrations is to include:
      a. A Sequential Location Number
      b. Date of Installation
      c. Tested System or Engineered Judgment Number
      d. Type of Assembly Penetrated
      e. Size and Type of Penetrating Item
      f. Hourly Rating to be Achieved
      g. Installer’s Name
   2. The Documentation Form for Construction Joints is to include:
      a. A Sequential Location Number
      b. Date of Installation
      c. Tested System or Engineered Judgment Number
      d. Type of Construction Joint
      e. Hourly Rating to be Achieved
      f. Installer’s Name
B. Copies of these documents are to be provided to the general contractor at the completion of the project.
C. Identify through-penetration firestop systems at fire-rated construction with pressure-sensitive, self-adhesive, preprinted vinyl labels. Attach labels permanently to surfaces of penetrated construction on both sides of each firestop system installation where labels will be visible to anyone seeking to remove penetrating items or firestop systems. Include the following information on labels:
   2. Contractor’s name, address and phone number.
   3. Through-penetration firestop system designation of applicable testing and inspecting agency.
   4. Date of installation.
   5. Through-penetration firestop system manufacturer’s name.
   6. Installer’s name.
3.06 ADJUSTING AND CLEANING
   A. Remove equipment, materials, and debris, leaving area in undamaged, clean condition.
   B. Clean all surfaces adjacent to sealed holes and joints to be free of excess firestop materials and soiling as work progresses.

3.07 LABOR USE TO INSTALL FIRESTOP SYSTEMS
   A. If firestopping is not assigned to a single-source firestop specialty contractor, the installation of each scope of work is to be performed jurisdictionally correct per existing trade agreements.

3.08 SCHEDULE OF COMMON PENETRATION FIRESTOP SYSTEMS
   A. (Refer to following page.)
   B. Schedule of through penetration firestop systems. Basis of design: Hilti, Inc.
## Schedule of through penetration firestop systems. Basis of design: Hilti, Inc.

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Issued For Bid
Firestopping
078400 -10
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END OF SECTION 078400
PART 1 - GENERAL

COMMUNICATIONS

1.1 SUMMARY

A. This section includes general design requirements, administration topics, and installation for communications systems.

B. The Dallas County Jail will be receiving a new television content distribution system. This system will comprise of mostly new infrastructure (fiber, coaxial cabling, modulators, combiners, taps, televisions, enclosures and processors allowing for a more robust manner of control for the jail staff) as well as leveraging existing infrastructure in the North Towers ground and floor levels (Parkland Medical). All previously used distribution cabling and amplifiers are to be removed by the selected contractor. The existing equipment within the AV floor racks (7th and 4th floor of the North Tower) will be removed and turned over to the county staff.

C. Subsequent deliverables for this project will include a 274117 AudioVisual Systems specification which will have a more granular break down of the AV rack equipment and associated programming needs. At this time the general breakdown of AV parts is below.

1. WRK @ 7th Floor Mezzanine North Tower – Middle Atlantic DWR-24-26PD
2. WRK @ 1st – 6th Floor Mezzanine North Tower – Middle Atlantic DWR-12-26PD
3. FRK @ 4th Floor - C5-FF27-1 with C5-VENT1-SM
4. FPD (55”) – NEC E558 with Crimson t46 mount (Forthcoming delineation of scope for new versus reused displays, contractor to keep the display element within the bids separate at this time)
5. FPD (65”) – NEC E658 with Crimson t46 mount (Forthcoming delineation of scope for new versus reused displays, contractor to keep the display element within the bids separate at this time)
6. FPD Enclosure – TV Armor Detention Facility Rated, Anti Ligature enclosure ordered to fit the NEC E558 display (Forthcoming delineation of scope for as an add alternate, contractor to keep the display element within the bids separate at this time)
7. PRO – Crestron CP4N Control Processor (the Crestron desktop control onto OFE existing computers for the control of TV’s within a specific pod or area).
8. CATV – Contemporary Research ICE-HE-DXL Display Control Center
9. RCV - ICC1-232 Display Controller
10. COAX to Fiber Conversion – Thor Broadcast

A. As depicted within the system drawings and riser diagrams the contractor is responsible for providing new horizontal and vertical pathways (j-hooks, sleeves, conduits etc.) to accommodate the new cabling supporting the new television content distribution system. Close coordination with the Dallas County Jail Facilities department and Multimedia Department is required to facilitate the pathway requirements in the various ceiling types within the buildings, there is a mixture of metal, gyp and exposed ceiling types and a majority require verifying access hatch placement or removal of secured panels to install said pathways and cabling.

1.2 SYSTEM DESCRIPTION

A. The objective of this project is to provide a complete communications cabling infrastructure system installation including, but not limited to: fiber backbone, riser system, horizontal data and voice cabling with attendant terminations, mounting equipment, cable pathway and management systems, testing and other items/materials, as specified in drawings, these specifications, and contract documents.

B. Related Sections

1. Section 270528 Pathways for Communications
2. Section 271300 Communications Backbone Cabling

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3. Section 274170 Community Access Television (CATV)

1.3 SCOPE OF WORK

A. This section establishes an infrastructure to be used as signal pathways for communications systems, but is not limited to the following:

1. Comply with all Project Contract documents and the following requirements for a complete project installation.
2. Provide a structured cabling system as described hereafter that includes, but is not limited to, supplying, installing and testing of: backbone cabling, riser cabling; coaxial cabling, connectors, CATV equipment including Taps and Fiber Optic devices for CATV distribution.
3. Furnish all labor, materials, tools, equipment, and services for the installation described herein.
4. Follow industry standard installation procedures for communications cable to assure that the mechanical and electrical transmission characteristics of this cable plant and equipment are maintained.

B. Work of this section covers complete installation of permanent and channel links for optical and coaxial video communications networks utilizing copper and fiber transmission media that includes, but is not limited to the following:

1. Provide, install, terminate, test, and document all fiber and copper backbone cables, riser cables, and horizontal cables.
2. Provide and install all termination devices such as, but not limited to, termination blocks, fiber distribution panels, bulkheads, connectors, and fiber fan out kits. Document all termination devices with proper labeling.
3. Provide in quantities specified, interconnect components such as, but not limited to, fiber patch cables, and coax jumpers as required.
4. Provide and install specified Telecommunication Room equipment such as, but not limited to, racks, cabinets, horizontal and vertical cable support devices, cable trays and cable runway, and required mounting brackets/hardware.
5. Provide and install UL-approved firestopping systems in all communication pass-through locations of rated ceiling, wall or floor penetrations involving, conduits, cable, and cable trays in coordination with General Contractor.
6. Provide and install grounding and bonding connection to the bus (PBB/SBB) provided by Division 26.
7. Provide and install all appropriate consumable items required to complete the installation.
8. Coordination with other trades.
9. Provide complete documentation and demonstration of work.
10. Provide indexed and organized complete Test Results of all copper and fiber cable and their components in native format.
11. Provide Submittals as outlined below.
12. Provide a Manufacturer's Extended Product Warranty and System Assurance Warranty for this wiring system.
13. Conduct a final document handover meeting with client, consultant, and PM to review, discuss and educate the Owner on the final product, test results, and As-Built Drawings.

C. Changes to the Scope of Work

1. Owner changes to the scope of work shall be in writing.
2. Change orders shall be submitted to the Owner/Project Manager complete with price breakdown and description for approval before any work is done.
3. The Contractor shall respond to these changes with a complete material list, including pricing, labor, and taxes in writing to be presented to the Owner for approval.
4. The Contractor shall not proceed with additional scope of work without signed approval by the Owner. Owner will not pay for additional work performed by the Contractor without written/signed approval of these changes.
5. Contractor will attach a copy of the signed change order with billing information.

1.4 PRODUCTS AND WORK BY OTHERS (NIC)

A. The Owner may separately procure and/or provide certain equipment and component that will be installed during the course of project. Such items may not be indicated in the documents.

B. Contractor shall cooperate with the Owner and Owner's suppliers when considering:
   1. The provision and installation of phone systems, related system equipment/software, and employee station equipment/software.
   2. The provision and installation of Uninterruptable Power Source (UPS) devices in communications rooms.
   3. Dedicated power panels, ground busbars, circuits, and utility outlets.
   4. Building mechanical ductwork, cooling/heating system (HVAC), and environmental control sensors.
   5. Communication pathway devices such as, but not limited to, cable tray and flex-tray in corridors, office spaces and open areas, outlet boxes and stub-ups, conduits, conduit sleeves, and penetrations in walls and floors.

1.5 SUBSTITUTION PROCEDURES

A. Substitution may be considered when a product becomes unavailable through no fault of the Contractor. An alternate product must be equal to or exceed specified requirements. The material substituted shall not void, alter or change manufacturers' structured cabling system warranty.

B. Document substitution requests with complete data substantiating compliance of proposed substitution with Contract Documents. Include in each request for substitution:
   1. Product identification, manufacturer's name and address.
   2. Product Data:
      a) Description, performance and test data, reference standards, finishes and colors.
      b) Samples: Finishes.
      c) Complete and accurate drawings indicating construction revisions required (if any) to accommodate substitutions.
      d) Data relating to changes required in construction schedule.
      e) Cost comparison between specified and proposed substitution.

C. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.

D. The Owner will be the final judge of acceptability, with review by DataCom Design Group and the distribution of the acceptance by the Architect.

E. No substitute shall be ordered, installed or utilized without the Architect's prior written verification of acceptance from the Owner.

1.6 REFERENCES AND RELATED DOCUMENTS

A. Drawings and General provisions of the contract, including Uniform General Conditions, Supplementary General Conditions, Architectural plans and specifications, requirements of Division 1, Electrical, Mechanical, Plumbing, Audio-Visual, Security and Communications specifications and plans, and the publications listed below apply to the Communications section, are incorporated into this specification by reference, and shall be considered a part of this section.

B. Reference to codes, rules, regulations, standards, manufacturer's instructions, or requirements of regulatory agencies shall mean reference to the latest printed edition of each in effect at the date of contract.
C. The Contractor shall read all sections in their entirety and apply them as appropriate for work in this section.

D. Conflicts
1. Drawings and specifications are to be used in conjunction with one another and to supplement one another.
2. In general, the specifications determine the nature and quality of the materials and tests, and the drawings establish the quantities, details, and give characteristics of performance that should be adhered to during the installation of the communications system components.
3. If there is an apparent conflict between the drawings and specifications, or between specification sections, the items with the greater quantity and/or quality shall be estimated and installed.
4. Clarification with the Owner and/or DataCom Design Group about these items shall be made in writing prior to procurement and installation.

E. Codes and Standards
1. American National Standards Institute/Telecommunications Industry Association (ANSI/TIA)
   a) ANSI/TIA-568.0-D "Generic Telecommunications Cabling for Customer Premises"
   b) ANSI/TIA-568.1-D "Commercial Building Telecommunications Infrastructure Standard"
   c) ANSI/TIA-568.3-D "Optical Fiber Cabling Components Standard"
   d) ANSI/TIA-568.4-D "Broadband Coaxial Cabling and Components Standard"
   e) ANSI/TIA-569-D "Telecommunications Pathways and Spaces"
   f) ANSI/TIA-606-D "Administration Standard for Commercial Telecommunications Infrastructure"
   g) ANSI/TIA-607-D "Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications"
2. BICSI
   a) BICSI Outside Plant Design Reference Manual
   b) BICSI Telecommunications Distribution Methods Manual (TDMM)
   a) It shall be indicated in the bid the components that may be of foreign manufacture, if any, and the country of origin.

1.7 QUALITY ASSURANCE
A. Communications Contractor shall have a complete working knowledge of low voltage communications cabling applications such as, but not limited to data, voice and video network systems.

B. Communications Contractor shall have installed similar-sized systems in at least ten (10) other projects in the last five (5) years prior to this bid and be regularly engaged in the business of installation of the types of systems specified in this document.

C. Communications Contractor and individual installation crew members shall be experienced and qualified to perform the work specified herein at time of bid submission. All onsite supervision personnel that will be assigned to this project shall be listed in the Pre-Installation Submittal.
1. 80% shall have a minimum of three (3) years of experience in the installation of the types of systems, equipment, and cables specified in this document prior to this bid.
2. All installation team members must demonstrate knowledge and compliance with all applicable methods, standards, and codes.
3. All members of the installation team shall be certified by the Structured Cabling System Assurance Warranty provider as having completed the necessary training to complete their work.
part of the installation and capable of an installation that falls under manufacturer's guidelines necessary to obtain the Manufacturer's System Assurance Warranty.
4. Any personnel substitutions shall be noted in writing to the Owner.
D. A BICSI RCDD shall supervise and approve all on-site work as a recognized member of the Contractor's installation team.
E. Refer also to General Conditions.
1.8 CONTRACTOR REQUIREMENTS
A. In order to accomplish the conditions of this agreement, the Contractor shall perform the specific duties listed herein.
B. Contractor shall provide and pay for all labor, supervision, tools, equipment, test equipment, tests and services to provide and install a complete communications cabling infrastructure system. Pay all required sales, gross receipts, and other taxes.
C. Regulatory Requirements
   1. Communications Contractor shall supply all city, county, and state telecommunication cabling permits required by Authority Having Jurisdiction (AHJ).
   2. Communications Contractor shall be licensed and/or bonded as required for telecommunications/low voltage cabling systems.
D. Privacy and Confidentiality
   1. The Contractor will respect and protect the privacy and confidentiality of Owner, its employees, processes, products, and intellectual property to extent necessary, consistent with the legal responsibilities of the Owner policies.
   2. Contractors shall sign a non-disclosure agreement and abide by the requirements to keep confidential all information concerning bid documents and this project.
E. Use of Subcontractors
   1. Successful bidder shall inform the Owner’s contact and General Contractor in writing about the intention to use Subcontractors and the scope of work for which they are being hired.
   2. The Owner or Owner’s designated contact must approve the use of Subcontractors in writing prior to the Subcontractor’s hiring and start of any work.
F. The Contractor’s designated Project Manager will be recognized as the single point of contact. The Project manager shall oversee all work performed to ensure compliance with specifications as outlined in bid documents (which includes all specifications, references, and drawings) to ensure a quality installation and attend project meetings with the telecommunication consultant, the Owner and others.
1.9 PRE-INSTALLATION MEETINGS
A. Communications Contractor shall attend and/or arrange a scheduled pre-installation conference prior to beginning any work of this section. This venue is to ask and clarify questions in writing with consultant and/or project manager/Owner representative.
B. Agenda
   1. Safety
   2. Work to be performed
   3. Scheduling
   4. Coordination
   5. Other topics as necessary
C. Attendance
   1. Communications project manager.supervisor shall attend meetings arranged by General Contractor, Owner’s representatives, and other parties affected by work of this document.
2. All individuals who will serve in an on-site supervisory capacity, including project managers, site supervisors, and lead installers, shall be required to attend the pre-installation conference. Individuals who do not attend the conference will not be permitted to supervise the installation and testing of communications cables on the project.

1.10 CONTRACT ADMINISTRATION
A. DataCom Design Group may perform site visits and provide job field reports upon inspection of Contractor's installation, materials, supporting hardware, coordination with other trades and progress to schedule to the client.
B. Job Field Report outline:
   1. General: The general installation progress in relation to scheduled work made by the Contractor up to that date.
   2. Deficiencies and/or Items of Note: Documents observations of the cable installation that may require corrective action by the Contractor.

1.11 POST INSTALLATION MEETINGS
A. At the time of substantial completion the contractor shall call and arrange for a post installation meeting to present and review all submittal documents to include but not be limited to As-Built Drawings, Test reports, Warranty paperwork, etc.
B. Attendees shall include
   1. Communications Contractor
   2. Project Manager/Owner Representative
   3. DataCom Design Group
C. At this meeting the Communications Contractor shall present and explain all documentation.
D. Any discrepancies or deviations noted by and agreed to by participants shall be remedied by the Communications Contractor and resubmitted within one (1) week of the meeting.

1.12 DELIVERY, STORAGE, AND HANDLING
A. Coordination with delivery companies, drivers, site address, and contact person(s) will be the responsibility of the Contractor.
B. Communications Contractor requirements:
   1. Be responsible for prompt material deliveries to meet contracted completion date.
   2. Coordinate deliveries and submittals with the General Contractor to ensure a timely installation.
   3. No equipment materials shall be delivered to the job site more than three weeks prior to the commencement of its installation.
   4. Equipment shall be delivered in original packages with labels intact and identification clearly marked.
   5. Equipment shall not be damaged in any way and shall comply with manufacturer's operating specifications.
   6. Equipment and components shall be protected from the weather, humidity, temperature variations, dirt, dust, or other contaminants.
   7. Equipment damaged prior to system acceptance shall be replaced at no cost to the Owner.
   8. Contractor shall be responsible for all handling and control of equipment. Contractor is liable for any material loss due to delivery and storage problems.
C. Contractor shall coordinate with manufacturer for warranty paperwork and procedures prior to the start of the project.
D. Contractor shall provide a minimum one (1) year warranty on installation and workmanship PLUS an Extended Product Warranty and System Assurance Warranty for this wiring system and shall commit to make available local support for the product and system during the Warranty period.
1. The Extended Product Warranty shall apply to all passive structured cabling system components and shall cover the replacement or repair of defective products and labor for the replacement or repair of such defective products for a minimum of one (1) year.

2. The System Assurance Warranty provides a complete system and product warranty that will be extended to the end-user, ensuring the structured cabling system will be free of defects in materials and workmanship, will meet or exceed applicable performance requirements defined in the contract documents, and support all current and future network applications for a minimum of twenty (20) years.

E. System Certification: Upon successful completion of the installation and subsequent inspection, the customer shall be provided with a numbered certificate, from the manufacturer, registering the installation.

1.13 PAYMENT

A. Refer to the General Contractor contract documents and/or master specifications issued by Architect for project and cost payment details.

1.14 SUBMITTALS

A. Refer to Requirements of Division 1.
B. Refer to Sections 271300.
C. The Communications Contractor shall not perform any portion of the work requiring submittal and review of shop drawings, product data, or samples until Owner has approved the respective submittal in writing. Such work shall be in accordance with approved submittals.
D. Pre-Installation Submittal Requirements
   1. Communications Contractor shall provide certificates for the appropriate insurance coverage as defined in contract documents.
   2. City, county, and/or state telecommunication cabling permits as required by Authority Having Jurisdiction (AHJ).
   3. Executed non-disclosure agreement.
   4. Appoint a Project Manager and provide the name and contact information.
   5. Shop Drawings
      a) Communications Contractor shall submit, for approval, floor plans that identify all device locations, cable routes, cable lengths, cable quantities and cable types, riser locations, and references to installation details and diagrams.
         1) Communication Contractor shall notify Owner of cable routes exceeding standardized lengths.
      b) Communications Contractor shall submit, for approval, diagrams that show room layouts, rack layouts (including elevations), riser layouts, etc.
      c) The Contractor shall make any corrections as required by the consultant team and submit revised shop drawings to the team for approval.
      d) Approval by the Consultant of such drawings or schedules shall not relieve the Contractor from responsibility for deviations from the drawings or specifications, nor shall it relieve the Contractor from responsibility for errors of any sort in shop drawings or schedules. Requests to deviate shall be submitted in writing to the Architect.
   6. Product Data Cut-sheets
      a) Communications Contractor shall submit catalogue cut-sheets that include manufacturer, trade name, and complete model number for each product specified. Model number shall be handwritten and/or highlighted to indicate exact selection.
b) Communications Contractor shall identify applicable specification section reference for each product performance for each component specified for approval prior to purchase and installation.

7. Warranty
   a) The Communications Contractor shall submit appropriate documentation from the certifying manufacturer showing the project is registered and qualified for the System Assurance Warranty.
   b) All subsequent work shall be in accordance with approved submittals. The Communications Contractor shall not perform any portion of the work requiring approval of the System Assurance Warranty manufacturer’s warranty registration qualification procedures that would disqualify any part or all of the wiring system from that warranty qualification.

8. Qualifications
   a) Communications Contractor shall submit a list of the Contractor’s previous projects that demonstrate qualification for this project. This list shall include, but not be limited to:
      1) At least ten (10) other projects in the last five (5) years
      2) Name and location of project
      3) Project contacts, email addresses, and phone numbers
      4) Total square footage
      5) Total number of cables/drops
      6) Types of media
   b) Communications Contractor shall submit an up-to-date and valid statement of qualifications for those assigned to perform the work specified herein at time of bid submission.
      1) Communications Contractor Employees
      2) Subcontractors
   c) Manufacturer certifications for Contractor and installers.

9. Cable Testing Plan
   a) The Contractor shall provide a complete and detailed test plan for approval of the cabling system specified herein, including a complete list of test equipment for copper and fiber components and accessories prior to beginning cable testing.
   b) The following minimal items shall be submitted for review:
      1) A testing plan that clearly describes procedures and methods.
      2) Product data for test equipment.
      3) Certifications and qualifications of all persons conducting the testing.
      4) Calibration certificates indicating that equipment calibration meets National Institute of Standards and Technology (NIST) standards and has been calibrated at least once in the previous year of the testing date.
      5) Examples of test reports, including all graphs, tables, and charts necessary for display of testing results.

E. Closeout Submittal Requirements
   1. As-Built Drawings
      a) Communications Design drawings are to be supplied to the Architect to prepare the master “As-Built” drawings.
      b) Submit one electronic copy and one hard copy with project deliverables within three (3) weeks subsequent to substantial completion. Provide a laminated floorplan with drop designations in the respective serving Telecom Room.
c) As-Built drawings shall be in AutoCAD format, same version as used by Architect and consultant. Dimensions and scale of the drawing sheets submitted shall match the size of the drawing sheets used for the contract documents.

d) Utilize normal recognized drafting procedures that match AutoCAD standards, Architect and Consultant guidelines, and methodology.

e) The As-Built drawings shall incorporate all changes made to the building identified in, but not limited to, addendum, change notices, site instructions or deviations resulting from site conditions.

1) Contractor shall clearly identify any resubmitted drawing sheets, documents or cut sheets either by using a color to highlight or cloud around resubmitted information.

2) Maintain drawing numbering or page/sheet scheme consistency as per previously issued drawings/documents.

f) Provide dimensioned plan and elevation views of networking components, showing:

1) All work area outlet locations complete with outlet/cable labeling.

2) Rack and/or cabinet locations complete with labeling.

3) One-line diagram of equipment/device interconnections with the cable plant.

4) Standard or typical details of installations unique to Owner's requirements.

2. The Communications Contractor shall deliver the Installer's Extended Product Warranty and Manufacturer's signed System Assurance Warranty of installed cabling system to include all components that comprise the complete cabling system.

a) Delivery shall be completed within two (2) weeks of the time of final punch list review.

b) Product Certificates shall be signed by manufacturers of cables, connectors, and terminal equipment certifying that products furnished comply with requirements.

3. Cable Testing Report Requirements

a) Submit certified test reports of Contractor-performed tests. Contractor shall submit the required Test Reports in the format and media specified, upon completion of testing the installed system.

b) The tests shall clearly demonstrate that the media and its components fully comply with the requirements specified herein.

c) Three (3) sets of electronic and hardcopy versions of test reports shall be submitted together and clearly identified with cable designations.

d) Cable inventory data shall be submitted for all fiber, copper, and coaxial cabling and termination components. Include products furnished:

1) Manufacturer’s name

2) Manufacturer’s part numbers

3) Cable designations

4) Location and riser assignments

5) Product Data

4. Supply Owner with training manuals with instructions on methods of adding or removing cabling to/from firestopped sleeves and chases.

F. The Contractor’s BICSI Registered Communications Distribution Designer (RCDD) supervisor shall review, approve and stamp all documents prior to submitting. The Contractor’s RCDD shall warrant in writing that 100% of the installation meets the requirements specified herein upon completion of all work.

PART 2 - PRODUCTS

2.1 SUMMARY
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A. Equipment and materials shall be standard products of a manufacturer regularly engaged in the manufacture of telecommunications cabling products and shall be the manufacturer's latest standard design in satisfactory use for at least one year prior to bid opening.

B. All material and equipment, as provided, should be the standard Commercial-Off-The-Shelf (COTS) products of a manufacturer engaged in the manufacturing of such products.
   1. All shall be typical commercial designs that comply with the requirements specified.
   2. All material and equipment shall be readily available through manufacturers and/or distributors.

C. All equipment shall be standard catalogued items of the manufacturer and shall be supplied complete with any optional items required for proper installation.

D. Coordinate the features of materials and equipment so they form an integrated system. Match components and interconnections for optimum future performance and backward compatibility.

E. All materials shall be UL- and/or ETL-approved and labeled in accordance with NEC for all products where labeling service normally applies.

F. Materials and equipment requiring UL 94, 149 or 1863 listing shall be so labeled. Modification of products that nullifies UL labels is not permitted.

G. Backward Compatibility: The provided products shall be backward compatible with lower category ratings such that if higher category components are used with lower category components, the basic link and channel measures shall meet or exceed the lower category's specified parameters.

H. Component Compliance: The provided products shall each meet the minimum transmission specifications listed herein such that no individual component will be less than specifications for permanent link and channel, regardless of the fact that tests for link and channel ultimately meet required specifications.

2.2 ACCEPTABLE MANUFACTURERS

   A. Identification (Labeling) System
      1. Brady
      2. Dymo
      3. Hellerman-Tyton
      4. Acceptable alternate

   B. Fire-Stop Systems
      1. Hilti
      2. SpecSeal
      3. 3M
      4. Acceptable alternate

   C. Fiber Optic CATV Active and Passive Equipment/Hardware
      1. Thor
      2. Scientific Atlanta

   D. Other Products as Referenced in other Division 27 Specifications.

PART 3 - EXECUTION

3.1 PREPARATION

   A. Field Measurements
      1. Verify dimensions in areas of installation by field measurements before fabrication and indicate measurements on shop drawings. Coordinate fabrication schedule with construction progress to avoid delaying the work.

   B. Established Dimensions
1. Where field measurements cannot be made without delaying the work, coordinate with the General Contractor to establish dimensions.
2. When approved in writing, proceed with fabricating units without field measurements.
3. Coordinate supports, adjacent construction, and fixture locations to ensure actual dimensions correspond to established dimensions.

C. Pre-installation inspection
1. The Contractor shall visually inspect all cables, cable reels, and shipping cartons to detect possible cable damage incurred during shipping and transport.
2. Visibly damaged goods are not acceptable and shall be replaced by the contractor at no additional cost to the Owner.

3.2 INSTALLATION
A. General
1. Contractor shall install work in accordance with specifications, drawings, manufacturer’s instructions and approved submittal data.

B. Allowable cable bend radius and pull tension:
   a) In general, communications cable cannot tolerate sharp bends or excessive pull tension during installation.
   b) Refer to cable manufacturer’s bend radius recommendations for the maximum allowable limits.
   c) After installation, exposed cable and other surfaces must be cleaned free of lubricant residue. Use only lubricants specifically designed for cable installation.

C. Labeling
1. Cable labels: Self-adhesive vinyl or vinyl-cloth wraparound tape markers, machine printed with alphanumeric cable designations.
2. Flat-surface labels: Self-adhesive vinyl or vinyl-cloth labels, machine printed with alphanumeric cable designations.
3. Provide transparent plastic label holders, and 4-pair marked colored labels.
4. In accordance with ANSI/TIA-606-C "Administration Standard for Commercial Telecommunications Infrastructure":
   a) Install colored labels according to the type of field as per color code designations.
   b) Use “designation strip color-code guidelines for voice, data, cross-connect, riser, and backbone fields”.
5. Pathway Labels and Labeling System
   a) Labeling system shall consist of a hand-held portable printer
   b) Conduits: General-purpose label designed for powdered coated surfaces with an ultra-aggressive adhesive. Label size shall be appropriate for the conduit size. Font size shall be legible from the finished floor.
   c) Inner duct: Polyethylene general-purpose tagging material attached using tie wraps.
   d) Junction boxes: General-purpose label designed for powdered coated surfaces with an ultra-aggressive adhesive, trade name. Font size shall be easily visible from the finished floor.
   e) All labels shall be permanent, i.e. will not fade, peel, or deteriorate due to environment or time.
   f) Identification
   g) All conduits, junction boxes, guts, and pull boxes shall have machine-generated labels easily visible from the finished floor.

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1) Conduits shall be labeled with the word “communications” and the conduit’s origination room number and destination room number.

2) The Contractor shall label conduit at each wall and floor penetration and at each conduit termination, such as outlet boxes, pull boxes, and junction boxes, or as otherwise specified in other sections.

3) Junction boxes, gutters and pull boxes shall be labeled with identification name or number as determined by contractor and submitted for approval.

4) The Contractor shall label conduit sleeves at each wall and floor penetration.

D. Firestop

1. Provide approved fire-resistant materials to restore originally-designed fire-ratings to all wall, floor, and ceiling penetrations used in the distribution and installation for communications cabling system.

2. Install and seal penetrations (conduit, sleeves, slots, chases) in fire-rated barriers created for communications infrastructure to prevent the passage of smoke, fire, toxic gas, or water through the penetrations.

3. The firestopping material shall maintain/establish the fire-rated integrity of the wall/barrier that has been penetrated.

4. All through penetrations in a fire rated surface require a sleeve, regardless of penetration diameter or penetrating cable count.

5. Using a “ring and string” method of installing cabling for membrane penetrations in a wall cavity is acceptable, provided the solution was accepted by the Owner in writing. Code-compliant firestopping rules still apply.

6. Coordinate firestopping procedures and materials with General Contractor.

7. Sharing the pathway of other trades/utilities through compliant and non-compliant penetrations does not remove the requirement to maintain code-compliant firestopping.

8. Provide and install removable, intumescent mechanical systems in floor chases for all openings greater than 0'-4".

9. Provide and install removable, intumescent, firestop bricks for all openings greater than 0'-4" where there are penetrations through walls.

10. Bricks shall be listed for insertion in fire-rated openings and require restraining materials or apparatus as needed per manufacturers’ specifications.

11. Provide manufacturer recommended material for rated protection for any given barrier.

12. Laminate and permanently affix adjacent to chases the following information:
   a) Manufacturer of firestop system.
   b) Date of installation/repair.
   c) Part and model numbers of system and all components.
   d) Name and phone numbers of local distributor and manufacturer’s corporate headquarters.

13. Solutions and shop drawings/submittals for firestop materials and systems shall be presented to the General Contractor for written approval of materials/systems prior to purchase and installation.

14. Materials shall be installed per manufacturer instructions, be UL-listed for intended use, and meet NEC and locals codes for fire stopping measures.

15. The material chosen shall be distinctively colored to be clearly distinguishable from other materials, adhere to itself, and maintain the characteristics for which it is designed to allow for the removal and/or addition of communication cables without the necessity of drilling holes in the material.

16. Develop training manuals with instructions on methods of adding or removing cabling to/from firestopped sleeves and chases.
E. Within the normal environment, the installed systems shall not generate nor be susceptible to any harmful electromagnetic emission, radiation, or induction that degrades, or obstructs any equipment.

F. Expansion Capability: Unless otherwise indicated, provide spare conductor pairs in cables, positions in patch panels, cross connects, and terminal strips, and space in cable pathways and backboard layouts to accommodate 20% future increase in structure cable system capacity.

G. In the event of a breach of the representations and warranties contained herein, the Contractor, at their own expense, shall take all measures necessary to make the cabling system work and comply with the applicable manufacturer written technical recommendations and standards.

H. System Tests

1. Upon completion of the installation of the communications infrastructure systems, including all pathways and grounding, the Contractor shall test the system.
   a) Cables and termination modules shall be affixed, mounted or installed to the designed/specification permanent location prior to testing.
   b) Any removal and reinstallation of any component in a circuit, including faceplates, shall require retesting of that circuit and any other disturbed or affected circuits.
   c) Approved instruments, apparatus, services, and qualified personnel shall be utilized.
   d) The Contractor must verify that the requirements of the specifications are fully met through testing with an approved tester (rated for testing parameters listed elsewhere), and documentation as specified below.
   e) This includes confirmation of requirements by demonstration, testing and inspection. Demonstration shall be provided at final walk-through in soft copy and printed test data.

2. Non-Compliant Cabling
   a) Testing that shows some or all pairs of a cable do not comply with specifications, without written approval by the Owner, shall be replaced at Contractor's expense (including respective connectors).
   b) With the Owner's written approval, the over-length cable(s) shall be excluded from requirements to pass standardized tests and shall be explicitly identified.
      1) Testing is still required for non-compliant cabling.
      2) The tests shall be for wire-mapping, opens, cable-pair shorts, and shorts-to-ground.
      3) The test results must be within acceptable tolerances and shall be submitted with the Owner's acceptance document.

3. Failed Tests
   a) If tests fail, Contractor shall correct as required to produce a legitimate passing test.
   b) Manipulation of tester parameters on a failing test in order to achieve a passing test is unacceptable.
   c) If the Contractor is found to have manipulated or falsified any failing test result to show a "PASS" for any reason (without written notice and prior approval of the Owner), the Contractor shall be required to employ a Third-Party Testing Agent selected by the Owner to retest the complete cable plant and shall be required to pay all costs associated with this retesting.

4. Owner reserves the right to be present during any or all testing.

I. CATV Hardware and Active Equipment

1. See Specification Section 274170.

3.3 CLEANING
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3.4 COMPLETION INSPECTION AND PUNCH LIST

A. When the Contractor determines that the Scope of Work has been completed in accordance with the plans and specifications, Contractor shall schedule a Completion Inspection with the Owner.

B. A Punch List will be generated during the Completion Inspection containing deficiencies in need of corrective action.

C. Complete all punch list deficiencies within 10 working days. The work is not complete until all punch list deficiencies have been addressed.

3.5 ACCEPTANCE

A. Once all work has been completed, test documentation has been submitted, and Owner is satisfied that all work is in accordance with contract documents, the Owner shall notify Contractor in writing of formal acceptance of the system.

B. Contractor must warrant in writing that 100% of the installation meets the requirements specified herein (Standards Compliance & Test Requirements).

C. Acceptance shall be subject to completion of all work, successful post-installation testing which yields 100% PASS rating, and receipt of full documentation soft and hard copies as described herein.
SECTION 270526
GROUNDING AND BONDING FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY
A. This section includes grounding and bonding products, design requirements and installation for communications systems.

B. Related Sections
1. Section 260000 Electrical (including related sub-sections)
2. Section 270000 Communications
3. Section 270528 Pathways for Communications Systems
4. Section 270543 Underground Ducts and Raceways for Communications Systems
5. Section 271100 Communications Equipment Room Fittings
6. Section 271300 Communications Backbone Cabling
7. Section 271500 Communications Horizontal Cabling
8. Section 274170 Community Access Television (CATV)

1.2 REFERENCES
A. The publications referenced in Section 270000 form a part of this specification. The publications are referred to in the text by basic designation only.

B. Specific reference in specifications to codes, rules, regulations, standards, manufacturer's instructions, or requirements of regulatory agencies shall mean the latest printed edition of each in effect at the date of contract unless the document is shown dated.

1.3 SYSTEM REQUIREMENTS
A. General
1. All conductor wire, busbars and conduit shall be UL listed.
2. The communications ground system shall be independent from all power grounding except for the connection to the building's electrical service main grounding electrode system.
3. Power grounding and/or bonding shall not be allowed to interfere or provide any back feed or be a conductor to the separate communications ground system source or to any communications bonded materials or equipment.

B. Telecommunication Bonding Backbone (TBB) and Secondary Bonding Busbar (SBB)
1. The Telecommunication Bonding Backbone (TBB) originates at the PBB and shall be extended from the PBB within the ER (MDF) throughout the building along the same route as the telecommunications backbone pathways, to the Secondary Bonding Busbar(s) (SBBs) in each TR (IDF).
2. The minimum TBB conductor size between busbars shall be a stranded copper ground wire one (1) AWG size smaller than the Telecommunications Bonding Conductor (TBC).

C. TEBC and RBC
1. All wallfield equipment, cabinets and racks shall be connected by the Telecommunications Equipment Bonding Conductor (TEBC). The TEBC is a stranded copper #4 conductor from the PBB/SBB extending along each row of racks within the room. Bond each rack with...
a Rack Bonding Conductor (RBC). The RBC is a stranded copper #6 conductor connected to the vertical rack bonding terminal. All connections shall be irreversible crimp connections. Route conductor so as to minimize the quantity of sweeping bends.

1.4 SUBMITTALS
A. Refer to Section 270000.

1.5 QUALITY ASSURANCE
A. Refer to Section 270000.

1.6 DELIVERY, STORAGE, AND HANDLING
A. Refer to Section 270000.
B. The Contractor shall ship on manufacturer's standard reel sizes of one continuous length. Where cut lengths are specified, mark reel quantity accordingly.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS
A. Subject to compliance with requirements, manufacturers that may be incorporated in the work, include:
B. Cable Manufacturers
   1. Houston Wire and Cable Company
   2. Okonite Company
   3. General Cable
   4. Owner Approved Alternate
C. Crimp Connector Manufacturers
   1. Thomas & Betts
   2. FCI Burndy Electrical
   3. O-Z/Gedney
   4. Owner Approved Alternate
D. Labeling
   1. Refer to Section 270000.

2.2 MATERIALS
A. Communications Grounding Conductors: Copper American Wire Gauge (AWG) wire of the following sizes:
   1. Telecommunications Bonding Conductor (TBC): #4/0 (unless otherwise sized by the Electrical Engineer of Record)
   2. Telecommunication Bonding Backbone (TBB): #3/0 (unless otherwise sized by the Electrical Engineer of Record)
   3. Backbone Bonding Conductor (BBC): equal AWG as the TBB (unless otherwise sized by the Electrical Engineer of Record)
   4. Telecommunications Equipment Bonding Conductor (TEBC): #4
   5. Rack Bonding Conductor (RBC): #6
B. Grounding Connectors
   1. Connectors shall be a copper alloy material and two-hole, double-crimp compression lug type at the connecting ends.

PART 3 - EXECUTION

3.1 EXAMINATION
A. Refer to Section 270000.
3.2 PREPARATION
A. Refer to Section 270000.
B. Copper and copper alloy connections should be cleaned prior to connection.

3.3 INSTALLATION
A. Refer to Section 270000.
B. General
1. Bonding and grounding procedures and components shall comply with ANSI/TIA-607-C "Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications".
2. Bonding should be accomplished such that the bonding system is integrated and compliant with NEC specifications.
3. Bonding conductors shall be routed with minimum bends or changes in direction and should be made directly to the points being bonded.
4. Bonding connections should be made by using compression copper lugs. However, for parts of the ground electrode system that are subject to corrosion, must carry high currents reliably, or for locations that require minimum maintenance, connections are made with low emission exothermic welding.
5. Burnish clean a 0'-1" X 0'-1" area, drill, tap, apply an adequate amount of antioxidant joint compound mixed for the metal surface types affected, and bolt conductor and connector to burnished and compounded area. Ensure proper conductivity.
6. Route bonding conductor(s) the shortest distance between bonding contact points.
7. The ground-wire connecting ends shall have a minimum amount of insulation removed at the ground lug.
8. Do not connect ground wire in power cable assemblies to the telecommunications ground system.
9. All grounding and bonding conductors shall be copper and may be insulated. If bare-bonding conductors are used, isolate bonding conductors and prevent contact.

C. Telecommunication Bonding Conductors
1. Each telecommunications grounding and bonding conductor shall be labeled at each end detailing the function and room number of its opposite end. Labels shall be located on conductors as close as practicable to their point of termination in a readable position. Labels shall be nonmetallic and include the following text, "TELECOMMUNICATIONS GROUND - DO NOT REMOVE. IF THIS CONNECTOR OR CABLE IS LOOSE OR MUST BE REMOVED, PLEASE CALL THE BUILDING TELECOMMUNICATIONS MANAGER".
2. All low emission exothermic welding shall be by Division 26.
3. Coordinate with the building services personnel in occupied spaces to prevent the smoke from the exothermic weld process from potentially setting off smoke/fire alarms.
4. Grounding and bonding conductors should not be placed in ferrous metallic conduit. If it is necessary to place grounding and bonding conductors in a ferrous metallic conduit that exceeds 1m (3ft) in length, the conductors shall be bonded to each end of the conduit using a grounding bushing or a No. 6AWG conductor, minimum.

D. Equipment Cabinets and Racks
1. The busbar shall be installed at the base and back of each cabinet/rack for floor fed cabinets/racks.
2. The busbar shall be installed at the top and back of each cabinet/rack for top fed cabinets/racks.
3. Each cabinet and rack shall be provided with a minimum # 6 AWG ground wire.
4. Do not loop from cabinet/rack to cabinet/rack.
5. All ground raceways within each cabinet/rack or cabinet base and adjacent-ganged cabinet base shall be an insulated metallic flex type raceway and shall not interfere with equipment mounting frames or equipment mounting brackets.

E. Cable Runway, Cable Raceway and Support System Grounding

1. The Contractor shall provide communications cable tray and cable runway systems with a communications dedicated ground from the SBB.

2. All cable tray needs to be electrically continuous.
   a) Metal raceways, wire-mesh cable trays, cable armor, cable sheath, enclosures, frames, fittings, and other metal non-current-carrying parts that are to serve as an alternate grounding path, with or without the use of supplementary equipment grounding conductors, shall be effectively bonded where necessary to ensure electrical continuity and the capacity to conduct safely any fault current plausibly to be imposed on them.
   b) Any nonconductive paint, enamel, or similar coating shall be removed at the threads, contact points, and contact surfaces.
   c) Grounding or bonding conductors shall be connected by fittings designed for that purpose to ensure adequate bonding.

3.4 FIELD QUALITY CONTROL

A. Testing

1. Upon completion of the electrical system, including all grounding, the Electrical Contractor shall test the system for stray currents, ground shorts, etc.

2. Approved instruments, apparatus, services, and qualified personnel shall be utilized.

3. If stray currents, shorts, etc., are detected, eliminate or correct as required.
SECTION 270528
PATHWAYS FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY
A. Section Includes
   1. Hangers and Supports, including open-top supports (cable hooks) for communications systems.
   2. Conduits and Pull Boxes for communications systems.
   3. Cable Tray and Cable Runway with associated accessories and fittings for communications systems.

B. Related Sections
   1. Section 270000 Communications Systems
   2. Section 271300 Communications Backbone Cabling
   3. Section 274170 Community Access Television (CATV)

1.2 REFERENCES
A. The publications referenced in Section 270000 form a part of this specification. The publications are referred to in the text by basic designation only.

B. Specific reference in specifications to codes, rules, regulations, standards, manufacturer’s instructions, or requirements of regulatory agencies shall mean the latest printed edition of each in effect at the date of contract unless the document is shown dated.

C. Conflicts
   1. Refer to Section 270000.

D. Codes and Standards
   1. Refer to Section 270000.

1.3 SUBMITTALS
A. Refer to Section 270000.

1.4 QUALITY ASSURANCE
A. Refer to Section 270000.

1.5 DELIVERY, STORAGE, and HANDLING
A. Refer to Section 270000.

B. Conduit Storage
   1. Package conduits in bundles maximum 10'-0" long, with conduit and coupling thread protectors for indoor/outdoor storage.
   2. Package fittings in manufacturer’s standard quantities and packaging suitable for indoor storage.
   3. Protect coating on plastic-coated rigid conduit, fittings, and bodies from damage during shipment and storage.
   4. Store conduit above ground on horizontal racks to prevent corrosion and entrance of debris.
   5. Equipment and components shall be protected from the weather, humidity, temperature variations, dirt, dust, or other contaminants. Protect plastic conduit and inner duct from sunlight. Equipment damaged prior to system acceptance shall be replaced at no cost to the Owner.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS
A. Subject to compliance with requirements, manufacturers that may be incorporated in the work, include:

B. Cable Hooks
   1. Cooper B-Line, Inc.
   2. Erica
   3. Caddy
   4. Owner approved alternate

C. Polyethylene Cable Support System
   1. Erica
   2. Owner approved alternate

D. Innerduct
   1. Carlon Riser Guard Flexible Raceway (corrugated innerduct)
   2. MaxCell (fabric innerduct)
   3. Owner approved alternate

E. Measured pull tape (pull tape printed with sequential footage markings)
   1. Fibertek
   2. Condux International
   3. Owner approved alternate

F. Labeling
   1. Refer to Section 270000.

G. Firestopping
   1. Refer to Section 270000.

2.2 CABLE HOOKS
A. Cable hooks shall be factory assembled for direct attachment to walls, hanger rods, beam flanges, purlins, strut, floor posts, etc. to meet job conditions.

B. Features
   1. Cable hooks shall have a flat bottom and provide a minimum of 0"-1.625" cable-bearing surface.
   2. Cable hooks shall have 90° radius edges to prevent damage while installing cables.
   3. Cable hooks shall be designed so that the mounting hardware is recessed to prevent cable damage.
   4. Cable hooks for non-corrosive areas shall be pre-galvanized steel. Where additional strength is required, cable hooks shall be spring steel with a zinc-plated finish.
   5. Cable hooks for corrosive areas shall be stainless steel.
   6. Cable hooks shall have a stainless steel cable latch retainer to provide containment of cables within the hook.
   7. The retainer shall be removable and reusable.

C. Factory assembled multi-tiered cable hooks shall be used where required to provide separate cabling compartments, or where additional capacity is needed.

D. Load cable hooks in accordance with manufacturer requirements and recommendations.

E. Provide capacity for 20% growth, add additional hooks as needed.

2.3 PULL BOXES, JUNCTION BOXES, AND GUTTERS
A. All junction boxes, gutters and pull boxes shall be UL listed and comply with NEC requirements.

B. All junction boxes, gutters and pull boxes shall meet the following minimum material requirements:
   1. 16-gauge steel or heavier
   2. Seams shall be continuously welded and grounded smooth
3. External screws and clamps
4. External mounting feet (where applicable)
5. Oil-resistant gasket and adhesive
6. ANSI 61 gray polyester powder coating inside and out over phosphatized surface

C. All junction boxes, gutters and pull boxes shall be provided with bushings for conduits and/or cabling.

D. All junction boxes, gutters and pull boxes shall be securely installed.

2.4 CONDUITS

A. All conduits shall be UL listed and comply with NEC requirements.

B. Conduit Fittings
   1. All fittings shall be compression or threaded.
   2. Fittings shall provide a secure connection for pulling communications cables.
   3. Setscrew fittings are not permitted.
   4. Conduit “condulets” are not permitted.

C. Non-metallic conduits are not permitted in above ground installations. Conversion fittings are required for non-metallic (below ground) to metallic (above ground) transitions.

D. Innerduct:
   1. All fiber shall be installed in innerduct unless fiber cabling is armored.
   2. Shall be constructed of non-metallic material.

E. Only manufacturer’s fittings, transition adapters, terminators and fixed bends shall be used.

F. Measured Pull Tape
   1. Pre-lubricated, woven polyester, low friction, and high abrasion resistant yarn with footage markers printed on the tape.
   2. Minimum average tensile strength shall be 1130 lbs. for 0’-1.5” and smaller conduits and innerduct.
   3. Minimum average tensile strength shall be 1800 lbs. for conduits larger than 0’-1.5”.

G. Fill and Bend Radius
   1. Conduit fill shall comply with NEC requirements.
   2. The minimum bend radius is 6 X the conduit inside diameter (ID) for 0’-2” conduit or less.
   3. The minimum bend radius is 10 X the conduit ID for a conduit greater than 0’-2”.
   4. There shall be no more than two 90° bends (180° total) between conduit pull boxes.
   5. Changes in direction shall be accomplished with sweeping bends observing minimum bend radius requirements above.
   6. Do not use pull boxes for direction changes unless specifically designated otherwise in the drawings.
   7. Unless otherwise noted in the drawings, conduits entering pull boxes shall be aligned with exiting conduits.

H. Routing
   1. Conduits shall be routed in the most direct route possible, with the fewest number of bends possible.
   2. There shall be no continuous conduit sections longer than 100’-0” for premises conduits. For runs that total more than 100’-0”, insert junction or pull boxes so that no continuous run between pull boxes is greater than 100’-0”.

I. Penetrations
   1. All conduit penetrations shall comply with all applicable fire codes.
   2. All conduit penetrations in fire-rated walls or floors shall be sealed and fire-proofed to meet or exceed the designed rating of the penetration area.

2.5 HANGERS AND SUPPORT

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A. Steel support brackets shall be galvanized steel and capable of supporting a minimum of 200 lbs with a safety factor of 3.
B. Steel support brackets shall have a removable galvanized steel retaining strap.
C. Steel support brackets shall accept 0'-3/8" (10mm) threaded rod for attachment to building structure or sub structure.

PART 3 - EXECUTION

3.1 EXAMINATION
A. Refer to Section 270000.

3.2 PREPARATION
A. Refer to Section 270000.
B. Verify system is properly sized for cables before installation.
C. Verify that the manufacturer recommended loads are not exceeded.
D. Verify general routing and coordinate locations with other trades before installation. Layout cable runs in advance to determine quantities of cable to be installed along pathways, and to ensure non-interference from other trade installations.

3.3 INSTALLATION
A. Refer to Section 270000.
B. Cable Hooks
1. Provide cable hook (j-hook) cable support system for horizontal and/or riser cabling in accessible ceiling space. Assemblies shall be complete with mounting hardware.
2. Provide threaded rod for supporting hangers when hanging from floor deck and deck members.
3. Follow manufacturers fill capacities.
4. Locate cable hooks on 4’ to 5’ centers to adequately support and distribute the cable’s weight.
5. Suspended cables shall be installed with at least 0’-3” of clear vertical space above the ceiling tiles and support channels.
6. For larger quantities of cables, provide special supports that are specifically designed to support the required cable weight and volume.
7. Do not support pathways or cables with the ceiling suspension system or use electrical, plumbing, or other pipes for support.
8. Cable supports shall be permanently anchored to building structure or substrates. Provide attachment hardware and anchors designed for the structure to which attached, and that are suitably sized to carry the weight of the cables to be supported.
9. Secure and support exposed horizontal cable at intervals not exceeding 5’-0” and not less than 1’-4” (16") from cabinets, pack pole, boxes, fittings, outlets, racks, frames, and terminals.
10. Cable sag between vertical supports for horizontal pathway shall not exceed 0’-6”. Provide at least 0’-3” cable sag between supports.
11. Painted J-hooks shall meet or exceed NEC requirements for the environment in which the product is installed.

C. Conduit and Pull Boxes
1. The Contractor shall route the conduit in approximate locations unless drawing is dimensioned for precise placement.
2. Conduit cuts shall be square. Ream ends of burrs and remove metal shavings and cutting lubricants before conduit is connected to the conduit system.
3. For conduit embedded in concrete, coat threaded connections in conduits with colloidal rust and corrosion inhibitor and sealant. Conduit must be clean and dry and must pass standard sizing test after concrete is poured.
4. Cap unused conduits with watertight caps
5. Make conduit connections with appropriate fittings and tighten securely.

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6. Use appropriate tools to install PVC coated conduit; avoid damage to exterior coating.
7. Install liquid-tight flexible metal conduit where exposed to weather, water, or other liquids.
8. Use IMC, PVC conduit, or rigid galvanized steel conduit in underground installations.

D. Innerducts
1. The Contractor shall provide fabric innerduct in all underground conduits, as indicated on the drawings.
   a) The Contractor shall use pre-lubricated, woven polyester, low friction, and high abrasion resistant fabric.
2. The Contractor shall be trained for proper installation technique by the innerduct manufacturer. The Contractor shall coordinate with the owner to demonstrate that pull ropes in each inner duct cell move freely from end to end.

E. Fiber Support:
1. Support vertical fiber optic cable with basket weave wire/cable grips. Support fiber riser with single weave support grip with a single offset eye.
2. Mount/attach pulling eye to a wall or ceiling deck secured hook to support/provide strain relief to riser cable. Provide a minimum 3'-0" loop of fiber prior to entering fire stopped floor sleeve.
3. Where required coil up slack fiber cable into pull box and secure with single weave support grip.

F. Clearances
1. A minimum of 1'-0" access headroom shall be provided above a cable tray. Ensure that other building components do not restrict access to the cable trays from the sides.
2. Power outlets shall not be installed in or mounted to cable tray or cable runway.
3. Provide 3'-0" of unencumbered space for every 10'-0" segment of tray.
4. Cable tray clearances
   a) Motors or transformers: 4'-0"
   b) Power cables and conduit: 1'-0"
   c) Fluorescent lighting: 0'-5"
   d) Halide lights: 1'-0"
   e) Above the ceiling tiles: 0'-3"
   f) Access above and on one side of the cable tray: 1'-0"

3.4 FIELD QUALITY CONTROL
A. Test system to ensure electrical continuity of bonding and grounding connections.
B. Ensure compliance with specified maximum ground resistance.

3.5 CLEANING
A. Remove all unnecessary tools and equipment, unused materials, packing materials, and debris from each area where Work has been completed unless designated for storage.
B. Wipe clean all cable trays and apply appropriate manufacturer's paint to areas that have been scratched.
SECTION 271300
COMMUNICATIONS BACKBONE CABLING

PART 1 - GENERAL

1.1 SUMMARY
A. This section includes the backbone cabling portion of a structured cabling system including:
   a) Fiber backbone cabling
   b) Splicing
   c) Termination and patch cables
   d) Coaxial backbone cabling

B. Provide all backbone cabling, terminating hardware, adapters, and cross-connecting hardware necessary to interconnect all system equipment including equipment located in Communications rooms.

C. Related Sections
   1. Section 270000 Communications
   2. Section 270528 Pathways for Communications
   3. Section 274170 Community Access Television (CATV)

1.2 REFERENCES
A. The publications listed below form a part of this specification. The publications are referred to in the text by basic designation only.
B. Specific reference in specifications to codes, rules, regulations, standards, manufacturer’s instructions, or requirements of regulatory agencies shall mean the latest printed edition of each in effect at the date of contract unless the document is shown dated.
C. Conflicts
   1. Refer to section 270000.
D. Codes and Standards (Most recent editions or as required in contract)
   1. Refer to section 270000.

1.3 SUBMITTALS
A. Refer to section 270000.
B. Cable Pulling Plan
   1. The contractor shall submit a cable pulling plan prior to installation.
   2. Submittal requirements:
      a) Indicate the installed backbone conduit layout in schematic format, including junction boxes and distances between junction boxes.
      b) Indicate contents of each conduit.
      c) Indicate the cable pulling calculations, conduit fill ratios and actual cable runs and tensions.
      d) Include detail and schedule showing the construction sequence of communications rooms.
      e) Installation of cabling shall not commence prior to approval of the pulling plan and calculations by the engineer.
C. Splice Plan
   1. The contractor shall submit shop drawings indicating the intended cable splice points, mounting method and equipment list prior to installation
D. Cable Testing Plan
1. Refer to Section 270000.

E. Cable Testing Reports
   1. Refer to Section 270000.

1.4 QUALITY ASSURANCE
   A. Refer to section 270000.
   B. Cable splicing personnel shall have a minimum of five years splicing experience and shall have completed a minimum of five major splicing projects.

1.5 DELIVERY, STORAGE, AND HANDLING
   A. Refer to section 270000.
   B. Storage temperature range: -40°F to 149°F (-40°C to 65°C)
   C. Fiber cables shall be shipped on reels in lengths as specified with a minimum overage of 10%:
      1. The cable shall be wound on the reel so that unwinding can be done without kinking the cable.
      2. Two meters of cable at both ends of the cable shall be accessible for testing.
         a) All fiber shall be tested on the reel for continuity and distance compliance before installation.
      3. Each reel shall have a permanent label attached showing length, cable identification number, cable size, cable type, attenuation, bandwidth, and date of manufacture.
         a) Labels shall be water resistant and the writing on the labels shall be indelible.

1.6 PROJECT/SITE CONDITIONS
   A. Refer to section 270000.

1.7 WARRANTY
   A. Refer to section 270000.

PART 2 - PRODUCTS

2.1 ACCEPTABLE FIBER CABLE MANUFACTURERS
   A. Armored & Plenum rated cable
      1. CommScope
      2. Berk-tek
      3. Belden
      4. Corning
      5. Draka
      6. Owner approved alternate

2.2 ACCEPTABLE COMPONENT MANUFACTURERS
   A. Fiber Connectors, (SC/APC)
      1. Leviton
      2. CommScope
      3. Belden
      4. Corning
      5. Panduit
      6. Owner approved alternate
   B. Fiber Duplex Patch Cables (Type SM)
      1. Ortronics
      2. Leviton
2.3 FIBER BACKBONE CABLEING

A. Fiber General Requirements

1. Fiber shall be certified to meet all parts of TIA-455 and comply with TIA-492, ANSI/ICEA S-83-596 and ANSI/ICEA S-83-640 and the NEC.
2. Fibers shall have D-LUX coating or approved equivalent to ensure color retention, minimize micro bending losses and improve handling. The coating shall be mechanically strippable.
3. Cable installed in plenums or air-handling spaces shall meet UL 910 and shall be marked OFNP (optical fiber non-conductive plenum) in accordance with the NEC.

   a) Plenum Fiber rated cable consisting of multiple fibers shall have a Plenum PVC outer jacket.
      1) Each group of fibers shall have a color-coded Low Smoke PVC buffer.
      2) The buffered fibers are organized in subunits of fibers, reinforced with aramid yarn for extra strength and surrounded with a color-coded low smoke tube.
b) Within the premises, all fiber shall be placed in plenum rated innerduct the entire length of the cable for protection. Use manufacturer plenum rated couplings for all connections.

4. Riser cable shall meet UL 1666 and be marked OFNR (optical fiber nonconductive riser) in accordance with the NEC.

   a) Non-plenum, riser rated cable consisting of multiple fibers, shall have an orange, Polyvinyl Chloride (PVC) outer jacket.

5. Fiber conductors shall follow standard color code schemes. Fiber numbers and binders shall correspond to the following color codes:

   a) Fiber/Binder No. 1 – blue
   b) Fiber/Binder No. 2 – orange
   c) Fiber/Binder No. 3 – green
   d) Fiber/Binder No. 4 – brown
   e) Fiber/Binder No. 5 – slate
   f) Fiber/Binder No. 6 – white
   g) Fiber/Binder No. 7 – red
   h) Fiber/Binder No. 8 – black
   i) Fiber/Binder No. 9 – yellow
   j) Fiber/Binder No. 10 – violet
   k) Fiber/Binder No. 11 – rose
   l) Fiber/Binder No. 12 – aqua

6. Cable Minimum Bending Radius:

   a) During Installation: 20X cable diameter
   b) After Installation: 10X cable diameter

7. Operating temperature range: -76°F to 185°F (-60°C to 85°C)

B. Single Mode Fiber Requirements

1. Fibers shall have dual wavelength capability, transmitting at 1310 and 1550 nm ranges.
2. 8.3 µm core
3. 125 µm ± 1 µm cladding diameter
4. Cladding non-circularity: = 1%
5. Core/cladding concentricity error: = .5 µm
6. Colored fiber diameter: 254 µm ± 7 µm
7. Maximum Attenuation: 1.0 dB/km at 1310 and 1550 nm (inside premises) and 0.5 dB/km at 1310 and 1550 nm (OSP)
8. Minimum Bandwidth: 20 GHz
9. The mechanical and environmental specifications for OSP fiber cable shall be in accordance with ANSI/ICEA S-87-640. OSP fiber cables shall be of a water-block construction and meet the requirements for compound flow and water penetration as established by ANSI/ICEA S-87-640. Outdoor cable shall have minimum pull strength of 2670 N (600 lbf).

C. Coaxial Cable Requirements

1. All cable must be plenum-rated RG-11
2. All cable shall be shielded, with a copper clad aluminum center conductor; expandable polyethylene dielectric; continuous aluminum outer conductor, and a flame retardant jacket.
3. All cable shall be tested and marked to comply with the NEC requirements for (CATVR) riser rating.

2.4 COPPER PATCH CABLES
2.5 FIBER PATCH CABLES
A. Refer to Section 271500.
B. Verify exact quantities and lengths with Owner prior to purchase.
C. Provide the appropriately-rated (matched to the installed cable plant) Modular Patch Cords for the appropriate location and equipment.
D. Duplex SC/APC connectors shall meet the following specifications:
   1. Made and warranted by the manufacturer of the cabling system installed in this project and shall meet or exceed patch cord specifications as outlined in TIA standards.
   2. Patch cords shall be in original packaging when presented to the Owner.
E. Single Mode patch cables shall be a stepped-index 8.3 µm core with a 125 µm cladding.
F. Duplex SC/APC connectors shall meet the following specifications:
   1. Return Loss: -50 dB maximum
   2. Mated Connector Loss: \( \mu = 0.35 \text{ dB}, \sigma = 0.2 \text{ dB} \)
   3. Connection Repeatability: 0.20 dB maximum changes per 200 re-connects.
G. Aramid yarn and a jacket of flame-retardant PVC shall cover the fiber cladding.
H. Single Mode patch cable additional requirements:
   1. Return Loss: -50 dB maximum
   2. Mated Connector Loss: \( \mu = 0.35 \text{ dB}, \sigma = 0.2 \text{ dB} \)
   3. Connection Repeatability: 0.20 dB maximum changes per 200 re-connects.

2.6 LABELING
A. Refer to Section 270000.

PART 3 - EXECUTION
3.1 EXAMINATION
A. Refer to Section 270000.
B. Verify the following before proceeding:
   1. Conduits, cable trays and pull boxes are properly installed following section 270528
   2. Liquid-carrying pipes are not installed in or above voice and data system communications rooms.
      a) Do not proceed with installation in affected areas until removed.

3.2 PREPARATION
A. Refer to section 270000.

3.3 COPPER INSTALLATION
A. Backbone Cable
   1. The Contractor shall install riser cables according to manufacturer’s instructions for compliance to warranty requirements.
B. Copper Cable and Connectors
   1. The Contractor shall install connectors according to manufacturer’s instructions for compliance to warranty requirements.

3.4 FIBER INSTALLATION
A. Fiber Cable Installation
   1. Fiber cable shall be installed in innerduct from near end termination point to far end termination point.
      a) Only UL-approved plenum-rated innerduct shall be installed in all plenum areas.
b) Metallic conduit may be used in lieu of innerduct in plenum-rated ceilings if it is bonded and grounded correctly.

2. Only technicians certified by the product manufacturer shall perform terminations.
   a) Terminations shall be made in a controlled environment.
   b) Cables may be assembled off-site, although testing must be completed with the cable in its final installed condition.
   c) Test optical fiber on the reel for distance and continuity verification before installation.

3. At each location where fiber cable is exposed to human intrusion, it shall be marked with warning tags.
   a) These tags shall be yellow or orange in color, and shall contain the warning "CAUTION FIBER OPTIC CABLE".
   b) The text shall be permanent, black, block characters, and at least 0'-0.1875" high.
   c) A warning tag shall be permanently affixed to each exposed cable or bundle of cables, at intervals of not less than 5'-0".
   d) Any section of exposed cable that is less than 5'-0" in length shall have at least one warning tag affixed to it.

B. Fiber Distribution Center
   1. Contractor shall provide sufficient spare adapter plates to fill the appropriate-sized FDC.

3.5 FIBER TERMINATION AND SPLICING

A. Interconnect Units and Distribution Shelves
   1. Modular in design and used in fiber interconnection, cross-connection, and splicing applications
   2. 1'-7" (19") rack-mountable
   3. Accept 6-strand 12-strand, 24-strand, 48-strand or 72-strand terminations
   4. Owner approved industry standard connector

B. Splicing and closures
   1. Fiber splice modules shall be utilized for all OSP terminations.
   2. The link shall consist of:
      a) Fiber cable
      b) Splice
      c) Splice tray holder/closure
      d) Fiber panel/coupler
      e) Pre-manufactured fiber pigtail with pre-polished fiber connector
      f) Fiber jumper to connect the pigtail-coupled link to the appropriate electronic switch

C. Fiber Fusion Splice
   1. Fusion splices shall be mounted in protective trays within the closure.
   2. Fusion splices shall not exceed a maximum optical attenuation of 0.3 dB when measured in accordance with ANSI/TIA-455-34, Method a (factory testing) or ANSI/TIA-455-59 (field testing).
      a) Fiber splices shall have a minimum return loss of 26 dB for Single Mode
         1) Minimum Single Mode return loss for broadband analog video (CATV) applications is 55 dB.

3.6 INSTALLATION REQUIREMENTS
A. All installation shall be done in conformance with ANSI/TIA-568-D standards, BICSI methods, and industry standard installation guidelines.
   1. The Contractor shall ensure that the maximum pulling tensions of the specified distribution cables are not exceeded and cable bends maintain the proper radius during the placement of the facilities.
   2. Failure to follow the appropriate guidelines shall require the Contractor to provide in a timely fashion the additional material and labor necessary to properly rectify the situation.
   3. This shall also apply to any and all damages sustained to the cables by the Contractor during the implementation.

B. The Contractor shall provide service loops for cables terminating in the communications rooms.
   1. A 10'-0" service loop shall be provided and secured in a neat and standards-compliant manner above the equipment racks or cable trays unless specified otherwise.
   2. This allows for future changes or expansion without installing new cables.

C. Documentation
   1. All cable inventory data documentation shall be submitted in format coordinated with and approved by owner so that data can be incorporated into existing databases.
   2. Documentation shall include cable identification number, source and destination, type of cable, length of cable and number of pairs or fibers.
   3. Complete cross-connect documentation is required. It shall include detailed documentation of each pair of all copper backbone cable and strand of fiber.

3.7 FIELD QUALITY CONTROL
A. Refer to section 270000

3.8 FIBER POST-INSTALLATION TESTING
A. Provide all labor, materials, tools, field-test instruments and equipment required for the complete and proper test measurements of the installed fiber cabling.
B. Contractor shall have successfully attended a fiber testing training program, which includes testing with an OLTS and an OTDR and have obtained a certificate as proof thereof.
C. All outlets, cables, patch panels and associated components shall be fully assembled and labeled prior to field-testing.
   1. Any testing performed on incomplete systems shall be redone on completion of the work.
D. Dust caps shall be placed on fiber end faces or adapters for each optical fiber link after all testing is complete on the fiber link.
E. Pre-test Submittals
   1. Manufacturers catalog sheets and specifications for the fiber cable field-test instruments including
      a) OLTS (Optical Loss Test Set)
      b) OTDR (Optical Time Domain Reflectometer)
   2. A schedule (list) of all fiber cables to be tested
   3. Fiber testing training program certificate
   4. Sample test reports
F. Fiber testing standards
   1. The Contractor shall meet or exceed the following standards and guidelines:
      a) ANSI/TIA-568.3-D Optical Fiber Transmission/Test Requirements, and Annex E: Optical Fiber Field Test Guidelines (Tier 2)
1) Tier 2 testing is a higher level of testing that provides qualitative measures of the installed condition and performance of the cabling system.

b) ANSI/TIA-568.3-D Optical Fiber Cabling Components Standard

c) TIA/TSB-140 Additional Guidelines for Field-Testing Length, Loss and Polarity of Optical Fiber Cabling Systems

2. Multi-mode requirements

a) ANSI/TIA-526-14-A, Method B

b) ANSI/TIA-455-50B

3. Single Mode requirements

a) ANSI/TIA-526-7, Method A.1: Optical Power Loss Measurements of Installed Single Mode Fiber Cable Plant-OFSTP-7

4. The cable installers shall have a copy of these references in their possession and be familiar with the contents.

G. In order to conform to the overall project event schedule, the contractor shall survey and coordinate the optical fiber testing with other applicable trades.

H. In addition to the test regiment detailed in this document, the contractor shall notify the Owner of any additional tests that are deemed necessary to guarantee a fully functional system.

1. The contractor shall carry out and record any additional measurement results at no additional charge.

I. The contractor shall provide all test measurement results two (2) weeks prior to substantial completion in spreadsheet format and native file format from the test instrument.

1. Software shall also be provided to view the native results.

J. All tests performed on optical fiber cabling that use a laser or LED in a test set shall be carried out with safety precautions in accordance with ANSI Z136.2.

1. A visible fault locator (VFL) normally uses a Class 2 or 3 light source and should not be directly viewed.

2. Safe usage of the tool requires indirect viewing of the light source by pointing the end of the fiber at an adjacent surface (or introducing another surface in front of a fixed mounted connector) until the presence of light is determined.

K. Link attenuation measurement and allowance calculation

1. The measured link attenuation shall be less than the link attenuation allowance. The link attenuation allowance is calculated as:

\[
\text{Link Attenuation Allowance (dB)} = \text{Cable Attenuation Allowance (dB)} + \text{Connector Insertion Loss Allowance (dB)} + \text{Splice Insertion Loss Allowance (dB)}
\]

1) Connector Insertion Loss Allowance (dB) = Number of Connector Pairs X 0.4dB

2) Splice Insertion Loss Allowance (dB) = Number of Splices X 0.15dB

3) Cable Attenuation Allowance (dB) = Maximum Cable Attenuation Coefficient (dB/km) X Length (km)

L. Fiber Testing Requirements

1. All installed fiber links shall be field-tested and pass the following tests:

a) OLTS (Optical Loss Test Set) length and dual wavelength attenuation

b) OTDR (Optical Time Domain Reflectometer) traces and event tables
2. OLTS (Optical Loss Test Set)
   a) The length and attenuation of each installed fiber link shall be measured and documented.
   b) System loss measurements requirements:
      1) 1310 and 1550 nanometers for Single Mode
   c) Reflective events (connections) shall not exceed 0.75 dB.
   d) Non-reflective events (splices) shall not exceed 0.3 dB.
   e) The acceptable link attenuation for Multi-mode horizontal fiber is based on the maximum distance of 295'-0".
   f) A horizontal link in a network with a consolidation point may be tested using a fixed upper limit for attenuation of 2.75 dB.
   g) Optical sources shall be turned on for a minimum of 5 minutes prior to referencing.
   h) Fiber links shall be measured and reported for attenuation in each direction and attenuation bi-directionally (averaged in both directions)
   i) Polarity shall be verified for duplex connector systems
   j) Mandrels
      1) Mandrels shall be used when testing attenuation of Multi-mode fiber cabling
      2) Where mandrels are used, secure the mandrel to the light source by some means such as a cable tie or tape.
      3) Care should be taken to ensure that the fiber jacket is not deformed or damaged when using a cable tie or tape.
      4) The light source shall be referenced to the meter a minimum of twice daily (i.e., in the morning and noon).

3. OTDR (Optical Time Domain Reflectometer)
   a) An OTDR trace shall be taken of each fiber link in one direction to ensure uniformity of cable attenuation and connector insertion loss
   b) Testing shall consist of a bi-directional end to end OTDR trace performed per TIA 455-61
   c) Individual connector, splice and fiber insertion loss shall be evaluated using the OTDR trace.

4. Maximum Attenuation
   a) Single Mode ISP (inside) 1.0 dB/km at 1310 nm and 1550 nm

5. Test Cords (Jumpers)
   a) Testing of the cabling shall be performed using high-quality test cords of the same fiber type and core size as the cabling under test. Use a single patch cord reference for fiber testing.
      1) OLTS test cords shall be between 3'-3" (1m) and 16'-4" (5m).
      2) OTDR testing shall be approximately 328'-0" (100m) for the launch cable and at least 82'-0" (25m) for the receive cable. OTDR testing shall be Bidirectional with Pigtails installed.
   b) The test jumper, the adapters, and fiber under test shall be cleaned immediately prior to each fiber being tested.
      1) After cleaning, cleaning solutions shall be given sufficient time to evaporate (approximately 30 seconds) prior to the mating of fiber test jumper to the fiber under test.
6. Test Failure
   a) Any fiber link that fails these requirements shall be diagnosed and corrected.
   b) Any corrective action that must take place shall be documented and followed with a new test to prove that the corrected link meets performance requirements.

7. Acceptable Testers
   a) Fluke DSX Cable Analyzer
   b) Owner Approved equivalent

M. The Owner or the Owner's representative shall be invited to witness, review or both witness and review field-testing.
   1. The Owner or the Owner's representative shall be notified of the testing start date, five (5) business days before testing commences.
   2. The Owner or the Owner's representative will select a random sample of 5% of the installed links and test that sample.
      a) The measured results obtained from the random sample shall be compared to the data provided by the contractor.
      b) If more than 2% of the sample results differ in terms of the pass/fail determination, the contractor under supervision of the Owner or Owner's representative shall repeat 100% of the testing at no cost to the Owner.

N. Test Results
   1. The detailed test results documentation data is to be provided in an electronic database for each tested fiber strand and shall contain the following information:
      a) Identification of the customer site as specified by the end-user.
      b) Name of the test limit selected to execute the stored test results.
      c) Name of the personnel performing the test.
      d) Date and time the test results were saved.
      e) The manufacturer, model and serial number of the test instrument.
      f) The version of the test software and the version of the test limit database held within the test instrument.
      g) Fiber identification number
      h) Length for each optical fiber
      i) Index of refraction used for length calculation when using a length capable OLTS.
      j) Test results to include OLTS attenuation link and channel measurements at the appropriate wavelength(s) and the margin (difference between the measured attenuation and the test limit value).
      k) Test results to include OTDR link and channel traces and event tables at the appropriate wavelength(s).
      l) Length for each optical fiber as calculated by the OTDR.
      m) Overall Pass/Fail evaluation of the link-under-test for OLTS and OTDR measurements.
      n) Circuit IDs reported by the test instrument should match the specified label ID.

3.9 CLEANING
   A. Refer to section 270000.

3.10 ACCEPTANCE
   A. Refer to Section 270000.

END OF SECTION 271300
PART 1 - GENERAL

1.1 SUMMARY
A. This document covers the general requirements for the installation of audiovisual (AV) systems.

1.2 RELATED DOCUMENTS
A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.3 CODES
A. Execute work in accordance with best AV system installation practices, National Electrical Code, and applicable state and local codes.

1.4 REGULATIONS
A. Comply with terms and conditions of Americans with Disabilities Act, especially regarding provisions for hearing impaired and wheelchair access in control areas.

1.5 SUBMITTALS
A. General
1. Refer to Division 1.
2. Submit in quantities, format and timetable as required by General Conditions.

B. Product Data Binders
1. Minimum number of Sets: two (2).
2. Timetable
   a. Submit within thirty (30) days after award of contract.
   b. Submit simultaneously with Shop Drawings.
   c. Drawing must be reviewed, approved and stamped with either an AVIXA CTS-I or CTS-D certification from a staff member employed by the AV firm.
   d. Allow minimum of ten (10) business days for review. All sets minus one (1) will be returned with review comments. If a resubmit is required, resubmit total quantity of complete sets. If second resubmit is required, Contractor shall reimburse Owner for expenses incurred during additional review process.
   e. Review and approval of Product Data is required before equipment purchase and installation.

C. Shop Drawings
1. Minimum Number of Sets: two (2).
2. Timetable
   a. Submit within thirty (30) days after award of contract.
   b. Submit simultaneously with Product Data Binders.
   c. Allow minimum of ten (10) business days for review. All sets minus one (1) will be returned with review comments. If a resubmit is required, resubmit total quantity of complete sets. If second resubmit is required, Contract shall reimburse Owner for expenses incurred during additional review process.
   3. Description:
      a. Shop Drawings shall be used for coordination between trades and updated as final record drawings.
      b. Bind all Shop Drawings together to form set. Loose drawings will not be accepted.
c. Each drawing shall include: Project, Building, Location, Contractor Name, Architect, AV Consultant, Date and Revision Number.

d. Number and title each drawing in logical manner as a set.

e. Include cover sheet with listing of all drawings included in bound set.

f. Ensure that labeling on Shop Drawings match labeling on equipment.

g. Minimum Scale:
   1) Floor Plans: 1/8 inch = 1 foot.
   2) Rack Elevations: 1-1/2 inch = 1 foot.
   3) Plate/Panel Details: 6 inches = 1 foot.
   4) Loudspeaker Details: 1 inch = 1 foot.

h. Include as a minimum:
   1) Floor plans indicating locations of all AV devices, vertical risers, pull boxes, and exposed wiring. Include Device ID (S, FRK, FB, BLU, WCP, etc., as referenced in design contract documents), as appropriate for projectors, screens, racks, floor boxes, AV plates in walls, etc.
   2) Schematic diagram showing all primary and secondary devices, interconnectivity and signal flow.
   3) Plate details showing size, material, finish, connectors, engraving, etc.
   4) Mounting detail drawings of loudspeakers, racks, and overhead equipment.

Hire services of professional structural engineer, licensed by the appropriate governing authority, to review shop drawings, building structural drawings, and any existing structures from which equipment is to be suspended. Include Structural Engineer’s stamped report with shop drawing submittal. Report shall include:

i. Itemization of items reviewed by the Structural Engineer.

j. Confirmation that proposed methods of suspending equipment as shown on the shop drawings conform to required safety factors.

k. Confirmation that building structure from which equipment is to be suspended will support equipment including required safety factors.

   1) Rack elevations.
   2) Complete schematic diagram. One-line diagram with detailed descriptions of product inputs and outputs is acceptable. Include terminal strip details and cable label information. If wiring diagram spans more than three (3) sheets, additionally provide simplified block diagram of entire system on one (1) sheet.
   3) Electrical power wiring diagram. Include circuit, switching, and control details.
   4) Wiring diagram of grounding and shielding scheme.
   5) Drawings for custom-fabricated items (i.e., plates, panels, cables, and assemblies).
   6) General construction drawings necessary for completion of work.

D. Operation and Maintenance Manuals

1. Minimum number of Sets: Two (2).

2. Bind Operation and Maintenance Manuals using either GBC or 3-ring binders.

3. Format and Minimum Information below:

   a. Section 1 - System Operation.
      1) Introduction/overview to system components and their functions and locations. Include a brief listing of basic system functions.
      2) Complete but simple system operating instructions to accomplish basic system functions, written for non-technical personnel.
3) Certificate indicating names of Owner personnel trained by AV Contactor, date of training, name of AV Contractor representative that provided training, and name of project.

b. Section 2 - System Documentation.
   1) Simplified system one-line schematic diagram showing changes made during construction.
   2) Complete inventory of system components including serial numbers. Identify location (equipment rack, over stage, stored in control room, etc.) of each component.
   3) Cable and terminal strip documentation including cable numbers, functions, originating locations, terminating locations, and signal levels.
   4) All Shop Drawings corrected to reflect as-built conditions.
   5) Other data and drawings required during construction.
   6) Initial Tests and Adjustments data.
   7) Final Tests and Adjustments data.
   8) USB drives including all utilized manufacturer’s software and saved copies of software configurations (configurations as established during Final Tests and Adjustments).

c. Section 3 - Manufacturer’s Documentation.
   1) For each equipment model at no additional costs to Owner, even if manufacturer does not include costs of such documentation with purchase of equipment item.
   2) Manufacturer’s Product Data.
   3) Operating instructions.
   4) Installation instructions.
   5) Service information.
   6) Schematic diagrams.
   7) Replacement parts list.

d. Section 4 - Maintenance Information.
   1) Preventive maintenance schedule letter clearly stating target dates of six month and end-of-warranty preventative maintenance inspections, and list of maintenance tasks performed.
   2) Maintenance instructions including manufacturer’s recommended maintenance, recommended maintenance schedule and information concerning proper inspection, testing, and replacement of components.
   3) Troubleshooting information complete with instructions for procedures during equipment failure.

e. Section 5 – Warranty Information
   1) System warranty letter.

4. Provide three (3) sets on a USB drive that include all material in Operation and Maintenance Manuals in PDF format except for copyrighted material.

5. Submit one (1) set of Operation and Maintenance Manuals at least ten (10) days before Final Tests and Adjustments procedures (minus data from Final Tests and Adjustments). This set will be reviewed by Owner and returned to Contractor. Re-submit after Final Tests and Adjustments and include data. NOTE: Do not schedule Final Tests and Adjustments or perform training of Owner personnel before submitting Operation and Maintenance Manual.

6. Submit remaining number of complete manuals as required by General Conditions within ten (10) days after return of reviewed set(s). Include Final Tests and Adjustment data, warranty period letter, and any other data not included in first submission.

1.6 QUALITY ASSURANCE

Dallas County IPTV System Upgrade

Project No.: 2020-DC048-113

AudioVisual Systems

03/30/2022

274116 - 3
A. AV Contractor Qualifications

1. Be established AV System Contractor, regularly engaged in furnishing and installing AV systems. NOTE: Electrical or general contracting firms responsible for completion of this work, but not meeting above requirement, shall employ services of approved AV Contractor as subcontractor to perform work described herein.

2. Be experienced in installations of similar size and scope within last five (5) years. Submit list of four (4) (minimum) installed jobs of similar magnitude, completed within last five years. For verification, submit complete information, including project name, project address, contact person, daytime telephone number plus month and year of project completion. At Owner's request, accompany Owner or Owner's representative on visit to any or all example completed projects submitted.

3. Be Authorized Dealer for all major lines of equipment listed in Part 2 (QSC, Samsung, etc.) Must have at least one permanent staff member who is factory trained in the installation and maintenance of each major product line offered.

4. Employ personnel (at all levels of work) experienced in projects of similar size and scope. Provide list of key personnel to be responsible for each of the following aspects of work: Project Management, Technical Documentation, Control System programming, DSP programming and Leadership of Field Work (one who is present for all field work). For each identified employee, indicate number of years employed by contractor, number of years' experience in assigned responsibilities, and list of previously completed projects where similar responsibilities were required.

5. Project manager assigned to this project must have a minimum of five (5) years' experience in installing and integrating AV systems of similar scale. Project Manager shall also have either an INFOCOMM CTS-I or CTS-D certification.

PART 2 - PRODUCTS

2.1 GUIDELINES

A. All active AV equipment shall be furnished by AV Contractor selected by the Owner. All active electronics shall be contractor furnished, contractor installed (CFCI).

B. Infrastructure Products - All conduits, basket tray/cable tray, pull boxes and associated parts required for infrastructure shall be installed by the electrical contractor unless specifically excluded in these specifications or drawings.

C. Performance - Regardless of completeness of descriptive paragraphs herein, each device shall meet its manufacturer's published specifications. Verify performance.

D. Contract Documents - Drawings and specifications are to be used in conjunction with one another and to supplement one another. In general, the specifications determine the nature and quality of the materials, and the drawings establish the quantities, details, and give characteristics of performance that should be adhered to in the installation of the AV system components. If there is an apparent conflict between the drawings and specifications, the items with the greater quantity or quality shall be provided and installed. Clarification with the owner about these items shall be made prior to the ordering and installation.

E. Quantities - All quantities are indicated on AV drawings or in Part 2 AV Products list. Confirm quantities on final Contract Documents. If Contract Documents do not include quantities necessary to deliver complete working system, provide notification of disparity, and install required quantity of devices for complete working system.

F. Small Parts - Systems are described in terms of major products. Even if not specifically mentioned, provide and install patch cables, connectors, hardware, converters, power supplies, labels, terminals, mounting accessories etc. necessary for complete and working system meeting design intent of specifications.

G. Balanced Lines - Unless specifically directed otherwise, wire all line and microphone level circuits as balanced with respect to signal ground. For products without balanced inputs or outputs, use balanced equipment.
outputs, provide high quality balancing transformers with proper level, shielding, and impedance characteristics. Assure all audio levels arriving and leaving matrix and routing switchers are equal to the manufacturer's recommended input audio level. If required, use Radio Design Labs, Inc. products or equivalent for level matching.

H. Keys - Provide five (5) sets of keys for any AV system product requiring keys.

I. Condition - Provide and install products listed in this section in factory new condition, conforming to applicable provisions of American National Standards Institute.

J. Designations - Each major product item is given unique designation (such as MIX1 for mixer number 1). The product designations are unique in this section only and may be repeated in other specification sections.

K. Security Screws - Use Middle Atlantic HSK Guardian Series button-head screws and bits to secure rack components, LCD mounts, Projector mounts and any other location deemed necessary by Owner. Use nylon washers (not provided by Bryce) to protect equipment surfaces. Account for appropriate tip wear when ordering quantity and do no use a bit beyond the manufacturer's recommendations. Provide ten (10) additional unused driver bits and deliver to the customer after completion.

L. AV Electrical Power - Ensure that “Star” ground configuration is properly implemented by the Electrical Contractor. Ensure that ground wires from each outlet are isolated from conduit, neutrals, and each other and are each home-run back to the dedicated breaker panel for AV systems.

M. Wireless Microphones - Coordinate frequency selection with other radio-frequency sources in the area and with manufacturer's recommendations.

N. Control System Programming:
   1. Utilize Infocomm International's (AVIXA) “Dashboard for Controls” concept for touch panel layout unless directed otherwise by Owner.
   2. AV management software shall be installed on Owner furnished computer(s) with adequate specifications per manufacturer's recommendations.
   3. Provide layout of each and every touch panel and hard-button panel pages in the product data submittal for approval by Owner. Provide examples of touch panel options for color, button and icon styles for owner approval with submittals. 120 days before system testing provide to owner a page by page powerpoint or other document showing touch panel layout with descriptions of functions for approval.
   4. Staff member certified by control system manufacturer shall program control system. Control programming must be done by in-house personnel. Programming cannot be subbed out to another contractor or individual.
   5. After programming is approved, all control system code and programming, including touch panel code and graphics, will become property of Owner. AV Contractor shall provide Owner both raw and compiled code on USB drive.

O. Audio System Programming - Layout and logical branching of DSP audio system. Include screen layout and menu branching drawings in AV submittal. After AV system is approved, all audio control system code and programming will become property of Owner. AV contractor shall provide virtual mixer web or desktop interface for mixer functions. Provide all DSP licenses required. AV Contractor shall provide Owner both raw and compiled code on USB drive.

P. EDID Configuration – The variety of resolutions of laptops and other computer devices that may be connected to these systems is unknown. Set preferred EDID settings to 3,840x2,160, 60Hz, 2-channel audio.

Q. AV Racks:
   1. Provide shelf for mounting of any device for which rack mount kit is not available.
2. Provide one Panelcrafters DATCO-XXXXX-RHIM-01 designer/integrator information plate or approved alternate per rack. Install information plate at the top of each rack unless 1RU space is not available. Contact Panelcrafters sales department to add AV Contractor graphic to the "integrator" section (approximately 8.5\" x 1.75\" of the right-hand side). All alternates must include AV Consultant graphic. Submit to AV designer for approval of final plate design prior to purchasing and installation.

R. AV Design Bid & Substitutions:
1. System design is around products listed in Part 2. Intent of product specification is to provide standard of quality and function for installed materials. Certain performance specifications are given to clarify job requirements.
2. Bid AV system with products specified in section below unless noted otherwise from Owner.
3. No substitutions will be allowed without prior approval from Owner specific to proposed manufacturer and model numbers.
4. Equipment listed in Part 2 is based on performance criteria to meet Owner design requirements.
5. All requested substitutions need to meet or exceed performance of devices listed in Part 2. For each request provide manufacturer's published specifications to verify performance and explain functional and cost impact.
6. Evaluation and approval of substitution requests will be performed by Owner.

2.2 SYSTEM DESCRIPTIONS
A. General Note – Contractor to refer to the construction document floor plans for quantity of the displays within the project. Contractor to use 43\" Ultra High Definition Commercial Displays with Full 3 year commercial warranty, RS-232 control port and 2 HDMI inputs for 75\% of displays shown on floor plans and 65\" Ultra High Definition Commercial Display with Full 3 year commercial warranty, RS-232 control port and 2 HDMI inputs for the remaining 25\% of displays shown on floor plans. This 75\% / 25\% methodology is being used to develop the overall line item for pricing the inclusion of the displays in the bid.

Each display within the new system will have one (1) Contemporary Research ICC1-232 Display Controller located with it (control and source signal) regardless if the displays are replaced or not.

B. General Note – The contractor is responsible for implementing a plan/method for completing the new CATV system by an area or building with the existing CATV system still working until the final "switch over". Provisions within the bid for this will be included within the contract and managed by the Dallas County PM and Media Services representative. Contractor will be required to comply with the Dallas County Jails staff background checks, sign-in / sign-out processes from the facility for all technicians.

C. Alternate #1 – Per Dallas County the contractor is to price and include within their scope of work and bid for an additional three (3) displays per floor (Two 65\" displays and one 43\" display for this pricing exercise), including the taps / trunks and labor (Contractor will include within this provisional pricing 200' run of horizontal coaxial cabling per display, one(1) Contemporary Research ICC1-232 Display Controller per display, and one mount per display). Contractor to refer to the construction document floor plans for floor quantities per building. These additional three (3) displays are not shown on the floor plans, they are for "TBD / In Addition" locations defined by Dallas County during the build out phase.

D. Alternate #2 – Per Dallas County the contractor is to price replacement of all existing displays separately from the racks, equipment, cabling and labor for the project. It is Dallas County's desire to include replacement of all existing displays within this scope of work but budget constraints may require this to be deprioritized when the final bidder is selected. Contractor to use 43\" Ultra High Definition Commercial Displays with Full 3 year commercial warranty, RS-232 control port and 2 HDMI Inputs and associated wall mounts.
E. **North tower** will house two (2) total CATV / Source racks. One (1) MRK rack located within the AV Services staff work room and one (1) FRK on the 7th floor mezzanine where the OTA signals and the content from the AV services MRK rack will be combined for site wide distribution. Along with the final modulated video content, Crestron network (LAN) control will be inserted into the final RF output prior to conversion to fiber and distribution to all displays in all buildings.

F. **B-Building** will have a wall field on each floor (refer to floor plans for locations) where the fiber cabling from the North tower will distribute horizontally to. The first “wall field” location will require for one (1) F-PLC-1X32 to be installed for sending signal to each of the F-RF-RX-MN-2 devices within this building.

G. **South Tower** will have a wall field on each floor (refer to floor plans for locations) where the fiber cabling from the North tower will distribute horizontally. The first “wall field” location will require for one (1) F-PLC-1X32 to be installed for sending signal to each of the F-RF-RX-MN-2 devices within this building.

1. This building has an existing service provider CATV system that is distributed to all “pod” displays. The contractor will NOT be interfacing or working on this existing service provider CATV system. The contractor will be connecting the newly defined system to the existing displays.

H. **West Tower** will have a wall field on each floor (refer to floor plans for locations) where the fiber cabling from the North tower will distribute horizontally. The first “wall field” location will require for one (1) F-PLC-1X32 to be installed for sending signal to each of the F-RF-RX-MN-2 devices within this building.

2.3 AV PRODUCTS

A. The following are major active products for The AV Services work room located on the 4th floor (located with the “MRK” device symbology on sheet #T-N104):

<table>
<thead>
<tr>
<th>Drawing Device Symbol</th>
<th>Manufacturer</th>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CON</td>
<td>Thor Broadcast</td>
<td>F-RF-1310-TX-8mW</td>
<td>One (1) 8 mW CATV RF Over Fiber Tx 45-870 MHz&lt;br&gt;Fiber output routed to the North Tower 7th floor mezzanine main floor rack for inclusion into the master / combined modulated output for site wide distribution.</td>
</tr>
<tr>
<td>MOD</td>
<td>Thor Broadcast</td>
<td>H-THUNDER-8</td>
<td>One (1) 8 HDMI Digital RF Encoder Modulator - Full HD up to 1080P&lt;br&gt;Output sent to the F-RF-1310-TX-8mW within this MRK</td>
</tr>
<tr>
<td>STRM</td>
<td>Rockbot</td>
<td>RB2</td>
<td>Four (4) Rockbot streaming boxes.&lt;br&gt;Connected to the existing building LAN and housed within the MRK on the 4th floor&lt;br&gt;Contractor to provide 1 year content license with all information for Dallas County to pick up the recurring fees after from Rockbot</td>
</tr>
</tbody>
</table>
| TP          | Crestron       | TS-1070-GV-B-S | One (1) TS-1070-GV-B-S 10.1 in. Tabletop Touch Screen, Government Version, Black Smooth  
|            |                |               | Connected to the existing building LAN at the Dallas County AV Services staff desk.  
|            |                |               | This touch panel will be programmed to control all building displays (logically segmented by building / area to be defined by the Dallas County AV Services staff). |
| MRK        | Middle Atlantic| RFR-1628TR    | 16 RU RFR Series Reference Furniture Rack (Teak Finish)  
|            |                |               | With RFR-CABCOOL50 50 CFM RFR Cabinet Cooler  
|            |                |               | With UPS-S500R UPS Backup power, 500VA  
|            |                |               | With PD-815SC-20 Slim Power Strip, 8 Outlet, 15A, Surge Protection  
|            |                |               | With louvered shelves to mount the Rockbot / Streaming Media players. |
| VID        | Tightrope Industries | VIOlite-600 Server | One (1) Video Server that requires the contractor to coordinate with the Dallas County AV Services staff to complete a data transfer from the existing SXLE Video Server which was purchased in 2012.  
|            |                |               | The VIOlite-600 Server will be rack mounted within the MRK, connected to the existing building LAN and configured per Dallas County AV Services requirements and leverage the owner furnished PC, keyboard and mouse currently located in the Dallas County AV Services staff desk.  
|            |                |               | DVI to HDMI adaptor cable will be required for connection to the Thor H-THUNDER-8 |
B. The following are major active products for 7th floor mezzanine “overall system headend” (located with the “FRK” device symbology on sheet #T-N107M):

<table>
<thead>
<tr>
<th>Drawing Device Symbol</th>
<th>Manufacturer</th>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>COM</td>
<td>Thor Broadcast</td>
<td>H-SP-1x12-RM</td>
<td>One (1) 1x12 Twelve-way CATV RF Coax Combiner.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The output from the 4th floor F-RF-RX-MN-2 and the H-16ATSC-IP will be routed and combined here.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The output of this H-SP-1x12-RM will be sent to the ICE-HE-DXL allowing for the Crestron network control data to be inserted onto the final RF signal</td>
</tr>
<tr>
<td>CON</td>
<td>Thor Broadcast</td>
<td>F-RF-1310-TX-8mW</td>
<td>One (1) 8 mW CATV RF Over Fiber Tx 45-870 MHz</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Fiber output routed to the F-PLC-1X32 within this 7th floor mezzanine main floor rack for inclusion into the master / combined modulated output for site wide distribution.</td>
</tr>
<tr>
<td>CNV</td>
<td>Thor Broadcast</td>
<td>F-RF-RX-MN-2</td>
<td>One (1) Fiber Optical Mini FTTH RF CATV CABLE TV Receiver with Dual Coax Output.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>This converter will bring the fiber optic signal from the 4th floor MRK rack back to RF for combining within the FRK system.</td>
</tr>
<tr>
<td>CPL</td>
<td>Thor Broadcast</td>
<td>F-PLC-1X32</td>
<td>One (1) 1x32 19&quot; Rack Mountable optical splitter - coupler SC/APC connectors.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>This Fiber distribution device will connect to each of the F-RF-RX-MN-2 within the North Tower as well as to each of the other buildings within this scope. Refer to the fiber riser diagrams</td>
</tr>
</tbody>
</table>

**Note** that the first “wall field” location is each of the other buildings will require for one (1) F-PLC-1X32 to be installed for sending signal to each of the F-RF-RX-MN-2 devices within that building.
<table>
<thead>
<tr>
<th>Vendor</th>
<th>Product</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICA</td>
<td>Contemporary Research</td>
<td>One (1) ICE-HE-DXL Display Control Center</td>
</tr>
<tr>
<td></td>
<td>ICE-HE-DXL</td>
<td>The RF output of this device will be routed to the F-RF-1310-TX-8mW</td>
</tr>
<tr>
<td></td>
<td></td>
<td>This ICE-HE-DXL will be connected to the network switch within the FRK for</td>
</tr>
<tr>
<td></td>
<td></td>
<td>the Crestron CP4N to provide control data onto the final RF signal</td>
</tr>
<tr>
<td>TUN</td>
<td>Thor Broadcast</td>
<td>One (1) 16 channel RF Tuner</td>
</tr>
<tr>
<td></td>
<td>H-16ATSC-IP</td>
<td>Output sent to the F-RF-1310-TX-8mW within this MRK</td>
</tr>
<tr>
<td>STRM</td>
<td>Rockbot</td>
<td>Four (4) Rockbot streaming boxes.</td>
</tr>
<tr>
<td></td>
<td>RB2</td>
<td>Connected to the existing building LAN</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Additional information regarding the service requirements TBD prior to</td>
</tr>
<tr>
<td></td>
<td></td>
<td>100% CD</td>
</tr>
<tr>
<td>PRO</td>
<td>Crestron</td>
<td>One (1) rack-mountable 4-Series control processor.</td>
</tr>
<tr>
<td>SW</td>
<td>Netgear</td>
<td>One (1) 24-Port Gigabit Ethernet Smart Switch with 2 Dedicated SFP Ports</td>
</tr>
<tr>
<td>SW</td>
<td>GS724Tv4</td>
<td>45 RU BGR Series Rack, 27 Inches Deep</td>
</tr>
<tr>
<td></td>
<td></td>
<td>With CBS-BGR Caster Base for BGR Series</td>
</tr>
<tr>
<td></td>
<td></td>
<td>With locking VFD-45A 45 RU Vented Front Door, Curved</td>
</tr>
<tr>
<td></td>
<td></td>
<td>With UPS-S500R UPS Backup power, 500VA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>With PD-815SC-20 Slim Power Strip, 8 Outlet, 15A, Surge Protection</td>
</tr>
<tr>
<td></td>
<td></td>
<td>With BGR-276FT-FC 276 CFM Fan Top, with Controller for BGR Series</td>
</tr>
<tr>
<td>VID</td>
<td>Tightrope Industries</td>
<td>One (1) Video Server that requires the contractor to coordinate with the</td>
</tr>
<tr>
<td></td>
<td>VIOlite-600 Server</td>
<td>Dallas County AV Services staff to complete a data transfer from the existing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SXLE Video Server which was purchased in 2012.</td>
</tr>
</tbody>
</table>

Dallas County IPTV System Upgrade

Project No.: 2020-DC048-113

AudioVisul Systems

03/30/20223
2.4 CABLES
   A. Interconnect Wiring – Refer to telecom specifications.
   B. Connectors – Refer to telecom specifications.

PART 3 - EXECUTION

3.1 INSTALLATION
   A. General Guidelines
      1. Quality of Work - Perform labor to accepted industry standards and state and local codes to accomplish complete and working system.
      2. Material and Labor - Provide specified products and other incidental materials, appliances, tools, and transportation required for complete and functioning systems. Provide personnel to perform labor who are skilled in techniques and can demonstrate technical knowledge AV infrastructure system installations.
      3. Documents at Job Site - Keep following documents at job site during entire construction period:
         a. Complete Specifications and Drawings.
         b. Approved Shop Drawings.
         c. Approved Product Data.
         d. Progress Set of Project Record Documents.
      4. Mounting - Mount equipment and enclosures plumb and square. Ensure that permanently installed equipment is firmly and safely held in place. Design equipment supports to support loads imposed with project safety factor of five (5) or greater. For devices hung overhead, obtain review by Structural Engineer licensed by the appropriate governing authority prior to installation.
      5. Dimension Verification - Verify dimensions and space requirements to assure that proper mounting, clearance, and maintenance access space is available for system components.
      6. Clean-Up - Leave project clean each day. Place debris where designated by General Contractor. Debris includes but not limited to: solder splatter, cable ends, stripped insulation, spent crimp connectors, gypsum board and ceiling tile dust, and product wrappings and cartons. After completion of installation, thoroughly clean areas worked, including non-visible areas such as equipment rack interiors, rack top panels, and inside lockable floor and wall boxes.
      7. Coordinate installation of AV infrastructure and equipment with other trades in order to follow project schedule.

The VIOLite-600 Server will be rack mounted within the MRK, connected to the existing building LAN and configured per Dallas County AV Services requirements and leverage the owner furnished PC, keyboard and mouse currently located in the Dallas County AV Services staff desk.

DVI to HDMI adaptor cable will be required for connection to the Thor H-THUNDER-8
8. Maintain any licensing required by the appropriate governing authority to install and terminate low voltage systems.

B. Labeling
1. Equipment Labels - AV Contractor shall provide engraved lamicoid labels on front and rear of rack-mounted equipment. Mount labels plumb and square. Include schematic reference design, item name, and system or area controlled by labeled component. On program preamps and mixers, provide label for each input indicating which source is controlled by labeled channel. Unless otherwise indicated, provide permanently-mounted black labels engraved with 1/8-inch white block characters. Handwritten, self-laminating, or embossed plastic (Dymo) labels are not acceptable. Provide labels for major equipment with two (2) lines (minimum) of engraving, coded as follows:
   a. Line 1: Generic name of device, such as MIXER AMPLIFIER.
   b. Line 2: Schematic designation of device, such as AV-MSW-1.

2. Control Labels – AV Contractor shall provide engraved label over each user-operated control that describes the function or purpose of control. Provide label of proper size to fit available space.

3. Terminal Strip Labels - AV Contractor shall label each terminal strip with unique identification code in addition to numerical label (Cinch MS series) for each terminal. Show terminal strip codes on system schematic drawings included with Project Record Documents.

4. Rear Equipment Labels - AV Contractor shall provide adhesive label on rear of equipment where cables attach, to indicate designation of cable connected at each point.

5. Cable and Wire Labels - Label cables and wiring logically, legibly and permanently for easy identification. Labels on cables shall be adhesive strip type, covered with clear heat shrink tubing. Factory stamped heat shrink tubing may be used. Hand-written or self-laminating type labels are not acceptable.

6. Cable Label Codes and Locations - Label each cable with unique alpha-numeric code. Locate cable designation at start and end of each cable run, within three (3) inches of termination point. For cable runs that have intermediate splice points, label cable with same designation throughout, with additional suffix to indicate each segment of run. Provide cable designation codes to schematic drawings included with Project Record Documents and Operation and Maintenance Manuals.

C. Power and Grounding
1. Power Coordination – Coordinate final connection of power and ground wiring to rack. Dallas County is and will provide power to telecom / audio visual systems. Before installation, verify load requirements for systems as accepted.

2. Bus Bars - Install 1-inch by ¼-inch copper ground bus bar, top to bottom in floor mounted AV racks. Ground and bond equipment chassis of each rack-mounted component without three-pin grounding plug to bus bars with #12 AWG insulated green wire using 6-32 or larger nuts, bolts, lock-washers, and appropriate NEMA connectors. Electrical Contractor (Division 16) shall provide and connect #4 AWG green insulated wire from Bus Bars to ground point in AV technical electrical panel.

D. Equipment Racks
1. Ventilation - Provide ventilation adequate to keep temperature in rack below 85 degrees Fahrenheit. Use “whisper” type ventilation fans in racks, adjusted to come on when temperature in rack rises above 85 degrees Fahrenheit, only if adequate cooling cannot be provided by Owner.

E. Wiring
1. Wiring Standards - Execute wiring in strict adherence to best AV engineering practices.
2. Field Connection Devices - Connect cable to active components through screw terminal connections and spade lugs when appropriate. For BNC connections use three-piece, dual crimp BNC properly sized for cable with insulating bushings. Wire nut or "Skotchlock" connectors are not acceptable. Do not wrap audio cable splices or connections with adhesive backed tape. Punch connectors or telephone-style punch blocks are not acceptable anywhere in the installation unless specifically authorized by Owner.

3. Run cable in ceiling plenums neatly parallel to building walls, supported every three feet to structure with plenum rated ties.

4. Raceways - Run vertical wiring inside rack in Panduit (or equivalent) plastic raceways with snap-on covers, sized to allow at least 50% future wiring. Mount raceways on full length 3/4-inch flat black plywood backboards, attached to rack sides. If between-rack wiring chases are provided, Panduit raceways are not required. Horizontal wiring in rack shall be neatly tied in manageable bundles with cable lengths cut to minimize excess cable slack, but still allow for service and testing. Provide horizontal support bars if cable bundles sag. Individually bundle excess AC power cable away from rack mounted equipment with plastic cable ties. Electrical tape and adhesive backed cable tie anchors are not acceptable.

5. Accessibility - Ensure that wiring and connections are completely visible and labeled in rack. Mount termination resistors, if required, on terminal strips, fully visible and not concealed within equipment or connectors.

6. Loudspeaker Polarity - Connect loudspeakers electrically in phase, using same wire color for loudspeaker wiring throughout project.

7. Physical Damage Prevention - Take necessary precautions to prevent physical damage to cables and equipment. Damaged cables or equipment will not be accepted. Separate, organize, and route cables to restrict channel crosstalk and feedback oscillation.

8. Racks - Looking into the rack from the rear, locate AC power, control, data and speaker wiring on the left; line level audio, control, video, and RF wiring on the right. Keep several inches of space between power cables and other signals.

9. Hum Prevention - Ensure that electromagnetic and electrostatic hum is at inaudible levels. For line level signals, float cable shields at the output of the source device. Do not cut or remove shield conductors; fold back unconnected shields over cable jacket and cover with clear heat-shrink tubing. Do not obstruct cable labels.

10. Other Connections - Make connections using rosin core solder or approved mechanical connectors. Where spade lugs are used, crimp properly with ratchet type crimping tool. Solder spade lugs mounted on #22 AWG or smaller cable after crimping.

3.2 STORAGE AND HANDLING

A. Power up any electronic equipment to ensure its proper functioning before its arrival onsite.

B. Ensure that materials (especially electronic and electro-acoustic devices) are protected against physical, environmental, and electronic damage until final acceptance by Owner.

C. Schedule delivery to minimize delays in the project.

D. Provide storage protection against temperature and humidity extremes, theft, vandalism, physical damage, and environmental damage.

3.3 WARRANTY

A. Refer to Division 1.

B. Warranty - Submit letter providing warranty covering labor and materials supplied under this contract. Bind in Operation and Maintenance Manuals. Terms as described in General Conditions. Minimum terms as follows:
1. System - Systems shall be free of manufacturing or installation defects for a minimum period of one (1) year from the date of final acceptance. Clearly designate begin and end dates of system warranty period.

2. Parts and Labor - Provide parts and labor to repair defects in materials and workmanship during system warranty period.

3. Response Time - Within system warranty period, provide initial on-site service response within one (1) business day of service call. Provide resolution to any system defects within 72 hours or within 48 hours of receipt of repaired or replaced product from manufacturer.

4. Replacement Products - If any item must be removed for repair during system warranty period, provide replacement item of similar quality at no charge.

5. Repair Limit - Do not repair any piece of equipment found defective during installation or system warranty period more than two (2) times. After second repair, replace defective item with similar approved item at no additional cost to Owner.

6. Extended Manufacturer's Warranties - Identify products with manufacturer's warranties extending beyond one (1) year. Provide terms and conditions of such warranties.

7. Service Personnel Information - Provide name(s) and telephone number(s) of service personnel to be contacted regarding repair and maintenance.

C. Extended Warranty - Provide cost to extend complete AV system warranty from one (1) year to three (3) years. Included a list of all provided services including maintenance schedules.

3.4 INITIAL TESTS

A. Purpose - These tests are to ensure that the AV system is installed and functioning as specified, and to ensure the system is ready for Final Tests and Adjustments (described later).

B. Testing Standards - Perform testing in accordance with ANSI standards.

C. Inspection - Verify prior to beginning actual tests and adjustments on systems:

1. Proper grounding of all electronic components (through third prong of power connector or separate connection between component chassis and ground bus bar).

2. Cables dressed, routed, and labeled, connected with proper polarity.

3. Insulation and shrink tubing in place.

4. Dust, debris, solder splatter, etc. removed.

5. Proper frequency settings (or modules) at crossovers and controllers.

6. All equalizer bands and tone controls set for flat frequency response.

7. Survey temperatures of each piece of equipment after four (4) hours use (minimum). Note and report any hot equipment.

D. Electrical Power Quality - While all sound and AV system components are unplugged from electrical power outlets, AV Contractor shall turn on power to outlets, and confirm proper voltages at each outlet across the following pairs of terminals: hot and neutral, hot and ground, and neutral and ground (zero volts across neutral and ground). AV Contractor to document measurements.

E. General Function Tests - Test each piece of equipment to ensure that it performs its intended function. Include all portable equipment in tests. Intent of initial tests is to verify complete, functioning system before Final Tests and Adjustments. Correct problems found during initial testing before beginning Final Tests and Adjustments. Document whether all pieces performed intended functions; note any unresolved malfunctions.

F. Initial Tests and Adjustments Data - Submit written report of Initial Tests and Adjustments data upon completion to Owner. Include printed name(s) of technician(s) performing tests, date(s) and time(s) of tests, model and serial numbers of test equipment, results of each initial test, descriptions of problems encountered and their solutions, and statement that system is ready for
3.5 FINAL TESTS AND ADJUSTMENTS

A. Purpose - These tests are to be witnessed by AV Consultant to determine if system is complete and functioning as designed and specified. Also, AV Consultant will perform listening and viewing tests and witness adjustments of all images for optimum clarity.

B. Timetable - Coordinate with Owner, General Contractor, and AV Consultant to schedule Final Tests and Adjustments after submittal of Initial Tests and Adjustments data.

C. System and Site Conditions - AV Consultant will witness Final Tests and Adjustments. Have systems fully functional and ready for observation and testing upon AV Consultant's arrival. Coordinate with all trades for quiet conditions throughout the listening areas and for the duration of the test schedule. If upon AV Consultant's arrival, systems do not meet criteria, site is not sufficiently quiet, or if Owner or AV Consultant is required to make additional trips to job site to witness additional testing or perform additional reviews of installed equipment, Contractor shall reimburse Owner for labor and expenses incurred by having incurred costs deducted from payments to contractor.

D. Test Labor - Provide technician familiar with this project's AV systems and operation of test equipment to perform testing. Provide additional technician to assist in the tests and to perform troubleshooting, repairs, and adjustments. Include labor for these technicians to be present for one (1), eight (8)-hour day during Final Tests and Adjustments.

E. Tools - Provide standard hand tools including screwdrivers, pliers, wire strippers, nut drivers, soldering iron, and other tools appropriate for troubleshooting system problems.

F. Ladders and Scaffolds - Provide ladders and scaffolds to inspect/adjust loudspeakers and rigging points.

G. Verification of Initial Tests and Adjustments - Verify that Initial Tests and Adjustments have been performed and meet criteria. During Final Tests and Adjustments, AV Consultant may require portions of the Initial Tests and Adjustments to be repeated. Repeat measurements as requested without claim for additional payment.

3.6 FINAL ACCEPTANCE BY OWNER

A. Certificate - Submit Certificate of Final Acceptance form signed by Owner verifying complete installation and proper operation of systems upon fulfillment of all requirements and upon recommendation by Owner.

B. General Adjustments - Adjust, balance, and align equipment for optimum quality, meeting manufacturers published specifications.

C. Input/Output Jack Demonstration - Demonstrate proper performance and phase of each system input and output jack (all audio input and output jacks) as received at AV and network systems.

D. Inventory - Inventory all installed and portable equipment for correct quantities.

E. Functional Demonstration - Demonstrate operation of each function of each major piece of equipment.

F. Other Tests - Perform any other tests on any part of the AV system as requested by Owner.

G. Final Equipment Settings - Record final settings of all equalizer bands, tone controls, filters, delays, limiters, etc., including those established through computer software settings. Include descriptions of settings (including software settings) in Operation and Maintenance Manual. Include software copy of configuration file(s) in Operation and Maintenance Manual.

H. Security Inspection - Inspect equipment for security from tampering (covers, shaft-locks, etc.).

I. Review of Labels - Inspect equipment for security from tampering (covers, shaft-locks, etc.).

3.7 OWNER TRAINING
A. Provide Owner training as described in General Conditions. As a minimum, provide twelve (12) hours instruction (within four (4) trips to site) regarding AV Systems operation to Owner-designated personnel. Schedule instruction time(s) with Owner to occur after completion of Final Tests and Adjustments. Coordinate with Owner in advance to schedule instruction time. Document date, time, and attendees of the training session and include documentation in Operation and Maintenance Manuals to serve as record of trained personnel.

3.8 SUPPORT DURING OWNER’S FIRST USE OF COMPLETED SYSTEM

A. Provide personnel familiar with design, installation, and operation of each system to be present at Owner’s first use of each completed system (up to six (6) hours total in two sessions). During first use of each system, respond to Owner requests for troubleshooting, adjustments, and additional training. If no one contractor employee or representative can provide expertise in all aspects of the system, provide multiple personnel for the six (6) hours per session as required. Schedule presence of personnel in advance with Owner. Should significant elements of the new system be operational prior to final completion, Owner may elect to schedule contractor presence for Owner function prior to final completion of system. Should Owner exercise this option, contractor presence will not be required at first use following final completion.

END OF SECTION 274116
SECTION 274170
COMMUNITY ACCESS TELEVISION (CATV)

PART 1 - GENERAL

1.1 SUMMARY
A. This Section identifies the technical design, specifications, and requirements for a Community Antenna Television System (CATV)

1.2 SYSTEM DESCRIPTION
A. The CATV Distribution System will support video and CATV communication networks.
   1. The Contractor shall provide all materials, equipment and labor necessary for a complete distribution cable plant including all backbone cabling, horizontal cabling, terminating hardware, adapters, faceplates, equipment and miscellaneous hardware necessary to interconnect all system equipment.
B. Related Sections
   1. Section 270000 Communications
   2. Section 270528 Pathways for Communications
   3. Section 271300 Communications Backbone Cabling

1.3 REFERENCES
A. The publications listed below form a part of this specification. The publications are referred to in the text by basic designation only.
B. Specific reference in specifications to codes, rules, regulations, standards, manufacturer's instructions, or requirements of regulatory agencies shall mean the latest printed edition of each in effect at the date of contract unless the document is shown dated.
C. Conflicts
   1. Refer to section 270000.
D. Codes and Standards
   1. Refer to section 270000.

1.4 SUBMITTALS
A. Refer to sections 270000.

1.5 QUALITY ASSURANCE
A. Refer to section 270000.

1.6 DELIVERY, STORAGE, AND HANDLING
A. Refer to sections 270000.
B. Storage temperature range: -40°F to 149°F (-40°C to 65°C)

1.7 PROJECT/SITE CONDITIONS
A. Refer to section 270000.

1.8 WARRANTY
A. Refer to section 270000.

1.9 MAINTENANCE AND SUPPORT
A. Refer to section 270000.
PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Active Fiber to Coax Equipment
   1. Thor
   2. Owner Approved Equivalent

B. RG11 Coaxial Plenum Cable
   1. CommScope
   2. Belden
   3. Mohawk
   4. Owner Approved Equivalent

C. RG6 Coaxial Plenum Cable
   1. CommScope
   2. Belden
   3. Mohawk
   4. Owner Approved Equivalent

D. Wall CATV Amplifiers
   1. Blonder Tongue
   2. Toner
   3. Thor
   4. Owner Approved Equivalent

E. Wall CATV Taps
   1. Scientific Atlanta
   2. Blonder Tongue
   3. Toner
   4. Owner Approved Equivalent

F. RG11 Coaxial Connector
   1. AMP
   2. Amphenol
   3. Mohawk
   4. Owner Approved Equivalent

G. RG6 Coaxial Connector
   1. AMP
   2. Amphenol
   3. Mohawk
   4. Owner Approved Equivalent

H. 75 Ω Terminator
   1. AMP
   2. Amphenol
   3. Viewsonic Lockinator
   4. Owner Approved Equivalent

I. Labeling
   1. Refer to section 270000.

J. Firestopping
1. Refer to section 270000.

2.2 ACCESSORIES
A. Mount one laminated full-size hard copy in color of an as-built floor plan designating workstation locations, pathways, and communications room locations. Confirm hard copy size with Owner.
B. Provide clear plastic lamination serving each communication room.
C. Install the laminated drawings within a protective Plexiglas encasement on the wall of the servicing communications rooms.
   1. To ease accessibility the Plexiglas encasement shall be in either flip-down format or file folder format.

2.3 DISTRIBUTION CABLING
1. RG-11 shall be considered if distances are long; designer shall evaluate distance, bandwidth and frequency of operation.
2. Shall consist of a #20 AWG solid-copper center conductor with 95% copper braided shield. The cable shall be UL and (UL) Listed for Fire Safety and ISO 9001 Certified.
3. Characteristic impedance shall be 75 Ω at 50 MHz

2.4 HORIZONTAL CABLING
A. Recognized cabling for providing the signal medium from the work area to the communications room shall be 75 Ω coaxial cable
B. RG6 Coaxial Cable requirements
   1. Quad shield, 18 AWG solid bare copper.
   2. Cable jacket shall comply with NEC Article 800 for use as a plenum cable and shall be UL and c (UL) Listed Type CMP (communications multipurpose plenum).
   3. Cable shall terminate with F-type compression connectors.
   4. Cable shall be marked 75 Ω.
   5. Installed cable shall support CATV signaling up to 750 MHz.
C. Cabling Method Requirements
   1. Provide cabling in accessible spaces, cable tray, (surface and/or enclosed raceway), conduits, and/or J-Hook cable support system.
   2. Within consoles, racks, cabinets, desks, and counters, in accessible ceilings spaces and in gypsum board partitions where open cable method may be used, use UL or ETL listed plenum rated cable in all spaces.
   3. Conceal raceway and cabling except in unfinished spaces as is practical.
   4. Utilize conduits/cable tray as indicated on the drawings.
   5. Examine pathway elements intended for cable.
      a) Check raceways and other elements for compliance with space allocations, installation tolerances, debris, hazards to cable installation, and other conditions affecting installation.
         1) Proceed with installation only after unsatisfactory conditions have been corrected.

2.5 APPLICATION OF MEDIA
A. Horizontal Cabling Requirements
1. Install cable using techniques, practices, and methods that are consistent with specified cabling and the installed components and that ensure specified performance levels of completed and linked signal paths, end to end.
2. Install cables in continuous lengths from outlet to specified telecom room.
3. Pull cables in smooth and regular motions using methods that prevent cable kinking.
4. Use approved cable pulling lubricant as required.
5. Keep all items protected before and after installation with dust and moisture proof barrier materials/envelopes.
   a) If wiring is terminated on patch panels, data, voice jacks prior to painting, carpet installation, and general finish clean up, these jacks shall be placed in a protective envelope to ensure dust, debris, moisture, and other foreign material do not settle onto jacks' contacts.
   b) Envelope will be removed on final trim out after other trades have finished their finish work.
   c) It shall be the contractor's responsibility to ensure the integrity of these protective measures throughout the life/installation of the project.
6. Do not bind cables tightly together with tie or other wraps. Wraps shall slip loosely around cables.
   a) Use Velcro wraps instead of cables ties for all bundling in the communications rooms.
7. Pull cables simultaneously if more than one is being installed in the same raceway/pathway.
8. Use pulling methods, including fish tape, cable, rope, and basket weave wire/cable grips that will not damage media or raceway.
9. Install open cabling parallel and perpendicular to surfaces or structural members following surface contours where possible.
10. Not bend cable greater than manufacturer's recommendations.
11. Cable bundles brought into the communications rooms shall be routed and dressed in such a manner that prior to termination the cables to prevent damage and misuse such as installers walking on the bundles on the floor.
   a) Do not store cable slack inside rack mounted vertical wire managers.
12. Cable pulling force shall not exceed the cable manufacturer's recommended pulling tensions.
13. When exiting runway and/or conduit via a means to ensure support of the cable, shall thereafter be supported with approved materials, and space supporting hardware to maintain performance characteristics.

B. Separation of Wires and Cabling Installation Practices:
1. The Contractor shall comply with TIA rules for separating copper communication and data-processing equipment cables from potential EMI sources, including electrical power lines and equipment.
2. Maintain a minimum spacing of 1'-6" (18") from electrical feeders and/or branch circuit wiring.
3. Maintain a minimum spacing of 1'-0" from auxiliary systems cabling.
4. Maintain a 0'-1" separation where cables must pass perpendicular to electrical, plumbing, or other wiring, conduit, or piping systems.
   a) Use non-conduit bushings, if necessary to maintain separation, which allow for the addition of a reasonable number of cables in the future.
5. Maintain minimum separation distance of 10'-0" from electrical apparatus such as motor driven equipment and transformers.
6. Provide all necessary installation materials, hardware, tools and equipment to perform insulation displacement type terminations at all patch panels.
7. Terminate cables in consistent consecutive order.
8. Arrange cables in ascending order of room numbers and outlet numbers within rooms.
9. Provide a 5'-0" service loop for horizontal cables at each rack in communications rooms.
10. Locate loop at ceiling deck or on bottom of cable runway in minimum 1'-6" (18") diameter.
11. Provide a service loop for horizontal cables at outlet.
    a) Locate service loop above or below outlet were vertical cable run transitions to horizontal run.

C. Coaxial Cable Requirements
1. RG-11 shall be considered in horizontal applications if distances exceed RG-6 limits.
2. Cable shall consist of a solid-copper center conductor with 95% copper braided shield.
3. Cable shall be UL and (UL) Listed for Fire Safety and ISO 9001 Certified.
4. Characteristic Impedance shall be 75 Ω.

2.6 TERMINATION HARDWARE
A. Work area outlets shall consist of one RG6 cable terminated with the appropriate F-type connector mounted at elevation coordinated with architectural drawings.
B. Outlet Faceplates shall be single gang and color match all technology and electrical faceplates.

2.7 PATCH CABLES
A. Coaxial Copper
    1. Provide the appropriately rated coaxial patch cables to support television connectivity from the wall plate to the device.
    2. Coordinate exact length with owner prior to purchase.
       a) Provide one patch cable per coaxial cable installed.

2.8 IDENTIFICATION (LABELING) SYSTEM
A. Refer to sections 270000 and 271300.

PART 3 - EXECUTION
3.1 DISTRIBUTION SYSTEM
A. An approved cable preparation device or splicing tool shall be used in all splicing.
B. All outlets shall be flush mounted. Coordinate with architect and telecom cabling system contractor.
C. All CATV distribution equipment indicated in communications rooms shall be wall mounted.
D. Materials shall be consistent throughout the building.
    1. Where two or more units of the same class of equipment or wiring are required, these units shall be the standard product of a single manufacturer and shall be the same product with the same material, model, and manufacturer number.
E. Contractor shall structure and equip the cable and wire system to minimize vulnerability to single point of failures.
    1. The Contractor will ensure that the wire and cable plant allows detection and diagnosis of problems to achieve high reliability and availability.
F. All wiring, materials, and equipment will be delivered and stored in a clean, dry space.
    1. Items will be properly packaged in factory-fabricated type containers and protected from damaging fumes, construction debris, and traffic until installation or job completion.
G. Labels on all wiring, materials, and equipment must show a nationally recognized testing laboratory listing.
H. All installation techniques and fixtures shall result in ease of maintenance and ready access to all components for testing measurements.
   1. All external screws, nuts, and locking washers shall be stainless steel. No self-tapping screws shall be used unless specifically approved by Owner.
   2. All parts shall be made of corrosion-resistant material, such as plastic, anodized aluminum, or brass.
   3. All materials used in installation shall be resistant to fungus growth and moisture deterioration.
   4. An inert dielectric material shall separate all dissimilar metals apt to corrode through electrolysis under the environmental operating conditions.

I. The cable pulling operation shall be performed such that a minimum bending of the cable shall occur in the unreeling and pulling operations.
   1. The pulling tension shall not be allowed to exceed the maximum tension specified by the manufacturer of the cable.
   2. Cables that pass-through pull boxes shall be labeled and dressed in a neat fashion.

J. Jacketing and insulation shall satisfy the Underwriters Laboratories (UL) listed fire-rated cable insulation requirements in all plenum areas.

K. Any pulling compound or lubricant used in cable installation shall not deteriorate the insulation or conductor(s).
   1. Pulling lubricants shall be of a type that is approved by the cable manufacturer.

L. The Contractor shall provide technicians familiar with the installation to be onsite at the time that Owner connects equipment to the cable plant.
   1. This support shall be for cut-over assistance and fault isolation that may be related to the cable plant.

3.2 ACCEPTANCE OF CABLE PLANT

A. Each area of construction completed and submitted as complete shall meet the following criteria under testing:
   1. Plant must meet all specifications as described in these instructions.
   2. Operational prints, manuals, signal logs, and as-built prints must be furnished.
   3. Visual testing and signal verification will be conducted at random locations to determine that video quality is consistent with signal levels.
   4. Specifications set forth for construction of the system have been devised in order to insure system compatibility and performance.
      a) Compliance to these specifications shall be determined during periodic observances of construction.
      b) All devices and the cable shall also be tested and the data shall be submitted to Owner as basis for acceptance.
      c) If subsystem tests fail because of any components in the subsystem, the components shall be corrected or substituted with other components (with prior approval from Owner and Engineer) and the tests shall be repeated.

   5. Contractor must notify the Owner prior to making any changes in submitted system design and/or installation.
   6. Contractor is not to proceed with changes of any type without prior written approval from Owner.

3.3 WIRING PLAN REQUIREMENTS

A. The cable installation techniques shall be such that the mechanical and communications characteristics of the cables are not degraded at the time of installation.
1. Any special environmental requirements for equipment shall be specified.

B. Contractor will submit for approval a detailed description of the procedures and equipment used in the termination of the cabling plant.

C. Distribution of the cabling will be accomplished through cable trays, conduit raceways, ducts, core holes, extended columns, false half columns and plenums.

D. All cabling shall be run at right angles, parallel or perpendicular to the building’s structural members.

E. Horizontal cable segments will be dressed and placed in cable trays and supported by distribution rings and/or J-Hooks when individual segments leave the cable tray.
   1. Where cables converge at Equipment Room locations, ladder trays, distribution rings and/or J-Hooks will support them.
   2. All cable placements shall be based on the Communications and Audio-Visual drawings.

F. Contractor shall not place communications wiring in the same conduit, raceway, or J-Hook space as used for wire for electrical power distribution, or any other low voltage applications.
   1. Communications pathways are exclusive and not designed or intended to be shared by any other high or low voltage applications.

G. Cable runs shall be properly supported at all times and not be allowed to run on ceiling grid. Contractor shall maintain a minimum clearance of 1'-0" from any electrical fixtures.

H. Under carpet wiring and flat wiring shall not be used.

I. Contractor shall not splice any cabling.

3.4 TESTING REQUIREMENTS

A. Contractor shall perform sample tests in the presence of Owner representatives.

B. Performing the testing procedures specified herein assures that the communication cabling meets the performance characteristics specified.
   1. All testing shall comply with TIA/SCTE Standards and Manufacturers.
   2. If testing indicates that the performance characteristics are not met, the test shall be declared FAIL:
      a) The cable shall be modified and/or repaired accordingly.
      b) The failed test and any other test that may be affected by the modification and/or repair shall be re-run.
      c) After all components have been installed in the cable plant, the integrity of the cable plant shall be verified.

C. Testing shall check for continuity, length, anomalies, and approximate attenuation.
   1. If subsystem test fail because of any components in the subsystem, the particular components shall be corrected or substituted with other components and the tests shall be repeated.
   2. If a component has been modified as a result of the subsystem test failure, a report shall be prepared and delivered to Owner prior to re-testing.
   3. The Contractor shall prepare and submit all test procedures and data forms for the pre-installation, post installation and subsystem test to Owner.

D. Testing and test equipment will be provided by the contractor to test and to certify 100% operational condition of all materials and equipment including:
   1. Cables
   2. Wiring
   3. Terminals
   4. Connections
E. Contractor shall prepare and submit all test procedures and data forms for the pre-installation, post installation and subsystem test to Owner.
   1. The test procedures shall have Owner approval before the tests.

3.5 IDENTIFICATION, LABELING, AND DOCUMENTATION

A. Contractor shall label all termination devices, from workstation outlet to patch panel.
   1. The contractor will mark each unit with permanently attached markings, which will not impair the cable, wiring, equipment, or present a hazard to maintenance personnel.
   2. Cables shall be identified at all cable termination points.

B. If changes occur prior to acceptance testing that alter the documentation previously furnished, the Contractor shall formally update and re-issue the relevant documentation to all parties designated including Owner’s Engineer.

C. Owner and/or Owner’s designate will review all documentation for accuracy and completeness and may reject substandard submittals.

D. Contractor shall establish, maintain, and deliver complete system documentation, including:
   1. Documentation procedures
   2. Operational information
   3. Configuration information
   4. Historical records
   5. Drawings

E. Contractor shall provide three sets of documentation for each product utilized. The documentation shall include:
   1. Pamphlets
   2. Product materials
   3. Operation manuals
   4. Technical specifications

F. Contractor shall establish cable records during the installation.
   1. These cable records shall be computer readable (ASCII, MS-Word, MS-Excel) and provided to Owner in hardcopy and electronic formats.
   2. Records shall include distribution cable number, duct paths, and workstation location.

G. The Contractor shall provide and install identification markers on all inside cables, wiring terminals and frames, so that they can readily be distinguished and referenced to the cable documentation.

3.6 WIRING METHODS

A. Contractor shall provide and install adequate service loops for all equipment.

B. Contractor shall provide and install new and unused wire and cable as required by the manufacturer of specified equipment items or by these specifications.
   1. Any cable that does not travel within conduit must be equivalently specified and meet the National Electric Code, state, city, and local building fire codes.

C. Contractor shall route cables and wiring within equipment racks and cabinetry according to function, separating wires of different signal levels (line level, amplifier output, AC, etc.) by as much physical distance as is possible.

D. Contractor shall neatly arrange and loosely bundle all cable with hook and loop type ties.

E. Contractor shall provide and install cables and wires in continuous lengths without splices between terminations.

F. In each and every case, contractor shall terminate cables and wires with the proper connector required for the associated operation of the equipment to which it is connected.
1. Contractor shall not connect cables to equipment without the proper connector.

G. Contractor shall provide and install all wires, cables, and connectors (mechanical crimp type only) that are needed to support installation.

3.7 GROUNDING

A. Contractor shall provide and install equipment grounding connections for Television Broadband Distribution System, and tighten connections to comply with the tightening torques specified in UL Standard 486A to assure permanent and effective grounds.

B. Contractor shall ground equipment to eliminate shock hazard and to minimize, to the greatest extent possible, ground loops, common mode returns, noise pickup, cross talk, and other impairments.

C. Contractor shall ground and bond all racks and associated equipment to ground bus bar.

3.8 FIELD QUALITY CONTROL

A. Manufacturer's Field Services

1. Contractor shall provide services of a duly factory authorized service representative for this project location to supervise the field assembly and connection of components and the pretesting, testing of the system.

B. Inspection

1. Contractor shall make observations to verify that units and controls are properly labeled and that interconnecting wires and terminals are identified.

C. Testing

1. Contractor shall rectify deficiencies indicated by tests and completely retest work affected by such deficiencies at Contractor's expense.

   a) The Contractor shall also verify by the system test that the total system meets the specifications and complies with applicable standards.

2. Contractor shall inspect and test the completed systems for compliance with all specifications, including data rates, storage capacity, communication with all viewing locations, reporting capabilities, etc.

3. Contractor shall provide and install the system to be free of short circuits, adjacent channel interference, RF noise, and other problems that could cause the quality of the video signal to degenerate.

4. Inject a modulated signal into the amplifier to distribute to CATV locations to verify quality of service.

5. Arrange with Owner representative minimum 1 week prior to this QOS procedure for attendance during testing for Owner to verify quality of service.

3.9 WARRANTY

A. Contractor guarantees all equipment, labor, materials, and workmanship furnished as required by General Conditions of Agreement and Supplemental General Conditions.

1. The warranty will commence from either the date of final system acceptance or the date of the Certificate of Project Substantial Completion, whichever occurs last.

B. Contractor and the material and equipment manufacturers will warrant the system for parts and labor for one (1) year.

3.10 CLEANING AND PROTECTION

A. Prior to final acceptance, the Contractor will clean the system components and protect them from damage and deterioration.

END OF SECTION 274170

Dallas County IPTV System Upgrade

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Community Access Television - CATV

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