Purchasing Division
Finance Department

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Addendum 2
Solicitation 23-99776
GANC Connector Trail, Snowmaking & Lighting

This addendum serves to notify all bidders of the following changes to the solicitation documents:

1. The deadline for questions has been extended to **NOON on December 1, 2023.**
2. Due to the funding source, a project labor agreement and community benefits provisions will not be required.
3. The special provisions certification page has been signed.
4. Attached are the questions from the pre-bid meeting with answers provided.

Additional changes are identified below.

SP-13 (1806) DETERMINATION AND EXTENSION OF CONTRACT TIME

Item 1. **ADD** Construction operations shall not be allowed within Phase 1 and Phase 2 trail project areas until after March 26, 2024.

SP-18 (2101) CLEARING **REMOVE ENTIRELY** and **REPLACE** with the following:

1. Clearing of trees (>4" DBH) from within the GANC cross country ski trails has been completed previously by others. Clearing of any remaining brush (<4" DBH) to complete grading work on the trail shall be considered incidental.
2. Oak Wilt Prevention
    a. To prevent the spread in our area Contractors are to take the following precautions when working on trails in the vicinity of oaks.
        i. April – July: No cutting down or pruning of oaks during this period above ground.
        ii. April – July: If you sever a root it must be saw-cut clean to remove all the damage and painted with a water-based shellac or tree pruning sealant to fully close the wound.
        iii. August – Ground Freeze: No restrictions on cutting or pruning.
        iv. If an oak must be removed and is in the way of the trail the stump and all roots must be fully removed and disposed of in an upland location. They cannot be reburied.
3. If you must prune or accidentally wound an oak, immediately apply pruning paint, water-based paint, or shellac to the pruning cut or wound. This step very effectively prevents oak wilt infection. *Contractor must have pruning paint, water-based paint, or shellac on site at all times during the construction.*

SP-20 (2105) EXCAVATION AND EMBANKMENT **REMOVE ENTIRELY** and **REPLACE** with the following:

This project is not expected to require rock blasting or rock excavation of boulders or rock material larger than 1 cubic yard. Rocks that equal a size of 1 cubic yard or less shall be considered common excavation. Contractor is allowed to re-use suitable rocks that may be uncovered on site for construction of natural stone retaining walls as shown on the plans.

ADD THE FOLLOWING SECTION:

SP-27 (2112) SUBGRADE PREPARATION

Subgrade Preparation shall consist of removing rocks and stumps within the trail width (24 feet), filling in any holes left behind, and rake area smooth. Contractor shall complete this work in the areas of the 2.0 km Connector trail that are noted as SUBGRADE PREPARATION in the plans.

ADD THE FOLLOWING SPECIAL PROVISIONS:

SECTION 26 00 11 – BASIC MATERIAL AND METHODS

SECTION 26 05 19 – LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

SECTION 26 05 26 – GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

SECTION 26 05 34 – CONDUIT

SECTION 26 05 35 – SURFACE RACEWAYS

SECTION 26 05 37 – BOXES

SECTION 26 05 53 – IDENTIFICATION FOR ELECTRICAL SYSTEMS

SECTION 26 09 23 – LIGHTING CONTROL DEVICES

SECTION 26 21 00 – LOW-VOLTAGE ELECTRICAL SERVICE ENTRANCE

SECTION 26 24 16 – PANELBOARDS

SECTION 26 27 26 – WIRING DEVICES

SECTION 26 28 13 – FUSES

SECTION 26 43 00 – SURGE PROTECTIVE DEVICES

SECTION 26 51 00 – INTERIOR LIGHTING

SECTION 26 56 00 – EXTERIOR LIGHTING

SECTION 27 10 05 – STRUCTURED CABLING FOR VOICE AND DATA – INSIDE-PLANT

REPLACE THE FOLLOWING PLAN SHEETS:

Sheet: 2, 22, 23, 24, 25, 26, 27, 28, 29

ADD THE FOLLOWING PLAN SHEETS:

Sheet: E1, E2, E3, E4

ADD THE FOLLOWING SECTIONS TO THE BID SET

APPENDIX 1 – Avoidance and Minimization Measures

Please acknowledge receipt of this Addendum by checking the acknowledgement box within the www.bidexpress.com solicitation.

Posted: **11/30/2023**

The following questions asked at the pre-bid meeting at Spirit Mountain on 11/21/23, are answered below.

1. For the li*ghting package that will be furnished by City, does this include the hardware package?*
    a. *Light Fixtures, Poles and Hardware furnished by Contractor, see Addendum 2 (11/30/2023).*
2. *When and where can work begin, and what areas need to be avoided?*
    a. *Blue and Yellow off-limits until March 26th due to World Cup? Phase 1 and 2 existing trail is off limits for construction access until March 26th. See Addendum 2 (11/30/2023)*
3. *What is the process for rock removal?*
    a. *See Addendum 2 (11/30/2023)*
4. *When will pipe coatings be required? Cathodic protection, UV protection?*
    a. *Cathodic protection extent will be determined in the field once we know how much pipe gets buried. We will add it to the contract at that time.*
5. Will trails be open to the public?
    a. Trails at Spirit Mountain will remain open during construction, but there will be required closures at Superior Hiking Trail. Trails in Phase 1 and 2 will be open to skiing until March 26 (see item 2). DWP must remain passable during construction season. Superior Hiking Trail must remain passable. Downhill mountain bike trails can be blocked off as needed for construction. Temporary closures are allowed on all trails with adequate signs and communication to trail owner/organization and Spirit Mountain. See Addendum 2.
6. What is the process for tree removal?
    a. See Addendum 2 (11/30/23)
7. For the wireless lighting controls to be installed at valve houses, who is to furnish controls?
    a. D Furnished by City for installation by contractor. See Addendum 2 (11/30/23)
8. I was told that the northeast trail in light blue on the printout is existing, and all that is needed is to install light poles (all pipe and wire are existing). Does this include existing pipe and wire for the power pedestals?
    a. *Yes correct. See Addendum 2(11/30/23)*
9. Does the existing area in the light blue trail already have the power panel A and B with LCPA and LCPB panels or does this still need to be provided? I am assuming it's all done since its existing and was told all is need is installation of the light poles.
    a. Yes. See Addendum 2 (11/30/23)
10. Are the light poles provided by owner?
    a. No poles are to be provided by contractor. See Addendum 2 (11/30/23)
11. On general notes on electrical plans it indicates direct buried MC. Is this for all lighting and power that needs to be trenched? I was told there are some areas that cannot be trenched. If so, do you want to change to pipe and wire for that, so its protected?
    a. Yes. See Addendum 2 (11/30/23).
12. Light fixtures are provided by owner does this include hardware to attach to poles?
    a. Contractor to provide hardware. See item 1 above. See Addendum 2 (11/30/23).
13. Do subcontractors need to submit a bid bond to the City?

    a. The general or prime contractor will need to provide a bid bond when they submit their bid. Subcontractors do not submit anything to the City.
14. On the electrical prints under bid/Alternate alternates 3 and 4, it says "stub out with conduit and box only." Is that correct or do you need the light poles and bases included?
    a. Light poles and bases are not included. Note in question is correct. See Addendum 2 (11/30/23)
15. It looks like the bid quantities listed in bid express are the exact quantities as the previous bid for Grand Ave Nordic Center from 2018. Are bid quantities correct? Was none of the work completed from the previous bid package?
    a. The bid quantities were updated in Addendum 1, and additional changes are made with Addendum 2.
16. SP-4.1 & SP-10 state work to start and complete on dates from 2018?
    a. The special provisions were replaced entirely in Addendum 1. The 2018 dates are not correct.
17. Valve station #1 is shown in the details, but shown as already completed, with no details on the proposed valve station.
    a. Valve station has been completed and is not part of this bid.
18. Snowmaking by phases, and piping layout drawings areas of work shown as previously completed do not line up correctly, please advise.
    a. Phase 1 work has all piping complete. Phase II and III will need piping as part of this project. Valve house 1 and 2 are complete. Valve house 3 is part of this bid.
19. The piping quantities sheet lists phase 1 quantities, was this previously completed?
    a. Phase 1 was previously completed. The bid sheet has been updated.
20. What piping is above grade, shallow bury, or deep bury?
    a. Pipe is to be shallow bury where possible.
21. How many above-ground elevated pipe support assemblies are required?
    a. This will need to be field fit at the time of construction due to the variability of the terrain.
22. There is a bid item for “BESSEMER AREA DRAINAGE IMPROVEMENTS,” but in the drawings, it is shown as previously completed, please advise.
    a. This was previously completed. The bid items in Bid Express have been updated.
23. Are all the culverts listed in the culvert table on sheet 6 of 11 in SEH drawings required? Many of the culverts are shown as completed in other drawings?
    a. The culverts from the original SEH plans were incorporated into the TKDA plans through Addendum 1 of this project (Addendum 5 of the plan set). The TKDA plans were re-issued entirely through this addendum, replacing the original plans of the bid package.
24. Is there a coating spec. for water supply pipe on this project?
    a. Yes. See specifications provided in Addendum 2 (11/30/23)
25. How many pump houses are on this project? The bid form lists 2 (one in alternate #5 & #7), from the walkthrough, it looks like only 1?
    a. Only valve house 3 is included in this scope of work.
26. Who is supplying the hydrants?
    a. Contractor to supply.
27. Who is supplying the valves?
    a. Contractor to supply.

28. Are there quantities for above-grade pipe supports? If not, can you list the quantity for bidding purposes? If it is incidental, what unit price should it be included in?
    a. Due to the variability of the terrain the exact quantity is unknown.
29. Where would pricing for valves be included?
    a. See addendum 2 (11/30/23)
30. Can you delete items from the bid form that have a zero quantity?
    a. No. The items are there because they may need to be added to the project later and pricing is needed.
31. Can the pipe outside the valve house be ERW?
    a. All piping is ERW. See addendum 2 (11/30/23)

SPECIAL PROVISIONS
LOWER SPIRIT NORDIC CENTER CULVERT BID PACKAGE
November 21, 2023

I HEREBY CERTIFY THAT THIS PLAN, specification or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

Signature	Emily R. Major Typed or Printed Name
November 21, 2023 Date	52201 MN License

SECTION 26 00 01

CERTIFICATION

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

NATHAN PATRICK EISENBARTH, P.E. **DATE** **02-21-2018**

REGISTRATION NO. 53579

THIS CERTIFICATION COVERS DIVISION 26 AND 27.

END OF SECTION

SECTION 26 00 11
BASIC MATERIAL AND METHODS

PART 1 GENERAL

1.01 CONDITIONS OF THE CONTRACT

A. The Conditions of the Construction Contract and applicable provisions of Division l - General Requirements, as well as these General Provisions, shall apply to all of Division 26 and 27.

B. All installations shall meet all Local, State and National Codes.

1.02 DEFINITIONS

A. Furnish: Under this Contract, Contractor shall deliver to the site item(s) specified, as well as additional specialized materials and/or accessories necessary for the use and operation of item or items specified.

B. Install: Under this Contract, Contractor shall set in position, connect (including sub-assemblies furnished), and adjust for use. Contractor shall furnish miscellaneous specialty items such as fittings, hangers, fastening devices, etc., as obviously necessary for a complete and operating installation.

C. Provide: Under this Contract, Contractor shall furnish and install item or items specified. Contractor shall perform all labor and furnish all materials and equipment necessary to that specified item or system will be complete and operational in every respect.

1.03 DRAWINGS

A. In general, the drawings of the Electrical Systems and Equipment are to scale, however, to determine exact locations of walls and partitions, the Contractor shall consult the Architectural and/or Structural Drawings which are dimensioned. Drawings shall not take precedence over field measurements. Plans showing circuiting or conduit routing, although shown on scale drawings, are diagrammatic only. They are intended to indicate the size and/or capacity where stipulated, approximate location and/or direction, and approximate general arrangement of one phase of work to another, but not the exact detail or exact arrangement of construction.

B. If it is found before installation of any or all construction phases, that a more convenient, suitable or workable arrangement of any or all phases of the project would result by varying or altering the arrangement indicated on the drawings, the Engineer may require any or all Contractors to change the location or arrangement of their work without additional cost to the Owner. Such rearrangement shall be in accordance with directions from the Engineer.

C. Where discrepancies are discovered after certain portions or phases of any Contract have been installed, the Engineer reserves the right to have the Contractor make minor changes in conduit or duct, outlet, fixture or equipment locations or arrangements to avoid conflict with other work at no additional cost to the Owner. It shall be the responsibility of the contractor to provide written notification to the Engineer prior to making any changes or performing any additional work described in the plans and specifications. The Contractor may not be compensated for work done before notifying the Engineer.

D. Because the drawings are to a relatively small scale to show as large a portion as is practical, the fact that only certain features of the system are indicated does not mean that other similar or different features or details will not be required. The Contractor shall furnish all incidental labor, materials, or equipment for the systems under his control, so that each system is a complete and operating one unless otherwise specifically stipulated in the detailed body of the Specifications.

E. The Contractor shall be responsible for determining all field measurements before commencing construction, giving due consideration to building design and other equipment to be installed. Electrical equipment not dimensioned on the drawings shall be field located, giving due consideration to the work of other trades. The Contractor shall verify all dimensions before proceeding with the work. Where cutting and patching is required, each Subcontractor shall be responsible for his own work, unless otherwise determined by the Contractor.

F. Dimensions shall not be scaled from the drawings. If the Contractor discovers any discrepancy between actual measurements and those shown on the drawings which prevents good practice, good arrangement, or which is contrary to the intent of the drawings and specifications, he shall notify the Engineer before proceeding with the work.

G. Circuit Breaker added to existing Electrical Panels shall meet the Interrupting Rating of the panel or the smallest circuit breaker.

1.04 SITE INSPECTION

A. Before submitting a proposal for the Work contemplated in these specifications and accompanying drawings, each bidder shall examine the site and familiarize himself with all the existing conditions and limitations, including the extent of demolition, cutting and patching to be done by the Subcontractor for Electrical Work. No extras will be allowed because of the Contractor's misunderstanding as to the amount of work involved, or his lack of knowledge of any condition in connection with the Work.

1.05 PRODUCT/ASSEMBLY/SYSTEM SUBSTITUTIONS

A. Where the Bid Documents stipulate a particular Product, substitutions will be considered by the Engineer up to 7 days before receipt of bids.

B. When a request to substitute a Product is made, the Engineer may approve the substitution and will issue an Addendum to known bidders.

C. The submission shall provide sufficient information to determine acceptability of such products.

D. Provide Products as specified unless substitutions are submitted in this manner and subsequently accepted.

E. The cost of any changes of other trades as a result of use of the substitution material or equipment must be borne by the Subcontractor submitting such material or equipment.

F. Fax or telephone requests for substitution will not be accepted.

G. Those vendors wishing written approval shall include a return copy and a self-addressed stamped envelope with their request.

H. The listing of any manufacturer as "acceptable" does not imply automatic approval. It is the sole responsibility of the Contractor to ensure that any price quotations received and submittals made are for equipment which meet or exceed the specifications included herein.

1.06 EQUIPMENT

A. All equipment shall be new and in first-class condition. Equipment shall not be used for purposes other than intended by the manufacturer.

B. Manufacturer's nameplate, name or trademark shall be permanently affixed to all equipment and material furnished under this Specification. Nameplate of Subcontractor or distributor will not be acceptable. Nameplate shall be masked prior to any painting. Remove masking after completion.

C. Equipment specified and furnished shall be of a type and manufacturer that has a local representative and a local replacement and service outlet to give complete coverage on parts and service at all times.

1.07 WARRANTY

A. The Contractor shall be held responsible for any and all defects in equipment and workmanship which appear for one (1) full year after the date of Substantial Completion. All such defects must be repaired or defective equipment promptly replaced by the Contractor at no expense to the Owner.

1.08 INSPECTIONS AND FEES

A. The Contractor shall obtain all permits and licenses required in connection with the work under Division 26 and 27. Cost for such shall be paid by the Contractor.

B. When application for utility service is the Owner's responsibility, the Contractor shall be responsible for all phases of the installation other than the application itself and shall coordinate the utility's work with his installation.

1.09 SUBMITTALS

A. Drawing Plan Backgrounds Available
   1. Electronic drawing files may be available to the contractor for the purpose of preparing shop drawings or submittals. Files provided by the Engineer are generally available at a nominal fee of $100 per drawing file. Drawings requiring extensive modification for retransmitall will have an additional time and material charge for labor or expenses incurred.

B. List of Suppliers & Subcontractors:
   1. The Contractor shall submit a list of suppliers, Subcontractors, and manufacturers for equipment installed under Division 26 and 27 for approval. Contractor shall make such submittal within 16 days after Notice to Proceed, prior to ordering any equipment. Approval of such list does not relieve the Contractor from submittal of shop drawings, nor shall it constitute final approval should the shop drawings be found not in agreement with the Specifications.
   2. If a list of materials is not submitted, it shall be assumed that the Contractor has waived his option of equipment selection in favor of selection by the Engineer.

C. Cost Breakdown:
   1. Before submittal of the first Request for Payment, the Contractor shall submit to the Engineer, an itemized cost breakdown, including separation of labor and material, for work under Division 26 and 27. The breakdown shall be divided in such detail as requested to aid in approval of Payment Requests based on work completed. Breakdown shall include, but not be limited to:
      a. Special Electrical Conditions (Bonds, Fees, Mobilization, etc.)
      b. Conduit, boxes, wire, etc.
      c. Panelboards, Switchboard, circuit breakers and disconnects.
      d. Devices
      e. Lighting Controls
      f. Pedestals
      g. Poles

D. Shop Drawings:
   1. See Division 1 for submittals procedures. This section supplements the requirements of Division 1. In case of differences, the greater requirement applies.
   2. Shop drawings shall be submitted for all major equipment under each Section of this Specification.
   3. Shop drawings must first be checked by the Contractor for capacities and space conformance, and so stamped prior to submittal to the Engineer.
   4. Submit the signed and stamped electronic drawings or a minimum of eight (8) copies of paper shop drawings.

E. Operating and Maintenance Manuals:
   1. The Contractor shall prepare two (2) hard cover, looseleaf portfolios of all Electrical equipment furnished by him on the project. These portfolios shall include manufacturer's shop drawings, parts' lists, warranty information including dates, and operating and maintenance instructions of such equipment. Information shall be submitted neatly folded to approximately 8-1/2" x 11" size and shall be bound in indexed looseleaf binders of adequate size to contain the material. Upon completion of these portfolios, the Contractor shall turn over the same to the Engineer for approval and delivery to the Owner.
   2. Instructions shall include the following information:
      a. Manufacturer's recommended cleaning and maintenance procedures.
      b. List of materials recommended for maintenance.
      c. Complete operating instructions.

d. Name and address of authorized service organization and parts depot.

3. Where indicated in the Specifications, the Contractor shall provide the services of a factory trained representative to instruct the Owner's authorized personnel in the operation, control and maintenance of equipment.

F. Record Drawings:

1. The Contractor shall keep a complete set of all Electrical drawings in his job site office for purposes of showing "As-Built" installation of Electrical systems and equipment.
2. This set of drawings shall be used for no other purpose. Where any material, equipment or system components are installed different from that shown on the Drawings, such differences shall be clearly and neatly shown on this set of drawings using ink, or indelible pencil. The change notations shall be kept up-to-date on a daily basis. This set of drawings shall be transmitted to the Engineer as directed, and after the Engineer has examined the drawings, the set will be returned to the Contractor for further use. At the completion of the project, the set of drawings shall be turned over to the Engineer for approval and delivery to the Owner.

1.10 TEMPORARY UTILITIES

A. Contractor shall refer to Division 1 for temporary electrical and telephone requirements during construction.

B. The Electrical Subcontractor shall coordinate with the Contractor for temporary service location and special power requirements.

PART 2 - PRODUCTS - NOT USED.

PART 3 - EXECUTION

3.01 WORKMANSHIP

A. Workmanship shall be first-class in every respect. Standard accepted practice in the various trades shall be considered as minimum. The Engineer reserves the right to reject any workmanship not in accordance with the specifications, either before or after installation of equipment.

3.02 COORDINATION

A. The Contractor shall coordinate locations and arrangements of his equipment with other Contractors and Subcontractors working on the project. Before starting work, the Contractor shall examine the Architectural, Structural and Electrical drawings and specifications, as well as shop and vendor drawings, for all divisions, to ascertain locations, levels, arrangements and dimensions of other work and shall confer and cooperate with all other Contractors or Subcontractors to avoid all interferences. He shall also provide Subcontractors for other trades with information regarding locations, arrangements and dimensions of his equipment. He shall also coordinate his own cutting and patching requirements with those of other Subcontractors, so that it will not be necessary for any Subcontractor to remove or re-do work improperly scheduled.

B. In cases of interferences between various items of equipment or between equipment and building members, if simplified construction is made possible by the relocation of certain equipment, changes in arrangements may be made, but only if authorized by the A/E.

C. Interferences between the work of different divisions which cannot be resolved by the parties involved shall be submitted to the Engineer who shall decide upon final location and arrangement without respect to which work was installed first.

3.03 JOB INSPECTION

A. Periodic job site observations will be made throughout the construction to review applications for payment, observe methods and materials of construction, and review requirements of the Bid Documents.

B. Contractor shall notify the Engineer, or authority having jurisdiction, and arrange for observation of installation prior to backfill or concealing of systems. Contractor shall, to the maximum

practical extent, schedule work to allow for the observation of systems' installation in groups rather than individually.

C. Upon completion of all work, and submittal and approval of Test Reports, Maintenance Manuals and Record Drawings, Contractor shall notify the A/E and shall make arrangements for a Substantial Completion inspection.

D. After the inspection is made, the Contractor will receive a list of items requiring adjustment, correction, replacement or completion.

E. The Contractor shall promptly comply completely with all the listed requirements. Should the Contractor fail to perform promptly, the Engineer reserves the right to have the work completed by others and the cost deducted from the contract price.

F. The Contractor will be billed for projects which are not complete enough for a Substantial Completion Report (Punch List) by the Engineer when one is previously scheduled.

3.04 INSTRUCTION

A. Complete operating instructions composed of charts, diagrams, installation instructions, service instructions and wiring diagrams, shall be mounted in a conspicuous location on or immediately adjacent to the equipment concerned. Charts shall be in a glass or approved plastic-enclosed case.

B. Contractor shall instruct the Owner's personnel in the operation and maintenance procedures of all equipment and systems. Contractor shall confirm in writing prior to the final inspection that Owner has been instructed to his satisfaction in the operation of all systems. Coordinate with the Owner.

C. The Contractor shall obtain and maintain a list of all attendee in attendance at all training sessions. This list shall be submitted to the Engineer.

D. Additional requirements shall be listed in some sections of this specification.

E. Every Training Session shall be videotaped by the contractor.

3.05 ENERGIZED EQUIPMENT

A. Electrical Equipment that is energized shall not be worked on in the energized state.

END OF SECTION

SECTION 26 05 19

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Single conductor building wire.

B. Metal-clad cable.

C. Wiring connectors.

1.02 REFERENCE STANDARDS

A. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire; 2013.

B. ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft; 2011.

C. ASTM B33 - Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes; 2010 (Reapproved 2014).

D. ASTM B787/B787M - Standard Specification for 19 Wire Combination Unilay-Stranded Copper Conductors for Subsequent Insulation; 2004 (Reapproved 2014).

E. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

F. NECA 120 - Standard for Installing Armored Cable (AC) and Metal-Clad Cable (MC); 2012.

G. NEMA WC 70 - Nonshielded Power Cable 2000 V or Less for the Distribution of Electrical Energy; 2009.

H. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

I. UL 44 - Thermoset-Insulated Wires and Cables; Current Edition, Including All Revisions.

J. UL 83 - Thermoplastic-Insulated Wires and Cables; Current Edition, Including All Revisions.

K. UL 486A-486B - Wire Connectors; Current Edition, Including All Revisions.

L. UL 486C - Splicing Wire Connectors; Current Edition, Including All Revisions.

M. UL 486D - Sealed Wire Connector Systems; Current Edition, Including All Revisions.

N. UL 1569 - Metal-Clad Cables; Current Edition, Including All Revisions.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate sizes of raceways, boxes, and equipment enclosures installed under other sections with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
2. Coordinate the installation of direct burial cable with other trades to avoid conflicts with piping or other potential conflicts.
3. Coordinate with electrical equipment installed under other sections to provide terminations suitable for use with the conductors to be installed.
4. Notify Engineer of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for conductors and cables, including detailed information on materials, construction, ratings, listings, and available sizes, configurations, and stranding.

C. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

1.05 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

PART 2 PRODUCTS

2.01 CONDUCTOR AND CABLE APPLICATIONS

A. Do not use conductors and cables for applications other than as permitted by NFPA 70 and product listing.

B. Provide single conductor building wire installed in suitable raceway unless otherwise indicated, permitted, or required.

C. Metal-clad cable is permitted only as follows:
   1. Where not otherwise restricted, may be used:
      a. For direct burial with a PVC jacket.

2.02 CONDUCTOR AND CABLE GENERAL REQUIREMENTS

A. Provide products that comply with requirements of NFPA 70.

B. Provide products listed, classified, and labeled as suitable for the purpose intended.

C. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.

D. Comply with NEMA WC 70.

E. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.

F. Thermoset-Insulated Conductors and Cables: Listed and labeled as complying with UL 44.

G. Conductor Material:
   1. Provide copper conductors only. Aluminum conductors are not acceptable for this project. Conductor sizes indicated are based on copper.
   2. Provide copper conductors except where aluminum conductors are specifically indicated. Substitution of aluminum conductors for copper is not permitted. Conductor sizes indicated are based on copper unless specifically indicated as aluminum. Conductors designated with the abbreviation "AL" indicate aluminum.
   3. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B787M unless otherwise indicated.
   4. Tinned Copper Conductors: Comply with ASTM B33.

H. Minimum Conductor Size:
   1. Branch Circuits: 12 AWG.
      a. Exceptions:
         1) See drawing for indicated conductor size.

I. Conductor Color Coding:
   1. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.
   2. Color Coding Method: Integrally colored insulation.
   3. Color Code:
      a. 480Y/277 V, 3 Phase, 4 Wire System:
         1) Phase A: Brown.
         2) Phase B: Orange.
         3) Phase C: Yellow.
         4) Neutral/Grounded: Gray.
      b. 240/120 V, 1 Phase, 3 Wire System:
         1) Phase A: Black.
         2) Phase B: Red.
         3) Neutral/Grounded: White.
      c. Equipment Ground, All Systems: Green.

MATCH EXISTING PHASE I AND II WORK COMPLETED.

2.03 SINGLE CONDUCTOR BUILDING WIRE

A. Description: Single conductor insulated wire.

B. Conductor Stranding:
   1. Feeders and Branch Circuits:
      a. Size 12 AWG and Smaller: Solid.
      b. Size 12 AWG and Larger: Stranded.

C. Insulation Voltage Rating: 600 V.

D. Insulation:
   1. Copper Building Wire: Type THHN/THWN or THHN/THWN-2.

2.04 METAL-CLAD CABLE

A. Description: NFPA 70, Type MC cable listed and labeled as complying with UL 1569, and listed for use in classified firestop systems to be used.

B. Conductor Stranding:
   1. Size 10 AWG and Smaller: Solid.
   2. Size 8 AWG and Larger: Stranded.

C. Insulation Voltage Rating: 600 V.

D. Insulation: Type THHN, THHN/THWN, or THHN/THWN-2.

E. Grounding: Full-size integral equipment grounding conductor.

F. Armor: Steel, interlocked tape.

G. Listed for direct burial, Provide PVC jacket applied over cable armor where indicated or required for environment of installed location.

2.05 WIRING CONNECTORS

A. Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be connected, and listed as complying with UL 486A-486B or UL 486C as applicable.

B. Wiring Connectors for Splices and Taps:
   1. Copper Conductors Size 8 AWG and Smaller: Use twist-on insulated spring connectors.
   2. Copper Conductors Size 6 AWG and Larger: Use mechanical connectors or compression connectors.

C. Wiring Connectors for Terminations:
   1. Provide terminal lugs for connecting conductors to equipment furnished with terminations designed for terminal lugs.
   2. Provide compression adapters for connecting conductors to equipment furnished with mechanical lugs when only compression connectors are specified.
   3. Provide motor pigtail connectors for connecting motor leads in order to facilitate disconnection.
   4. Copper Conductors Size 8 AWG and Larger: Use mechanical connectors or compression connectors where connectors are required.

D. Twist-on Insulated Spring Connectors: Rated 600 V, 221 degrees F for standard applications and 302 degrees F for high temperature applications; pre-filled with sealant and listed as complying with UL 486D for damp and wet locations.

E. Mechanical Connectors: Provide bolted type or set-screw type.

F. Compression Connectors: Provide circumferential type or hex type crimp configuration.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that interior of building has been protected from weather.

B. Verify that work likely to damage wire and cable has been completed.

C. Verify that raceways, boxes, and equipment enclosures are installed and are properly sized to accommodate conductors and cables in accordance with NFPA 70.

D. Verify that field measurements are as shown on the drawings.

E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

A. Clean raceways thoroughly to remove foreign materials before installing conductors and cables.

3.03 INSTALLATION

A. Circuiting Requirements:
   1. Unless dimensioned, circuit routing indicated is diagrammatic.
   2. When circuit destination is indicated and routing is not shown, determine exact routing required.
   3. Arrange circuiting to minimize splices.
   4. Circuiting Adjustments: Unless otherwise indicated, when branch circuits are shown as separate, combining them together in a single raceway is not permitted.
   5. Common Neutrals: Unless otherwise indicated, sharing of neutral/grounded conductors among up to three single phase branch circuits of different phases installed in the same raceway is not permitted. Provide dedicated neutral/grounded conductor for each individual branch circuit.

B. Install products in accordance with manufacturer's instructions.

C. Install conductors and cable in a neat and workmanlike manner in accordance with NECA 1.

D. Install metal-clad cable (Type MC) in accordance with NECA 120.

E. Installation in Raceway:
   1. Tape ends of conductors and cables to prevent infiltration of moisture and other contaminants.
   2. Pull all conductors and cables together into raceway at same time.
   3. Do not damage conductors and cables or exceed manufacturer's recommended maximum pulling tension and sidewall pressure.
   4. Use suitable wire pulling lubricant where necessary, except when lubricant is not recommended by the manufacturer.

F. Direct Burial Cable Installation:
   1. Provide trenching and back filling.
   2. Protect cables from damage in accordance with NFPA 70.
   3. Cables shown to be direct buried when encountering bed rock outcroppings and going around is not feasible, go over the rock and encased in a minimum of 2" of concrete.
   4. Provide underground warning tape in accordance with Section 26 05 53 along entire cable length.

G. Paralleled Conductors: Install conductors of the same length and terminate in the same manner.

H. Secure and support conductors and cables in accordance with NFPA 70 using suitable supports and methods approved by the authority having jurisdiction.

I. Terminate cables using suitable fittings.
   1. Metal-Clad Cable (Type MC):
      a. Use listed fittings.
      b. Cut cable armor only using specialized tools to prevent damaging conductors or insulation. Do not use hacksaw or wire cutters to cut armor.

J. Install conductors with a minimum of 12 inches of slack at each outlet.

K. Where conductors are installed in enclosures for future termination by others, provide a minimum of 5 feet of slack.

L. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.

M. Group or otherwise identify neutral/grounded conductors with associated ungrounded conductors inside enclosures in accordance with NFPA 70.

N. Make wiring connections using specified wiring connectors.
   1. Make splices and taps only in accessible boxes. Do not pull splices into raceways or make splices in conduit bodies or wiring gutters.
   2. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors.
   3. Do not remove conductor strands to facilitate insertion into connector.
   4. Clean contact surfaces on conductors and connectors to suitable remove corrosion, oxides, and other contaminates. Do not use wire brush on plated connector surfaces.
   5. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
   6. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.

O. Insulate splices and taps that are made with uninsulated connectors using methods suitable for the application, with insulation and mechanical strength at least equivalent to unspliced conductors.

P. Insulate ends of spare conductors using vinyl insulating electrical tape.

Q. Field-Applied Color Coding: Where vinyl color coding electrical tape is used in lieu of integrally colored insulation as permitted in Part 2 under "Color Coding", apply half overlapping turns of tape at each termination and at each location conductors are accessible.

R. Unless specifically indicated to be excluded, provide final connections to all equipment and devices, including those furnished by others, as required for a complete operating system.

END OF SECTION

SECTION 26 05 26
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Grounding and bonding requirements.

B. Conductors for grounding and bonding.

C. Connectors for grounding and bonding.

D. Ground rod electrodes.

1.02 REFERENCE STANDARDS

A. IEEE 81 - IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System; 2012.

B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

C. NEMA GR 1 - Grounding Rod Electrodes and Grounding Rod Electrode Couplings; 2007.

D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

E. UL 467 - Grounding and Bonding Equipment; Current Edition, Including All Revisions.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Verify exact locations of underground metal water service pipe entrances to building.
   2. Coordinate the work with other trades to provide steel reinforcement complying with specified requirements for concrete-encased electrode.
   3. Notify Engineer of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

B. Sequencing:
   1. Do not install ground rod electrodes until final backfill and compaction is complete.

1.04 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

PART 2 PRODUCTS

2.01 GROUNDING AND BONDING REQUIREMENTS

A. Do not use products for applications other than as permitted by NFPA 70 and product listing.

B. Unless specifically indicated to be excluded, provide all required components, conductors, connectors, conduit, boxes, fittings, supports, accessories, etc. as necessary for a complete grounding and bonding system.

C. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

D. Grounding System Resistance:
   1. Achieve specified grounding system resistance under normally dry conditions unless otherwise approved by Engineer. Precipitation within the previous 48 hours does not constitute normally dry conditions.
   2. Grounding Electrode System: Not greater than 25 ohms to ground, when tested according to IEEE 81 using "fall-of-potential" method.

E. Grounding Electrode System:
   1. Provide connection to required and supplemental grounding electrodes indicated to form grounding electrode system.
      a. Provide continuous grounding electrode conductors without splice or joint.

b. Install grounding electrode conductors in raceway where exposed to physical damage. Bond grounding electrode conductor to metallic raceways at each end with bonding jumper.

2. Ground Rod Electrode(s):
   a. Provide three electrodes in an equilateral triangle configuration unless otherwise indicated or required.
   b. Space electrodes not less than 10 feet from each other and any other ground electrode.
   c. Where location is not indicated, locate electrode(s) at least 5 feet outside building perimeter foundation as near as possible to electrical service entrance; where possible, locate in softscape (uncovered) area.
3. Provide additional ground electrode(s) as required to achieve specified grounding electrode system resistance.

F. Bonding and Equipment Grounding:
1. Provide bonding for equipment grounding conductors, equipment ground busses, metallic equipment enclosures, metallic raceways and boxes, device grounding terminals, and other normally non-current-carrying conductive materials enclosing electrical conductors/equipment or likely to become energized as indicated and in accordance with NFPA 70.
2. Provide insulated equipment grounding conductor in each feeder and branch circuit raceway. Do not use raceways as sole equipment grounding conductor.
3. Where circuit conductor sizes are increased for voltage drop, increase size of equipment grounding conductor proportionally in accordance with NFPA 70.
4. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
5. Terminate branch circuit equipment grounding conductors on solidly bonded equipment ground bus only. Do not terminate on neutral (grounded) or isolated/insulated ground bus.

2.02 GROUNDING AND BONDING COMPONENTS

A. General Requirements:
1. Provide products listed, classified, and labeled as suitable for the purpose intended.
2. Provide products listed and labeled as complying with UL 467 where applicable.

B. Conductors for Grounding and Bonding, in Addition to Requirements of Section 26 05 26:
1. Use insulated copper conductors unless otherwise indicated.
   a. Exceptions:
      1) Use bare copper conductors where installed underground in direct contact with earth.

C. Connectors for Grounding and Bonding:
1. Description: Connectors appropriate for the application and suitable for the conductors and items to be connected; listed and labeled as complying with UL 467.
2. Unless otherwise indicated, use exothermic welded connections for underground, concealed and other inaccessible connections.
3. Unless otherwise indicated, use mechanical connectors, compression connectors, or exothermic welded connections for accessible connections.

D. Ground Rod Electrodes:
1. Comply with NEMA GR 1.
2. Material: Copper-bonded (copper-clad) steel.
3. Size: 3/4 inch diameter by 10 feet length, unless otherwise indicated.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that work likely to damage grounding and bonding system components has been completed.

B. Verify that field measurements are as shown on the drawings.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install grounding and bonding system components in a neat and workmanlike manner in accordance with NECA 1.

C. Ground Rod Electrodes: Unless otherwise indicated, install ground rod electrodes vertically. Where encountered rock prohibits vertical installation, install at 45 degree angle or bury horizontally in trench at least 30 inches (750 mm) deep in accordance with NFPA 70 or provide ground plates.
   1. Outdoor Installations: Unless otherwise indicated, install with top of rod 6 inches below finished grade.

D. Make grounding and bonding connections using specified connectors.
   1. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors. Do not remove conductor strands to facilitate insertion into connector.
   2. Remove nonconductive paint, enamel, or similar coating at threads, contact points, and contact surfaces.
   3. Exothermic Welds: Make connections using molds and weld material suitable for the items to be connected in accordance with manufacturer's recommendations.
   4. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
   5. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.

END OF SECTION

SECTION 26 05 34
CONDUIT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Galvanized steel rigid metal conduit (RMC).

B. Intermediate metal conduit (IMC).

C. PVC-coated galvanized steel rigid metal conduit (RMC).

D. Rigid polyvinyl chloride (PVC) conduit.

E. Conduit fittings.

1.02 REFERENCE STANDARDS

A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC); 2005.

B. ANSI C80.6 - American National Standard for Electrical Intermediate Metal Conduit (EIMC); 2005.

C. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

D. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT); 2013.

E. NECA 111 - Standard for Installing Nonmetallic Raceways (RNC, ENT, LFNC); 2003.

F. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2012.

G. NEMA RN 1 - Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit; 2005.

H. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Conduit; 2013.

I. NEMA TC 3 - Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing; 2015.

J. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

K. UL 6 - Electrical Rigid Metal Conduit-Steel; Current Edition, Including All Revisions.

L. UL 514B - Conduit, Tubing, and Cable Fittings; Current Edition, Including All Revisions.

M. UL 651 - Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings; Current Edition, Including All Revisions.

N. UL 1242 - Electrical Intermediate Metal Conduit-Steel; Current Edition, Including All Revisions.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate minimum sizes of conduits with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
   2. Coordinate the arrangement of conduits with structural members, ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
   3. Verify exact conduit termination locations required for boxes, enclosures, and equipment installed under other sections or by others.
   4. Coordinate the work with other trades to provide roof penetrations that preserve the integrity of the roofing system and do not void the roof warranty.
   5. Notify Engineer of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

B. Sequencing:
   1. Do not begin installation of conductors and cables until installation of conduit is complete between outlet, junction and splicing points.

1.04 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store conduit and fittings in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 CONDUIT APPLICATIONS

A. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70 and product listing.

B. Unless otherwise indicated and where not otherwise restricted, use the conduit types indicated for the specified applications. Where more than one listed application applies, comply with the most restrictive requirements. Where conduit type for a particular application is not specified, use galvanized steel rigid metal conduit.

C. Underground:
   1. Exterior, Direct-Buried: Use PVC conduit for flow meter and control valve communication wiring.
   2. Exterior, Direct-Buried: Use galvanized steel rigid metal conduit or PVC-coated galvanized steel rigid metal conduit.
   3. Where steel conduit is installed in direct contact with earth where soil has a resistivity of less than 2000 ohm-centimeters or is characterized as severely corrosive based on soils report or local experience, use corrosion protection tape to provide supplementary corrosion protection or use PVC-coated galvanized steel rigid metal conduit.

D. Interior, Damp or Wet Locations: Use galvanized steel rigid metal conduit.

E. Exposed, Interior, Subject to Physical Damage: Use galvanized steel rigid metal conduit or intermediate metal conduit (IMC).

F. Exposed, Exterior: Use galvanized steel rigid metal conduit or PVC-coated galvanized steel rigid metal conduit.

2.02 CONDUIT REQUIREMENTS

A. Electrical Service Conduits: Also comply with Section 26 21 00.

B. Fittings for Grounding and Bonding: Also comply with Section 26 05 26.

C. Provide all conduit, fittings, supports, and accessories required for a complete raceway system.

D. Provide products listed, classified, and labeled as suitable for the purpose intended.

E. Where conduit size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

2.03 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

A. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.

B. Fittings:
   1. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
   2. Material: Use steel or malleable iron.
   3. Connectors and Couplings: Use threaded type fittings only. Thread less set screw and compression (gland) type fittings are not permitted.

2.04 INTERMEDIATE METAL CONDUIT (IMC)

A. Description: NFPA 70, Type IMC galvanized steel intermediate metal conduit complying with ANSI C80.6 and listed and labeled as complying with UL 1242.

B. Fittings:

1. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
2. Hazardous (Classified) Locations: Use fittings listed and labeled as complying with UL 1203 for the classification of the installed location.
3. Material: Use steel or malleable iron.
4. Connectors and Couplings: Use threaded type fittings only. Thread less set screw and compression (gland) type fittings are not permitted.

2.05 PVC-COATED GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

A. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit with external polyvinyl chloride (PVC) coating complying with NEMA RN 1 and listed and labeled as complying with UL 6.

B. Exterior Coating: Polyvinyl chloride (PVC), nominal thickness of 40 mil.

C. PVC-Coated Fittings:
1. Manufacturer: Same as manufacturer of PVC-coated conduit to be installed.
2. Non-Hazardous Locations: Use fittings listed and labeled as complying with UL 514B.
3. Material: Use steel or malleable iron.
4. Exterior Coating: Polyvinyl chloride (PVC), minimum thickness of 40 mil.

D. PVC-Coated Supports: Furnish with exterior coating of polyvinyl chloride (PVC), minimum thickness of 15 mil.

2.06 RIGID POLYVINYL CHLORIDE (PVC) CONDUIT

A. Description: NFPA 70, Type PVC rigid polyvinyl chloride conduit complying with NEMA TC 2 and listed and labeled as complying with UL 651; Schedule 40 unless otherwise indicated, Schedule 80 where subject to physical damage; rated for use with conductors rated 90 degrees C.

B. Fittings:
1. Manufacturer: Same as manufacturer of conduit to be connected.
2. Description: Fittings complying with NEMA TC 3 and listed and labeled as complying with UL 651; material to match conduit.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as shown on drawings.

B. Verify that mounting surfaces are ready to receive conduits.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install conduit in a neat and workmanlike manner in accordance with NECA 1.

C. Install galvanized steel rigid metal conduit (RMC) in accordance with NECA 101.

D. Install intermediate metal conduit (IMC) in accordance with NECA 101.

E. Install PVC-coated galvanized steel rigid metal conduit (RMC) using only tools approved by the manufacturer.

F. Install rigid polyvinyl chloride (PVC) conduit in accordance with NECA 111.

G. Conduit Routing:
1. Unless dimensioned, conduit routing indicated is diagrammatic.
2. When conduit destination is indicated and routing is not shown, determine exact routing required.
3. Conceal all conduits unless specifically indicated to be exposed.
4. Conduits installed underground or embedded in concrete may be routed in the shortest possible manner unless otherwise indicated. Route all other conduits parallel or

perpendicular to building structure and surfaces, following surface contours where practical.

5. Arrange conduit to maintain adequate headroom, clearances, and access.
6. Arrange conduit to provide no more than the equivalent of four 90 degree bends between pull points.
7. Arrange conduit to provide no more than 150 feet between pull points.
8. Route conduits above water and drain piping where possible.
9. Arrange conduit to prevent moisture traps. Provide drain fittings at low points and at sealing fittings where moisture may collect.
10. Maintain minimum clearance of 6 inches between conduits and piping for other systems.
11. Group parallel conduits in the same area together on a common rack.

H. Conduit Support:
   1. Secure and support conduits in accordance with NFPA 70 and Section 26 05 29 using suitable supports and methods approved by the authority having jurisdiction.
   2. Use conduit strap to support single surface-mounted conduit.
      a. Use clamp back spacer with conduit strap for damp and wet locations to provide space between conduit and mounting surface.
   3. Use metal channel (strut) with accessory conduit clamps to support multiple parallel surface-mounted conduits.
   4. Use of wire for support of conduits is not permitted.

I. Connections and Terminations:
   1. Use approved zinc-rich paint or conduit joint compound on field-cut threads of galvanized steel conduits prior to making connections.
   2. Where two threaded conduits must be joined and neither can be rotated, use three-piece couplings or split couplings. Do not use running threads.
   3. Use suitable adapters where required to transition from one type of conduit to another.
   4. Terminate threaded conduits in boxes and enclosures using threaded hubs or double lock nuts for dry locations and raintight hubs for wet locations.
   5. Provide insulating bushings or insulated throats at all conduit terminations to protect conductors.
   6. Secure joints and connections to provide maximum mechanical strength and electrical continuity.

J. Underground Installation:
   1. Provide trenching and backfill.
   2. Conduits shown to be direct buried when encountering bed rock outcroppings and going around is not feasible, go over the rock and incase in a minimum of 2" of concrete.

K. Hazardous (Classified) Locations: Where conduits cross boundaries of hazardous (classified) locations, provide sealing fittings located as indicated or in accordance with NFPA 70.

L. Conduit Movement Provisions: Where conduits are subject to movement, provide expansion and expansion/deflection fittings to prevent damage to enclosed conductors or connected equipment. This includes, but is not limited to:
   1. Where conduits cross structural joints intended for expansion, contraction, or deflection.
   2. Where conduits are subject to earth movement by settlement or frost.
   3. Any runs over 200 feet.

M. Provide pull string in all empty conduits and in conduits where conductors and cables are to be installed by others. Leave minimum slack of 12 inches at each end.

N. Provide grounding and bonding in accordance with Section 26 05 26.

3.03 CLEANING

A. Clean interior of conduits to remove moisture and foreign matter.

END OF SECTION

SECTION 26 05 35
SURFACE RACEWAYS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surface raceway systems.

1.02 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

B. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

C. UL 5 - Surface Metal Raceways and Fittings; Current Edition, Including All Revisions.

D. UL 111 - Outline of Investigation for Multioutlet Assemblies; Current Edition, Including All Revisions.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate the placement of raceways with millwork, furniture, equipment, etc. installed under other sections or by others.
   2. Coordinate rough-in locations of outlet boxes provided under Section 26 05 37 and conduit provided under Section 26 05 34 as required for installation of raceways provided under this section.
   3. Verify minimum sizes of raceways with the actual conductors and components to be installed.
   4. Notify Engineer of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

B. Sequencing:
   1. Do not install raceways until final surface finishes and painting are complete.
   2. Do not begin installation of conductors and cables until installation of raceways is complete between outlet, junction and splicing points.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets including dimensions, knockout sizes and locations, materials, fabrication details, finishes, service condition requirements, and accessories.
   1. Surface Raceway Systems: Include information on fill capacities for conductors and cables.

C. Shop Drawings:
   1. Pre-wired Surface Raceway Systems: Provide plan and elevation views including dimensioned locations of wiring devices and circuiting arrangements.

1.05 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

PART 2 PRODUCTS

2.01 RACEWAY REQUIREMENTS

A. Provide all components, fittings, supports, and accessories required for a complete raceway system.

B. Provide products listed, classified, and labeled as suitable for the purpose intended.

C. Do not use raceways for applications other than as permitted by NFPA 70 and product listing.

2.02 SURFACE RACEWAY SYSTEMS

A. Surface Metal Raceways: Listed and labeled as complying with UL 5.

B. Surface Raceway System:
   1. Raceway Type: Single channel, painted steel or stainless steel as indicated on the drawings..
   2. Accessory Device Boxes: Suitable for the devices to be installed; color to match raceway.
   3. Integrated Device Provisions:
      a. Receptacles:
         1) Comply with Section 26 27 26, except for finishes.
         2) Configuration: It will be the contractors option on existing walls above counters to use wire mold 3000, or separate surface boxes and 700 raceway.
      b. Communications Outlets:
         1) Data Jacks: As specified in Section 27 10 05.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as shown on the drawings.

B. Verify that outlet boxes and conduit terminations are installed in proper locations and are properly sized in accordance with NFPA 70 to accommodate raceways.

C. Verify that mounting surfaces are ready to receive raceways and that final surface finishes are complete, including painting.

D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install raceways in a neat and workmanlike manner in accordance with NECA 1.

C. Install raceways plumb and level.

D. Secure and support raceways in accordance with Section 26 05 29 at intervals complying with NFPA 70 and manufacturer's requirements.

E. Close unused raceway openings.

F. Provide grounding and bonding in accordance with Section 26 05 26.

3.03 CLEANING

A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

END OF SECTION

SECTION 26 05 37
BOXES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Outlet and device boxes up to 100 cubic inches, including those used as junction and pull boxes.

B. Cabinets and enclosures, including junction and pull boxes larger than 100 cubic inches.

1.02 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

B. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2010.

C. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.

D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

E. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.

F. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.

G. UL 508A - Industrial Control Panels; Current Edition, Including All Revisions.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate the work with other trades to avoid placement of obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
   2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
   3. Coordinate minimum sizes of boxes with the actual installed arrangement of conductors, clamps, support fittings, and devices, calculated according to NFPA 70.
   4. Coordinate minimum sizes of pull boxes with the actual installed arrangement of connected conduits, calculated according to NFPA 70.
   5. Notify Engineer of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for cabinets and enclosures, boxes for hazardous (classified) locations, floor boxes, and underground boxes/enclosures.

C. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 60 00 - Product Requirements, for additional provisions.
   2. Keys for Lockable Enclosures: Two of each different key.

1.05 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

PART 2 PRODUCTS

2.01 BOXES

A. General Requirements:
   1. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.

2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.
3. Provide products listed, classified, and labeled as suitable for the purpose intended.
4. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
5. Provide grounding terminals within boxes where equipment grounding conductors terminate.

B. Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches:
1. Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E, or UL 508A.
2. NEMA 250 Environment Type, Unless Otherwise Indicated:
a. Indoor Clean, Dry Locations: Type 1, painted steel.
b. Outdoor Locations: Type 3R, painted steel.
3. Junction and Pull Boxes Larger Than 100 cubic inches:
a. Provide screw-cover or hinged-cover enclosures unless otherwise indicated.
4. Cabinets and Hinged-Cover Enclosures, Other Than Junction and Pull Boxes:
a. Provide lockable hinged covers, all locks keyed alike unless otherwise indicated.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as shown on drawings.

B. Verify that mounting surfaces are ready to receive boxes.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Perform work in a neat and workmanlike manner in accordance with NECA 1 and, where applicable, NECA 130, including mounting heights specified in those standards where mounting heights are not indicated.

C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

D. Unless otherwise indicated, provide separate boxes for line voltage and low voltage systems.

E. Unless otherwise indicated, boxes may be surface-mounted where exposed conduits are indicated or permitted.

F. Box Supports:
1. Secure and support boxes in accordance with NFPA 70 and Section 26 05 29 using suitable supports and methods approved by the authority having jurisdiction.
2. Provide independent support from building structure except for cast metal boxes (other than boxes used for fixture support) supported by threaded conduit connections in accordance with NFPA 70. Do not provide support from piping, ductwork, or other systems.

G. Install boxes plumb and level.

H. Close unused box openings.

I. Provide grounding and bonding in accordance with Section 26 05 26.

3.03 CLEANING

A. Clean interior of boxes to remove dirt, debris, plaster and other foreign material.

3.04 PROTECTION

A. Immediately after installation, protect boxes from entry of moisture and foreign material until ready for installation of conductors.

END OF SECTION

SECTION 26 05 53
IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Electrical identification requirements.

B. Identification nameplates and labels.

C. Underground warning tape.

D. Warning signs and labels.

1.02 REFERENCE STANDARDS

A. ANSI Z535.2 - American National Standard for Environmental and Facility Safety Signs; 2011.

B. ANSI Z535.4 - American National Standard for Product Safety Signs and Labels; 2011.

C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

D. UL 969 - Marking and Labeling Systems; Current Edition, Including All Revisions.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Verify final designations for equipment, systems, and components to be identified prior to fabrication of identification products.

B. Sequencing:
   1. Do not conceal items to be identified, in locations such as above suspended ceilings, until identification products have been installed.
   2. Do not install identification products until final surface finishes and painting are complete.

1.04 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

PART 2 PRODUCTS

2.01 IDENTIFICATION REQUIREMENTS

A. Identification for Equipment:
   1. Use identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.
      a. Panelboards:
         1) Identify voltage and phase.
         2) Identify power source and circuit number. Include location when not within sight of equipment.
         3) Identify main overcurrent protective device. Use identification label for panelboards with a door. For power distribution panelboards without a door, use identification nameplate.
         4) Use typewritten circuit directory to identify load(s) served for panelboards with a door. Identify spares and spaces using pencil.
         5) For power panelboards without a door, use identification nameplate to identify load(s) served for each branch device. Do not identify spares and spaces.
      b. Enclosed switches, circuit breakers, and motor controllers:
         1) Identify voltage and phase.
         2) Identify power source and circuit number. Include location when not within sight of equipment.
         3) Identify load(s) served. Include location when not within sight of equipment.
      c. Time Switches:
         1) Identify load(s) served and associated circuits controlled. Include location.
      d. Enclosed Contactors:

1) Identify ampere rating.
2) Identify voltage and phase.
3) Identify load(s) and associated circuits controlled. Include location.

2. Service Equipment:
   a. Use identification nameplate to identify each service disconnecting means.
3. Available Fault Current Documentation: Use identification label to identify the available fault current and date calculations were performed at locations requiring documentation by NFPA 70, including but not limited to the following.
   a. Service equipment.
4. Arc Flash Hazard Warning Labels: Comply with NFPA 70 and 70E
5. Use warning labels, identification nameplates, or identification labels to identify electrical hazards for equipment where multiple power sources are present with the word message "DANGER; Hazardous voltage; Multiple power sources may be present; Disconnect all electric power including remote disconnects before servicing" or approved equivalent.

B. Identification for Conductors and Cables:
1. Color Coding for Power Conductors 600 V and Less: Comply with Section 26 05 19.
2. Use identification nameplate or identification label to identify color code for ungrounded and grounded power conductors inside door or enclosure at each piece of feeder or branch-circuit distribution equipment when premises has feeders or branch circuits served by more than one nominal voltage system.

C. Identification for Devices:
1. Wiring Device and Wall plate Finishes: Comply with Section 26 27 26.
2. Use identification label to identify fire alarm system devices.
3. Use engraved wall plate to identify serving branch circuit for all receptacles.

2.02 IDENTIFICATION NAMEPLATES AND LABELS

A. Identification Nameplates:
1. Materials:
   a. Outdoor Locations: Use plastic, stainless steel, or aluminum nameplates suitable for exterior use.
2. Plastic Nameplates: Two-layer or three-layer laminated acrylic or electrically non-conductive phenolic with beveled edges; minimum thickness of 1/16 inch; engraved text.
3. Stainless Steel Nameplates: Minimum thickness of 1/32 inch; engraved or laser-etched text.
4. Aluminum Nameplates: Anodized; minimum thickness of 1/32 inch; engraved or laser-etched text.
5. Mounting Holes for Mechanical Fasteners: Two, centered on sides for sizes up to 1 inch high; Four, located at corners for larger sizes.

B. Identification Labels:
1. Text: Use factory pre-printed or machine-printed text. Do not use handwritten text unless otherwise indicated.

C. Format for Equipment Identification:
1. Minimum Size: 1 inch by 2.5 inches.
2. Legend:
   a. Equipment designation or other approved description.
3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height:
   a. Equipment Designation: 1/2 inch.
5. Color:
   a. Normal Power System: White text on black background.

D. Format for Receptacle Identification:
1. Minimum Size: 1 inch(es) by 2 inch(es).
2. Legend: Power source and circuit number or other designation indicated.

3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height: 1/4 inch.
5. Color: White text on black background.

2.03 UNDERGROUND WARNING TAPE

A. Non-detectable Type Tape: 6 inches wide, with minimum thickness of 4 mil.

B. Legend: Type of service, continuously repeated over full length of tape.

C. Color:
1. Tape for Buried Power Lines: Black text on yellow background.

2.04 WARNING SIGNS AND LABELS

A. Comply with ANSI Z535.2 or ANSI Z535.4 as applicable.

B. Warning Signs:
1. Materials:
a. Indoor Dry, Clean Locations: Use factory pre-printed rigid plastic or self-adhesive vinyl signs.
b. Outdoor Locations: Use factory pre-printed rigid aluminum signs.
2. Rigid Signs: Provide four mounting holes at corners for mechanical fasteners.
3. Minimum Size: 7 by 10 inches unless otherwise indicated.

C. Warning Labels:
1. Materials: Use factory pre-printed or machine-printed self-adhesive polyester or self-adhesive vinyl labels; UV, chemical, water, heat, and abrasion resistant; produced using materials recognized to UL 969.
2. Machine-Printed Labels: Use thermal transfer process printing machines and accessories recommended by label manufacturer.
3. Minimum Size: 2 by 4 inches unless otherwise indicated.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install identification products to be plainly visible for examination, adjustment, servicing, and maintenance. Unless otherwise indicated, locate products as follows:
1. Surface-Mounted Equipment: Enclosure front.
2. Free-Standing Equipment: Enclosure front; also enclosure rear for equipment with rear access.
3. Branch Devices: Adjacent to device.
4. Interior Components: Legible from the point of access.
5. Devices: Outside face of cover.

C. Install identification products centered, level, and parallel with lines of item being identified.

D. Secure nameplates to exterior surfaces of enclosures using stainless steel screws and to interior surfaces using self-adhesive backing or epoxy cement.

E. Install self-adhesive labels and markers to achieve maximum adhesion, with no bubbles or wrinkles and edges properly sealed.

F. Install underground warning tape above buried lines with one tape per trench at 3 inches below finished grade.

G. Secure rigid signs using stainless steel screws.

H. Mark all handwritten text, where permitted, to be neat and legible.

END OF SECTION

SECTION 26 09 23
LIGHTING CONTROL DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Outdoor photo controls.

B. Lighting Control Panel.

C. Segment Manager. AND WIRELESS NODES.

1.02 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

B. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

C. UL 773A - Nonindustrial Photoelectric Switches for Lighting Control; Current Edition, Including All Revisions.

1.03 SUBMITTALS - OWNERS VENDOR FURNISHED, CONTRACTOR CONFIRMED AND SUBMITTED FOR REVIEW AND APPROVAL

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Include ratings, configurations, standard wiring diagrams, dimensions, colors, service condition requirements, and installed features.

C. Shop Drawings:
   1. ~~Day~~lighting Controls: Provide lighting plan indicating location, model number, and orientation of each photo sensor and associated system component. WIRELESS NODE AND

D. Field Quality Control Reports.

E. Manufacturer's Installation Instructions: Include application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

F. Operation and Maintenance Data: Include detailed information on device programming and setup.

G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 60 00 - Product Requirements, for additional provisions.

H. Project Record Documents: Record actual installed locations and settings for lighting control devices. INCLUDE VENDOR FURNISHED, CONTRACTOR CONFIRMED / ADJUSTED RECORD DOCUMENTS IN CLOSEOUT PACKAGE.

1.04 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

PART 2 PRODUCTS

2.01 LIGHTING CONTROL DEVICES - GENERAL REQUIREMENTS

A. Provide products listed, classified, and labeled as suitable for the purpose intended.

B. Unless specifically indicated to be excluded, provide all required conduit, wiring, connectors, hardware, components, accessories, etc. as required for a complete operating system.

C. Basis of Design: ~~Wattstopper~~ OHLI

2.02 OUTDOOR PHOTO CONTROLS

A. Manufacturers:
   1. ~~Wattstopper LMPO-200~~. OHLI

B. Stem-Mounted Outdoor Photo Controls:
   1. Description: Direct-wired photo control unit with threaded conduit mounting stem and field-adjustable swivel base, listed and labeled as complying with UL 773A.
   2. Housing: Weatherproof, impact resistant polycarbonate.

3. Photo Sensor: Cadmium sulfide.
4. Provide external sliding shield for field adjustment of light level activation.
5. Light Level Activation: 1 to 5 footcandles turn-on and 3 to 1 turn-off to turn-on ratio with delayed turn-off.
6. Voltage: As required to control the load indicated on the drawings.
7. Failure Mode: Fails to the on position.
8. Load Rating: As required to control the load indicated on the drawings.

2.03 LIGHTING CONTROL PANEL

A. Hardware: Provide LMCP lighting control panels in the locations and capacities as indicated on the Drawing and schedules. Each panel shall be of modular construction and consist of the following components:

1. Enclosure/Tub shall be NEMA 1, sized to accept an interior with 1-8 relays. IF REQUIRED BY MANUFACTURE.
2. Cover shall be configured for surface mounting of the panel as indicated on the plans. LMCP panel cover shall have a hinged and lockable door with restricted access to line voltage section of the panel.
3. Interior assembly shall be supplied as a factory assembled component specifically designed and listed for field installation. Interior construction shall provide total isolation of high voltage (Class 1) wiring from low voltage (Class 2) wiring within the assembled panel. Interior assembly shall include intelligence boards, power supply, DIN rails for mounting optional Class 2 control devices, and individually replaceable latching type relays. Panel interiors shall include the following features:
   a. Direct wired switch inputs associated with each relay shall support 2-wire momentary switches only.
   b. Digital inputs (four RJ-45 jacks) shall support 1-, 2-, 3-, 4-, and 8-button digital switches; digital IO modules capable of receiving 0-5V or 0-10V analog photocell inputs; digital IO modules capable of receiving momentary or maintained contact closure inputs or analog sensor inputs; digital daylighting sensors; and digital occupancy sensors. Inputs are divided into two separate digital networks, each capable of supplying 250mA to connected devices.
   c. True relay state shall be indicated by the on-board LED and shall be available to external control devices and systems via BACnet.
   d. Automatically sequenced operation of relays to reduce impact on the electrical distribution system when large loads are controlled simultaneously.
   e. Group and pattern control of relays shall be provided through a simple keypad interface from a handheld IR programmer. Any set of relays can be associated with a group for direct on/off control or pattern (scene) control via a simple programming sequence using the relay override pushbuttons and LED displays for groups 1-8 or a handheld IR programmer for groups 1-99.
   f. Relay group status for shall be provided through LED indicators for groups 1-8 and via BACnet for groups 1-99. A solid LED indicates that the last group action called for an ON state and relays in the group are on or in a mixed state.
4. Single-pole latching relays with modular plug-in design. Relays shall provide the following ratings and features:
   a. Electrical:
      1) 20 amp at 277V
      2) 14,000 amp short circuit current rating (SCCR) at 347V
      3) Relays shall be specifically UL 20 listed for control of plug-loads
5. Integral system clock shall provide scheduling capabilities for panel-only projects without DLM segment networks or BAS control.
   a. Each panel shall include digital clock capability able to issue system wide automation commands to up to 11 other panels for a total of 12 networked lighting control panels. Clock shall provide capability for up to 254 independent schedule events per panel for each of the ninety-nine system wide channel groups.

b. Clock capability of each panel shall support the time-based energy saving requirements of applicable local energy codes.
c. Clock module shall provide astronomic capabilities, time delays, blink warning, daylight savings, and holiday functions and will include a battery backup for clock function and program retention in non-volatile FLASH memory. Clocks that require multiple events to meet local code lighting shut off requirements shall not be allowed.
d. Clock capability of each panel shall operate on a basis of ON/OFF or Normal Hours/After Hours messages to automation groups that implement pre-configured control scenarios. Scenarios shall include:
    1) Scheduled ON / OFF
    2) Manual ON / Scheduled OFF
    3) Astro ON / OFF (or Photo ON / OFF)
    4) Astro and Schedule ON / OFF (or Photo and Schedule ON / OFF)
e. User interface shall be a portable IR handheld remote control capable of programming any panel in the system (LMCT-100)
f. Clock capability of each panel shall employ non-volatile memory and shall retain user programming and time for a minimum of 10 years.
g. Schedules programmed into the clock of any one panel shall be capable of executing panel local schedule or Dark/Light (photocell or Astro) events for that panel in the event that global network communication is lost. Lighting control panels that are not capable of executing events independently of the global network shall not be acceptable.

6. Lighting control panel can support schedule, group, and photocell control functions, as configured in a Segment Manager controller, via a segment network connection.
7. WattStopper Product Number: Relay Panels: LMCP8.
8. Relay panel to be UL Listed or certified by other accepted National Recognized Testing Laboratory.

B. User Interface: Each lighting control panel system shall be supplied with at least one handheld configuration tool ~~(LMCT-100)~~. As a remote programming interface the configuration tool shall allow setup, configuration, and diagnostics of the panel without the need for software or connection of a computer. User interface shall have the following panel-specific functions as a minimum:
1. Set network parameters including panel device ID, MS/TP MAC address, baud rate and max master range.
2. Relay Group creation of up to 99 groups. Group creation shall result in programming of all seven key relay parameters for member relays. The seven parameters are as follows: After-hours Override Time Delay, Normal Hours Override Time Delay, Action on Transition to Normal Hours, Action on Transition to After Hours, Sensor Action During Normal Hours, Sensor Action During After Hours, Blink-Warn Time for After Hours.
3. Program up to 254 separate scheduled events. Events shall occur on seven day intervals with each day selectable as active or inactive, and shall be configurable as to whether the event is active on holidays. Holidays are also defined through the User Interface.
4. Program up to 32 separate Dark/Light events. Events shall have a selectable source as either calculated Astro with delay, or a digital IO module with an integral 0-5V or 0-10V analog photocell. Dark/Light events shall occur on seven day intervals with each day selectable as active or inactive, and shall be configurable as to whether the event is active on holidays.
5. Button binding of digital switches to groups shall be accessible via the handheld IR remote and accomplished from the digital switch station.
6. Programming of panel location information shall be accomplished by the handheld IR remote and include at a minimum LAT, LON, DST zone, and an approximate city/state location.
7. NETWORK SYSTEM SHALL BE COMPATIBLE WITH USER FURNISHED HANDHELD SMART DEVICES WITH APPLICATION FOR SYSTEM CONTROL FROM REMOTE LOCATION(S).

2.04 SEGMENT MANAGER

A. For networked applications, the Digital Lighting Management system shall include at least one segment manager to manage network communication. It shall be capable of serving up a graphical user interface via a standard web browser utilizing either unencrypted TCP/IP traffic via a configurable port (default is 80) or 256 bit AES encrypted SSL TCP/IP traffic via a configurable port (default is 443).

B. Each segment manager shall have integral support for at least three segment networks. Segment networks may alternately be connected to the segment manger via external BACnet-to-IP interface routers and switches, using standard Ethernet structured wiring. Each router shall accommodate one segment network.

C. Operational features of the Segment Manager shall include the following:
   1. Connection to PC or LAN via standard Ethernet TCP/IP via standard Ethernet TCP/IP with the option to use SSL encrypted connections for all traffic.
   2. Easy to learn and use graphical user interface, compatible with Internet Explorer 8, or equal browser. The Segment Manager shall not require installation of any lighting control software on an end-user PC.
   3. Log in security capable of restricting some users to view-only or other limited operations.
   4. Segment Manager shall provide two main sets of interface screens - those used to initially configure the unit (referred to as the config screens), and a those used to allow users to dynamic monitor the performance of their system, and provide a centralized scheduling interface. Capabilities using the Config Screens shall include:
      a. Automatic discovery of DLM devices and relay panels on the segment network(s). Commissioning beyond activation of the discovery function shall not be required to provide communication, monitoring or control of all local networks and lighting control panels.
      b. Allow information for all discovered DLM devices to be imported into the Segment Manager via a single XML based site file from the WattStopper LMCS Software, significantly reducing the time needed to make a system usable by the end user. Importable information can include text descriptions of every DLM component and individual loads, and automatic creation of room location information and overall structure of DLM network. Info entered into LMCS should not have to be re-entered manually via keystrokes into the Segment Manager
      c. After discovery, panels shall be presented in a standard navigation tree format. Selecting a device from the tree will allow the device settings and operational parameters to be viewed and changed by the user.
      d. Ability to view and modify DLM device operational parameters. It shall be possible to set device parameters independently for normal hours and after hours operation including sensor time delays and sensitivities, and load response to sensor including Manual-On or Auto-On.
      e. Provide capabilities for integration with a BAS via BACnet protocol. At a minimum, the following points shall be available to the BAS via BACnet IP connection to the segment manager: load dimming level; panel channel schedule state; panel relay state; and Segment Manager Group schedule state control. Any of above items shall be capable of being moved into an "Export Table" that will provide any integrator with only the data they need, and by using the Export Table effectively create a firewall between the integrator's request for info and the overall system performance.
   5. If shown on the Drawings, Segment Managers shall be integrated into a larger control network by the addition of a Network Supervisor package. The Supervisor is a server level computer running a version of the Segment Manager interface software with dedicated communication and networking capability, able to pull information automatically from each individual Segment Manager in the network. By using a Supervisor, information for individual Segment Managers can be accessed and stored on the Supervisor's hard drive, eliminating the risk of data being overwritten after a few days because of Segment Manager memory limits.

6. Segment Manager shall allow access and control of the overall system database via Native Niagara AX FOX connectivity. Systems that must utilize a Tridium Niagara controller in addition to the programming, scheduling and configuration server are not acceptable.

~~D. WattStopper Product Numbers: LMSM-3E.~~

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as shown on the drawings.

B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.

C. Verify that openings for outlet boxes are neatly cut and will be completely covered by devices or wall plates.

D. Verify that final surface finishes are complete, including painting.

E. Verify that branch circuit wiring installation is completed, tested, and ready for connection to lighting control devices.

F. Verify that the service voltage and ratings of lighting control devices are appropriate for the service voltage and load requirements at the location to be installed.

G. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

A. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.03 INSTALLATION

A. Perform work in a neat and workmanlike manner in accordance with NECA 1 and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.

B. Install lighting control devices in accordance with manufacturer's instructions.

C. Install all cabling using manufacturer's factory-tested Cat 5e cable with un-terminated RJ-45 connectors. ~~Wattstopper LM-MTSP-DB-S4000.~~

1. If pre-terminated cable is not used for area wiring, each field-terminated cable shall be tested following installation and testing results submitted to the Manufacturer's Representative for approval prior to proceeding with the Work.
2. Low voltage wiring topology must comply with manufacturer's specifications.
3. Route network wiring as indicated on the Drawings as closely as possible. Document final wiring location, routing and topology on as built drawings.

D. All line voltage connections shall be tagged to indicate circuit and switched legs.

E. Test all devices to ensure proper communication.

F. Calibrate all sensor time delays and sensitivity to guarantee proper detection of occupants and energy savings. Adjust time delay so that controlled area remains lighted while occupied as indicated on plans.

G. Provide written or computer-generated documentation on the configuration of the system including room by room description including:

1. Sensor parameters, time delays, sensitivities, and daylighting setpoints.
2. Sequence of operation
3. Load Parameters (e.g. blink warning, etc.)

H. Post start-up tuning - Adjust sensor time delays and sensitivities to meet the Owner's requirements 30 days from beneficial occupancy. Provide a detailed report to the Owner of post start-up activity.

I. Tighten all panel Class I conductors from both circuit breaker and to loads to torque ratings as marked on enclosure UL label.

J. All Class II cabling shall enter enclosures from within low-voltage wiring areas and shall remain within those areas. No Class I conductors shall enter a low-voltage area.

K. Run separate neutrals for any phase dimmed branch load circuit. Different types of dimming loads shall have separate neutral.

L. Unless otherwise indicated, connect lighting control device grounding terminal or conductor to branch circuit equipment grounding conductor and to outlet box with bonding jumper.

M. Install lighting control devices plumb and level, and held securely in place.

N. Program the lighting controls once each area is ready for occupancy or after each phase has been completed.

O. Outdoor Photo Control Locations:
   1. Where possible, locate outdoor photo controls with photo sensor facing north. If north facing photo sensor is not possible, install with photo sensor facing east, west, or down.
   2. Locate outdoor photo controls so that photo sensors do not face artificial light sources, including light sources controlled by the photo control itself.

P. Install outdoor photo controls so that connections are weatherproof. Do not install photo controls with conduit stem facing up in order to prevent infiltration of water into the photo control.

3.04 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Inspect each lighting control device for damage and defects.

C. Test outdoor photo controls to verify proper operation, including time delays where applicable. AND DIMMING LEVELS AND WIRELESS NODES

D. Correct wiring deficiencies and replace damaged or defective lighting control devices.

3.05 ADJUSTING

A. Adjust devices and wall plates to be flush and level.

B. Adjust external sliding shields on outdoor photo controls under optimum lighting conditions to achieve desired turn-on and turn-off activation as indicated or as directed by ~~Engineer~~. OWNER.

3.06 CLEANING

A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

3.07 COMMISSIONING OWNER'S Ohli representative will

A. ~~Wattstopper representative to~~ program the lighting control system to the owners requirements and specification. Ensure the lighting control system is fully operational, programmed and tested after each phase of construction is completed.

B. See Section 01 40 00 for General Commissioning Requirements for 3rd Party commissioning requirements. Ensure the lighting control system is fully operational code compliant, complies with engineer's specifications and plans.

3.08 CLOSEOUT ACTIVITIES

A. Demonstration: Demonstrate proper operation of lighting control devices to Owner and Engineer, and correct deficiencies or make adjustments as directed, once each area is ready for occupancy or after each phase has been completed.

B. Training: Train Owner's personnel on operation, adjustment, programming, and maintenance of lighting control devices.
   1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
   2. Provide minimum of two hours of training. Training to be videotaped by contractor.
   3. Instructor: Qualified contractor familiar with the project and with sufficient knowledge of the installed lighting control devices.
   4. Location: At project site.

6. Factory telephone support shall be available at no cost to the Owner following acceptance. Factory assistance shall consist of assistance in solving application issues pertaining to the control equipment.

END OF SECTION

SECTION 26 21 00

LOW-VOLTAGE ELECTRICAL SERVICE ENTRANCE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Electrical service requirements.

1.02 DEFINITIONS

A. Service Point: The point of connection between the facilities of the serving utility and the premises wiring as defined in NFPA 70, and as designated by the Utility Company.

1.03 REFERENCE STANDARDS

A. IEEE C2 - National Electrical Safety Code; 2012.

B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 ADMINISTRATIVE REQUIREMENTS

A. No later than two weeks following date of the Agreement, notify Utility Company of anticipated date of service.

B. Coordination:
   1. Verify the following with Utility Company representative:
      a. Utility Company requirements, including division of responsibility.
      b. Exact location and details of utility point of connection.
      c. Utility easement requirements.
      d. Utility Company charges associated with providing service.
   2. Coordinate the work with other trades to avoid placement of other utilities or obstructions within the spaces dedicated for electrical service and associated equipment.
   3. Coordinate arrangement of service entrance equipment with the dimensions and clearance requirements of the actual equipment to be installed.
   4. Notify Engineer of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

C. Arrange for Utility Company to provide permanent electrical service. Prepare and submit documentation required by Utility Company.

D. Utility Company charges associated with providing permanent service to be paid by Owner.

E. Preinstallation Meeting: Convene one week prior to commencing work of this section to review service requirements and details with Utility Company representative.

F. Scheduling:
   1. Arrange for inspections necessary to obtain Utility Company approval of installation.

1.05 QUALITY ASSURANCE

A. Comply with the following:
   1. IEEE C2 (National Electrical Safety Code).
   2. NFPA 70 (National Electrical Code).
   3. The requirements of the Utility Company.

PART 2 PRODUCTS

2.01 ELECTRICAL SERVICE REQUIREMENTS

A. Provide new electrical services consisting of all required conduits, conductors, equipment, metering provisions, supports, accessories, etc. as necessary for connection between Utility Company point of supply and service entrance equipment.

B. Electrical Service Characteristics: As indicated on drawings.

C. Utility Company: Minnesota Power.

Note this is from previous. Contractor shall coordinate as required for new service work with Mn Power.

1. Point of Contact: Justin Maki.
2. Phone: 218-355-2553.

D. Division of Responsibility:
   1. Pad-Mounted Utility Transformers:
      a. Transformer Vaults and Pads: Furnished and installed by Contractor per Utility Company requirements.
      b. Transformers: Furnished and installed by Utility Company.
      c. Transformer Grounding Provisions: Furnished and installed by Contractor per Utility Company requirements.
      d. Primary:
         1) Trenching and Backfilling: Provided by Utility Company.
         2) Conduits: Furnished by Utility Company and installed by Contractor.
         3) Conductors: Furnished and installed by Utility Company.
      e. Secondary:
         1) Trenching and Backfilling: Provided by Contractor.
         2) Conduits: Furnished and installed by Contractor.
         3) Conductors: Furnished and installed by Contractor (Service Point at transformer).
   2. Terminations at Service Point: Provided by Utility Company.
   3. Metering Provisions:
      a. Meter Bases: Furnished and installed by Contractor per Utility Company requirements.
      b. Metering Transformer Cabinets: Furnished and installed by Contractor per Utility Company requirements.

E. Products Furnished by Contractor: Comply with Utility Company requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as shown on drawings.

B. Coordinate location of service transformers with Utility.

C. Verify that ratings and configurations of service entrance equipment are consistent with the indicated requirements.

D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions and Utility Company requirements.

B. Perform work in a neat and workmanlike manner in accordance with NECA 1.

C. Arrange equipment to provide minimum clearances and required maintenance access.

D. Provide required trenching and backfilling in accordance with Section 31 23 16.13.

E. Construct cast-in-place concrete pads for utility equipment in accordance with Utility Company requirements and Section 03 30 00.

F. Provide required support and attachment components in accordance with Section 26 05 29.

G. Provide grounding and bonding for service entrance equipment in accordance with Section 26 05 26.

H. Identify service entrance equipment, including main service disconnect(s) in accordance with Section 26 05 53.

END OF SECTION

This contractor shall include through Schneider Electric Co., a power study that includes the final programmable device settings, Arc Flash data, AIC data, and report for owners records included in close out O&M manuals.

SECTION 26 24 16
PANELBOARDS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Power distribution panelboards.

B. Load centers.

C. Overcurrent protective devices for panelboards.

1.02 REFERENCE STANDARDS

A. FS W-C-375 - Circuit Breakers, Molded Case; Branch Circuit and Service; Federal Specification; Revision E, 2013.

B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

C. NECA 407 - Standard for Installing and Maintaining Panelboards; 2009.

D. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.

E. NEMA PB 1 - Panelboards; 2011.

F. NEMA PB 1.1 - General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less; 2013.

G. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

H. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.

I. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.

J. UL 67 - Panelboards; Current Edition, Including All Revisions.

K. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures; Current Edition, Including All Revisions.

L. UL 869A - Reference Standard for Service Equipment; Current Edition, Including All Revisions.

M. UL 943 - Ground-Fault Circuit-Interrupters; Current Edition, Including All Revisions.

N. UL 1699 - Arc-Fault Circuit-Interrupters; Current Edition, Including All Revisions.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
   2. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
   3. Notify Engineer of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for panelboards, enclosures, overcurrent protective devices, and other installed components and accessories.

C. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, overcurrent protective device arrangement and sizes, short circuit current ratings, conduit entry locations, conductor terminal information, and installed features and accessories.
   1. Include dimensioned plan and elevation views of panelboards and adjacent equipment with all required clearances indicated.

2. Clearly indicate whether proposed short circuit current ratings are fully rated or, where acceptable, series rated systems.

D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

E. Project Record Documents: Record actual installed locations of panelboards and actual installed circuiting arrangements.

F. Maintenance Data: Include information on replacement parts and recommended maintenance procedures and intervals.

G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
1. See Section 01 60 00 - Product Requirements, for additional provisions.
2. Panelboard Keys: Two of each different key.

1.05 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store panelboards in accordance with manufacturer's instructions and NECA 407.

B. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

C. Handle carefully in accordance with manufacturer's written instructions to avoid damage to panelboard internal components, enclosure, and finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

~~A. Eaton Corporation: www.eaton.com.~~

~~B. General Electric Company: www.geindustrial.com.~~

C. Schneider Electric; Square D Products: www.schneider-electric.us.

~~D. Siemens Industry, Inc: www.usa.siemens.com.~~

matching existing gear installed in PH I.

2.02 PANELBOARDS - GENERAL REQUIREMENTS

A. Provide products listed, classified, and labeled as suitable for the purpose intended.

B. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
1. Altitude: Less than 6,600 feet.
2. Ambient Temperature:
a. Panelboards Containing Circuit Breakers: Between 23 degrees F and 104 degrees F.

C. Short Circuit Current Rating:
1. Provide panelboards with listed short circuit current rating not less than the available fault current at the installed location as indicated on the drawings.

D. Panelboards Used for Service Entrance: Listed and labeled as suitable for use as service equipment according to UL 869A.

E. Mains: Configure for top or bottom incoming feed as indicated or as required for the installation.

F. Branch Overcurrent Protective Devices: Replaceable without disturbing adjacent devices.

G. Bussing: Sized in accordance with UL 67 temperature rise requirements.
1. Provide fully rated neutral bus unless otherwise indicated, with a suitable lug for each feeder or branch circuit requiring a neutral connection.

2. Provide solidly bonded equipment ground bus in each panelboard, with a suitable lug for each feeder and branch circuit equipment grounding conductor.

H. Conductor Terminations: Suitable for use with the conductors to be installed.

I. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
   1. Manufactures:
      a. American Midwest Power
   2. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
      a. Outdoor Locations: Type 3R.
   3. Boxes: Galvanized steel unless otherwise indicated.
      a. Provide wiring gutters sized to accommodate the conductors to be installed.
   4. Fronts:
      a. Fronts for Surface-Mounted Enclosures: Same dimensions as boxes.
      b. Fronts for Flush-Mounted Enclosures: Overlap boxes on all sides to conceal rough opening.
      c. Finish for Painted Steel Fronts: Architectural Bronze/Brown unless otherwise indicated.
   5. Lockable Doors: CT compartments keyed separate to all other compartment to be keyed alike unless otherwise indicated.

J. Future Provisions: Prepare all unused spaces for future installation of devices including bussing, connectors, mounting hardware and all other required provisions.

K. Surge Protective Devices: Factory-installed, internally mounted surge protective devices are provided in accordance with Section 26 43 00, list and label panelboards as a complete assembly including surge protective device.

2.03 POWER DISTRIBUTION PANELBOARDS (400A AND ABOVE)

A. Description: Panelboards complying with NEMA PB 1, power and feeder distribution type, circuit breaker type, and listed and labeled as complying with UL 67; ratings, configurations and features as indicated on the drawings.

B. Conductor Terminations:
   1. Main and Neutral Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
   2. Main and Neutral Lug Type: Mechanical.

C. Bussing:
   1. Phase and Neutral Bus Material: Aluminum or copper.
   2. Ground Bus Material: Aluminum or copper.

D. Circuit Breakers:
   1. Provide bolt-on type or plug-in type secured with locking mechanical restraints.
   2. Provide thermal magnetic circuit breakers unless otherwise indicated.
   3. Provide electronic trip circuit breakers for circuit breaker frame sizes 400 amperes and above.

E. Enclosures:
   1. Provide surface-mounted or flush-mounted enclosures unless otherwise indicated.
   2. Fronts: Provide lockable hinged door with concealed hinges for access to overcurrent protective device handles without exposing live parts.
   3. Provide clear plastic circuit directory holder mounted on inside of door.

2.04 LOAD CENTERS

A. Description: Circuit breaker type load centers listed and labeled as complying with UL 67; ratings, configurations, and features as indicated on the drawings.

B. Bussing:

1. Phase Bus Connections: Arranged for sequential phasing of overcurrent protective devices.
2. Bus Material: Aluminum or copper.

C. Circuit Breakers: Thermal magnetic plug-in type.

D. Enclosures:
1. Provide flush-mounted enclosures unless otherwise indicated.
2. Provide circuit directory label on inside of door or individual circuit labels adjacent to circuit breakers.

2.05 OVERCURRENT PROTECTIVE DEVICES

A. Molded Case Circuit Breakers:
1. Description: Quick-make, quick-break, over center toggle, trip-free, trip-indicating circuit breakers listed and labeled as complying with UL 489, and complying with FS W-C-375 where applicable; ratings, configurations, and features as indicated on the drawings.
2. Interrupting Capacity:
a. Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating indicated on the drawings, but not less than
1) 20,000 rms symmetrical amperes at 480 VAC.
b. Fully Rated Systems: Provide circuit breakers with interrupting capacity not less than the short circuit current rating indicated.
3. Conductor Terminations:
a. Provide mechanical lugs unless otherwise indicated.
b. Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
4. Thermal Magnetic Circuit Breakers: For each pole, furnish thermal inverse time tripping element for overload protection and magnetic instantaneous tripping element for short circuit protection.
5. Electronic Trip Circuit Breakers: Furnish solid state, microprocessor-based, true rms sensing trip units for 400A and larger circuit breakers.
a. Provide the following field-adjustable trip response settings:
1) Long time pickup, adjustable by replacing interchangeable trip unit or by setting dial.
2) Long time delay.
3) Short time pickup and delay.
4) Instantaneous pickup.
5) Ground fault pickup and delay where ground fault protection is indicated.
6. Multi-Pole Circuit Breakers: Furnish with common trip for all poles.
7. Provide the following circuit breaker types where indicated:
a. Ground Fault Circuit Interrupter (GFCI) Circuit Breakers: Listed as complying with UL 943, class A for protection of personnel.
b. Arc-Fault Circuit Interrupter (AFCI) Circuit Breakers: Combination type listed as complying with UL 1699.
8. Do not use tandem circuit breakers.
9. Do not use handle ties in lieu of multi-pole circuit breakers.
10. Provide the following features and accessories where indicated or where required to complete installation:
a. Handle Pad-Lock Provision: For locking circuit breaker handle in OFF position.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as shown on the drawings.

B. Verify that the ratings and configurations of the panelboards and associated components are consistent with the indicated requirements.

C. Verify that mounting surfaces are ready to receive panelboards.

D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install panelboards securely, in a neat and workmanlike manner in accordance with NECA 1 (general workmanship), NECA 407 (panelboards), and NEMA PB 1.1.

C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

D. Install panelboards plumb.

E. Install flush-mounted panelboards so that trims fit completely flush to wall with no gaps and rough opening completely covered.

F. Mount panelboards such that the highest position of any operating handle for circuit breakers or switches does not exceed 79 inches above the floor or working platform.

G. Provide grounding and bonding in accordance with Section 26 05 26.

H. Install all field-installed branch devices, components, and accessories.

I. Set field-adjustable circuit breaker tripping function settings as indicated.

J. Provide filler plates to cover unused spaces in panelboards.

K. Identify panelboards in accordance with Section 26 05 53.

3.03 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Test GFCI circuit breakers to verify proper operation.

C. Test AFCI circuit breakers to verify proper operation.

D. Correct deficiencies and replace damaged or defective panelboards or associated components.

3.04 ADJUSTING

A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.

B. Adjust alignment of panelboard fronts.

C. Load Balancing: For each panelboard, rearrange circuits such that the difference between each measured steady state phase load does not exceed 20 percent and adjust circuit directories accordingly. Maintain proper phasing for multi-wire branch circuits.

3.05 CLEANING

A. Clean dirt and debris from panelboard enclosures and components according to manufacturer's instructions.

B. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION

SECTION 26 27 26
WIRING DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Wall switches.

B. Receptacles.

C. Receptacle Pedestals.

1.02 REFERENCE STANDARDS

A. FS W-S-896 - Switches, Toggle (Toggle and Lock), Flush-mounted (General Specification); Federal Specification; Revision F, 1999.

B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

C. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2010.

D. NEMA WD 1 - General Color Requirements for Wiring Devices; 1999 (R 2010).

E. NEMA WD 6 - Wiring Devices - Dimensional Specifications; 2012.

F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

G. UL 20 - General-Use Snap Switches; Current Edition, Including All Revisions.

H. UL 498 - Attachment Plugs and Receptacles; Current Edition, Including All Revisions.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate wiring device ratings and configurations with the electrical requirements of actual equipment to be installed.
   2. Notify Engineer of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.

B. Sequencing:
   1. Do not install wiring devices until final surface finishes and painting are complete.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Shop Drawings and Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations.

C. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

1.05 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Products: Listed, classified, and labeled as suitable for the purpose intended.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. SMI Snow Makers.

B. HKD Snowmakers

2.02 WIRING DEVICE APPLICATIONS

A. Provide wiring devices suitable for intended use and with ratings adequate for load served.

B. Provide weatherproof pedestal by SMI with Outlet and receptacle installed as well as in and out lugs as shown on the plans.

2.03 WIRING DEVICE FINISHES

A. Provide wiring device finishes as described on plans unless otherwise indicated.

2.04 ALL WIRING DEVICES

A. Provide products listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

2.05 WALL SWITCHES

A. Wall Switches - General Requirements: AC only, quiet operating, general-use snap switches with silver alloy contacts, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 20 and where applicable, FS W-S-896; types as indicated on the drawings.
   1. Wiring Provisions: Terminal screws for side wiring and screw actuated binding clamp for back wiring with separate ground terminal screw.

B. Standard Wall Switches: Industrial specification grade, 20 A, 120/277 V with standard toggle type switch actuator and maintained contacts; single pole single throw, double pole single throw, three way, or four way as indicated on the drawings.

2.06 RECEPTACLES

A. Convenience Receptacles:
   1. Standard Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R; single or duplex as indicated on the drawings.
   2. Tamper Resistant and Weather Resistant Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R, listed and labeled as tamper resistant type and as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations; single or duplex as indicated on the drawings.

B. GFCI Receptacles:
   1. GFCI Receptacles - General Requirements: Self-testing, with feed-through protection and light to indicate ground fault tripped condition and loss of protection; listed as complying with UL 943, class A.
   2. Tamper Resistant GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as tamper resistant type.
   3. Tamper Resistant and Weather Resistant GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as tamper resistant type and as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations.

2.07 RECEPTACLE PEDESTAL

A. Pin and sleeve receptacles
   1. Single Red Watertight Receptacle: 60A, 3 phase, 480V, 4W, 4 pin, Nema 3R
   2. Hubbell HBL460R7W or approved equal

B. Housing
   1. 12 gauge galvanized steel with power coat paint

C. Circuit Breaker
   1. 60A, 3 phase, 480V, 20,000 AIC interrupting rating

D. Power Distribution Block
   1. Tri lug, 600V. 3 pole, tin plated aluminum

E. Grounding Lug
   1. Aluminum, 2 conductor one-hole mount

F. Entire Receptacle Pedestal assembly needs to be UL Listed or certified by an accepted National Recognized Test Laboratory.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as shown on the drawings.

B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.

C. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Perform work in a neat and workmanlike manner in accordance with NECA 1 and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.

B. Coordinate locations of outlet boxes provided under Section 26 05 37 as required for installation of wiring devices provided under this section.

C. Install wiring devices in accordance with manufacturer's instructions.

D. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.

E. Where required, connect wiring devices using pigtails not less than 6 inches long. Do not connect more than one conductor to wiring device terminals.

F. Connect wiring devices by wrapping conductor clockwise 3/4 turn around screw terminal and tightening to proper torque specified by the manufacturer. Where present, do not use push-in pressure terminals that do not rely on screw-actuated binding.

G. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.

H. Unless otherwise indicated, GFCI receptacles may be connected to provide feed-through protection to downstream devices. Label such devices to indicate they are protected by upstream GFCI protection.

I. Install wiring devices plumb and level with mounting yoke held rigidly in place.

J. Install wall switches with OFF position down.

K. Install vertically mounted receptacles with grounding pole on bottom and horizontally mounted receptacles with grounding pole on left.

L. Install wall plates to fit completely flush to wall with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.

M. Install blank wall plates on junction boxes and on outlet boxes with no wiring devices installed or designated for future use.

3.03 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Inspect each wiring device for damage and defects.

C. Operate each wall switch, wall dimmer, and fan speed controller with circuit energized to verify proper operation.

D. Test each receptacle to verify operation and proper polarity.

E. Test each GFCI receptacle for proper tripping operation according to manufacturer's instructions.

F. Correct wiring deficiencies and replace damaged or defective wiring devices.

3.04 ADJUSTING

A. Adjust devices and wall plates to be flush and level.

B. Adjust presets for wall dimmers according to manufacturer's instructions as directed by ~~Engineer.~~ owner.

END OF SECTION

SECTION 26 28 13
FUSES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fuses.

1.02 REFERENCE STANDARDS

A. NEMA FU 1 - Low Voltage Cartridge Fuses; 2012.

B. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

C. UL 248-1 - Low-Voltage Fuses - Part 1: General Requirements; Current Edition, Including All Revisions.

D. UL 248-12 - Low-Voltage Fuses - Part 12: Class R Fuses; Current Edition, Including All Revisions.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard data sheets including voltage and current ratings, interrupting ratings, time-current curves, and current limitation curves.

C. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 60 00 - Product Requirements, for additional provisions.
   2. Extra Fuses: One set(s) of three for each type and size installed.

1.04 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

PART 2 PRODUCTS

2.01 APPLICATIONS

A. General Purpose Branch Circuits: Class RK1, time-delay.

2.02 FUSES

A. Provide products listed, classified, and labeled as suitable for the purpose intended.

B. Unless specifically indicated to be excluded, provide fuses for all fusible equipment as required for a complete operating system.

C. Provide fuses of the same type, rating, and manufacturer within the same switch.

D. Comply with UL 248-1.

E. Unless otherwise indicated, provide cartridge type fuses complying with NEMA FU 1, Class and ratings as indicated.

F. Voltage Rating: Suitable for circuit voltage.

G. Class R Fuses: Comply with UL 248-12.
   1. Class RK1, Time-Delay Fuses.

H. Selectivity: Where the requirement for selectivity is indicated, furnish products as required to achieve selective coordination.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that fuse ratings are consistent with circuit voltage and manufacturer's recommendations and nameplate data for equipment.

B. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Do not install fuses until circuits are ready to be energized.

B. Install fuses with label oriented such that manufacturer, type, and size are easily read.

END OF SECTION

SECTION 26 43 00
SURGE PROTECTIVE DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surge protective devices for service entrance locations.

1.02 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

B. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

C. UL 1449 - Standard for Surge Protective Devices; Current Edition, Including All Revisions.

1.03 ADMINISTRATIVE REQUIREMENTS

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Include detailed component information, voltage, surge current ratings, repetitive surge current capacity, voltage protection rating (VPR) for all protection modes, maximum continuous operating voltage (MCOV), nominal discharge current (I-n), short circuit current rating (SCCR), connection means including any required external overcurrent protection, enclosure ratings, outline and support point dimensions, weight, service condition requirements, and installed features.

C. Shop Drawings: Include wiring diagrams showing all factory and field connections with wire and circuit breaker/fuse sizes.

1.05 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Factory-installed, Internally Mounted Surge Protective Devices:
   1. Same as manufacturer of equipment containing surge protective device, to provide a complete listed assembly including SPD.

2.02 SURGE PROTECTIVE DEVICES - GENERAL REQUIREMENTS

A. Description: Factory-assembled surge protective devices (SPDs) for 60 Hz service; listed, classified, and labeled as suitable for the purpose intended; system voltage as indicated on the drawings.

B. Protected Modes:
   1. Wye Systems: L-N, L-G, N-G, L-L.

C. UL 1449 Voltage Protection Ratings (VPRs):
   1. 480Y/277V System Voltage: Not more than 1,500 V for L-N, L-G, and N-G modes and 2,000 V for L-L mode.

D. UL 1449 Maximum Continuous Operating Voltage (MCOV): Not less than 115% of nominal system voltage.

E. Equipment Containing Factory-installed, Internally Mounted SPDs: Listed and labeled as a complete assembly including SPD.
   1. Distribution Panelboards: See Section 26 24 16.

2.03 SURGE PROTECTIVE DEVICES FOR SERVICE ENTRANCE LOCATIONS

A. Unless otherwise indicated, provide factory-installed, internally mounted SPDs.

B. List and label as complying with UL 1449, Type 1 when connected on line side of service disconnect overcurrent device and Type 1 or 2 when connected on load side of service disconnect overcurrent device.

C. Provide SPDs utilizing field-replaceable modular or non-modular protection circuits.

D. Surge Current Rating: Not less than 120 kA per mode/240 kA per phase.

E. UL 1449 Nominal Discharge Current (I-n): 20 kA.

F. UL 1449 Short Circuit Current Rating (SCCR): Not less than the available fault current at the installed location as indicated on the drawings.

G. Diagnostics:
   1. Protection Status Monitoring: Provide indicator lights to report the protection for each phase.
   2. Alarm Notification: Provide indicator light and audible alarm to report alarm condition. Provide button to manually silence audible alarm.

PART 3 EXECUTION

3.01 INSTALLATION

A. Perform work in a neat and workmanlike manner in accordance with NECA 1.

B. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

C. Unless indicated otherwise, connect service entrance surge protective device on load side of service disconnect main overcurrent device.

D. Do not energize SPD until bonding of neutral and ground for service entrance and separately derived systems is complete in accordance with Section 26 05 26 where applicable. Replace SPDs damaged by improper or missing neutral-ground bond.

END OF SECTION

SECTION 26 51 00
INTERIOR LIGHTING

PART 1 GENERAL

1.01 SECTION INCLUDES

1.02 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

B. NECA/IESNA 500 - Standard for Installing Indoor Commercial Lighting Systems; 2006.

C. NECA/IESNA 502 - Standard for Installing Industrial Lighting Systems; 2006.

D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate the installation of luminaires with mounting surfaces installed under other sections or by others. Coordinate the work with placement of supports, anchors, etc. required for mounting. Coordinate compatibility of luminaires and associated trims with mounting surfaces at installed locations.
   2. Coordinate the placement of luminaires with structural members, ductwork, piping, equipment, diffusers, fire suppression system components, and other potential conflicts installed under other sections or by others.
   3. Coordinate the placement of exit signs with furniture, equipment, signage or other potential obstructions to visibility installed under other sections or by others.
   4. Notify Engineer of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.

1.04 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

PART 2 PRODUCTS

PART 3 EXECUTION

3.01 PREPARATION

A. Provide extension rings to bring outlet boxes flush with finished surface.

B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.02 INSTALLATION

A. Coordinate locations of outlet boxes provided under Section 26 05 37 as required for installation of luminaires provided under this section.

B. Install products according to manufacturer's instructions.

C. Install luminaires securely, in a neat and workmanlike manner, as specified in NECA 1 (general workmanship), NECA 500 (commercial lighting), and NECA 502 (industrial lighting).

D. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.

E. Suspended Luminaires:
   1. Install using the suspension method indicated, with support lengths and accessories as required for specified mounting height.
   2. Provide minimum of two supports for each luminaire equal to or exceeding 4 feet in length, with no more than 4 feet between supports.
   3. Install canopies tight to mounting surface.
   4. Unless otherwise indicated, support pendants from swivel hangers.

F. Wall-Mounted Luminaires: Unless otherwise indicated, specified mounting heights are to center of luminaire.

G. Install accessories furnished with each luminaire.

H. Bond products and metal accessories to branch circuit equipment grounding conductor.

I. Install lamps in each luminaire.

3.03 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Inspect each product for damage and defects.

C. Operate each luminaire after installation and connection to verify proper operation.

D. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by Engineer.

3.04 ADJUSTING

A. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by Engineer. Secure locking fittings in place.

3.05 CLEANING

A. Clean surfaces according to NECA 500 (commercial lighting), NECA 502 (industrial lighting), and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.

3.06 PROTECTION

A. Protect installed luminaires from subsequent construction operations.

END OF SECTION

SECTION 26 56 00
EXTERIOR LIGHTING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Poles and accessories.

1.02 REFERENCE STANDARDS

A. IEEE C2 - National Electrical Safety Code; 2012.

B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

C. NECA/IESNA 501 - Standard for Installing Exterior Lighting Systems; 2006.

D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate placement of poles and associated foundations with utilities, curbs, sidewalks, trees, walls, fences, striping, etc. installed under other sections or by others.
   2. Notify Engineer of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Shop Drawings:
   1. Indicate dimensions and components for each pole that is not a standard product of the manufacturer.

C. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on pole construction, dimensions, ratings, finishes, installation requirements, listings, service conditions, weight, effective projected area (EPA), and installed accessories; include model number nomenclature clearly marked with all proposed features.

D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.

E. Operation and Maintenance Data: Instructions for each product including information on replacement parts.

1.05 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Receive, handle, and store products according to NECA/IESNA 501 and manufacturer's written instructions.

B. Keep products in original manufacturer's packaging and protect from damage until ready for installation.

PART 2 PRODUCTS

2.01 POLES

A. All Poles:
   1. Provide poles and associated support components suitable for the luminaire(s) and associated supports and accessories to be installed.
   2. Material: Treated Western Red Cedar Utility Pole Class 4, 26 feet in length.
   3. Material: Straight Square Steel Pole, 17 feet mounted on a concrete base, height indicated on the drawings, unless otherwise noted. Bronze Finish.

4. Unless otherwise indicated, provide with the following features/accessories for metal poles:
    a. Top cap.
    b. Handhole, 3"x5" size.
    c. Anchor bolts with leveling nuts or leveling shims.
    d. Anchor base cover.

B. Metal Poles: Provide ground lug, accessible from handhole or transformer base.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as shown on the drawings.

B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate conductors in accordance with NFPA 70.

C. Verify that suitable support frames are installed where required.

D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.

E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

A. Provide extension rings to bring outlet boxes flush with finished surface.

B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.03 INSTALLATION

A. Install products according to manufacturer's instructions.

B. Install luminaires securely, in a neat and workmanlike manner, as specified in NECA 1 (general workmanship) and NECA/IESNA 501 (exterior lighting).

C. Pole-Mounted Luminaires:
1. Maintain the following minimum clearances:
    a. Comply with IEEE C2.
    b. Comply with utility company requirements.
2. Foundation-Mounted Poles:
    a. Provide cast-in-place concrete foundations for poles as indicated.
    b. Install foundations plumb.
    c. Install poles plumb, using leveling nuts or shims as required to adjust to plumb.
    d. Tighten anchor bolt nuts to manufacturer's recommended torque.
    e. Install non-shrink grout between pole anchor base and concrete foundation, leaving small channel for condensation drainage.
    f. Install anchor base covers or anchor bolt covers as indicated.
3. Grounding:
    a. Bond luminaires, metal accessories, metal poles, and foundation reinforcement to branch circuit equipment grounding conductor.

D. Install accessories furnished with each luminaire.

E. Bond products and metal accessories to branch circuit equipment grounding conductor.

F. See drawings for pole base details.

3.04 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Inspect each product for damage and defects.

C. Operate each luminaire after installation and connection to verify proper operation.

3.05 ADJUSTING

A. Location of the poles is shown on a small scale, adjust the final location as directed by the owners rep. (possible + or - 30') with no change to the contract price.

B. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by Engineer. Secure locking fittings in place.

C. Luminaires with Field-Rotatable Optics: Position optics according to manufacturer's instructions to achieve lighting distribution as indicated or as directed by Engineer.

3.06 CLEANING

A. Clean surfaces according to NECA/IESNA 501 and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.

3.07 PROTECTION

A. Protect installed luminaires from subsequent construction operations.

END OF SECTION

SECTION 27 10 05

STRUCTURED CABLING FOR VOICE AND DATA - INSIDE-PLANT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Communications pathways.

B. Copper cable and terminations.

C. Communications identification.

1.02 REFERENCE STANDARDS

A. NECA/BICSI 568 - Standard for Installing Building Telecommunications Cabling; National Electrical Contractors Association; 2006.

B. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

C. TIA-568 (SET) - Commercial Building Telecommunications Cabling Standard Set; 2015.

D. TIA-568-C.2 - Balanced Twisted-Pair Telecommunications Cabling and Components Standards; Rev C, 2009 (with Addenda; 2014).

E. TIA-569-C - Commercial Building Standard for Telecommunications Pathways and Spaces; Rev C, 2012 (with Addenda; 2013).

F. TIA-606-B - Administration Standard for the Telecommunications Infrastructure; Rev B, 2012.

G. TIA-607-B - Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises; Rev B, 2012 (with Addenda; 2013).

H. ANSI/J-STD-607 - Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications; Rev A, 2002.

I. UL 514C - Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers; Current Edition, Including All Revisions.

J. UL 1863 - Communications-Circuit Accessories; Current Edition, Including All Revisions.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate the work with other trades to avoid placement of other utilities or obstructions within the spaces dedicated for communications equipment.
   2. Coordinate arrangement of communications equipment with the dimensions and clearance requirements of the actual equipment to be installed.
   3. Notify Engineer of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product.

C. Shop Drawings: Show compliance with requirements on isometric schematic diagram of network layout, showing cable routings, telecommunication closets, rack and enclosure layouts and locations, service entrance, and grounding, prepared and approved by BICSI Registered Communications Distribution Designer (RCDD).

D. Field Test Reports.

1.05 QUALITY ASSURANCE

A. Products: Listed, classified, and labeled as suitable for the purpose intended.

PART 2 PRODUCTS

2.01 SYSTEM DESIGN

A. Provide a complete permanent system of cabling and pathways for lighting controls.
   1. Comply with TIA-568 (SET) (cabling) and TIA-569-C (pathways), latest editions (commercial standards).
   2. Comply with Communications Service Provider requirements.
   3. Provide fixed cables and pathways that comply with NFPA 70 and TIA-607-B and are UL listed or third party independent testing laboratory certified.
   4. Provide connection devices that are rated for operation under conditions of 0-80 degrees F at relative humidity of 0 to 95 percent, noncondensing.

B. System Description:
   1. Horizontal Cabling: Copper.

2.02 PATHWAYS

A. Conduit: As specified in Section 26 05 34; provide pull cords in all conduit.

2.03 COPPER CABLE AND TERMINATIONS

A. Copper Horizontal Cable:
   1. Cable Type - _____ Data: TIA-568-C.2 Category 6A UTP (unshielded twisted pair); 23 AWG.
   2. Cable Applications: Use listed NFPA 70 Type CMP plenum cable unless otherwise indicated.

B. Copper Cable Terminations: Insulation displacement connection (IDC) type using appropriate tool; use screw connections only where specifically indicated.

C. Jacks and Connectors: Modular RJ-45, non-keyed, terminated with 110-style insulation displacement connectors (IDC); high impact thermoplastic housing; suitable for and complying with same standard as specified horizontal cable; UL 1863 listed.
   1. Performance: 500 mating cycles.

2.04 COMMUNICATIONS OUTLETS

A. Outlet Boxes: Comply with Section 26 05 37.
   1. Provide depth as required to accommodate cable manufacturer's recommended minimum conductor bend radius.
   2. Minimum Size, Unless Otherwise Indicated:
      a. Data or Combination Voice/Data Outlets: 4 inch square by 2-1/8 inch deep (100 by 54 mm) trade size.

B. Wall Plates:
   1. Comply with system design standards and UL 514C.
   2. Accepts modular jacks/inserts.
   3. Capacity:
      a. Data or Combination Voice/Data Outlets: 2 ports.
   4. Wall Plate Material/Finish - Surface-Mounted Outlets: Match wiring device and wall plate finishes specified in Section 26 27 26.

2.05 IDENTIFICATION PRODUCTS

A. Comply with TIA-606-B.

B. Comply with Section 26 05 53.

PART 3 EXECUTION

3.01 INSTALLATION - GENERAL

A. Comply with latest editions and addenda of TIA-568 (SET) (cabling), TIA-569-C (pathways), TIA-607-B (grounding and bonding), NECA/BICSI 568, NFPA 70, and SYSTEM DESIGN as specified in PART 2.

B. Comply with Communication Service Provider requirements.

C. Grounding and Bonding: Perform in accordance with TIA-607-B and NFPA 70.

D. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 84 00.

3.02 INSTALLATION OF PATHWAYS

A. Install pathways with the following minimum clearances:
   1. 48 inches from motors, generators, frequency converters, transformers and uninterruptible power systems.
   2. 12 inches from power conduits and cables and panelboards.

B. Conduit, in Addition to Requirements of Section 26 05 34:

C. Outlet Boxes:
   1. Coordinate locations of outlet boxes provided under Section 26 05 37 as required for installation of telecommunications outlets provided under this section.

3.03 INSTALLATION OF EQUIPMENT AND CABLING

A. Cabling:
   1. Do not bend cable at radius less than manufacturer's recommended bend radius; for unshielded twisted pair use bend radius of not less than 4 times cable diameter.
   2. Do not over-cinch or crush cables.
   3. Do not exceed manufacturer's recommended cable pull tension.
   4. When installing in conduit, use only lubricants approved by cable manufacturer and do not chafe or damage outer jacket.

B. Service Loops (Slack or Excess Length): Provide the following minimum extra length of cable, looped neatly:
   1. At Distribution Frames: 120 inches.

C. Copper Cabling:
   1. Category 5e and Above: Maintain cable geometry; do not untwist more than 1/2 inch from point of termination.
   2. For 4-pair cables in conduit, do not exceed 25 pounds pull tension.
   3. Use T568B wiring configuration.

D. Identification:
   1. Use wire and cable markers to identify cables at each end.
   2. Use manufacturer-furnished label inserts, identification labels, or engraved wall plate to identify each jack at communications outlets with unique identifier.

3.04 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Comply with inspection and testing requirements of specified installation standards.

C. Visual Inspection:
   1. Inspect cable jackets for certification markings.
   2. Inspect cable terminations for color coded labels of proper type.

D. Testing - Copper Cabling and Associated Equipment:
   1. Test operation of shorting bars in connection blocks.

E. Final Testing: After all work is complete

END OF SECTION

SCHEDULE OF ESTIMATED QUANTITIES

LINE ITEM NO.	NOTE	ITEM NO.	ITEM DESCRIPTION	UNIT	BASE BID 1 0.8K LOOP QUANTITIES	BASE BID 2 2.0K CONNECTOR QUANTITIES	TOTAL ESTIMATED QUANTITIES	NOTES
1		2021.501	MOBILIZATION	LUMP SUM	0.50	0.50	1	
2	2	2101.502	GRUBBING	EACH	110.00	69.00	179	
3	3	2105.501	COMMON EXCAVATION	CU YD	2,251.00	2,666.00	4917	
4	4	2105.604	GEOTEXTILE FABRIC TYPE V	SQ YD	308.00	792.00	1100	
5		2112.603	SUBGRADE PREPARATION	LIN FT	-	2,080.00	2080	SEE GRADING TABLE
6	5	2118.507	AGGREGATE SURFACING (CV) CLASS 5	CU YD	49.00	126.00	175	
7	2	2411.000	NATURAL STONE RETAINING WALL	LIN FT	476.00	1,224.00	1700	
8		2501.502	12" CS PIPE APRON	EACH	6.00	2.00	8	SEE CULVERT TABLE
9		2501.502	15" CS PIPE APRON	EACH	-	6.00	6	SEE CULVERT TABLE
10		2501.502	18" CS PIPE APRON	EACH	12.00	4.00	16	SEE CULVERT TABLE
11		2501.502	24" CS PIPE APRON	EACH	2.00	6.00	8	SEE CULVERT TABLE
12		2501.502	30" CS PIPE APRON	EACH	-	4.00	4	SEE CULVERT TABLE
13	14	2501.503	12" CP PIPE CULVERT (SMOOTH)	LIN FT	170.00	70.00	240	SEE CULVERT TABLE
14	14	2501.503	15" CP PIPE CULVERT (SMOOTH)	LIN FT	-	155.00	155	SEE CULVERT TABLE
15	14	2501.503	18" CP PIPE CULVERT (SMOOTH)	LIN FT	380.00	110.00	490	SEE CULVERT TABLE
16	14	2501.503	24" CP PIPE CULVERT (SMOOTH)	LIN FT	50.00	215.00	265	SEE CULVERT TABLE
17	14	2501.503	30" CP PIPE CULVERT (SMOOTH)	LIN FT	-	190.00	190	SEE CULVERT TABLE
18		2511.507	RANDOM RIPRAP CLASS IV	CU YD	244.00	304.00	548	SEE CULVERT TABLE
19	6	2557.602	TRAIL GATE, TYPE SPECIAL	EACH	-	2.00	2	
20		2563.601	TRAFFIC CONTROL	LUMP SUM	0.50	0.50	1	
21		2573.502	CULVERT END CONTROLS	EACH	10.00	11.00	21	
22		2573.503	SILT FENCE, TYPE MS	LIN FT	1,350.00	6,277.00	7627	PLACE DOWNSLOPE OF ALL CONSTRUCTION AREAS
23		2573.503	SEDIMENT CONTROL LOG TYPE COMPOST	LIN FT	270.00	695.00	965	
24	9	2573.535	STABILIZED CONSTRUCTION EXIT	EACH	-	2.00	2	
25	8	2575.501	SEEDING	ACRE	2.50	6.40	8.90	
26		2575.502	SEED MIXTURE TYPE 36-311	LB	83.75	214.40	298	APPLICATION RATE = 33.5 LBS/ACRE
27	7	2575.604	ROLLED EROSION PREVENTION CATEGORY 25	SQ YD	2,720.00	7,000.00	9720	PLACE ON ALL SLOPES STEEPER THAN 1:3 (33.33%)

6

DRAINAGE NOTES	
A	GRADE DITCH TO CULVERT
B	ROUTE SNOWMAKING PIPE DRAINAGE TO CULVERT
C	ROUTE SNOWMAKING LOW POINT DRAINS AND BLOW-OFFS TO CULVERT
D	WETLAND ASSUMED TO FLOW ALONGSIDE TRAIL HERE.
E	ANY CONCENTRATED FLOW FROM THIS POINT IS ANTICIPATED TO BE INTERCEPTED BY THE DOWNGRADIENT WETLANDS AND SWALES.
F	ANY CONCENTRATED FLOW FROM THIS POINT IS ANTICIPATED TO BE INTERCEPTED BY THE DOWNGRADIENT WETLANDS AND SWALES.
G	ROUTE FLOW UPGRADIENT OF THE DWP TO THE NORTH OR SOUTH, RATHER THAN ACROSS THE DWP.
H	LOW POINT DRAINAGE ACROSS TRAIL OR INSTALL CULVERT
I	REINFORCE TOE OF SLOPE TO ALLOW DRAINAGE ALONG TOE
J	ANTICIPATED FLOW PATH OF 85TH AVE W CREEK BASED ON TOPOGRAPHY- ADJUST CULVERT LOCATION AS NEEDED.
K	ADD APRON AND RIPRAP TREATMENT TO END OF EXISTING PIPE. CONFIRM DIAMETER PRIOR TO ORDERING APRONS
L	ANTICIPATED FLOW PATH OF 85TH AVE W CREEK FROM CITY LINEWORK.
M	CITY PROVIDED LINEWORK INDICATES 85TH AVE W CREEK FLOWS THROUGH THIS LOCATION, TOPOGRAPHY INDICATES IT DOES NOT.
N	ROUTE SNOWMAKING PIPE DRAINAGE TO NORTH.
O	ASSUMED OUTLET FLOW WILL BE ROUTED ALONG SNOWPIPE RATHER THAN OVERFLOWING TRAIL DOWNGRADIENT.
P	ASSUME SNOWMAKING PIPE WILL DIRECT WATER INTO WETLAND.
Q	ROUTE ANY IMPOUNDED WATER HERE TO CULVERT 105 OR OVER TRAIL.
R	DRAINAGE CHANNEL ASSUMED IN THIS LOCATION BASED ON THE DOWNSTREAM DRAINAGE CHANNEL.
S	DRAINAGE CHANNEL ASSUMED IN THIS LOCATION BASED ON THE DOWNSTREAM DRAINAGE CHANNEL.
T	ROUTE ANY IMPOUNDED WATER TO CULVERT 140 WITH A DITCH.
U	PROVIDE A BERM ALONG THE NORTH SIDE OF TRAIL TO DIRECT WETLAND DRAINAGE ALONG THE SIDE OF THE TRAIL.
V	GRADE DITCH TO WETLAND TO DRAIN LOW POINT AREA.
W	RAISE MOUNTAIN BIKE TRAIL AND SKI TRAIL FOR DITCH CULVERT
X	REMOVE EXISTING CULVERT, INSTALL NEW CULVERT. PATCH EXISTING ROADWAY SURFACE WITH 12" AGGREGATE BASE CLASS 5 (INCIDENTAL)
Y	DO NOT DISTURB WETLAND WITH SWALE GRADING. CROSS ONLY THROUGH DRAINAGE CHANNEL.
Z	PLACE SNOW MAKING PIPE ON SUPPORT TO ALLOW DRAINAGE TO PASS UNDERNEATH.
AA	PROVIDE STEEP CULVERT TREATMENT (CONC. JOINT ANCHORS, CUT-OFF COLLARS), INCIDENTAL
BB	PROVIDE HIGH VELOCITY OUTLET TREATMENT (GEOTEXTILE SEAL), INCIDENTAL

CULVERT TABLE

	2501.503	2501.503	2501.503	2501.503	2501.503	2501.502	2501.502	2501.502	2501.502	2501.502	SPEC. 2511	SPEC. 2511	
	12" CP PIPE CULVERT (SMOOTH)	15" CP PIPE CULVERT (SMOOTH)	18" CP PIPE CULVERT (SMOOTH)	24" CP PIPE CULVERT (SMOOTH)	30" CP PIPE CULVERT (SMOOTH)	12" CS PIPE APRON	15" CS PIPE APRON	18" CS PIPE APRON	24" CS PIPE APRON	30" CS PIPE APRON	RANDOM RIPRAP CLASS IV (UPSTREAM)	RANDOM RIPRAP CLASS IV (DOWNSTREAM)	NOTES
CULVERT ID	LIN FT	LIN FT	LIN FT	LIN FT	LIN FT	EACH	EACH	EACH	EACH	EACH	CU YD	CU YD	
51A			60					1			12	0	
51B			60					1			0	12	
52			50					2			14	14	AA, BB
53			50					2			12	14	AA, BB
54			50					2			12	14	AA, BB
55	60					2					10	10	AA
56A				50					2		16	16	AA, BB
56B			50					2			12	12	AA, BB
56C			60					2			12	12	AA, BB
60	60					2					12	12	AA
66A	50					2					8	8	AA, H
100				110					2		14	16	AA, BB
105		50					2				10	12	AA, BB
110	70					2					8	10	AA
115			50					2			12	14	AA, BB
120				50					2		14	16	AA, BB
125				55					2		14	16	AA, BB
130		55					2				14	14	AA, BB
135		50					2				12	14	AA, BB
140			60					2			14	16	AA, BB
145					90					2	16	16	X, AA, BB
150					100					2	16	16	W
PROJECT ITEM TOTALS	**240**	**155**	**490**	**265**	**190**	**8**	**6**	**16**	**8**	**4**	**264**	**284**	

CONSTRUCTION NOTES

1. CLEARING OPERATIONS COMPLETED PREVIOUSLY BY OTHERS.
2. GRUBBING PAY ITEMS SHALL INCLUDE ALL LABOR AND MATERIALS ASSOCIATED WITH REMOVING ALL WOODY VEGETATION FROM THE GANC (GRAND AVENUE NORDIC CENTER) TRAIL CORRIDOR. BURSH AND STUMPS MAY BE CHIPPED AND DISTRIBUTED ONSITE. DISTRIBUTED MATERIAL MAY NOT EXCEED 4" DEPTH OR BE DISTRIBUTED IN WETLANDS. BRUSH AND STUMPS MAY BE BURNED AT DESIGNATED AREAS ONSITE. CONTRACTOR TO OBTAIN PRIOR CITY APPROVAL AND REQUIRED BURN PERMITS AS NECESSARY.
2. NATURAL STONE RETAINING WALL PAY ITEM SHALL INCLUDE ALL LABOR AND MATERIALS ASSOCIATED WITH CONSTRUCTING SHORT NATURAL STONE RETAINING WALLS WHERE NECESSARY TO MINIMIZE SOIL DISTURBANCES. NATURAL STONES FOR RETAINING WALLS EXIST ONSITE BUT MUST BE GATHERED AND INSTALLED BY CONTRACTOR.
3. COMMON EXCAVATION ITEM INCLUDES MATERIALS AND LABOR ASSOCIATED WITH GRADING TRAIL TO MAXIMUM CROSS SLOPE OF 5%. TRAIL CENTERLIN PROFILE IS EXPECTED TO REMAIN NEAR EXISTING GRADEW ITH MINOR EXCAVATION TO CREATE THE TRAIL TYPICAL SECITON PER DETAILS. IT IS EXPECTED THAT EXCESS MATERIAL WILL BE DISTRIBUTED ONSITE, SEEDED AND STABILIZED PER THE SWPPP. STABILIZING EFFORTS FOR AREAS OF EXCESS FILL WILL BE CONSIDERED INCIDENTAL TO COMMON EXCAVATION PAY ITEM. CONTRACTOR MAY UTILIZE EXISTING OR CREATE NEW BORROW PITS WHERE APPROPRIATE TO GENERATE FILL MATERIAL. ALL DISTRUBED AREAS TO BE SEEDED AND STABILIZED PER THE SWPPP. SEEDING AND STABILIZATION FOR BORROW PITS SHALL BE CONSIDERED INCIDENTAL.
4. GEOTEXTILE FABRIC ITEM TO INCLUDE LABOR AND MATERIALS ASSOCIATED WITH REINFORCING THE TRAIL OVER STORMWATER PIPING.
5. NATURAL SURFACE TRAIL IS INTENDED FOR WINTER CROSS COUTNRY SKIING USE. AGGREGATE TRAIL SURFACING INTENDED FOR TRAIL CONSTRUCTION OVER STORMWATER STRUCTURES AND TOP DRESSING OF EXISTING SERVICE ROAD ON CONNECTOR TRAIL.
6. TRAIL GATE TYPE SPECIAL ITEM TO INCLUDE LABOR AND MATERIALS ASSOCIATED WITH FURNISHING AND INSTALLING SINGLE SWING GATES PER DETAILS. TRILA GATES TO RESTRICT ALL MOTORIZED ACCESS OT THE TRAIL EXCEPT MAINTENANCE VEHICLES AT THE SKYLINE PARKWAY INTERSECTION.
7. EROSION CONTROL BLANKET ITEM TO INCLUDE LABOR AND MATERIALS ASSOCIATED WITH STABILIZING ANY TRAIL GRADES OR BACKSLOPES GREATER THAN 1:3. STONE RETAINING WALLS MAY BE CONSTRUCTED IN LIEU OF 1:3 BACKSLOPES.
8. SEEDING ITEM SHALL INCLUDE ALL LABOR AND MATERIALS ASSOCIATED WITH STABILIZING THE TRAIL GRADE AND BACKSLOPES PER THE SWPPP. ALL DISTURBED AREAS MUST BE RE-ESTABLISHED WITH THE SPECIFIED SEED MIX.
9. STABILIZED CONSTRUCITON EXITS SHALL BE INSTALLED AT SKYLINE PARKWAY.
10. STORMWATER CONVEYANCE AND SNOWMAKING UTILITY DESIGN COMPLETED BY OTHERS. STORMWATER AND SNOW PRODUCTION UTILITIES SHOWN FOR REFERENCE ONLY.
11. WORK OUTSIDE OF WETLANDS MAY BEGIN ONCE THE CONTRACTOR HAS RECEIVED THE NOTICE TO PROCEED FROM THE CITY. WORK INSIDE THE WETLANDS IS RESTRICTED TO CLEARING ACTIVITIES ONLY UNTIL WETLAND MITIGATION PROCESS HAS BEEN COMPLETED. NO GROUND DISTURBING ACTIVITIES ARE ALLOWED UNTIL THE MITIGATION PROCESS HAS BEEN COMPLETED.
12. FERTILIZER SHALL BE APPLIED PER THE SWPPP AND INCLUDED AS INCIDENTAL.
13. OWNER RESERVES THE RIGHT TO MAKE ADJUSTMENTS TO ALIGNMENTS IN THE FIELD DURING CONSTRUCTION OF SKI TRAILS AT THEIR DISCRETION. UNIT PRICE QUANTITY ADJUSTMENTS SHALL BE ESTABLISHED AT THE TIME OF PROPOSED ADJUSTMENTS AND AGREED UPON BY OWNER AND CONTRACTOR.
14. CULVERT LOCATIONS SHALL BE FIELD VERIFIED SO THAT CULVERTS ARE PLACED IN APPROPRIATE LOCATIONS TO PROMOTE POSITIVE DRAINAGE. LOCATIONS MUST BE APPROVED BY OWNER PRIOR TO CULVERT PLACEMENT.

6

NO.	DATE	BY	DESCRIPTION OF REVISIONS
6	11/27/23	EM	ADDENDUM 6 - SEQ CLARIFICATIONS
5	11/21/23	EM	ADDENDUM 5 - ADD CULVERT INFORMATION
4	11/13/23	EM	ADDENDUM 4 - CONSTRUCTION OF 0.8K LOOP & CONNECTOR TRAIL
3	03/13/18	WD	ADDENDUM 3
2	03/02/18	WD	ADDENDUM 2
1	02/23/18	WD	ADDENDUM 1

DESIGNED JS
DRAWN WD
CHECKED JG

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.
SIGNATURE: Will D. DeRocher DATE: 02/08/2018
PRINTED NAME: WILL D. DEROCHER LIC. NO.: 54757

TKDA
444 Cedar Street, Suite 500 420
Saint Paul, MN 55101
651.292.8626
tkda.com

SCHEDULE OF ESTIMATED QUANTITIES
GRAND AVENUE NORDIC CENTER SKI TRAIL

PROJ. NO. 16585.000
DRAWING NO. 02

PLOT DATE: Jun 20, 2018 - 2:49pm
FILENAME: K:\ia-FD\duth_City\16585000\04_Production\01_CAD\02_Sheets\GANC Title Sheet.dwg

CONNECT TO EXISTING SKI TRAIL

BEGINNING OF CONNECTOR TRAIL
0+00

AREAS WITH SLOPES 1:3 OR GREATER TO BE BLANKETED AND SEEDED OR DAYLIGHTED USING SHORT RETAINING WALLS. WALLS TO BE CONSTRUCTED WITH AVAILABLE ONSITE STONE.

DISTURBED AREAS LESS THEN 1:3 TO BE SEED AND STABILIZED WITH BLOWN STRAW, HYDRO MULCH OR OTHER APPROVED METHOD.

1+00
2+00
3+00
4+00
5+00
6+00
7+00

1230
1220
1210
1200

6

2.0 CONNECTOR GRADING NOTES

START STATION	END STATION	ESTIMATED LENGTH (FT)	GRADING TYPE
00+05.00	02+98.07	293.07	SUBGRADE PREPARATION
02+98.07	04+43.59	145.52	COMMON EXCAVATION
04+43.59	05+32.66	89.07	SUBGRADE PREPARATION
05+32.66	06+30.22	97.56	COMMON EXCAVATION
06+30.22	06+81.10	50.88	SUBGRADE PREPARATION
06+81.10	07+69.96	88.86	COMMON EXCAVATION
07+69.96	08+95.61	125.65	SUBGRADE PREPARATION
08+95.61	09+29.95	34.34	COMMON EXCAVATION
09+29.95	11+46.29	216.34	SUBGRADE PREPARATION
11+46.29	13+31.11	184.82	COMMON EXCAVATION
13+31.11	14+76.47	145.36	SUBGRADE PREPARATION
14+76.47	20+28.05	551.58	COMMON EXCAVATION
20+28.05	33+32.01	1303.96	NO WORK - ROAD SURFACE
33+32.01	33+77.89	45.88	SUBGRADE PREPARATION
33+77.89	34+78.10	100.21	COMMON EXCAVATION
34+78.10	37+95.08	316.98	SUBGRADE PREPARATION
37+95.08	42+07.33	412.25	COMMON EXCAVATION
42+07.33	42+37.53	30.20	SUBGRADE PREPARATION
42+37.53	44+54.24	216.71	COMMON EXCAVATION
44+54.24	45+57.99	103.75	SUBGRADE PREPARATION
45+57.99	48+80.64	322.65	COMMON EXCAVATION
48+80.64	49+54.44	73.80	SUBGRADE PREPARATION
49+54.44	50+14.86	60.42	COMMON EXCAVATION
50+14.86	54+22.64	407.78	SUBGRADE PREPARATION
54+22.64	60+96.23	673.59	COMMON EXCAVATION
60+96.23	62+77.13	180.90	SUBGRADE PREPARATION

N
W
E
S

0
40
80
Feet

ALL CONTRACTORS AND SUBCONTRACTORS SHALL VERIFY ALL DIMENSIONS BY MEASUREMENT AT THE BUILDING AND/OR SITE

0
1
BAR IS ONE INCH ON ORIGINAL DRAWING. IF NOT ONE INCH ON THIS DRAWING ADJUST SCALES ACCORDINGLY.

NO.	DATE	BY	DESCRIPTION OF REVISIONS
6	11/29/23	EM	ADDENDUM 6 - GRADING CLARIFICATIONS

DESIGNED JS
DRAWN WD
CHECKED JG

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED ARCHITECT UNDER THE LAWS OF THE STATE OF MINNESOTA.
SIGNATURE: _____ DATE: 02/08/2018
PRINTED NAME: WILL D. DEROCHER LIC. NO.: 54757

TKDA
444 Cedar Street, Suite 500
Saint Paul, MN 55101
651.292.4582
tkda.com

CONNECTOR I
0+00 - 9+00

PROJ. NO. 16585.000
DRAWING NO. 22

PLOT DATE: Jun 20, 2018 - 2:53pm
FILENAME: K:\ia-fs\Duluth_City\16585000\04_Production\01_CAD\02_Sheets\GANC Site Plan sheets.dwg

PLOT DATE: Jun 20, 2018 - 2:53pm
FILENAME: K:\a-tDuluth_City\16585000\04_Production\01_CAD\02_Sheets\GANIC Site Plan sheets.dwg

NO	DATE	BY	DESCRIPTION OF REVISIONS
6	11/29/22	EM	ADDENDUM 6 - GRADING CLARIFICATIONS

DESIGNED JS
DRAWN WD
CHECKED JG

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED ARCHITECT UNDER THE LAWS OF THE STATE OF MINNESOTA.
SIGNATURE: Will D. DeGroche
PRINTED NAME: WILL D. DEGROCHER LIC. NO.: 54757
DATE: 02/08/2018

TKDA
444 Cedar Street, Suite 420
St. Paul, MN 55101-2156
651.292.4400
tkda.com

CONNECTOR II
9+00 - 14+00

PROJ. NO. 16585.000
DRAWING NO. 23

ALL CONTRACTORS AND SUBCONTRACTORS SHALL VERIFY ALL DIMENSIONS BY MEASUREMENT AT THE BUILDING AND/OR SITE

BAR IS ONE INCH ON ORIGINAL DRAWING. IF NOT ONE INCH ON THIS DRAWING ADJUST SCALES ACCORDINGLY.
0 1

2.0 CONNECTOR GRADING NOTES

START STATION	END STATION	ESTIMATED LENGTH (FT)	GRADING TYPE
00+05.00	02+98.07	293.07	SUBGRADE PREPARATION
02+98.07	04+43.59	145.52	COMMON EXCAVATION
04+43.59	05+32.66	89.07	SUBGRADE PREPARATION
05+32.66	06+30.22	97.56	COMMON EXCAVATION
06+30.22	06+81.10	50.88	SUBGRADE PREPARATION
06+81.10	07+69.96	88.86	COMMON EXCAVATION
07+69.96	08+95.61	125.65	SUBGRADE PREPARATION
08+95.61	09+29.95	34.34	COMMON EXCAVATION
09+29.95	11+46.29	216.34	SUBGRADE PREPARATION
11+46.29	13+31.11	184.82	COMMON EXCAVATION
13+31.11	14+76.47	145.36	SUBGRADE PREPARATION
14+76.47	20+28.05	551.58	COMMON EXCAVATION
20+28.05	33+32.01	1303.96	NO WORK - ROAD SURFACE
33+32.01	33+77.89	45.88	SUBGRADE PREPARATION
33+77.89	34+78.10	100.21	COMMON EXCAVATION
34+78.10	37+95.08	316.98	SUBGRADE PREPARATION
37+95.08	42+07.33	412.25	COMMON EXCAVATION
42+07.33	42+37.53	30.20	SUBGRADE PREPARATION
42+37.53	44+54.24	216.71	COMMON EXCAVATION
44+54.24	45+57.99	103.75	SUBGRADE PREPARATION
45+57.99	48+80.64	322.65	COMMON EXCAVATION
48+80.64	49+54.44	73.80	SUBGRADE PREPARATION
49+54.44	50+14.86	60.42	COMMON EXCAVATION
50+14.86	54+22.64	407.78	SUBGRADE PREPARATION
54+22.64	60+96.23	673.59	COMMON EXCAVATION
60+96.23	62+77.13	180.90	SUBGRADE PREPARATION

6

PLOT DATE: Jun 20, 2018 - 2:53pm
FILENAME: K:\a-fDuluth_City\16585000\04_Production\01_CAD\02_Sheets\GANIC Site Plan sheets.dwg

NO	DATE	BY	DESCRIPTION OF REVISIONS
6	11/29/23	EM	ADDENDUM 6 - GRADING CLARIFICATIONS

DESIGNED JS
DRAWN WD
CHECKED JG

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED ARCHITECT UNDER THE LAWS OF THE STATE OF MINNESOTA.
SIGNATURE: Will D. DeGroche DATE: 02/08/2018
PRINTED NAME: WILL D. DEGROCHER LIC. NO.: 54757

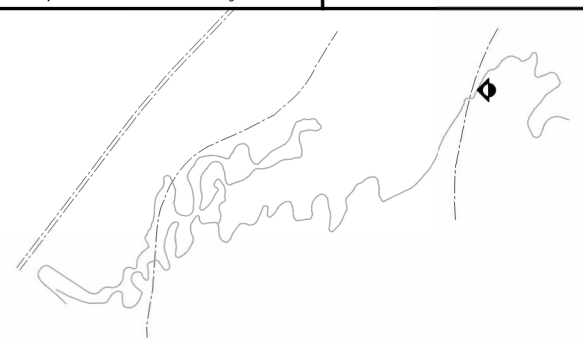
TKDA
444 Cedar Street, Suite 420
St. Paul, MN 55101-2156
651.292.4600
tkda.com

CONNECTOR III
14+00 - 22+00

PROJ. NO. 16585.000
DRAWING NO. 24

ALL CONTRACTORS AND SUBCONTRACTORS SHALL VERIFY ALL DIMENSIONS BY MEASUREMENT AT THE BUILDING AND/OR SITE

BAR IS ONE INCH ON ORIGINAL DRAWING. IF NOT ONE INCH ON THIS DRAWING ADJUST SCALES ACCORDINGLY.
0 1



2.0 CONNECTOR GRADING NOTES			
START STATION	END STATION	ESTIMATED LENGTH (FT)	GRADING TYPE
00+05.00	02+98.07	293.07	SUBGRADE PREPARATION
02+98.07	04+43.59	145.52	COMMON EXCAVATION
04+43.59	05+32.66	89.07	SUBGRADE PREPARATION
05+32.66	06+30.22	97.56	COMMON EXCAVATION
06+30.22	06+81.10	50.88	SUBGRADE PREPARATION
06+81.10	07+69.96	88.86	COMMON EXCAVATION
07+69.96	08+95.61	125.65	SUBGRADE PREPARATION
08+95.61	09+29.95	34.34	COMMON EXCAVATION
09+29.95	11+46.29	216.34	SUBGRADE PREPARATION
11+46.29	13+31.11	184.82	COMMON EXCAVATION
13+31.11	14+76.47	145.36	SUBGRADE PREPARATION
14+76.47	20+28.05	551.58	COMMON EXCAVATION
20+28.05	33+32.01	1303.96	NO WORK - ROAD SURFACE
33+32.01	33+77.89	45.88	SUBGRADE PREPARATION
33+77.89	34+78.10	100.21	COMMON EXCAVATION
34+78.10	37+95.08	316.98	SUBGRADE PREPARATION
37+95.08	42+07.33	412.25	COMMON EXCAVATION
42+07.33	42+37.53	30.20	SUBGRADE PREPARATION
42+37.53	44+54.24	216.71	COMMON EXCAVATION
44+54.24	45+57.99	103.75	SUBGRADE PREPARATION
45+57.99	48+80.64	322.65	COMMON EXCAVATION
48+80.64	49+54.44	73.80	SUBGRADE PREPARATION
49+54.44	50+14.86	60.42	COMMON EXCAVATION
50+14.86	54+22.64	407.78	SUBGRADE PREPARATION
54+22.64	60+96.23	673.59	COMMON EXCAVATION
60+96.23	62+77.13	180.90	SUBGRADE PREPARATION

2.0 CONNECTOR GRADING NOTES			
START STATION	END STATION	ESTIMATED LENGTH (FT)	GRADING TYPE
00+05.00	02+98.07	293.07	SUBGRADE PREPARATION
02+98.07	04+43.59	145.52	COMMON EXCAVATION
04+43.59	05+32.66	89.07	SUBGRADE PREPARATION
05+32.66	06+30.22	97.56	COMMON EXCAVATION
06+30.22	06+81.10	50.88	SUBGRADE PREPARATION
06+81.10	07+69.96	88.86	COMMON EXCAVATION
07+69.96	08+95.61	125.65	SUBGRADE PREPARATION
08+95.61	09+29.95	34.34	COMMON EXCAVATION
09+29.95	11+46.29	216.34	SUBGRADE PREPARATION
11+46.29	13+31.11	184.82	COMMON EXCAVATION
13+31.11	14+76.47	145.36	SUBGRADE PREPARATION
14+76.47	20+28.05	551.58	COMMON EXCAVATION
20+28.05	33+32.01	1303.96	NO WORK - ROAD SURFACE
33+32.01	33+77.89	45.88	SUBGRADE PREPARATION
33+77.89	34+78.10	100.21	COMMON EXCAVATION
34+78.10	37+95.08	316.98	SUBGRADE PREPARATION
37+95.08	42+07.33	412.25	COMMON EXCAVATION
42+07.33	42+37.53	30.20	SUBGRADE PREPARATION
42+37.53	44+54.24	216.71	COMMON EXCAVATION
44+54.24	45+57.99	103.75	SUBGRADE PREPARATION
45+57.99	48+80.64	322.65	COMMON EXCAVATION
48+80.64	49+54.44	73.80	SUBGRADE PREPARATION
49+54.44	50+14.86	60.42	COMMON EXCAVATION
50+14.86	54+22.64	407.78	SUBGRADE PREPARATION
54+22.64	60+96.23	673.59	COMMON EXCAVATION
60+96.23	62+77.13	180.90	SUBGRADE PREPARATION

6

5

CULVERT 145

SKYLINE PARKWAY

STORMWATER SYSTEMS (BY OTHERS)

26+00

25+00

24+00

23+00

22+00

21+00

20+00

1120 1110 1100 1090 1080 1070 1050 1040 1030

REPAIR MTB TRAIL AS PART OF PROJECT

INSTALL TRAIL GATES ON UPPER SIDE OF SKYLINE PARKWAY

STABILIZED CONSTRUCTION EXIT

CULVERT 150

GRADE OF EXISTING ROAD SURFACE, TOP DRESS AS NECESSARY WITH CLASS 5 FLATTEN BERM ON DOWNSLOPE SIDE OF ROADWAY.

N W E S

0 40 80 Feet

ALL CONTRACTORS AND SUBCONTRACTORS SHALL VERIFY ALL DIMENSIONS BY MEASUREMENT AT THE BUILDING AND/OR SITE

0 1

BAR IS ONE INCH ON ORIGINAL DRAWING. IF NOT ONE INCH ON THIS DRAWING ADJUST SCALES ACCORDINGLY.

NO.	DATE	BY	DESCRIPTION OF REVISIONS
6	11/29/23	EM	ADDENDUM 6 - GRADING CLARIFICATIONS
5	11/21/23	EM	ADDENDUM 5 - ADDED CULVERTS AND REVISED SWPPP
1	02/23/18	WD	ADDENDUM 1

DESIGNED JS
DRAWN WD
CHECKED JG

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED ARCHITECT UNDER THE LAWS OF THE STATE OF MINNESOTA.
SIGNATURE: _____ DATE: 02/08/2018
PRINTED NAME: WILLD. DEROCHER LIC. NO.: 54757

TKDA
Saint Paul, MN 55101
tkda.com

CONNECTOR IV
22+00 - 28+00

PROJ. NO. 16585.000
DRAWING NO. 25

PLOT DATE: Jun 20, 2018 - 2:54pm
FILENAME: K:\a-f\Duluth_City\16585000\04_Production\01_CAD\02_Sheets\GANC Site Plan sheets.dwg

6

GRADE OF EXISTING ROAD SURFACE, TOP DRESS AS NECESSARY WITH CLASS 5
FLATTEN BERM ON DOWNSLOPE SIDE OF ROADWAY.

5

CULVERT
202

ROCK LOG TYPE COMPOST

UNNAMED CREEK

UNNAMED CREEK

MATCH LINE

1090
1090
1080
1070
1060
1050
1040

26+00
27+00
28+00
29+00
30+00
31+00
32+00
33+

N
W
E
S

0
40
80
Feet

ALL CONTRACTORS AND SUBCONTRACTORS SHALL VERIFY ALL DIMENSIONS BY MEASUREMENT AT THE BUILDING AND/OR SITE

0
1
BAR IS ONE INCH ON ORIGINAL DRAWING. IF NOT ONE INCH ON THIS DRAWING ADJUST SCALES ACCORDINGLY.

NO.	DATE	BY	DESCRIPTION OF REVISIONS
6	11/29/23	EM	ADDENDUM 6 - GRADING CLARIFICATIONS
5	11/21/23	EM	ADDENDUM 5 - ADDED CULVERTS AND REVISED SWPPP

DESIGNED JS
DRAWN WD
CHECKED JG

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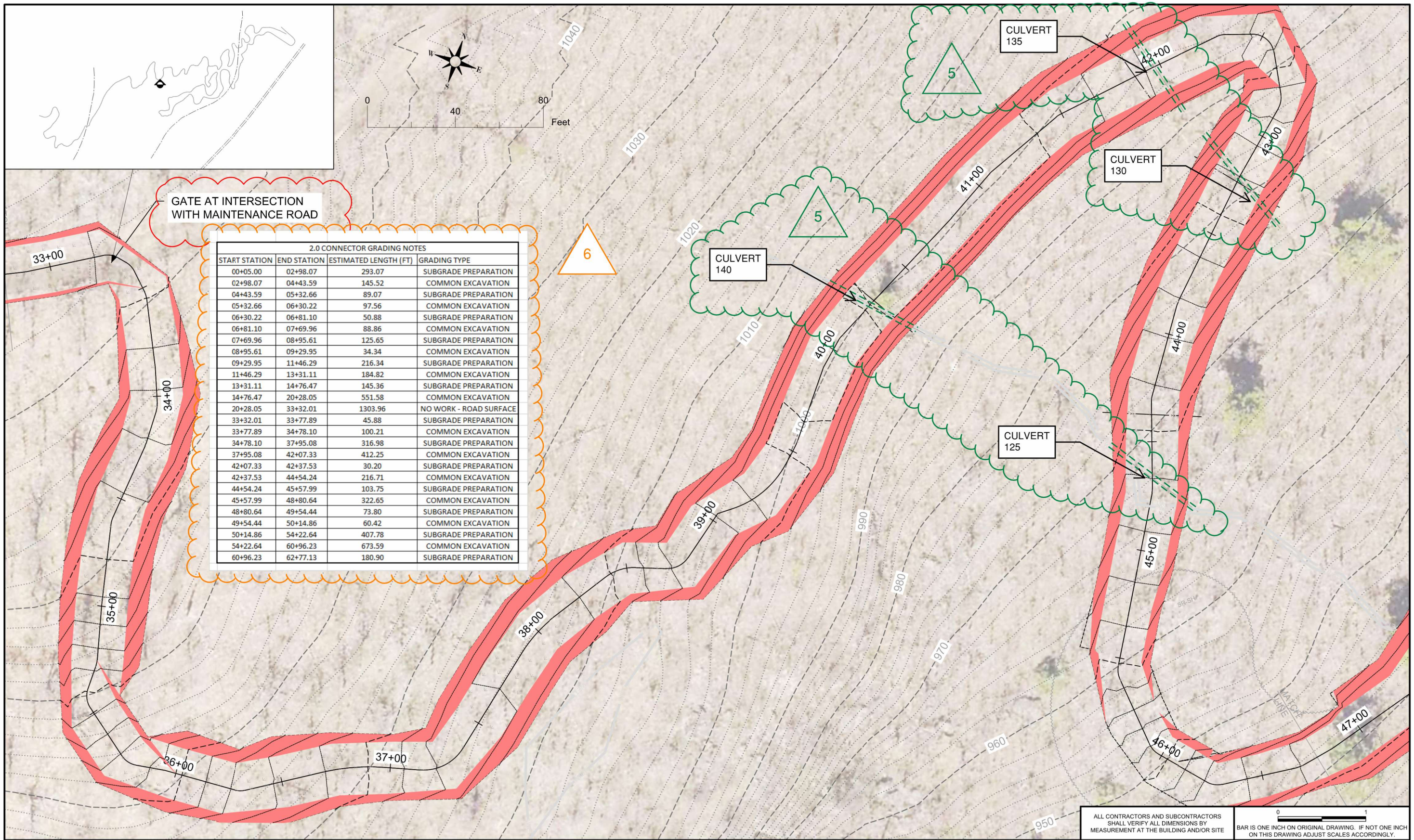
SIGNATURE: _____ DATE: 02/08/2018
PRINTED NAME: WILL D. DEROCHER LIC. NO.: 54757

TKDA
444 Cedar Street, Suite 500 420
Saint Paul, MN 55101
651.292.4626
tkda.com

CONNECTOR V
28+00 - 35+00

PROJ. NO. 16585.000
DRAWING NO. 26

PLOT DATE: Jun 20, 2018 - 2:54pm
FILENAME: K:\a-f\Duluth_City\16585000\04_Production\01_CAD\02_Sheets\GANC Site Plan sheets.dwg



2.0 CONNECTOR GRADING NOTES			
START STATION	END STATION	ESTIMATED LENGTH (FT)	GRADING TYPE
00+05.00	02+98.07	293.07	SUBGRADE PREPARATION
02+98.07	04+43.59	145.52	COMMON EXCAVATION
04+43.59	05+32.66	89.07	SUBGRADE PREPARATION
05+32.66	06+30.22	97.56	COMMON EXCAVATION
06+30.22	06+81.10	50.88	SUBGRADE PREPARATION
06+81.10	07+69.96	88.86	COMMON EXCAVATION
07+69.96	08+95.61	125.65	SUBGRADE PREPARATION
08+95.61	09+29.95	34.34	COMMON EXCAVATION
09+29.95	11+46.29	216.34	SUBGRADE PREPARATION
11+46.29	13+31.11	184.82	COMMON EXCAVATION
13+31.11	14+76.47	145.36	SUBGRADE PREPARATION
14+76.47	20+28.05	551.58	COMMON EXCAVATION
20+28.05	33+32.01	1303.96	NO WORK - ROAD SURFACE
33+32.01	33+77.89	45.88	SUBGRADE PREPARATION
33+77.89	34+78.10	100.21	COMMON EXCAVATION
34+78.10	37+95.08	316.98	SUBGRADE PREPARATION
37+95.08	42+07.33	412.25	COMMON EXCAVATION
42+07.33	42+37.53	30.20	SUBGRADE PREPARATION
42+37.53	44+54.24	216.71	COMMON EXCAVATION
44+54.24	45+57.99	103.75	SUBGRADE PREPARATION
45+57.99	48+80.64	322.65	COMMON EXCAVATION
48+80.64	49+54.44	73.80	SUBGRADE PREPARATION
49+54.44	50+14.86	60.42	COMMON EXCAVATION
50+14.86	54+22.64	407.78	SUBGRADE PREPARATION
54+22.64	60+96.23	673.59	COMMON EXCAVATION
60+96.23	62+77.13	180.90	SUBGRADE PREPARATION

ALL CONTRACTORS AND SUBCONTRACTORS SHALL VERIFY ALL DIMENSIONS BY MEASUREMENT AT THE BUILDING AND/OR SITE

0 1

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NO.	DATE	BY	DESCRIPTION OF REVISIONS
6	11/29/23	EM	ADDENDUM 6 - GRADING CLARIFICATIONS
5	11/21/23	EM	ADDENDUM 5 - ADDED CULVERTS AND REVISED SWPPP
1	02/23/18	WD	ADDENDUM 1

DESIGNED JS
DRAWN WD
CHECKED JG

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED ARCHITECT UNDER THE LAWS OF THE STATE OF MINNESOTA.
SIGNATURE: Will D. DeRocher DATE: 02/08/2018
PRINTED NAME: WILL D. DEROCHER LIC. NO.: 54757

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444 Cedar Street, Suite 1500
Saint Paul, MN 55101
651.292.4400
tkda.com

CONNECTOR VI
35+00 - 49+00

PROJ. NO. 16585.000
DRAWING NO. 27

PLOT DATE: Jun 20, 2018 - 2:54pm
FILENAME: K:\a-f\Duluth_City\16585000\04_Production\01_CAD\02_Sheets\GANC Site Plan sheets.dwg

PLOT DATE: Jun 20, 2018 - 2:54pm
FILENAME: K:\a-fDduth_City\16585000\04_Production\01_CAD\02_Sheets\GANIC Site Plan sheets.dwg

NO	DATE	BY	DESCRIPTION OF REVISIONS
6	11/29/23	EM	ADDENDUM 6 - GRADING CLARIFICATIONS
5	11/21/23	EM	ADDENDUM 5 - ADDED CULVERTS AND REVISED SWPPP

DESIGNED JG
DRAWN WD
CHECKED JG

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED ARCHITECT UNDER THE LAWS OF THE STATE OF MINNESOTA
SIGNATURE: Will D. DeGroCher
PRINTED NAME: WILL D. DEGROCHER
DATE: 02/08/2018
LIC. NO.: 54757

TKDA
444 Cedar Street, Suite 420
St. Paul, MN 55101-2156
651.292.4600
tkda.com

CONNECTOR VII
49+00 - 60+00

PROJ. NO. 16585.000
DRAWING NO. 28

ALL CONTRACTORS AND SUBCONTRACTORS SHALL VERIFY ALL DIMENSIONS BY MEASUREMENT AT THE BUILDING AND/OR SITE

BAR IS ONE INCH ON ORIGINAL DRAWING. IF NOT ONE INCH ON THIS DRAWING ADJUST SCALES ACCORDINGLY.
0 1

2.0 CONNECTOR GRADING NOTES

START STATION	END STATION	ESTIMATED LENGTH (FT)	GRADING TYPE
00+05.00	02+98.07	293.07	SUBGRADE PREPARATION
02+98.07	04+43.59	145.52	COMMON EXCAVATION
04+43.59	05+32.66	89.07	SUBGRADE PREPARATION
05+32.66	06+30.22	97.56	COMMON EXCAVATION
06+30.22	06+81.10	50.88	SUBGRADE PREPARATION
06+81.10	07+69.96	88.86	COMMON EXCAVATION
07+69.96	08+95.61	125.65	SUBGRADE PREPARATION
08+95.61	09+29.95	34.34	COMMON EXCAVATION
09+29.95	11+46.29	216.34	SUBGRADE PREPARATION
11+46.29	13+31.11	184.82	COMMON EXCAVATION
13+31.11	14+76.47	145.36	SUBGRADE PREPARATION
14+76.47	20+28.05	551.58	COMMON EXCAVATION
20+28.05	33+32.01	1303.96	NO WORK - ROAD SURFACE
33+32.01	33+77.89	45.88	SUBGRADE PREPARATION
33+77.89	34+78.10	100.21	COMMON EXCAVATION
34+78.10	37+95.08	316.98	SUBGRADE PREPARATION
37+95.08	42+07.33	412.25	COMMON EXCAVATION
42+07.33	42+37.53	30.20	SUBGRADE PREPARATION
42+37.53	44+54.24	216.71	COMMON EXCAVATION
44+54.24	45+57.99	103.75	SUBGRADE PREPARATION
45+57.99	48+80.64	322.65	COMMON EXCAVATION
48+80.64	49+54.44	73.80	SUBGRADE PREPARATION
49+54.44	50+14.86	60.42	COMMON EXCAVATION
50+14.86	54+22.64	407.78	SUBGRADE PREPARATION
54+22.64	60+96.23	673.59	COMMON EXCAVATION
60+96.23	62+77.13	180.90	SUBGRADE PREPARATION

CULVERT 105
CULVERT 110
CULVERT 115
CULVERT 120
47+00
48+00
49+00
50+00
51+00
53+00
54+00
56+00
57+00
5
6
880
890
900
910
920
930
MATCH LINE
0 40 80 Feet
N E S W

CULVERT 110

CULVERT 100

CULVERT 105

END OF CONNECTOR TRAIL
62+77

PREVIOUS CONSTRUCTION

2.0 CONNECTOR GRADING NOTES			
START STATION	END STATION	ESTIMATED LENGTH (FT)	GRADING TYPE
00+05.00	02+98.07	293.07	SUBGRADE PREPARATION
02+98.07	04+43.59	145.52	COMMON EXCAVATION
04+43.59	05+32.66	89.07	SUBGRADE PREPARATION
05+32.66	06+30.22	97.56	COMMON EXCAVATION
06+30.22	06+81.10	50.88	SUBGRADE PREPARATION
06+81.10	07+69.96	88.86	COMMON EXCAVATION
07+69.96	08+95.61	125.65	SUBGRADE PREPARATION
08+95.61	09+29.95	34.34	COMMON EXCAVATION
09+29.95	11+46.29	216.34	SUBGRADE PREPARATION
11+46.29	13+31.11	184.82	COMMON EXCAVATION
13+31.11	14+76.47	145.36	SUBGRADE PREPARATION
14+76.47	20+28.05	551.58	COMMON EXCAVATION
20+28.05	33+32.01	1303.96	NO WORK - ROAD SURFACE
33+32.01	33+77.89	45.88	SUBGRADE PREPARATION
33+77.89	34+78.10	100.21	COMMON EXCAVATION
34+78.10	37+95.08	316.98	SUBGRADE PREPARATION
37+95.08	42+07.33	412.25	COMMON EXCAVATION
42+07.33	42+37.53	30.20	SUBGRADE PREPARATION
42+37.53	44+54.24	216.71	COMMON EXCAVATION
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49+54.44	50+14.86	60.42	COMMON EXCAVATION
50+14.86	54+22.64	407.78	SUBGRADE PREPARATION
54+22.64	60+96.23	673.59	COMMON EXCAVATION
60+96.23	62+77.13	180.90	SUBGRADE PREPARATION

ALL CONTRACTORS AND SUBCONTRACTORS SHALL VERIFY ALL DIMENSIONS BY MEASUREMENT AT THE BUILDING AND/OR SITE

BAR IS ONE INCH ON ORIGINAL DRAWING. IF NOT ONE INCH ON THIS DRAWING ADJUST SCALES ACCORDINGLY.

NO.	DATE	BY	DESCRIPTION OF REVISIONS
6	11/29/23	EM	ADDENDUM 6 - GRADING CLARIFICATIONS
5	11/21/23	EM	ADDENDUM 5 - ADDED CULVERTS AND REVISED SWPPP
4	11/13/23	EM	ADDENDUM 4 - CONSTRUCTION OF 0.8K LOOP & CONNECTOR TRAIL

DESIGNED JS
DRAWN WD
CHECKED JG

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED ARCHITECT UNDER THE LAWS OF THE STATE OF MINNESOTA.
SIGNATURE: _____ DATE: 02/08/2018
PRINTED NAME: WILL D. DEROCHER LIC. NO.: 54757

TKDA
444 Cedar Street, Suite 500 420
Saint Paul, MN 55101
651.292.4626
tkda.com

CONNECTOR VIII
60+00 - 64+99

PROJ. NO. 16585.000
DRAWING NO. 29

PLOT DATE: Jun 20, 2018 - 2:54pm
FILENAME: K:\a-f\Duluth_City\16585000\04_Production\01_CAD\02_Sheets\GANC Site Plan sheets.dwg

BID/ALTERNATE:

WORK COMPLETED IN PREVIOUS PHASE.

BASE BID #3: ALL ABOVE GROUND LIGHTING, LIGHTING POLES/BASES, LIGHTING CONTROLS, AND RELATED TERMINATIONS FOR PH I AREA, CONNECTED TO PREVIOUSLY INSTALLED WIRING SYSTEMS.

~~BASE BID TO INCLUDE:~~
ALL UNDERGROUND ~~ELECTRICAL~~ INFRASTRUCTURE (LIGHTING, ~~LIGHTING CONTROLS~~ AND POWER) FOR PHASE 1 (1.5K) LOOP. ~~ALL ABOVE GROUND ELECTRICAL~~ INFRASTRUCTURE FOR SNOWMAKING (POWER) FOR ~~PHASE 1 (1.5K)~~ LOOP. ~~ALL LIGHTING~~ WIRING TO BE STUBBED OUT OF THE ~~GROUND WITH NO~~ BASE. CONDUIT AND BOX ONLY. ~~PROVIDE~~ ALL POWER ~~DISTRIBUTION~~ EQUIPMENT REQUIRED FOR PHASE 1.

ADD ALTERNATE #3 TO INCLUDE:
ALL UNDERGROUND LIGHTING, LIGHTING CONTROL AND POWER FOR PHASE 2 (1.0K) LOOP. ALL LIGHTING WIRING TO BE STUBBED OUT OF THE GROUND WITH NO BASE. CONDUIT AND BOX ONLY. ALL POWER WIRING TO BE STUBBED OUT WITH CONDUIT AND BOX ONLY. PROVIDE LIGHTING CONTROL WIRING. INSTALL WP JBOX ON 4X4 GREEN TREAT POST 24" AFG.

ADD ALTERNATE #4 TO INCLUDE:
ALL UNDERGROUND LIGHTING, LIGHTING CONTROL AND POWER FOR PHASE 3 (0.8K) LOOP. ALL LIGHTING WIRING TO BE STUBBED OUT OF THE GROUND WITH NO BASE. CONDUIT AND BOX ONLY. ALL POWER WIRING TO BE STUBBED OUT WITH CONDUIT AND BOX ONLY. PROVIDE LIGHTING CONTROL WIRING. PROVIDE ALL POWER DISTRIBUTION EQUIPMENT FOR PHASE 3. INSTALL WP JBOX ON 4X4 GREEN TREAT POST 24" AFG. THIS ALSO INCLUDES BELOW GRADE POWER FOR VALVE HOUSE #3.

ADD ALTERNATE #5 TO INCLUDE:
ALL ABOVE GROUND SNOWMAKING POWER INFRASTRUCTURE FOR PHASE 2 (1.0k) LOOP. PROVIDE ALL ELECTRICAL PEDESTALS AND ASSOCIATED ELECTRICAL. INCLUDE A UNIT PRICE TO INSTALL ELECTRICAL PEDESTAL. THIS INCLUDES ALL ABOVE GRADE ELECTRICAL WORK FOR VALVE HOUSE #3.

ADD ALTERNATE #6 TO INCLUDE:
ALL ABOVE GROUND SNOWMAKING POWER INFRASTRUCTURE FOR PHASE 3 (0.8k) LOOP. PROVIDE ALL ELECTRICAL PEDESTALS AND ASSOCIATED ELECTRICAL. INCLUDE A UNIT PRICE TO INSTALL ELECTRICAL PEDESTAL.

ADD ALTERNATE #7 TO INCLUDE:
ALL ABOVE GROUND LIGHTING AND LIGHTING CONTROLS INFRASTRUCTURE FOR PHASE ~~1~~, 2 ~~AND 3 (3.3k TOTAL)~~ LOOP. PROVIDE POLE, BASE, ASSOCIATED ELECTRICAL AND INSTALL LIGHT FIXTURES. ~~PROVIDE~~ LIGHTING CONTROLS TO COMPLETE SYSTEM. INCLUDE A UNIT PRICE TO INSTALL WOOD AND METAL POLES.

ADD ALTERNATE #8 TO INCLUDE:
ALL ABOVE GROUND LIGHTING AND LIGHTING CONTROLS INFRASTRUCTURE FOR PHASE 3 (0.8k) LOOP. PROVIDE POLE, BASE, ASSOCIATED ELECTRICAL AND INSTALL LIGHT FIXTURES. INSTALL LIGHTING CONTROLS TO COMPLETE SYSTEM. INCLUDE A UNIT PRICE TO INSTALL WOOD AND METAL POLES.

Keyed Notes:

1. PROVIDE A PHOTOCELL ON THE EXTERIOR OF THE LIGHTING PANEL (A). CONNECT TO THE LIGHTING CONTROL PANEL A.
2. SEE DETAIL ON SHEET 6/E4 FOR POWER AND LIGHTING FLOOR PLAN.
3. INSTALL ~~PROVIDE A WATTSTOPPER LMSM-3E~~ SEGMENT MANAGER WITH AN ENCLOSURE ~~LMSM-ENC1 OR APPROVED EQUAL~~ FURNISHED BY OWNER. COORDINATE LOCATION IN THE CHALET WITH THE OWNER. PROVIDE A DEDICATED CIRCUIT FROM THE EXISTING PANEL IN THE BASEMENT. ELECTRICAL CONTRACTOR TO FIELD VERIFY LOCATIONS.
4. INSTALL ~~PROVIDE A LMDC-300~~ NETWORK BRIDGE ~~AND LMRC-101~~ FURNISHED BY OWNER. AT EACH LIGHTING PANEL. CONNECT TO THE SEGMENT MANAGER IN THE CHALET WITH A DIRECT BURIED CABLE LM-MSTP-DB OR APPROVED EQUAL. SEE DETAIL ON SHEET 2/E3.

General Notes:

TYPICAL - ALL WIRING FOR PH I INSTALLED UNDER PREVIOUS SCOPE. CONNECT NEW LIGHTING AS NOTED AND INDICATED.

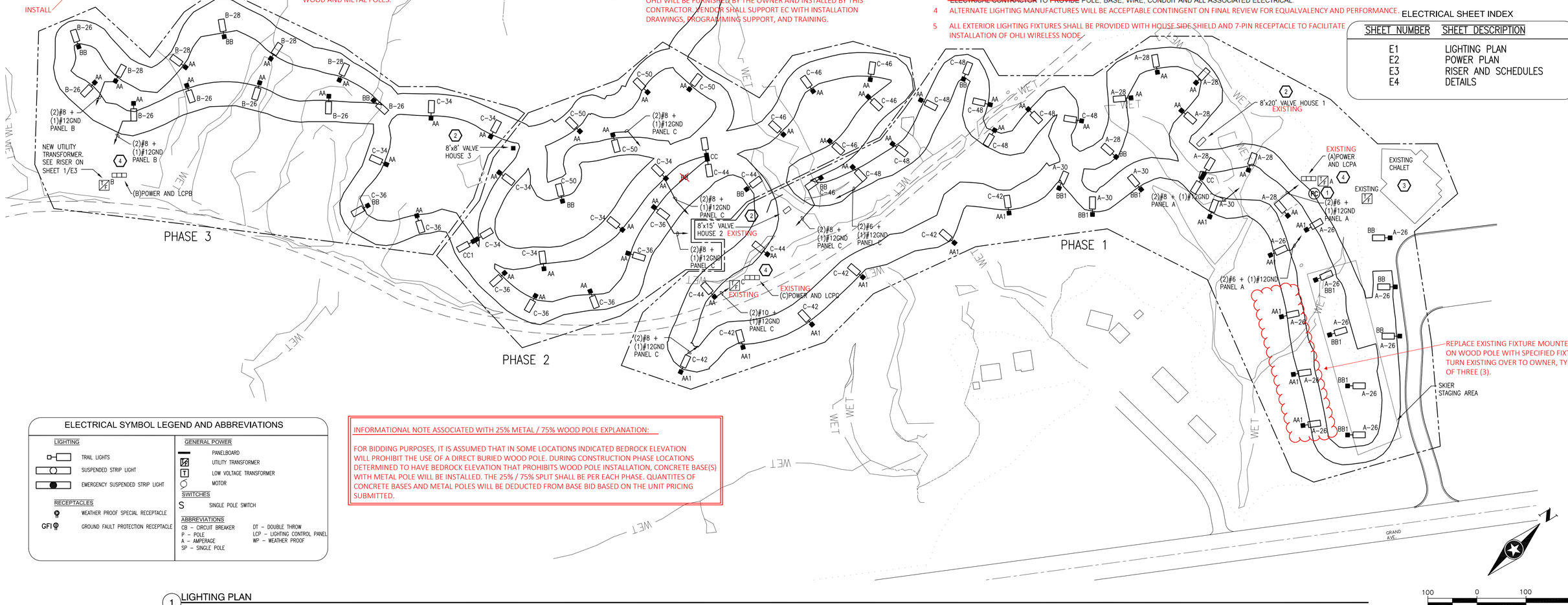
A. PROVIDE PROPER NUMBER OF CONDUCTORS TO ACHIEVE CIRCUITING SHOWN.
B. CIRCUIT NUMBERS AT DEVICES CORRESPOND TO PANELBOARD BREAKERS (SEE PANELBOARD SCHEDULE). BRANCH CIRCUIT CONDUCTORS SHALL BE SIZED PER THE N.E.C. (#12 MINIMUM).
C. EACH CIRCUIT SHALL HAVE AN INDIVIDUAL NEUTRAL (CIRCUITS SHALL NOT SHARE NEUTRALS).
D. SEE DETAILS 1-5,10/E4 FOR LIGHT POLE INSTALLATION. COORDINATE EXACT LIGHT POLE LOCATION WITH THE OWNER AND TRAIL DESIGNER.
E. LIGHTING CIRCUITS ARE ALL COPPER CONDUCTORS.
F. SEE TRENCH AND BACKFILL DETAIL ON SHEET 9/E4.
G. ALL WIRING TYPE MC DIRECT BURIED.
H. TRAIL LIGHTS TO BE PROGRAMMED AT 100% LIGHT OUTPUT WHEN OCCUPANCY IS DETECTED. AFTER A 30 MINUTES DELAY OF NO OCCUPANCY DETECTION THE LIGHTS WILL DIM DOWN TO 50% LIGHT OUTPUT.
I. USE SAME TRENCH FOR WIRING LIGHT FIXTURES AND POWER PEDESTALS WHEN PRACTICAL.
J. PROVIDE A UNIT PRICE IN THE BID TO INSTALL WOOD POLES AND A UNIT PRICE TO INSTALL STEEL POLES WITH ALL ASSOCIATED ELECTRICAL INCLUDED FOR EACH POLE.
K. LIGHTS WILL ALSO BE AUTOMATICALLY AND MANUALLY CONTROLLED BY SEGMENT MANAGER.
L. ELECTRICAL CONTRACTOR IS REQUIRED TO WALK THE SITE PRIOR TO OPENING BID DATE.
M. WIRELESS LIGHTING CONTROL SYSTEM AS MANUFACTURED BY OHLI WILL BE FURNISHED BY THE OWNER AND INSTALLED BY THIS CONTRACTOR. VENDOR SHALL SUPPORT EC WITH INSTALLATION DRAWINGS, PROGRAMMING SUPPORT, AND TRAINING.

LUMINAIRE SCHEDULE

TYPE	MANUFACTURER	MODEL	VOLTS	LAMP	DESCRIPTION	NOTES
AA	LUMARK PHILIPS	NAV-AF-04-D-UNV-T2-10K-7030-MS/DIM-L20-A15-BZ	UNV	LED 160W 16000 LU	AREA/SITE LED LIGHT FIXTURE, WITH BRONZE STRAIGHT ARM DARK SKY COMPLIANT, BRONZE FINISH, INTEGRATED MOTION SENSOR 3000K, TYPE II DISTRIBUTION, DIMMING DRIVER	1,2,3
AA1	LUMARK PHILIPS	NAV-AF-04-D-UNV-T2-10K-7030-MS/DIM-L20-LS/HSS-A15-BZ	UNV	LED 160W 16000 LU	AREA/SITE LED LIGHT FIXTURE, HOUSE SIDE SHIELD DARK SKY COMPLIANT, BRONZE FINISH, MOTION SENSOR 3000K, TYPE II DISTRIBUTION, DIMMING DRIVER, BRONZE STRAIGHT ARM	1,2,3
BB	LUMARK PHILIPS	NAV-AF-04-D-UNV-T3-10K-7030-MS/DIM-L20-A15-BZ	UNV	LED 160W 16000 LU	AREA/SITE LED LIGHT FIXTURE, WITH BRONZE STRAIGHT ARM DARK SKY COMPLIANT, BRONZE FINISH, INTEGRATED MOTION SENSOR 3000K, TYPE III DISTRIBUTION, DIMMING DRIVER	1,2,3
BB1	LUMARK PHILIPS	NAV-AF-04-D-UNV-T3-10K-7030-MS/DIM-L20-HSS-A14-BZ	UNV	LED 160W 16000 LU	AREA/SITE LED LIGHT FIXTURE, HOUSE SIDE SHIELD DARK SKY COMPLIANT, BRONZE FINISH, UINTEGRATED MOTION SENSOR 3000K, TYPE III DISTRIBUTION, DIMMING DRIVER, BRONZE STRAIGHT ARM	1,2,3
CC	LUMARK PHILIPS	(SEE ABOVE) CPS-2-HS-4011-17'-DM10-BZ	UNV	(2) LED 160W 16000 LU	TWO TYPE BB FIXTURES (SEE ABOVE) TWO HEADS ON ONE POLE 17' 4"X4" SQUARE STEEL DARK BRONZE, W/ HAND HOLE	3
CC1	LUMARK PHILIPS	(SEE ABOVE) CPS-2-HS-4011-17'-DM10-BZ	UNV	(2) LED 160W 16000 LU	ONE TYPE AA AND ONE TYPE BB FIXTURE (SEE ABOVE) TWO HEADS ON ONE POLE 17' 4"X4" SQUARE STEEL DARK BRONZE, W/ HAND HOLE	3
DD	LUMARK PHILIPS	XTOR1B-Y-PC1	UNV	LED 12W 1300 LU	WALL PACK, DARK SKY COMPLIANT DARK BRONZE FINISH 120V PHOTOCELL	3
F	METALUX PHILIPS	4SNLED-LD4-46SL-LW-UNV-L830-CD1-U	UNV	LED 46W 4600LU	4' LED STRIP LIGHT WITH FROST LENS 0-10V DIMMING. 3000K	3
F1	METALUX PHILIPS	4SNLED-LD4-46SL-LW-UNV-EL-L830-CD1-U	UNV	LED 46W 4600LU	4' LED STRIP LIGHT WITH FROST LENS 0-10V DIMMING. 3000K, BATTERY BACK UP	3

NOTE
1. EC TO PROVIDE NECESSARY HARDWARE FOR MOUNTING. BOLT FIXTURE TO WOOD POLE USING BOLTS THAT GO THROUGH THE POLE WITH WASHERS AND NUTS. DO NOT USE LAG BOLTS. FOR THE TOTAL AMOUNT OF POLES IN THE PROJECT, PROVIDE 75% TO BE WOOD UTILITY POLES. SEE DETAIL ON SHEET 3/E4.
2. EC TO PROVIDE NECESSARY HARDWARE FOR MOUNTING. FOR THE TOTAL AMOUNT OF POLES IN THE PROJECT, PROVIDE 25% OF THE POLES TO BE METAL. SEE DETAIL ON SHEET 1/E4.
3. LIGHT FIXTURES TO BE ~~PURCHASED BY THE OWNER. ELECTRICAL CONTRACTOR TO INSTALL THE LIGHT FIXTURE.~~ FURNISHED AND INSTALLED BY THIS CONTRACTOR INCLUDING BUT NOT LIMITED ~~ELECTRICAL CONTRACTOR~~ TO ~~PROVIDE~~ POLE, BASE, WIRE, CONDUIT AND ALL ASSOCIATED ELECTRICAL.
4. ALTERNATE LIGHTING MANUFACTURES WILL BE ACCEPTABLE CONTINGENT ON FINAL REVIEW FOR EQUALVALENCY AND PERFORMANCE.
5. ALL EXTERIOR LIGHTING FIXTURES SHALL BE PROVIDED WITH HOUSE SIDE SHIELD AND 7-PIN RECEPTACLE TO FACILITATE INSTALLATION OF OHLI WIRELESS NODE.

ELECTRICAL SHEET INDEX



ELECTRICAL SYMBOL LEGEND AND ABBREVIATIONS

LIGHTING
- TRAIL LIGHTS
- SUSPENDED STRIP LIGHT
- EMERGENCY SUSPENDED STRIP LIGHT

RECEPTACLES
- WEATHER PROOF SPECIAL RECEPTACLE
- GFI GROUND FAULT PROTECTION RECEPTACLE

GENERAL POWER
- PANELBOARD
- UTILITY TRANSFORMER
- T LOW VOLTAGE TRANSFORMER
- MOTOR

SWITCHES
- S SINGLE POLE SWITCH

ABBREVIATIONS
CB – CIRCUIT BREAKER; P – POLE; A – AMPERAGE; SP – SINGLE POLE; DT – DOUBLE THROW; LCP – LIGHTING CONTROL PANEL; WP – WEATHER PROOF

INFORMATIONAL NOTE ASSOCIATED WITH 25% METAL / 75% WOOD POLE EXPLANATION:

FOR BIDDING PURPOSES, IT IS ASSUMED THAT IN SOME LOCATIONS INDICATED BEDROCK ELEVATION WILL PROHIBIT THE USE OF A DIRECT BURIED WOOD POLE. DURING CONSTRUCTION PHASE LOCATIONS DETERMINED TO HAVE BEDROCK ELEVATION THAT PROHIBITS WOOD POLE INSTALLATION, CONCRETE BASE(S) WITH METAL POLE WILL BE INSTALLED. THE 25% / 75% SPLIT SHALL BE PER EACH PHASE. QUANTITES OF CONCRETE BASES AND METAL POLES WILL BE DEDUCTED FROM BASE BID BASED ON THE UNIT PRICING SUBMITTED.

1 LIGHTING PLAN
1" = 100'-0"

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Revisions		
No.	Date	Description
0	Date	Description
	11/29/23	2023 BID - ADDENDUM #6

PROJECT: SPIRIT MOUNTAIN NORDIC TRAILS
DULUTH, MINNESOTA

SHEET TITLE: LIGHTING PLAN

I hereby certify that this plan, specification or report was prepared by me or under my direct supervision and that I am a duly licensed Professional Engineer under the laws of the State of Minnesota.
Nate P. Eisenbarth
Reg. No. 53579 Date: 2/21/2018

DRAWN BY: NJA
CHECKED BY: NPE
PROJECT: S-15001
LINE IS 1 INCH AT FULL SIZE (IF NOT 1"-SCALE ACCORDINGLY)

DRAWING NO: E1
Sheet 1 of 4

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BID/ALTERNATE:

BASE BID TO INCLUDE:
ALL UNDERGROUND ELECTRICAL INFRASTRUCTURE (LIGHTING, LIGHTING CONTROLS AND POWER) FOR PHASE 1 (1.5k) LOOP. ALL ABOVE GROUND ELECTRICAL INFRASTRUCTURE FOR SNOWMAKING (POWER) FOR PHASE 1 (1.5k) LOOP. ALL LIGHTING WIRING TO BE STUBBED OUT OF THE GROUND WITH NO BASE. CONDUIT AND BOX ONLY. PROVIDE ALL POWER DISTRIBUTION EQUIPMENT REQUIRED FOR PHASE 1.

ADD ALTERNATE #3 TO INCLUDE:
ALL UNDERGROUND LIGHTING, LIGHTING CONTROL AND POWER FOR PHASE 2 (1.0K) LOOP. ALL LIGHTING WIRING TO BE STUBBED OUT OF THE GROUND WITH NO BASE. CONDUIT AND BOX ONLY. ALL POWER WIRING TO BE STUBBED OUT WITH CONDUIT AND BOX ONLY. PROVIDE LIGHTING CONTROL WIRING.

ADD ALTERNATE #4 TO INCLUDE:
ALL UNDERGROUND LIGHTING, LIGHTING CONTROL AND POWER FOR PHASE 3 (0.8K) LOOP. ALL LIGHTING WIRING TO BE STUBBED OUT OF THE GROUND WITH NO BASE. CONDUIT AND BOX ONLY. ALL POWER WIRING TO BE STUBBED OUT WITH CONDUIT AND BOX ONLY. PROVIDE LIGHTING CONTROL WIRING. PROVIDE ALL POWER DISTRIBUTION EQUIPMENT FOR PHASE 3.

ADD ALTERNATE #5 TO INCLUDE:
ALL ABOVE GROUND SNOWMAKING POWER INFRASTRUCTURE FOR PHASE 2 (1.0k) LOOP. PROVIDE ALL ELECTRICAL PEDESTALS AND ASSOCIATED ELECTRICAL. INCLUDE A UNIT PRICE TO INSTALL ELECTRICAL PEDESTAL.

ADD ALTERNATE #6 TO INCLUDE:
ALL ABOVE GROUND SNOWMAKING POWER INFRASTRUCTURE FOR PHASE 3 (0.8K) LOOP. PROVIDE ALL ELECTRICAL PEDESTALS AND ASSOCIATED ELECTRICAL. INCLUDE A UNIT PRICE TO INSTALL ELECTRICAL PEDESTAL.

ADD ALTERNATE #7 TO INCLUDE:
ALL ABOVE GROUND LIGHTING AND LIGHTING CONTROLS INFRASTRUCTURE FOR PHASE 1, 2 AND 3 (3.3k TOTAL) LOOP. PROVIDE POLE, BASE, ASSOCIATED ELECTRICAL AND INSTALL LIGHT FIXTURES. PROVIDE LIGHTING CONTROLS TO COMPLETE SYSTEM. INCLUDE A UNIT PRICE TO INSTALL WOOD AND METAL POLES.

Keyed Notes:

1. SEE DETAIL ON SHEET 6/E4. PROVIDE 1/2" PVC CONDUIT WITH 3#12 CU CONDUCTORS FROM VALVE HOUSE 1 TO THE EXISTING MAIN PUMP HOUSE. CONTROL VALVE PROVIDED BY THE MECHANICAL CONTRACTOR. COORDINATE EXACT LOCATIONS WITH THE MECHANICAL CONTRACTOR.
2. PROVIDE CONDUIT AND WIRE FROM PANEL LC-1 TO THE FLOW METER. SEE DETAIL ON SHEET 6/E4. PROVIDE 1/2" PVC CONDUIT WITH 2C/16AWG SHIELDED TWISTED PAIR FROM THE EXISTING MAIN PUMP HOUSE TO THE FLOW METER IN VALVE HOUSE 1. FLOW METER PROVIDED BY THE MECHANICAL CONTRACTOR COORDINATE EXACT LOCATIONS WITH THE MECHANICAL CONTRACTOR.
3. COORDINATE LOCATION OF THE POWER DISTRIBUTION EQUIPMENT AND PAD WITH THE OWNER.
4. SEE DETAIL ON SHEET 6/E4 FOR THE POWER FLOOR PLAN.

General Notes:

A. PROVIDE PROPER NUMBER OF CONDUCTORS TO ACHIEVE CIRCUITING SHOWN.

B. EACH CIRCUIT SHALL HAVE AN INDIVIDUAL NEUTRAL (CIRCUITS SHALL NOT SHARE NEUTRALS).

C. ALL SNOW MAKING WATER HYDRANTS AND ELECTRICAL POWER PEDESTALS MUST BE INSTALLED ON THE SAME SIDE OF THE TRAIL. SEE DETAILS ON SHEET 4,5/E4.

D. PAY CLOSE ATTENTION TO ALUMINUM (AL) OR COPPER (CU) CONDUCTORS. ALL WIRING TYPE MC DIRECT BURIED.

E. ALL ELECTRICAL PEDESTALS ARE 480V, 3P, 60A RECEPTACLES WITH 4-PIN, PIN AND SLEEVE CONNECTION. SEE DETAILS ON SHEET 2,4/E4 FOR INSTALLATION. COORDINATE INSTALLATION WITH THE OWNER.

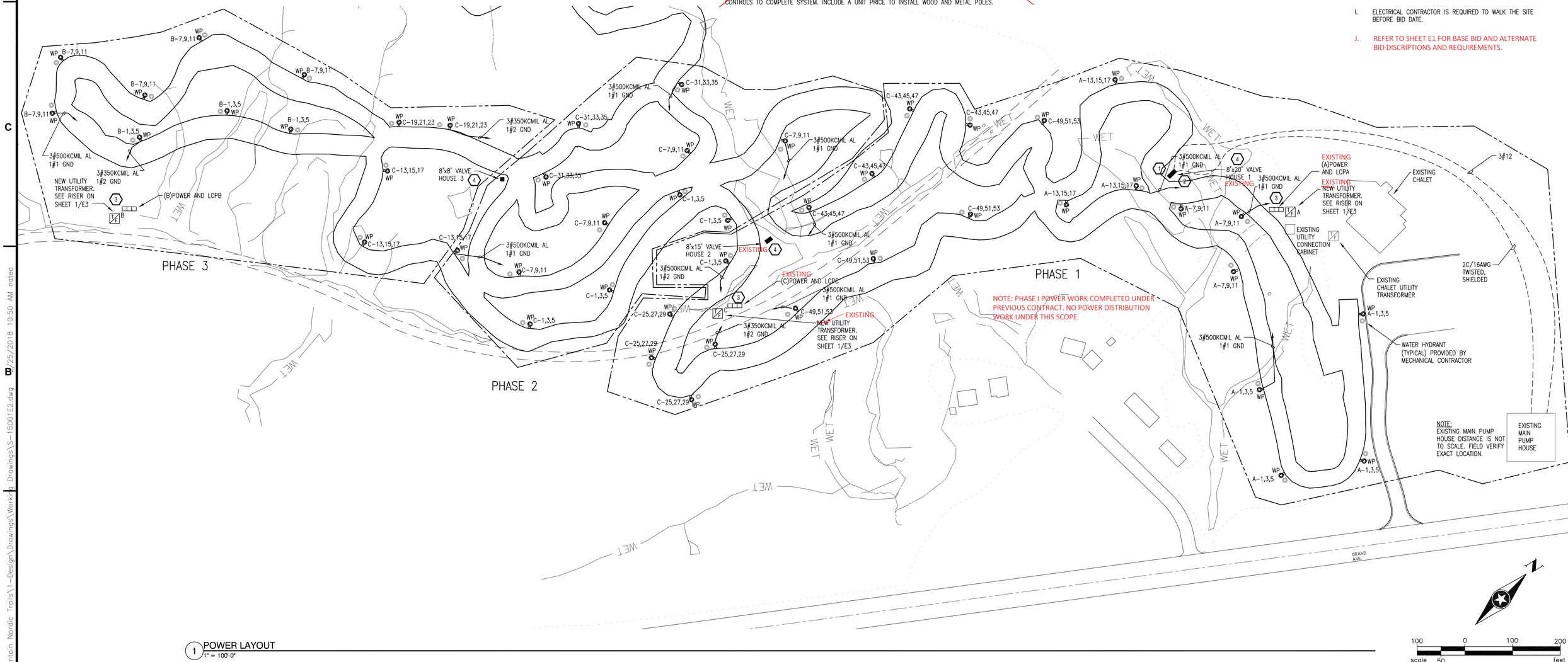
F. SEE TRENCH AND BACKFILL DETAIL ON SHEET 9/E4.

G. USE SAME TRENCH FOR WIRING LIGHT FIXTURES AND POWER PEDESTALS WHEN PRACTICAL.

H. IN THE BID PROVIDE A UNIT PRICE AND DEDUCT TO INSTALL EACH ELECTRICAL PEDESTAL WITH ALL ASSOCIATED ELECTRICAL.

I. ELECTRICAL CONTRACTOR IS REQUIRED TO WALK THE SITE BEFORE BID DATE.

J. REFER TO SHEET E1 FOR BASE BID AND ALTERNATE BID DISCRIPTIONS AND REQUIREMENTS.



1 POWER LAYOUT
1" = 100'-0"

100 0 100 200
scale 50 feet

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Revisions		
No.	Date	Description
0	Date	Description
	11/29/23	2023 BID - ADDENDUM #6

PROJECT:
SPIRIT MOUNTAIN NORDIC TRAILS
DULUTH, MINNESOTA

SHEET TITLE:
POWER PLAN

I hereby certify that this plan, specification or report was prepared by me or under my direct supervision and that I am a duly licensed Professional Engineer under the laws of the State of Minnesota.
Nate P. Eisenbarth
Reg. No. 53579 Date: 2/21/2018

DRAWN BY: NJA
CHECKED BY: NPE
PROJECT: S-15001
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DRAWING NO: E2
Sheet 2 of 4

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ELECTRIC HEAT SCHEDULE

TYPE	MANUFACTURER OR APPROVED EQUAL	CATALOG NO.	VOLT	PHASE	WATTS	THERMOSTAT	NOTES
UH-1	DAYTON	3UG73E	240	1	5,000	2YU33	1

NOTES:
1. PROVIDE A MOUNTING BRACKET 2YU83

MOTOR AND EQUIPMENT SCHEDULE

IDENTITY	LOCATION	DESCRIPTION	MOTOR BY	VOLTAGE	PHASE	LOAD	UNITS	STARTER: MANUAL MOTOR SWITCH	STARTER: MAGNETIC	STARTER: BY	CONTROL: ELEC THERMOSTAT	CONTROL: PRESS. OR FLOAT SW.	CONTROL: START/STOP	CONTROL: TEMP. CONTROL	CONTROL: LIGHT SWITCH	CONTROL: MANUAL STARTER	CONTROL: BY	DISCONNECT: DISCONNECT	DISCONNECT: CORD & PLUG	DISCONNECT: MANUAL SWITCH	DISCONNECT: RECEPTACLE	DISCONNECT: COMB STARTER	DISCONNECT: BY	WIRE SIZE	PANEL	CIRCUIT	NOTES
UH-1	VH~~-2,3~~	UNIT HEATER 1	E	240	1	5	KW	X		E	X						E	X					E	10	LC1,2,3	2,4	1

NOTES
1 SEE PANEL SCHEDULE ON SHEET E3 AND DETAIL ON SHEET 6/E4

ABBREVIATIONS
E - ELECTRICAL CONTRACTOR
M - MECHANICAL CONTRACTOR
G - GENERAL CONTRACTOR
O - OTHERS
HOA - HAND-OFF-AUTOMATIC SWITCH
S/S - START/STOP SWITCH
P - PILOT LIGHT
U - WITH UNIT

PANEL SCHEDULE EXISTING - SHOWN FOR REFERENCE

PANEL	A	AMPS	800			GRD. BUS	YES			
LOCATION	EXTERIOR	VOLTS	277/480			O.C.P DEVICE	MCB			
MOUNTING	PAD MOUNT	PHASE	3			FED FROM	TRANSFORMER A			
AIC	35,000A	WIRE	4			REMARKS	GND FAULT PROTECTION**			

RM. NO.	LOAD DESCRIPTION	BRKR	CKT NO.	BUS A	BUS B	BUS C	CKT NO.	BRKR	LOAD DESCRIPTION	RM. NO.
	POWER PEDESTALS	250/3	1	X			2			
			3		X		4	100/3	SPARE	
			5			X	6			
	POWER PEDESTALS	200/3	7	X			8			
			9		X		10	300/3	SPARE	
			11			X	12			
	POWER PEDESTALS	200/3	13	X			14			
			15		X		16	300/3	SPARE	
			17			X	18			
	SPARE	200/3	19	X			20			
			21		X		22	100/3	SPARE	
			23			X	24			
	T-VH1, PNL LC-1	40/2	25	X			26	20/1	LIGHTING	
			27		X		28	20/1	LIGHTING	
	SPACE		29			X	30	20/1	LIGHTING	
	SPACE		31	X			32	20/1	LCPA	
	SPACE		33		X		34	20/1	SPARE	
	SPACE		35			X	36	20/1	SPARE	
	SPACE		37	X			38		SPACE	
	SPACE		39		X		40		SPACE	
	SPACE		41			X	42		SPACE	

** SERVICE RATED. PROVIDE SURGE PROTECTION DEVICE

PANEL SCHEDULE

PANEL	B	AMPS	600			GRD. BUS	YES			
LOCATION	EXTERIOR	VOLTS	277/480			O.C.P DEVICE	MCB			
MOUNTING	PAD MOUNT	PHASE	3			FED FROM	TRANSFORMER B			
AIC	13,000A	WIRE	4			REMARKS	GND FAULT PROTECTION**			

RM. NO.	LOAD DESCRIPTION	BRKR	CKT NO.	BUS A	BUS B	BUS C	CKT NO.	BRKR	LOAD DESCRIPTION	RM. NO.
	POWER PEDESTAL	200/3	1	X			2			
			3		X		4	100/3	SPARE	
			5			X	6			
	POWER PEDESTAL	300/3	7	X			8	300/3	SPARE	
			9		X		10			
			11			X	12			
	SPARE	200/3	13	X			14	300/3	SPARE	
			15		X		16			
			17			X	18			
	SPARE	250/3	19	X			20			
			21		X		22	100/3	SPARE	
			23			X	24			
	LCPB	20/1	25	X			26	20/1	LIGHTING	
	SPARE	20/1	27		X		28	20/1	LIGHTING	
	SPACE		29			X	30		SPACE	
	SPACE		31	X			32		SPACE	
	SPACE		33		X		34		SPACE	
	SPACE		35			X	36		SPACE	
	SPACE		37	X			38		SPACE	
	SPACE		39		X		40		SPACE	
	SPACE		41			X	42		SPACE	

** SERVICE RATED. PROVIDE SURGE PROTECTION DEVICE

PANEL SCHEDULE EXISTING - SHOWN FOR REFERENCE

PANEL	C	AMPS	1600			GRD. BUS	YES			
LOCATION	EXTERIOR	VOLTS	277/480			O.C.P DEVICE	MCB			
MOUNTING	PAD MOUNT	PHASE	3			FED FROM	TRANSFORMER C			
AIC	18,000A	WIRE	4			REMARKS	GND FAULT PROTECTION**			

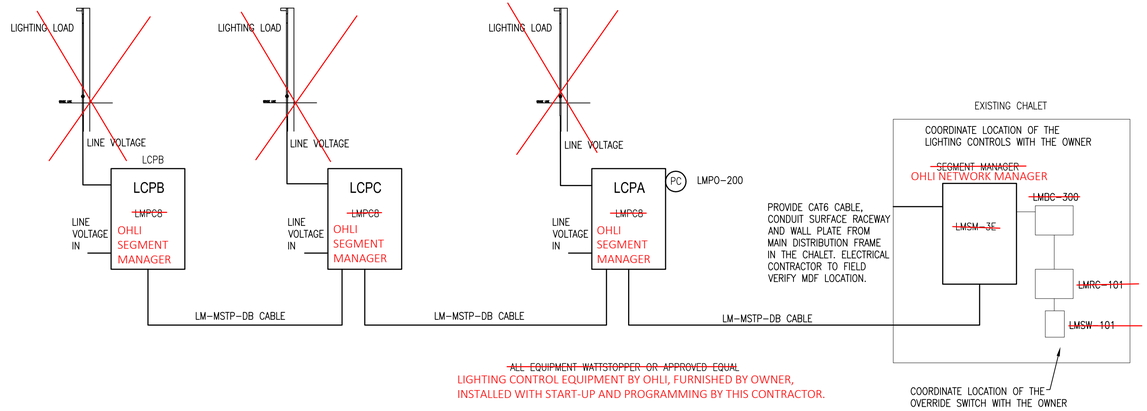
RM. NO.	LOAD DESCRIPTION	BRKR	CKT NO.	BUS A	BUS B	BUS C	CKT NO.	BRKR	LOAD DESCRIPTION	RM. NO.
	POWER PEDESTAL	300/3	1	X			2	20/1	LCPC	
			3		X		4	20/1	SPARE	
			5			X	6	20/1	SPARE	
	POWER PEDESTAL	250/3	7	X			8			
			9		X		10	60/3	SPARE	
			11			X	12			
	POWER PEDESTAL	200/3	13	X			14			
			15		X		16	300/3	SPARE	
			17			X	18			
	POWER PEDESTAL	125/3	19	X			20			
			21		X		22	100/3	SPARE	
			23			X	24			
	POWER PEDESTAL	250/3	25	X			26			
			27		X		28	40/2	T-VH2, PNL LC-2	
			29			X	30	40/2	T-VH3, PNL LC-3	
	POWER PEDESTAL	200/3	31	X			32			
			33		X		34	20/1	LIGHTING	
			35			X	36	20/1	LIGHTING	
	SPARE	200/3	37	X			38	20/1	SPARE	
			39		X		40	20/1	SPARE	
			41			X	42	20/1	LIGHTING	
	POWER PEDESTAL	250/3	43	X			44	20/1	LIGHTING	
			45		X		46	20/1	LIGHTING	
			47			X	48	20/1	LIGHTING	
	POWER PEDESTAL	250/3	49	X			50	20/1	LIGHTING	
			51		X		52	20/1	SPARE	
			53			X	54	20/1	SPARE	

** SERVICE RATED. ARC FLASH REDUCTION. PROVIDE SURGE PROTECTION DEVICE

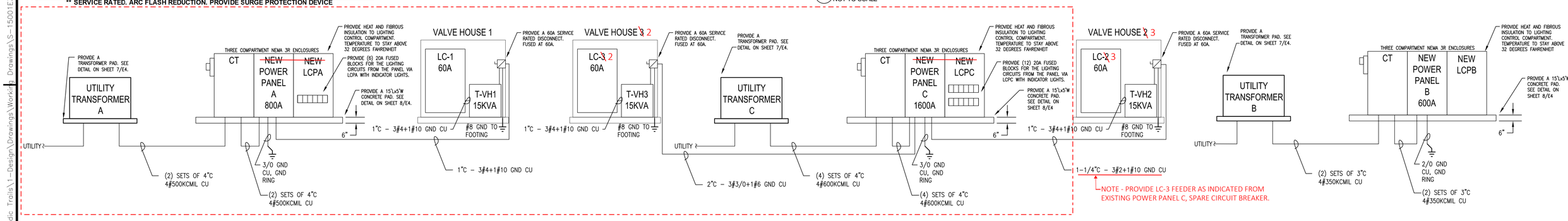
LOAD CENTER PANEL SCHEDULES

PANEL	LC-~~1,2,~~3	AMPS	60	GRD. BUS	YES
LOCATION	VH~~1,2,~~ OR 3	VOLTS	120/240	O.C.P DEVICE	60 MCB
MOUNTING	SURFACE	PHASE	1	FED FROM	A OR C
		WIRE	3	REMARKS	3 LC PANELS

RM. NO.	LOAD DESCRIPTION	BRKR	CKT NO.	A	B	CKT NO.	BRKR	LOAD DESCRIPTION	RM. NO.
	LIGHTS	20/1	1	X		2	30/2	UH-1	
	RECEPTACLES	20/1	3		X	4			
LC-1 ONLY	FLOW METER	20/1	5	X		6	20/2	SPARE	
	SPARE	20/1	7		X	8			
	SPARE	20/1	9	X		10		SPACE	
	SPARE	20/1	11		X	12		SPACE	



2 TYPICAL NEW LIGHTING CONTROL PANELS LCPA, LCPB & LCPC
NOT TO SCALE



1 RISER LAYOUT
NOT TO SCALE

TORRENT Engineering and Equipment
P.O. BOX 270 MILFORD, IN 46542 USA
Phone: (574)-658-3200 Fax: (574)-658-3229 www.torrentee.com

SEH
PHONE: 218.279.3000
418 W SUPERIOR ST STE 200
DULUTH, MN 55802-1512
www.sehinc.com

FOSTER, JACOBS & JOHNSON, INC.
345 CANAL PARK DRIVE
SUITE 200
DULUTH, MINNESOTA 55802
218.722.3060
218.722.1931 fax
Email: mail@fjj.com

Revisions		
No.	Date	Description
0	Date	Description
	11/29/23	2023 BID - ADDENDUM #6

PROJECT: SPIRIT MOUNTAIN NORDIC TRAILS
DULUTH, MINNESOTA

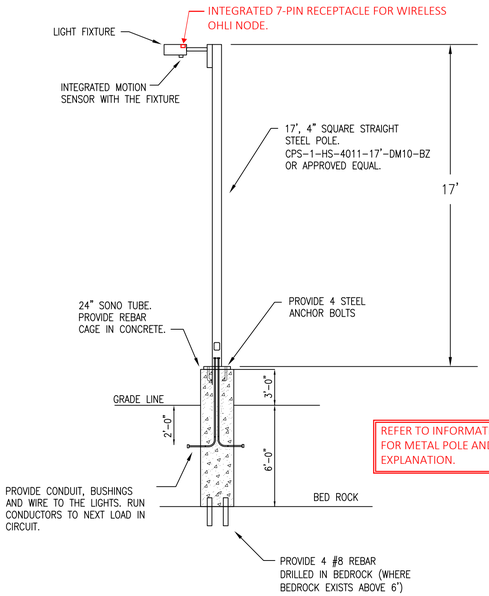
SHEET TITLE: RISER AND SCHEDULES

I hereby certify that this plan, specification or report was prepared by me or under my direct supervision and that I am a duly licensed Professional Engineer under the laws of the State of Minnesota.
Nate P. Eisenbarth
Reg. No. 53579 Date: 2/21/2018

DRAWN BY: NJA
CHECKED BY: NPE
PROJECT: S-15001
LINE IS 1 INCH AT FULL SIZE (IF NOT 1"-SCALE ACCORDINGLY)

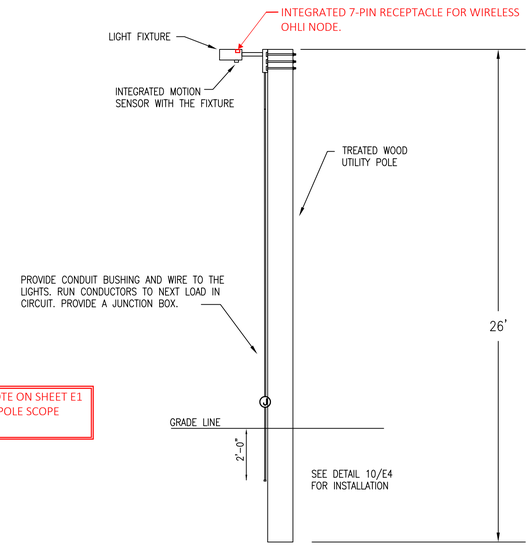
DRAWING NO: E3
Sheet 3 of 4

S:\S-15001-Spirit Mountain Nordic Trails\1-Design\Drawings\Working Drawings\S-15001E3.dwg 2/22/2018 8:58 AM natea

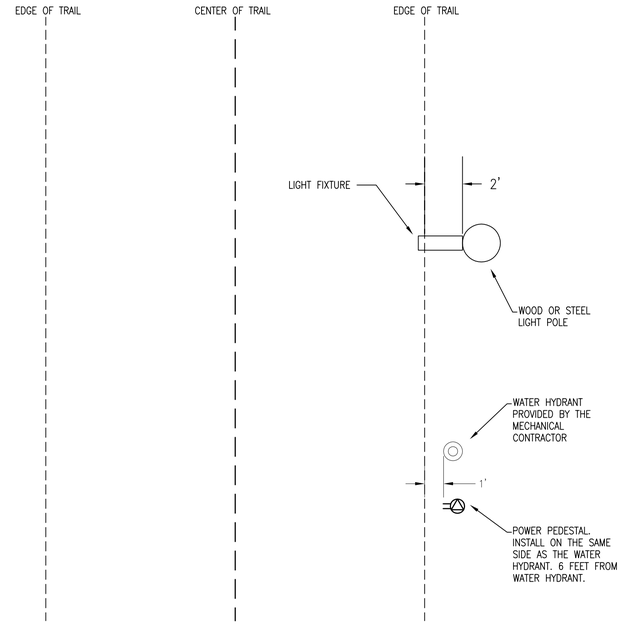


REFER TO INFORMATIONAL NOTE ON SHEET E1 FOR METAL POLE AND WOOD POLE SCOPE EXPLANATION.

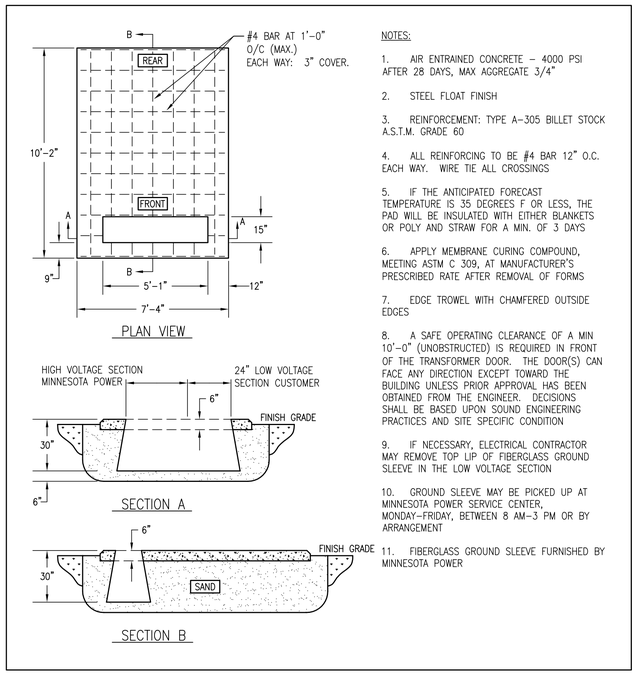
1 STEEL LIGHT POLE INSTALLATION DETAIL
NOT TO SCALE



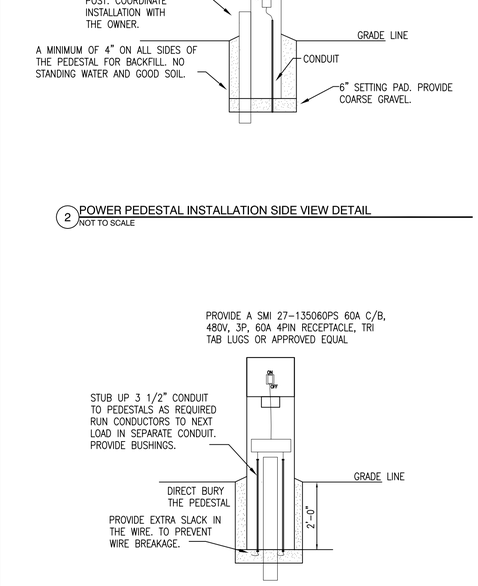
3 WOOD LIGHT POLE INSTALLATION DETAIL
NOT TO SCALE



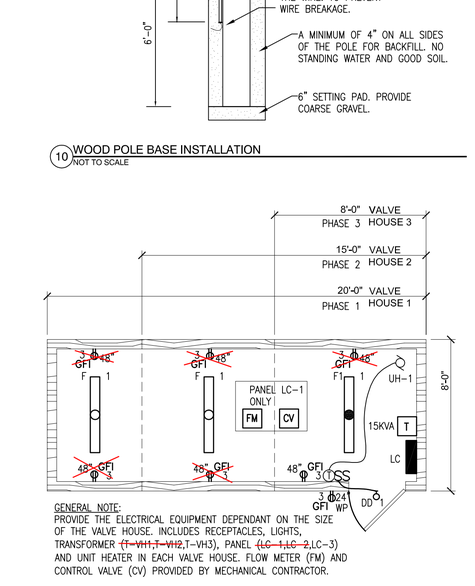
5 TYPICAL ELECTRICAL TRAIL CONSTRUCTION DETAIL
NOT TO SCALE



7 500KVA TRANSFORMER PAD DETAIL
NOT TO SCALE



2 POWER PEDESTAL INSTALLATION SIDE VIEW DETAIL
NOT TO SCALE

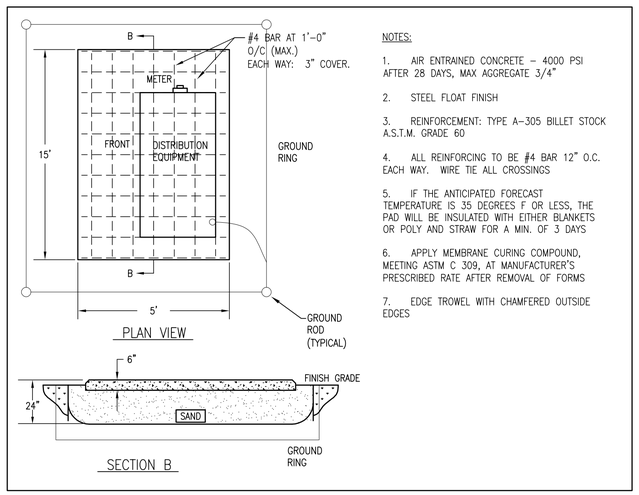


10 WOOD POLE BASE INSTALLATION
NOT TO SCALE

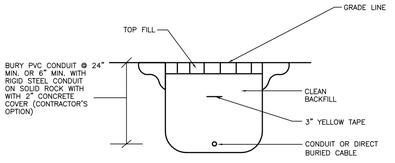
4 POWER PEDESTAL INSTALLATION FRONT VIEW DETAIL
NOT TO SCALE

GENERAL NOTE:
PROVIDE THE ELECTRICAL EQUIPMENT DEPENDANT ON THE SIZE OF THE VALVE HOUSE. INCLUDES RECEPTACLES, LIGHTS, TRANSFORMER ~~(T-VH1,T-VH2~~,T-VH3), PANEL ~~(LC-1,LC-2~~,LC-3) AND UNIT HEATER IN EACH VALVE HOUSE. FLOW METER (FM) AND CONTROL VALVE (CV) PROVIDED BY MECHANICAL CONTRACTOR.

6 VALVE HOUSE POWER AND LIGHTING PLAN
1/4" = 1'



8 POWER DISTRIBUTION PAD DETAIL
NOT TO SCALE



9 TRENCH DETAIL
NOT TO SCALE

REFER TO SPECIFCATION SECTION 26 05 34; 3.02.J FOR REQUIREMENTS ASSOCIATED WITH BEDROCK ELEVATION CONFLICTS.

TORRENT Engineering and Equipment
P.O. BOX 270 MILFORD, IN 46542 USA
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SEH
PHONE: 218.279.3000
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DULUTH, MN 55802-1512
www.sehinc.com

FOSTER, JACOBS & JOHNSON, INC.
345 CANAL PARK DRIVE 218.722.3060
SUITE 200 218.722.1931 fax
DULUTH, MINNESOTA 55802 Email: mail@fjj.com

Revisions		
No.	Date	Description
0	Date	Description
	11/29/23	2023 BID - ADDENDUM #6

PROJECT:
SPIRIT MOUNTAIN NORDIC TRAILS
DULUTH, MINNESOTA

SHEET TITLE:
DETAILS

I hereby certify that this plan, specification or report was prepared by me or under my direct supervision and that I am a duly licensed Professional Engineer under the laws of the State of Minnesota.
Nate P. Eisenbarth
Reg. No. 53579 Date: 2/21/2018

DRAWN BY: NJA
CHECKED BY: NPE
PROJECT: S-15001
LINE IS 1 INCH AT FULL SIZE (IF NOT 1"-SCALE ACCORDINGLY)

DRAWING NO: E4
Sheet 4 of 4

S:\S-15001-Spirit Mountain Nordic Trails\1-Design\Drawings\Working Drawings\S-15001E4.dwg 2/22/2018 8:58 AM nateo

DEPARTMENT OF TRANSPORTATION

May 23, 2023

Dawn Marsh
U.S. Fish and Wildlife Service
Minnesota-Wisconsin ES Field Office
4101 American Blvd East
Bloomington, MN 55425-1665

S.P. 0016-22-1A, FRTP D1
Project Code: 2023-0021230
Duluth, St. Louis County, Minnesota

Notification of Determination – May affect, not likely to adversely affect – Northern long-eared bat (*Myotis septentrionalis*)
Notification of Determination – May affect, not likely to adversely affect – Canada Lynx (*Lynx canadensis*)
Notification of Determination – May affect, not likely to adversely affect – Gray wolf (*Canis lupus*)
Notification of Determination – May affect, not likely to adversely affect – Red Knot (*Calidris canutus rufa*)

No Effect Determination – Piping plover (*Charadrius melodus*)
No Jeopardy Determination – Tricolored bat (*Perimyotis subflavus*)
No Jeopardy Determination – Monarch butterfly (*Danaus plexippus*)

Project Description:

The proposed project will repair / replace abutments at a bridge crossing Knowlton Creek. The bridge carries a snowmobile trail. Additional work include trail improvements. Less than 2.5 acres of tree clearing may occur.

Action Area identified for the proposed project (blue line is boundary).

Conservation Measures:

Required Avoidance and Minimization Measures (AMMs). See MnDOT boiler plate special provisions (e.g., *Protection of Fish and Wildlife Resources*).

- **General AMM 1**: Ensure all operators, employees, and contractors working in areas of known or presumed bat habitat are aware of all FHWA/FRA/FTA (Transportation Agencies) environmental commitments, including all applicable AMMs. *Notify contractor(s) during the pre-construction meeting. Bat sightings (including sick, injured, and/or dead bats) on the project must be reported to OES wildlife ecologist (612-741-7678) within 24 hours of discovery.*
- **Lighting AMM 1 & AMM 2:** Direct temporary lighting, if used, away from wooded areas during the bat active season (April 1 to Nov. 14, inclusive). If installing new or replacing existing permanent lights, use downward-facing, full cut-off lens lights (with same intensity or less for replacement lighting); or for those transportation agencies using the BUG system developed by the Illuminating Engineering Society, be as close to 0 for all three ratings with a priority of "uplight" of 0 and "backlight" as low as practicable. *Please contact Susan Zarling (MnDOT Lighting Engineer) at 651-234-7052 with questions about approved products.*
- **Tree Removal AMM 3**: Tree removal must be limited to that specified in project plans and ensure that contractors understand clearing limits and how they are marked in the field (e.g., install bright colored flagging/fencing prior to any tree clearing to ensure contractors stay within clearing limits).
- **Tree Removal AMM 4***:* Tree removal must not remove documented NLEB roosts, or trees within 0.25 miles of roosts; or documented foraging habitat any time of the year.

Additional Required Conservation Measures:

- **Project proponent must contact MnDOT OES Protected Species Program Coordinator** (Christopher.E.Smith@state.mn.us) at least one (1) month prior to April 1, 2024, if the project is not 100% completed. Project proponent must provide:
    - A project update detailing which project activities have been completed to date.
    - A project update detailing which project activities remain and approximate schedule for their completion.
- Contractor must inspect Bridges and Culverts, including expansion joints to determine if bats or bat signs are present before beginning Work during the bat active season (April 1 to Nov. 14, inclusive). If bats or bat signs are detected, stop work, and notify the MnDOT wildlife ecologist immediately.
- Restrict all activities to avoid tree clearing June 1 to August 15, inclusive. Tree removal must avoid bat pupping season. Complete all tree clearing by March 31, 2024.
- If rolled control products are to be used, they must be limited to bio-netting, natural netting or woven type products without plastic mesh nettings or other plastic components. In the 2018 MnDOT Standards Specifications for Construction, Category 3N or 4N products meet these concerns. The new 2020 Standard Specifications no longer have plastic mesh in *any* temporary rolled product, as plastic mesh has been eliminated from all these categories. Thus, all categories of temporary rolled products now meet these concerns but be aware that hydro-mulch products may contain small plastic fibers to aid in its matrix strength. These loose fibers could potentially re-suspend and make their way into Public Waters. Please review mulch products and not utilize any materials with plastic fiber additives in areas that drain to Public Waters.

Additional Recommended Conservation Measures:

- Revegetation of disturbed soils should follow district Vegetation Establishment Recommendations (http://www.dot.state.mn.us/environment/erosion/vegetation.html) and use 3#-### series seed mixes

that contain native species in areas that are not proposed for frequently mowed lawn. Include mowing and weed spraying as indicated in the District Vegetation Establishment Recommendations. For additional information, visit: http://www.dot.state.mn.us/environment/erosion/vegetation.html.

Species List for the Project Action Area

A list of federally threatened, endangered, proposed and candidate species, and designated and proposed critical habitat that overlaps with the action area, was requested via the Information for Planning and Consultation (IPaC) web application maintained by the U.S. Fish and Wildlife Service (requested May 2023). Based on this list, the project is within the range of the following:

Species	Status	Habitat
Canada lynx *Lynx canadensis*	Threatened	Northern forests
Gray wolf *Canis lupus*	Threatened	Northern forests
Tricolored Bat *Perimyotis subflavus*	Proposed - Endangered	Hibernates in caves, mines, and tunnels. Roosts in live or dead trees, buildings, and bridges. Forages along forested edges and over waterways.
Northern long-eared bat *Myotis septentrionalis*	Endangered	Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer.
Piping plover (*Charadrius melodus*)	Endangered	Sandy beaches and shorelines
Red Knot (*Calidris canutus rufa*)	Threatened	Sandy beaches and shorelines
Monarch butterfly *Danaus plexippus*	Candidate	Grassland habitats where milkweed and flowers are present.

MnDOT consults the Minnesota Department of Natural Resources Natural Heritage Information System (Copyright 5/23/2023 State of Minnesota, Department of Natural Resources), and other resources as available, to determine if proposed projects may affect listed species.

Migratory Bird Treaty Act and Bald and Golden Eagle Protection Act

The Migratory Bird Treaty Act of 1918 (MBTA) is a federal law regulating the taking, killing, and possession of migratory birds and is administered by the U. S. Fish and Wildlife Service (Service). Under the MBTA, it is unlawful for any person to take, kill, or possess regulated species of birds. Take that occurs incidental to otherwise lawful activities -- "incidental take" -- is also prohibited. Frequently encountered birds on transportation projects subject to regulation under the MBTA include, but are not limited to, cliff swallows, bank swallows, eastern phoebes, American robins, red-winged blackbirds, mourning doves, and killdeer.

The Bald and Golden Eagle Protection Act of 1940 (BGEPA) is a federal law regulating impacts to bald and golden eagles. The BGEPA is administered by the Service. Under the BGEPA, the term "take" means to pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb. Unlike protections under MBTA, both occupied and unoccupied eagle nests are protected. Construction projects, including tree clearing, occurring adjacent to eagle nests and/or important roosting areas may require seasonal avoidance and/or permitting.

This project was reviewed for potential impacts to birds protected under the MBTA and eagles protected under the BGEPA. **The Service will not be reviewing or commenting on impacts to migratory birds or eagles unless MnDOT OES determines additional coordination with the Service is required.** Findings and avoidance measures, if required, are identified in Attachment 1.

Endangered Species Act – Section 7 Consultation

Section 7 of Endangered Species Act of 1973, as amended (Act), requires each Federal agency to review any action that it funds, authorizes or carries out to determine whether it may affect threatened, endangered, proposed species or listed critical habitat. Federal agencies (or their designated representatives) must consult with the U.S. Fish and Wildlife Service (Service) if any such effects may occur because of their actions. Consultation with the Service is not necessary if the proposed action will not directly or indirectly affect listed species or critical habitat. If a federal agency finds that an action will have no effect on listed species or critical habitat, it should maintain a written record of that finding that includes the supporting rationale.

Notice of Determinations

Notification of Determination – May affect, not likely to adversely affect – Northern long-eared bat (Myotis septentrionalis)

No documented NLEB hibernacula and/or roost trees are documented within the project Action Area (https://files.dnr.state.mn.us/eco/ereview/minnesota_nleb_township_list_and_map.pdf).

This project review relies on the USFWS-issued Northern Long-eared Bat Rangewide Determination Key to satisfy requirements under Section 7(a)(2) of the Endangered Species Act of 1973 (ESA) (87 Stat. 884, as amended; 16 U.S.C 1531 et seq.). The Service will notify us within 15 calendar days if the Service determines that this proposed Action does not meet the criteria for a "may affect, not likely to adversely affect" (NLAA) determination for the Northern long-eared bat. If the Service does not notify us within that timeframe, you may proceed with the Action under the terms of the NLAA concurrence provided here (i.e., silence is acceptance). The review was completed using the U.S. Fish and Wildlife Service's Information for Planning and Consultation (IPaC) system. The U.S. Fish and Wildlife Service's concurrence letter is attached (Attachment 2).

Notification of Determination – May affect, not likely to adversely affect – Piping plover (Charadrius melodus)
Notification of Determination – May affect, not likely to adversely affect – Red Knot (Calidris canutus rufa)

The proposed project occurs within the suitable habitat is not anticipated to be impacted by the proposed project.

This project review relies on the USFWS-issued Minnesota-Wisconsin Federal Endangered Species Determination Key within the Information for Planning and Consultation (IPaC) system to satisfy requirements under Section 7(a)(2). The Service developed this system in accordance with the Endangered Species Act of 1973 (ESA) (87 Stat. 884, as amended; 16 U.S.C 1531 et seq.). The Service will notify us within 30 calendar days if we determine that this proposed Action does not meet the criteria for a "may affect, not likely to adversely affect" (NLAA) determination for Federally listed species in Minnesota and Wisconsin. If the Service does not notify us within that timeframe, you may proceed with the Action under the terms of the NLAA concurrence provided here (i.e., silence is acceptance). The U.S. Fish and Wildlife Service's concurrence verification letter is attached (Attachment 3).

Notification of Determination – May affect, not likely to adversely affect – Gray wolf (Canis lupus)
Notification of Determination – May affect, not likely to adversely affect – Canada lynx (Lynx canadensis)

While the proposed project occurs within the range of these species in undeveloped areas, no direct (e.g., increases in traffic) or indirect (e.g., removal of 10 acres or more of boreal forest) impacts are anticipated. The proposed project includes tree clearing, but the trees proposed for clearing occur mainly in degraded or disturbed habitat directly adjacent to the existing roadway. Tree clearing associated with this project may include scattered small trees and brush along the corridor near guardrail, signage, sensors, and culvert repairs and/or replacements, and staging areas. Generally, tree clearing on this sort of project is limited to single trees, or small clumps of volunteer trees and brush, that have grown up following previous disturbances along the corridor.

This project review relies on the USFWS-issued Minnesota-Wisconsin Federal Endangered Species Determination Key within the Information for Planning and Consultation (IPaC) system to satisfy requirements under Section 7(a)(2). The Service developed this system in accordance with the Endangered Species Act of 1973 (ESA) (87 Stat. 884, as amended; 16 U.S.C 1531 et seq.). The Service will notify us within 30 calendar days if we determine that this proposed Action does not meet the criteria for a "may affect, not likely to adversely affect" (NLAA) determination for Federally listed species in Minnesota and Wisconsin. If the Service does not notify us within that timeframe, you may proceed with the Action under the terms of the NLAA concurrence provided here (i.e., silence is acceptance). The U.S. Fish and Wildlife Service's concurrence verification letter is attached (Attachment 3).

No Effect and No Jeopardy Determinations

No Jeopardy Determination – Tricolored bat (Perimyotis subflavus)

The proposed project *may affect* tricolored bats and/or suitable tricolored bat habitat. Stressors for the tricolored bat include tree clearing, noise (including percussives), lighting, and/or bridge work in areas of documented or presumed tricolored bat habitat. Based on the proposed scope of work, project activities are not expected to appreciably diminish the quality or extent of available suitable habitat within the project's action area. Additionally, the project will incorporate bat-specific Conservation Measures to further avoid and minimize impacts to this species. ***Therefore, MnDOT on behalf of the FHWA, does not anticipate the proposed action will jeopardize the continued existence of this species.***

No Jeopardy Determination – Monarch Butterfly (Danaus plexippus)

The proposed project *may affect* monarch butterflies and/or suitable monarch habitat. Ground and vegetation disturbing activities are not expected to appreciably diminish the quality or extent of available suitable habitat within the project's Action Area. ***Therefore, MnDOT on behalf of the FHWA, does not anticipate the proposed action will jeopardize the continued existence of this species.***

Please contact me if there are questions or concerns.

Thank you,

Christopher E. Smith, M.Sc., CWB®
Wildlife Ecologist | Protected Species Program Coordinator
(he/him/his)

Minnesota Department of Transportation
Office of Environmental Stewardship
395 John Ireland Blvd., M.S. 620
St. Paul, Minnesota 55155

DEPARTMENT OF TRANSPORTATION

Migratory Bird Treaty Act

Based on the proposed scope of work proposed and/or the timing of proposed work, **impacts are anticipated** to birds protected under the Migratory Bird Treaty Act (16 U.S.C. 703-712).

Impacts often occur due to one of the following:

- Bridge and/or culvert work when birds are known or suspected of nesting on the structure. Check element 900 on the routine bridge inspection report.
- Building demolition when birds are known or suspected of nesting on the structure.
- Tree and shrub clearing during the bird nesting season, approximately April 15 to August 30, inclusive. Note the bird nesting season varies year-to-year and species-to-species.
- See boilerplate special provisions “PROTECTION OF FISH AND WILDLIFE RESOURCES” for standard avoidance measures.

No further coordination is required; however, project team has questions or concerns related to avoidance requirements, please contact the MnDOT protected species team at: protectedspecies.dot@state.mn.us

Learn more about the Migratory Bird Treaty Act at: https://www.fws.gov/law/migratory-bird-treaty-act-1918

Bald and Golden Eagle Protection Act

Based on the best available information, the proposed action is not anticipated to disturb, harm, or destroy a bald eagle or a bald eagle nest protected under the Bald ang Golden Eagle Protection Act (16 U.S.C. 668-668d). If a nest is found ahead of, or during construction, **stop all work** within 300’ of the nest and contact the MnDOT protected species team right away. E-mail: protectedspecies.dot@state.mn.us or Phone: 612-741-7678.

Learn more about the Bald and Golden Eagle Protection Act at: https://www.fws.gov/law/bald-and-golden-eagle-protection-act

Attachment 2

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Minnesota-Wisconsin Ecological Services Field Office
3815 American Blvd East
Bloomington, MN 55425-1659
Phone: (952) 858-0793 Fax: (952) 646-2873

In Reply Refer To:
Project code: 2023-0021230
Project Name: FRTP #0016-22

May 23, 2023

Federal Nexus: yes
Federal Action Agency (if applicable): Federal Highway Administration

Subject: Federal agency coordination under the Endangered Species Act, Section 7 for 'FRTP #0016-22'

Dear Christopher Smith:

This letter records your determination using the Information for Planning and Consultation (IPaC) system provided to the U.S. Fish and Wildlife Service (Service) on May 23, 2023, for 'FRTP #0016-22' (here forward, Project). This project has been assigned Project Code 2023-0021230 and all future correspondence should clearly reference this number. **Please carefully review this letter. Your Endangered Species Act (Act) requirements may not be complete.**

Ensuring Accurate Determinations When Using IPaC

The Service developed the IPaC system and associated species' determination keys in accordance with the Endangered Species Act of 1973 (ESA; 87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.) and based on a standing analysis. All information submitted by the Project proponent into the IPaC must accurately represent the full scope and details of the Project. Failure to accurately represent or implement the Project as detailed in IPaC or the Northern Long-eared Bat Rangewide Determination Key (DKey), invalidates this letter.

Determination for the Northern Long-Eared Bat

Based upon your IPaC submission and a standing analysis completed by the Service, your project has reached the determination of “May Affect, Not Likely to Adversely Affect” the northern long-eared bat. Unless the Service advises you within 15 days of the date of this letter that your IPaC-assisted determination was incorrect, this letter verifies that consultation on the Action is complete and no further action is necessary unless either of the following occurs:

- new information reveals effects of the action that may affect the northern long-eared bat in a manner or to an extent not previously considered; or,
- the identified action is subsequently modified in a manner that causes an effect to the northern long-eared bat that was not considered when completing the determination key.

15-Day Review Period

As indicated above, the Service will notify you within 15 calendar days if we determine that this proposed Action does not meet the criteria for a “may affect, not likely to adversely affect” (NLAA) determination for the northern long-eared bat. If we do not notify you within that timeframe, you may proceed with the Action under the terms of the NLAA concurrence provided here. This verification period allows the identified Ecological Services Field Office to apply local knowledge to evaluation of the Action, as we may identify a small subset of actions having impacts that we did not anticipate when developing the key. In such cases, the identified Ecological Services Field Office may request additional information to verify the effects determination reached through the Northern Long-eared Bat DKey.

Other Species and Critical Habitat that May be Present in the Action Area

The IPaC-assisted determination for the northern long-eared bat does not apply to the following ESA-protected species and/or critical habitat that also may occur in your Action area:

- Canada Lynx *Lynx canadensis* Threatened
- Gray Wolf *Canis lupus* Threatened
- Monarch Butterfly *Danaus plexippus* Candidate
- Piping Plover *Charadrius melodus* Endangered
- Red Knot *Calidris canutus rufa* Threatened
- Tricolored Bat *Perimyotis subflavus* Proposed Endangered

You may coordinate with our Office to determine whether the Action may affect the species and/or critical habitat listed above. Note that reinitiation of consultation would be necessary if a new species is listed or critical habitat designated that may be affected by the identified action before it is complete.

If you have any questions regarding this letter or need further assistance, please contact the Minnesota-Wisconsin Ecological Services Field Office and reference Project Code 2023-0021230 associated with this Project.

Action Description
You provided to IPaC the following name and description for the subject Action.

1. Name

FRTP #0016-22

2. Description

The following description was provided for the project 'FRTP #0016-22':

> The proposed project will replace / replace abutments at a bridge crossing Knowlton Creek. The bridge carries a snowmobile trail. Additional work include trail improvements. No tree clearing is proposed.

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@46.71959715,-92.20523315479328,14z

DETERMINATION KEY RESULT

Based on the answers provided, the proposed Action is consistent with a determination of “may affect, but not likely to adversely affect” for the Endangered northern long-eared bat (*Myotis septentrionalis*).

QUALIFICATION INTERVIEW

1. Does the proposed project include, or is it reasonably certain to cause, intentional take of the northern long-eared bat or any other listed species?

   Note: Intentional take is defined as take that is the intended result of a project. Intentional take could refer to research, direct species management, surveys, and/or studies that include intentional handling/encountering, harassment, collection, or capturing of any individual of a federally listed threatened, endangered or proposed species?

   No

2. Do you have post-white nose syndrome occurrence data that indicates that northern long-eared bats (NLEB) are likely to be present in the action area?

   Bat occurrence data may include identification of NLEBs in hibernacula, capture of NLEBs, tracking of NLEBs to roost trees, or confirmed acoustic detections. With this question, we are looking for data that, for some reason, may have not yet been made available to U.S. Fish and Wildlife Service.

   No

3. Does any component of the action involve construction or operation of wind turbines?

   Note: For federal actions, answer ‘yes’ if the construction or operation of wind power facilities is either (1) part of the federal action or (2) would not occur but for a federal agency action (federal permit, funding, etc.).

   No

4. Is the proposed action authorized, permitted, licensed, funded, or being carried out by a Federal agency in whole or in part?

   Yes

5. Is the Federal Highway Administration (FHWA), Federal Railroad Administration (FRA), or Federal Transit Administration (FTA) funding or authorizing the proposed action, in whole or in part?

   Yes

6. FHWA, FRA, and FTA have completed a range-wide programmatic consultation for transportation- related actions within the range of the Indiana bat and northern long-eared bat.

   Does your proposed action fall within the scope of this programmatic consultation?

   Note:If you have **previously consulted** on your proposed action with the Service under the NLEB 4dRule, answer 'no' to this question and proceed with using this key. If you have **not yet consulted** with the Service on your proposed action and are unsure whether your proposed action falls within the scope of the FHWA, FRA, FTA range-wide programmatic consultation, please select "Yes" and use the FHWA, FRA, FTA Assisted Determination Key in IPaC to determine if the programmatic consultation is applicable to your action. Return to this key and answer ‘no’ to this question if it is not.

   No

7. Are you an employee of the federal action agency or have you been officially designated in writing by the agency as its designated non-federal representative for the purposes of Endangered Species Act Section 7 informal consultation per 50 CFR § 402.08?

   Note: This key may be used for federal actions and for non-federal actions to facilitate section 7 consultation and to help determine whether an incidental take permit may be needed, respectively. This question is for information purposes only.

   Yes

8. Is the lead federal action agency the Environmental Protection Agency (EPA) or Federal Communications Commission (FCC)? Is the Environmental Protection Agency (EPA) or Federal Communications Commission (FCC) funding or authorizing the proposed action, in whole or in part?

   No

9. Is the lead federal action agency the Federal Energy Regulatory Commission (FERC)?

   No

10. Have you determined that your proposed action will have no effect on the northern long-eared bat? Remember to consider the effects of any activities that would not occur but for the proposed action.

    If you think that the northern long-eared bat may be affected by your project or if you would like assistance in deciding, answer "No" below and continue through the key. If you have determined that the northern long-eared bat does not occur in your project's action area and/or that your project will have no effects whatsoever on the species despite the potential for it to occur in the action area, you may make a "no effect" determination for the northern long-eared bat.

    Note: Federal agencies (or their designated non-federal representatives) must consult with USFWS on federal agency actions that may affect listed species [50 CFR 402.14(a)]. Consultation is not required for actions that will not affect listed species or critical habitat. Therefore, this determination key will not provide a consistency or verification letter for actions that will not affect listed species. If you believe that the northern long-eared bat may be affected by your project or if you would like assistance in deciding, please answer "No" and continue through the key. Remember that this key addresses only effects to the northern long-eared bat. Consultation with USFWS would be required if your action may affect another listed species or critical habitat. The definition of Effects of the Action can be found here: https://www.fws.gov/media/northern-long-eared-bat-assisted-determination-key-selected-definitions

    No

11. Does the action area contain any caves (or associated sinkholes, fissures, or other karst features), mines, rocky outcroppings, or tunnels that could provide habitat for hibernating northern long-eared bats?

    Yes

12. Have you conducted, or will you conduct, a voluntary Phase 1 habitat assessment for potentially suitable hibernacula in accordance with the guidance in Appendix H of the USFWS' current Range-wide Indiana bat and Northern long-eared bat Survey Guidelines?

    Note: The survey guidelines can be found at: https://www.fws.gov/library/collections/range-wide-indiana-bat-and-northern-long-eared-bat-survey-guidelines.

    No

13. Will the proposed action result in the cutting or other means of knocking down, bringing down, or trimming of any trees suitable for northern long-eared bat roosting?

    Note: Suitable northern long-eared bat roost trees are live trees and/or snags ≥3 inches dbh that have exfoliating bark, cracks, crevices, and/or cavities.

    Yes

PROJECT QUESTIONNAIRE

Enter the extent of the action area (in acres) from which trees will be removed - round up to the nearest tenth of an acre. For this question, include the entire area where tree removal will take place, even if some live or dead trees will be left standing.

2.5

In what extent of the area (in acres) will trees be cut, knocked down, or trimmed during the inactive (hibernation) season for northern long-eared bat? **Note:** Inactive Season dates for spring staging/fall swarming areas can be found here: https://www.fws.gov/media/inactive-season-dates-swarming-and-staging-areas

.5

In what extent of the area (in acres) will trees be cut, knocked down, or trimmed during the active (non-hibernation) season for northern long-eared bat? **Note:** Inactive Season dates for spring staging/fall swarming areas can be found here: https://www.fws.gov/media/inactive-season-dates-swarming-and-staging-areas

2.5

Will all potential northern long-eared bat (NLEB) roost trees (trees ≥3 inches diameter at breast height, dbh) be cut, knocked, or brought down from any portion of the action area greater than or equal to 0.1 acre? If all NLEB roost trees will be removed from multiple areas, select 'Yes' if the cumulative extent of those areas meets or exceeds 0.1 acre.

Yes

Enter the extent of the action area (in acres) from which all potential NLEB roost trees will be removed. If all NLEB roost trees will be removed from multiple areas, entire the total extent of those areas. Round up to the nearest tenth of an acre.

2.5

For the area from which all potential northern long-eared bat (NLEB) roost trees will be removed, on how many acres (round to the nearest tenth of an acre) will trees be allowed to regrow? Enter '0' if the entire area from which all potential NLEB roost trees are removed will be developed or otherwise converted to non-forest for the foreseeable future.

1.5

Will any snags (standing dead trees) ≥3 inches dbh be left standing in the area(s) in which all northern long-eared bat roost trees will be cut, knocked down, or otherwise brought down?

No

Will all project activities by completed by April 1, 2024?

No

IPAC USER CONTACT INFORMATION

Agency: Minnesota Department of Transportation
Name: Christopher Smith
Address: 395 John Ireland Blvd
Address Line 2: MS 620
City: St. Paul
State: MN
Zip: 55155
Email christopher.e.smith@state.mn.us
Phone: 6127417678

LEAD AGENCY CONTACT INFORMATION

Lead Agency: Federal Highway Administration

Attachment 3

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Minnesota-Wisconsin Ecological Services Field Office
3815 American Blvd East
Bloomington, MN 55425-1659
Phone: (952) 858-0793 Fax: (952) 646-2873

In Reply Refer To:
Project code: 2023-0021230
Project Name: FRTP #0016-22

May 23, 2023

Subject: Verification letter for 'FRTP #0016-22' for specified threatened and endangered species that may occur in your proposed project location consistent with the Minnesota-Wisconsin Endangered Species Determination Key (Minnesota-Wisconsin DKey).

Dear Christopher Smith:

The U.S. Fish and Wildlife Service (Service) received on **May 23, 2023** your effect determination(s) for the 'FRTP #0016-22' (Action) using the Minnesota-Wisconsin DKey within the Information for Planning and Consultation (IPaC) system. You have submitted this key to satisfy requirements under Section 7(a)(2). The Service developed this system in accordance of with the Endangered Species Act of 1973 (ESA) (87 Stat. 884, as amended; 16 U.S.C 1531 et seq.).

Based on your answers and the assistance of the Service's Minnesota-Wisconsin DKey, you made the following effect determination(s) for the proposed Action:

Species	**Listing Status**	**Determination**
Canada Lynx (*Lynx canadensis*)	Threatened	NLAA
Gray Wolf (*Canis lupus*)	Threatened	NLAA
Monarch Butterfly (*Danaus plexippus*)	Candidate	No effect
Piping Plover (*Charadrius melodus*)	Endangered	No effect
Red Knot (*Calidris canutus rufa*)	Threatened	NLAA
Tricolored Bat (*Perimyotis subflavus*)	Proposed Endangered	NLAA

Determination Information

The Service will notify you within 30 calendar days if we determine that this proposed Action does not meet the criteria for a "may affect, not likely to adversely affect" (NLAA) determination for Federally listed species in Minnesota and Wisconsin. If we do not notify you within that timeframe, you may proceed with the Action under the terms of the NLAA concurrence provided here. This verification period allows the Minnesota-Wisconsin Ecological Services Field Office

to apply local knowledge to evaluation of the Action, as we may identify a small subset of actions having impacts that were unanticipated. In such instances, the Minnesota-Wisconsin Ecological Services Field Office may request additional information to verify the effects determination reached through the Minnesota-Wisconsin DKey.

Additional Information

Sufficient project details: Please provide sufficient project details on your project homepage in IPaC (Define Project, Project Description) to support your conclusions. Failure to disclose important aspects of your project that would influence the outcome of your effects determinations may negate your determinations and invalidate this letter. If you have site-specific information that leads you to believe a different determination is more appropriate for your project than what the Dkey concludes, you can and should proceed based on the best available information.

Future project changes: The Service recommends that you contact the Minnesota-Wisconsin Ecological Services Field Office or re-evaluate the project in IPaC if: 1) the scope or location of the proposed Action is changed; 2) new information reveals that the action may affect listed species or designated critical habitat in a manner or to an extent not previously considered; 3) the Action is modified in a manner that causes effects to listed species or designated critical habitat; or 4) a new species is listed or critical habitat designated. If any of the above conditions occurs, additional consultation with the Service should take place before project changes are final or resources committed.

Species-specific information

Bald and Golden Eagles: Bald eagles, golden eagles, and their nests are protected under the Bald and Golden Eagle Protection Act (54 Stat. 250, as amended, 16 U.S.C. 668a-d) (Eagle Act). The Eagle Act prohibits, except when authorized by an Eagle Act permit, the “taking” of bald and golden eagles and defines “take” as “pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb.” The Eagle Act’s implementing regulations define disturb as “… to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, (1) injury to an eagle, (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior.”

If you observe a bald eagle nest in the vicinity of your proposed project, you should follow the National Bald Eagle Management Guidelines (May 2007). For more information on eagles and conducting activities in the vicinity of an eagle nest, please visit our regional eagle website or contact Margaret at Margaret_Rheude@fws.gov. **If the Action may affect bald or golden eagles, additional coordination with the Service under the Eagle Act may be required.**

The following species and/or critical habitats may also occur in your project area and **are not** covered by this conclusion:

- Northern Long-eared Bat *Myotis septentrionalis* Endangered

Coordination with the Service is not complete if additional coordination is advised above for any species.

Action Description
You provided to IPaC the following name and description for the subject Action.

1. Name

FRTP #0016-22

2. Description

The following description was provided for the project 'FRTP #0016-22':

> The proposed project will replace / replace abutments at a bridge crossing Knowlton Creek. The bridge carries a snowmobile trail. Additional work include trail improvements. No tree clearing is proposed.

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@46.71959715,-92.20523315479328,14z

QUALIFICATION INTERVIEW

1. This determination key is intended to assist the user in evaluating the effects of their actions on Federally listed species in Minnesota and Wisconsin. It does not cover other prohibited activities under the Endangered Species Act (e.g., for wildlife: import/export, Interstate or foreign commerce, possession of illegally taken wildlife, etc.; for plants: import/export, reduce to possession, malicious destruction on Federal lands, commercial sale, etc.) or other statutes. Additionally, this key DOES NOT cover wind development, purposeful take (e.g., for research or surveys), communication towers that have guy wires or are over 450 feet in height, aerial or other large-scale application of any chemical (such as insecticide or herbicide), and approval of long-term permits or plans (e.g., FERC licenses, HCP's).

   Click **YES** to acknowledge that you must consider other prohibitions of the ESA or other statutes outside of this determination key.

   Yes
2. Is the action being funded, authorized, or carried out by a Federal agency?

   Yes
3. Are you the Federal agency or designated non-federal representative?

   Yes
4. Does the action involve the installation or operation of wind turbines?

   No
5. Does the action involve purposeful take of a listed animal?

   No
6. Does the action involve a new communications tower?

   No
7. Does the activity involve aerial or other large-scale application of ANY chemical, including pesticides (insecticide, herbicide, fungicide, rodenticide, etc)?

   No
8. Does the action occur near a bald eagle nest?

   Note: Contact the Minnesota or Wisconsin Department of Natural Resources for an up-to-date list of known bald eagle nests.

   No
9. Will your action permanently affect local hydrology?

   No
10. Will your action temporarily affect local hydrology?

    Yes

11. Will your project have any direct impacts to a stream or river (e.g., Horizontal Directional Drilling (HDD), hydrostatic testing, stream/road crossings, new stormwater outfall discharge, dams, other in-stream work, etc.)?

    Yes

12. Does your project have the potential to impact the riparian zone or indirectly impact a stream/river (e.g., cut and fill; horizontal directional drilling; construction; vegetation removal; pesticide or fertilizer application; discharge; runoff of sediment or pollutants; increase in erosion, etc.)?

    Note: Consider all potential effects of the action, including those that may happen later in time and outside and downstream of the immediate area involved in the action.

    Endangered Species Act regulation defines "effects of the action" to include all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action. A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action. (50 CFR 402.02).

    Yes

13. Will your action disturb the ground or existing vegetation?

    Note: This includes any off-road vehicle access, soil compaction (enough to collapse a rodent burrow), digging, seismic survey, directional drilling, heavy equipment, grading, trenching, placement of fill, pesticide application (herbicide, fungicide), vegetation management (including removal or maintenance using equipment or prescribed fire), cultivation, development, etc.

    Yes

14. Will your action include spraying insecticides?

    No

15. Does your action area occur entirely within an already developed area?

    Note: Already developed areas are already paved, covered by existing structures, manicured lawns, industrial sites, or cultivated cropland, AND do not contain trees that could be roosting habitat. Be aware that listed species may occur in areas with natural, or semi-natural, vegetation immediately adjacent to existing utilities (e.g. roadways, railways) or within utility rights-of-way such as overhead transmission line corridors, and can utilize suitable trees, bridges, or culverts for roosting even in urban dominated landscapes (so these are not considered "already developed areas" for the purposes of this question). If unsure, select NO..

    No

16. Will the action occur during the red knot migration windows (May 15-June 15 or July 1-September 30?)

    Yes

17. Will the action modify beaches, dunes, mudflats, peat banks, sandbars, shoals, or other red knot habitats?

    For example, the following actions may modify red kot habitat: groins, jetties, sea walls, revetments, bulkheads, rip-rap, beach nourishment, nearshore dredging, dredge spoil disposal, sand mining/borrowing, beach bulldozing, sandbagging, sand fencing, vegetation planting/alteration/removal, deliberate or possible introduction of non-native vegetation, beach raking/mechanized grooming, boardwalks, aquaculture development.

    No

18. Will the action result in increased human disturbance or predation?

    For example, is the action likely to indirectly increase access or use of red knot habitats by humans and/or predators at times of year that the birds are typically present (e.g., commercial/residential development, beach access structures, boardwalks, pavilions, bridges/roads/ferries/trails, marinas, posts or other avian predator perches, structures or habitat features likely to encourage predator nesting/denning, trash cans or other predator attractants, feral cat colonies, policy changes likely to increase human use).

    No

19. Is there any potential for this action to harm Canada lynx directly (e.g., mammal trapping, poison bait, broadcasting disease control agents for wild animals, capturing animals for research projects, or regular human activity that may exclude lynx from forested habitat including blasting or explosives)?

    No

20. Is your action associated with the U.S. Forest Service?

    No

21. Is there any potential for this action to harm Canada lynx indirectly (e.g., increased traffic volume and speed that may result in vehicle strikes, regular human activity that may disturb or exclude lynx from forested habitat, blasting or explosives)?

    No

22. Will the action result in changes to Canada lynx or snowshoe hare habitat quality, quantity, or availability that is greater than 10 acres?
    E.g., thinning and/or other timber management and logging practices; residential and commercial development; road, railroad and utility corridors development; mining activities; prescribed fire; trail development; winter activities that compact snow such as winter road use, snowmobiling, cross country skiing, and dog sledding.

    No

23. Does the action area intersect with a known gray wolf denning or rendezvous area?

    No

24. Is there any potential for the action to harm wolves directly (e.g., mammal trapping, poison bait), or indirectly (e.g., increasing vehicle use that may result in vehicle strikes, exposure to potential human persecution)?

    No

25. [Hidden Semantic] Does the action area intersect the Threatened gray wolf AOI?

    Automatically answered
    Yes

26. [Hidden Semantic] Does the action area intersect the monarch butterfly species list area?

    Automatically answered
    Yes

27. Under the ESA, monarchs remain warranted but precluded by listing actions of higher priority. The monarch is a candidate for listing at this time. The Endangered Species Act does not establish protections or consultation requirements for candidate species. Some Federal and State agencies may have policy requirements to consider candidate species in planning. We encourage implementing measures that will remove or reduce threats to these species and possibly make listing unnecessary.

    If your project will have no effect on monarch butterflies (for example, if your project won't affect their habitat or individuals), then you can make a "no effect" determination for this project.

    Are you making a "no effect" determination for monarch?

    No

28. Is this project funded, authorized, or carried out by the U.S. Fish and Wildlife Service?

    No

29. [Hidden semantic] Does the action intersect the Tricolored bat species list area?

    Automatically answered
    Yes

30. The tricolored bat was proposed for listing as endangered on September 13, 2022. During winter, tricolored bats hibernate in caves, abandoned mines, and abandoned tunnels ranging from small to large in size. During spring, summer and fall months, they roost primarily among leaf clusters of live or recently dead deciduous/hardwood trees.

    What effect determination do you want to make for the tricolored bat (Only make a "may affect" determination if you think the project is likely to jeopardize the continued existence of the species)?

    2. “May affect – not likely to adversely affect”

IPAC USER CONTACT INFORMATION

Agency: Minnesota Department of Transportation
Name: Christopher Smith
Address: 395 John Ireland Blvd
Address Line 2: MS 620
City: St. Paul
State: MN
Zip: 55155
Email christopher.e.smith@state.mn.us
Phone: 6127417678

LEAD AGENCY CONTACT INFORMATION

Lead Agency: Federal Highway Administration

CITY OF DULUTH
Duluth Project No: L30159
Grand Avenue Nordic Center Ski Trails - 0.8 KM Loop and 2.0 KM Connector

BASE BID 1 - 0.8K LOOP

ITEM NO.	MNDOT SPEC NO.	DESCRIPTION	UNIT	BASE BID 1 QUANTITY	UNIT PRICE	BASE BID 1 TOTAL
1	2021.501	MOBILIZATION	LUMP SUM	0.5		
2	2101.505	GRUBBING	ACRE	2.5		
3	2105.501	COMMON EXCAVATION	CU YD	2251		
4	2105.604	GEOTEXTILE FABRIC TYPE V	SQ YD	308		
5	2112.603	SUBGRADE PREPARATION	LIN FT	0		
6	2118.507	AGGREGATE SURFACING (CV) CLASS 5	CU YD	49		
7	2411.000	NATURAL STONE RETAINING WALL	LIN FT	476		
8	2501.502	12" CS PIPE APRON	EACH	6		
9	2501.502	15" CS PIPE APRON	EACH	0		
10	2501.502	18" CS PIPE APRON	EACH	12		
11	2501.502	24" CS PIPE APRON	EACH	2		
12	2501.502	30" CS PIPE APRON	EACH	0		
13	2501.503	12" CP PIPE CULVERT (SMOOTH)	LIN FT	170		
14	2501.503	15" CP PIPE CULVERT (SMOOTH)	LIN FT	0		
15	2501.503	18" CP PIPE CULVERT (SMOOTH)	LIN FT	380		
16	2501.503	24" CP PIPE CULVERT (SMOOTH)	LIN FT	50		
17	2501.503	30" CP PIPE CULVERT (SMOOTH)	LIN FT	0		
18	2511.507	RANDOM RIPRAP CLASS IV	CU YD	244		
19	2557.602	TRAIL GATE, TYPE SPECIAL	EACH	0		
20	2563.601	TRAFFIC CONTROL	LUMP SUM	0.5		
21	2573.502	CULVERT END CONTROLS	EACH	10		
22	2573.503	SILT FENCE, TYPE MS	LIN FT	1350		
23	2573.503	SEDIMENT CONTROL LOG TYPE COMPOST	LIN FT	270		
24	2573.535	STABILIZED CONSTRUCTION EXIT	EACH	0		
25	2575.501	SEEDING	ACRE	2.5		
26	2575.502	SEED MIXTURE TYPE 36-311	LB	83.75		
27	2575.604	ROLLED EROSION PREVENTION CATEGORY 25	SQ YD	2720		

BASE BID 2 - 2.0K CONNECTOR

ITEM NO.	MNDOT SPEC NO.	DESCRIPTION	UNIT	BASE BID 2 QUANTITY	UNIT PRICE	BASE BID 2 TOTAL
1	2021.501	MOBILIZATION	LUMP SUM	0.5		
2	2101.505	GRUBBING	ACRE	6.4		
3	2105.501	COMMON EXCAVATION	CU YD	2666		
4	2105.604	GEOTEXTILE FABRIC TYPE V	SQ YD	792		
5	2112.603	SUBGRADE PREPARATION	LIN FT	2080		
6	2118.507	AGGREGATE SURFACING (CV) CLASS 5	CU YD	126		
7	2411.000	NATURAL STONE RETAINING WALL	LIN FT	1224		
8	2501.502	12" CS PIPE APRON	EACH	2		
9	2501.502	15" CS PIPE APRON	EACH	6		
10	2501.502	18" CS PIPE APRON	EACH	4		
11	2501.502	24" CS PIPE APRON	EACH	6		
12	2501.502	30" CS PIPE APRON	EACH	4		
13	2501.503	12" CP PIPE CULVERT (SMOOTH)	LIN FT	70		
14	2501.503	15" CP PIPE CULVERT (SMOOTH)	LIN FT	155		
15	2501.503	18" CP PIPE CULVERT (SMOOTH)	LIN FT	110		
16	2501.503	24" CP PIPE CULVERT (SMOOTH)	LIN FT	215		
17	2501.503	30" CP PIPE CULVERT (SMOOTH)	LIN FT	190		
18	2511.507	RANDOM RIPRAP CLASS IV	CU YD	304		
19	2557.602	TRAIL GATE, TYPE SPECIAL	EACH	2		
20	2563.601	TRAFFIC CONTROL	LUMP SUM	0.5		
21	2573.502	CULVERT END CONTROLS	EACH	11		
22	2573.503	SILT FENCE, TYPE MS	LIN FT	6277		
23	2573.503	SEDIMENT CONTROL LOG TYPE COMPOST	LIN FT	695		
24	2573.535	STABILIZED CONSTRUCTION EXIT	EACH	2		
25	2575.501	SEEDING	ACRE	6.4		
26	2575.502	SEED MIXTURE TYPE 36-311	LB	214.4		

27	2575.604	ROLLED EROSION PREVENTION CATEGORY 25	SQ YD	7000		

BASE BID #3 - Loop 1 Lighting						
ITEM NO.	MNDOT SPEC NO.	DESCRIPTION	UNIT	BASE BID 3 QUANTITY	UNIT PRICE	BASE BID 3 TOTAL
1	NA	MOBILIZATION	LUMP SUM	1		
2	NA	LIGHTING ASSEMBLIES	EACH	41		
3	NA	PROVIDE AND INSTALL LIGHTING CONTROL	LUMP SUM	41		
4	NA	PROVIDE AND INSTALL METAL POLE	EACH	10		
5	NA	PROVIDE AND INSTALL WOOD POLE	EACH	31		
6	NA	LIGHTING ASSEMBLY POWER CONNECTIONS	LUMP SUM	41		

Add Alternate 3 - Loop 2 Underground power						
ITEM NO.	MNDOT SPEC NO.	DESCRIPTION	UNIT	ADD ALT. # 3 QUANTITY	UNIT PRICE	ADD ALT. #3 TOTAL
1	NA	MOBILIZATION	LUMP SUM	1		
2	NA	UNDERGROUND LIGHTING POWER	LUMP SUM	22		
3	NA	UNDERGROUND SNOWMAKING PED. POWER	LUMP SUM	12		

Add Alternate 4 - Loop 3 Underground power						
ITEM NO.	MNDOT SPEC NO.	DESCRIPTION	UNIT	ADD ALT. # 4 QUANTITY	UNIT PRICE	ADD ALT. #4 TOTAL
1	NA	MOBILIZATION	LUMP SUM	1		
2	NA	UNDERGROUND LIGHTING POWER	LUMP SUM	17		
3	NA	UNDERGROUND SNOWMAKING PED. POWER	LUMP SUM	12		
4	NA	ELECTRIC SERVICE PACKAGE AND VH-3 FEEDER	LUMP SUM	10		

Add Alternate 5 - Loop 2 Aboveground Snowmaking power						
ITEM NO.	MNDOT SPEC NO.	DESCRIPTION	UNIT	ADD ALT. # 5 QUANTITY	UNIT PRICE	ADD ALT. #5 TOTAL
1	NA	MOBILIZATION	LUMP SUM	1		
2	NA	ABOVEGROUND SNOWMAKING PEDISTAL	EACH	12		

Add Alternate 6 - Loop 3 Aboveground Snowmaking power						
ITEM NO.	MNDOT SPEC NO.	DESCRIPTION	UNIT	ADD ALT. # 6 QUANTITY	UNIT PRICE	ADD ALT. #6 TOTAL
1	NA	MOBILIZATION	LUMP SUM	1		
2	NA	ABOVEGROUND SNOWMAKING PEDISTAL	EACH	12		
3	NA	VALVE HOUSE #3 ELECTRICAL PACKAGE	LUMP SUM	1		
4	NA	ELECTRIC SERVICE GEAR PACKAGE	LUMP SUM	1		
5	NA	VALVE HOUSE #3 BUILDING	LUMP SUM	1		
6						

Add Alternate 7 - Loop 2 Aboveground Lighting Systems						
ITEM NO.	MNDOT SPEC NO.	DESCRIPTION	UNIT	ADD ALT. # 7 QUANTITY	UNIT PRICE	ADD ALT. #7 TOTAL
1	NA	MOBILIZATION	LUMP SUM	1		
2	NA	LIGHTING ASSEMBIES	LUMP SUM	22		
3	NA	PROVIDE AND INSTALL LIGHTING CONTROL	LUMP SUM	22		
4	NA	PROVIDE AND INSTALL METAL POLE	EACH	5		
5	NA	PROVIDE AND INSTALL WOOD POLE	EACH	17		
6	NA	LIGHTING ASSEMBLY POWER CONNECTIONS	LUMP SUM	22		

Add Alternate 8 - Loop 3 Aboveground Lighting Systems						
ITEM NO.	MNDOT SPEC NO.	DESCRIPTION	UNIT	ADD ALT. # 8 QUANTITY	UNIT PRICE	ADD ALT. #8 TOTAL
1	NA	MOBILIZATION	LUMP SUM	1		
2	NA	LIGHTING ASSEMBIES	LUMP SUM	17		
3	NA	PROVIDE AND INSTALL LIGHTING CONTROL	LUMP SUM	17		
4	NA	PROVIDE AND INSTALL METAL POLE	EACH	4		
5	NA	PROVIDE AND INSTALL WOOD POLE	EACH	13		
6	NA	LIGHTING ASSEMBLY POWER CONNECTIONS	LUMP SUM	17		