KRAUS-ANDERSON®
CONSTRUCTION COMPANY

Breaking new ground since 1897

3716 Oneota Street
Duluth, MN 55807
O 218.722.3775
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www.krausanderson.com

KRAUS-ANDERSON® CONSTRUCTION COMPANY

ADDENDUM NO. 3
June 7, 2013

Duluth International Airport
New Parking Structure and Exterior Wayfinding Signage
Bid Package 2D
Duluth, MN 55811

TO ALL CONTRACTORS:

The following are clarifications and/or changes to the Plans and Specifications, dated May 15, 2013, to be Bid on June 11, 2013, for the above named Project. Acknowledge receipt of this Addendum in the space provided on the Bid Form. Failure to do so may subject the Bidder to disqualification.

1. A specific Bid Form Packet is required for the Prime Contractor's bid submission on this project. Bidders must contact Kim Lofquist, Kraus-Anderson® Construction Company, at 218-722-3775 or kim.lofquist@krausanderson.com to obtain the required Bid Form Packet.

   A. Bid Form Packet documents can be found in Volume 1 of the Project Manual, following is a list of those documents included in the Bid Form Packet: City of Duluth cover page; Bid Form; City of Duluth Purchasing Division General Specifications; AIA Document A310 Bid Bond; Affidavit of Non-Collusion; EEO Affirmative Action Policy Statement & Compliance Certificate; Forms 1 & 2 for Demonstration of Good Faith Efforts, Good Faith Efforts Affidavit and Certificate of Good Faith Efforts.

2. **Section 00 41 00 – Bid Form**

   A. Bid Form

      1. Bid Form replaced in its entirety.

   B. Official Bid Form Packet

      1. The official Bid Form packet will be issued in PDF format after the last Addendum is issued.

2. Note: Only Work Scope 2.20D is required to include the Reynolds, Smith & Hills, Inc.'s, unit price schedule.

3. **Section 01 32 13 - Schedules**

A. Schedules, Part 7. Preliminary Schedule Milestone Dates, A

1. Add the following note to Item 2: "The underground plumbing, backfill, and slab-on-grade concrete work will not be able to start until after the precast construction is complete."

2. Delete Item 4 in its entirety and replace with the following: "Substantial completion is on May 1, 2014."

3. Delete Item 5 in its entirety and replace with the following: "Final completion is on May 16, 2014."

4. **Section 01 23 00 - Alternates**

A. Alternates, Part 3 Schedule of Alternate, Par. 3.1 – L, M, & N

1. Add the following sentence to the end of Alternate Descriptions 10A, 10B, and 10C: "With this alternate there are thirty one (31) 4'x10' openings and thirty one (31) 4'x2'-2" (which are located directly above the 4'x10' openings) openings in the precast panels along grid line B."

B. Alternates, Part 3 Schedule of Alternate, Par. 3.1

1. Add the following Alternate No. 13 to Par. 3.1 as indicated below:

a. "R. Alternate No. 13: Work Scope 9.20D": "Replace the rigid insulation and vapor barrier behind the metal panels on the underside of the skywalk with spray applied closed cell polyurethane. Include all necessary items (backing, etc.) to install the spray foam. Note: Base bid is to include, rigid insulation and foam at perimeter of insulation to create a continuous vapor barrier. This work will not be completed until the summer of 2014."

5. **Section 01 01 40 Work Scope Descriptions**

A. Work Scope Index

1. Work Scope 10.20D – Interior & Exterior Wayfinding Signage – Add the following under Specification Sections and Remarks: "10 14 53 Traffic Signage Complete."

2. Work Scope 26.10D – Electrical Systems – Add the following under Specification Sections and Remarks: "Division 27 Communications Complete."

B. Work Scope Descriptions

1. Work Scope 10.20D – Interior & Exterior Wayfinding Signage:

   a. Add the following under Specification Sections: "10 14 53 Traffic Signage Complete."

2. Work Scope 26.10D – Electrical Systems:

   a. Add the following under Specification Sections: "Division 27 Communications Complete."

6. **General Information**

A. Drawing Page W100

1. Add Electrical Notes as follows:

   a. "Provide 277V power for sign illumination as follows:
   i. Signs E/01, E/04, E/05, & E/08 may be connected to perimeter roadway lighting circuit FP-9 or FP-10.
   ii. Sign E/13 may be connected to roadway lighting circuit FP-5."

   b. "All wiring shall be in conduit."

   c. "Existing circuit splice shall be done in handholes."

2. Add note as follows: "The contractor shall retain a certified utility locating service to locate all private (DAA owned) utilities within the project limits. It shall be the contractors' responsibility to locate all private utilities as necessary to complete the work."

B. See attached Site Electrical "Record" drawings for reference as it relates to the power requirements for the Exterior Wayfinding Signage.

C. See Appendix A for Responses to Bidder Questions (four pages).

D. Add Reynolds, Smith & Hills, Inc.'s, Addendum No. 3 dated June 7, 2013, in its entirety.

END OF ADDENDUM NO. 3

(Bidder may copy this form on his own letterhead)
SUBMIT IN DUPLICATE

BID FORM

BID TO: Duluth Airport Authority;
By the City Purchasing Agent
Room 100 City Hall
Duluth, MN 55802

BID FROM: _____
_____
_____
_____

In accordance with the Invitation to Bid and the proposed Contract Documents prepared by Reynolds, Smith and Hills, Inc., relating to the construction of:

Duluth International Airport
New Parking Structure and Exterior Wayfinding Signage
Bid Package 2D
Duluth, Minnesota

the undersigned, having visited the site of proposed construction and having become thoroughly familiar with local conditions affecting the cost and performance of the Work and with all requirements of the Contract Documents and related Addenda, hereby proposes and agrees to provide all labor, materials, equipment, applicable permits and taxes required to construct and complete the Work in accordance with the Contract Documents and Addenda for the following amounts:

Base Bids:

Instructions for Submitting Base Bids:

- Base Bid includes the Parking Structure and Skywalk.
- Provide Skywalk and Exterior Wayfinding Signage breakdown in space provided. These costs are to be included in the base bid and broken out in the space provided.
- Note: Cost breakdowns are for funding purposes only. These will not have an impact on award.
- For bidders wishing to submit bids on more than one Work Scope, space has been provided to submit bids for Multiple Work Scopes on the same Bid Form.
- State Base Bid in both words and figures in spaces provided.

1. Base Bid for Work Scope No. 2.20D Title Civil, Site Work, & Building Earthwork

   Bid Amount: _____ $_____

   a. Cost Breakdown No. 1: Skywalk (Part of Unit Price 71)

   Breakdown Amount: _____ $_____

2. Base Bid for Work Scope No. 2.90D Title Landscaping

   Bid Amount: _____ $_____

   a. Cost Breakdown No. 1: Skywalk

   Breakdown Amount: _____ $_____

3. Base Bid for Work Scope No. 3.30D Title Concrete

   Bid Amount: _____ $_____

   a. Cost Breakdown No. 1: Skywalk

   Breakdown Amount: _____ $_____

4. Base Bid for Work Scope No. 3.40D Title Precast Wall Panel & Floor Plank

   Bid Amount: _____ $_____

   a. Cost Breakdown No. 1: Skywalk

   Breakdown Amount: _____ $_____

5. Base Bid for Work Scope No. 4.20D Title Unit Masonry

   Bid Amount: _____ $_____

   a. Cost Breakdown No. 1: Skywalk

   Breakdown Amount: _____ $_____

6. Base Bid for Work Scope No. 5.10D Title Struct. Steel & Misc. Metal Fabrication & Erection

   Bid Amount: _____ $_____

   a. Cost Breakdown No. 1: Skywalk

   Breakdown Amount: _____ $_____

7. Base Bid for Work Scope No. 7.10D Title Metal Panels & Roofing

   Bid Amount: _____ $_____

   a. Cost Breakdown No. 1: Skywalk

   Breakdown Amount: _____ $_____

8. Base Bid for Work Scope No. 8.22D Title Overhead Coiling Doors

   Bid Amount: _____ $_____

   a. Cost Breakdown No. 1: Skywalk

   Breakdown Amount: _____ $_____

9. Base Bid for Work Scope No. 8.30D Title Doors, Frames, Hardware, & Misc. Specialties (Materials Only)

   Bid Amount: _____ $_____

   a. Cost Breakdown No. 1: Skywalk

   Breakdown Amount: _____ $_____

10. Base Bid for Work Scope No. 8.40D Title Aluminum Framed Automatic Entrances, Storefronts, and Glass

    Bid Amount: _____ $_____

    a. Cost Breakdown No. 1: Skywalk

    Breakdown Amount: _____ $_____

11. Base Bid for Work Scope No. 9.20D Title Metal Studs & Drywall

    Bid Amount: _____ $_____

    a. Cost Breakdown No. 1: Skywalk

    Breakdown Amount: _____ $_____

12. Base Bid for Work Scope No. 9.60D Title Terrazzo

    Bid Amount: _____ $_____

    a. Cost Breakdown No. 1: Skywalk

    Breakdown Amount: _____ $_____

13. Base Bid for Work Scope No. 9.65D Title Flooring

Bid Amount: _____ $_____

a. Cost Breakdown No. 1: Skywalk

Breakdown Amount: _____ $_____

14. Base Bid for Work Scope No. 9.90D Title Painting

Bid Amount: _____ $_____

a. Cost Breakdown No. 1: Skywalk

Breakdown Amount: _____ $_____

15. Base Bid for Work Scope No. 10.20D Title Interior & Exterior Wayfinding Signage

Bid Amount: _____ $_____

a. Cost Breakdown No. 1: Skywalk

Breakdown Amount: _____ $_____

b. Cost Breakdown No. 2: Exterior Wayfinding Signage

Breakdown Amount: _____ $_____

16. Base Bid for Work Scope No. 14.20D Title Elevator

Bid Amount: _____ $_____

a. Cost Breakdown No. 1: Skywalk

Breakdown Amount: _____ $_____

17. Base Bid for Work Scope No. 21.10D Title Fire Suppression System

Bid Amount: _____ $_____

a. Cost Breakdown No. 1: Skywalk

Breakdown Amount: _____ $_____

18. Base Bid for Work Scope No. 22.10D Title Mechanical Systems

Bid Amount: _____ $_____

a. Cost Breakdown No. 1: Skywalk

Breakdown Amount: _____ $_____

19. Base Bid for Work Scope No. 26.10D Title Electrical Systems

Bid Amount: _____ $_____

a. Cost Breakdown No. 1: Skywalk

Breakdown Amount: _____ $_____

b. Cost Breakdown No. 2: Exterior Wayfinding Signage

Breakdown Amount: _____ $_____

Combined Base Bid:

Work Scope Numbers and Titles on which Combined Bid is based:

Work Scope No. ____ Title: _____

Work Scope No. ____ Title: _____

Work Scope No. ____ Title: _____

Work Scope No. ____ Title: _____

Work Scope No. ____ Title: _____

Combined Bid Amount: _____ $_____

Alternates:

Refer to Section 01 23 00 for complete description of Alternates.

				ADD
Alternate No.	1A	to Work Scope	8.40D	$_____
Alternate No.	1B	to Work Scope	26.10D	$_____
Alternate No.	2	to Work Scope	3.40D	$_____
Alternate No.	3A	to Work Scope	9.60D	$_____
Alternate No.	3B	to Work Scope	9.65D	$_____
Alternate No.	4	to Work Scope	26.10D	$_____
Alternate No.	5	to Work Scope	26.10D	$_____

ADD

Alternate No. 6 to Work Scope 26.10D $_____

Alternate No. 7 to Work Scope 26.10D $_____

Alternate No. 8 to Work Scope 26.10D $_____

Alternate No. 9 to Work Scope 26.10D $_____

Alternate No. 10A to Work Scope 3.40D $_____

Alternate No. 10B to Work Scope 5.10D $_____

Alternate No. 10C to Work Scope 7.10D $_____

Alternate No. 11A to Work Scope 5.10D $_____

Alternate No. 11B to Work Scope 7.10D $_____

Alternate No. 12A to Work Scope 5.10D $_____

Alternate No. 12B to Work Scope 7.10D $_____

Alternate No. 13 to Work Scope 9.20D $_____

Addenda: Receipt of the following Addenda to the Contract Documents and their costs being incorporated into the Bid is acknowledged (provide Addenda numbers below):

Addenda No.	Dated	Addenda No.	Dated
_____	_____	_____	_____
_____	_____		

Bid Acceptance: If written notice of the acceptance of this Bid is received by the undersigned within 60 days after date set for opening of this Bid, or at any other time thereafter before Bid is withdrawn, the undersigned agrees to enter into and execute a Contract with the Owner in accordance with this Bid as accepted and in a form acceptable to Owner, and to furnish and deliver to the Construction Manager the Performance Bond, Payment Bond, and proof of insurance coverage, all within 10 days after notice of acceptance of this Bid.

Execution of Proposal: The entity(ies) signing this proposal is fully authorized to sign on behalf of the named firm and to fully bind the named firm to all of the conditions and provisions of the Contract. This proposal shall remain valid and not be withdrawn for 60 calendar days after bid due date.

Submitted this _____ day of _____, 20_____.

Name of Firm: _____

Street Address: _____

City: _____ State: _____ Zip: _____

Phone Number: _____ Fax Number: _____

Bidder is: (check one)

☐ Individual ☐ Partnership ☐ Corporation

If Bidder is a corporation, give legal name of corporation, state where incorporated, and names of president and secretary; if a partnership, give names of all individual co-partners composing the firm. If an individual, give first and last name in full.

_____

_____

_____

_____

Name (typed or printed): _____

Signature: _____

Title: _____

END OF DOCUMENT

SITE ELECTRICAL NOTES

ELECTRICAL NOTES:

GENERAL:
ALL WORK SHALL BE PERFORMED IN STRICT ACCORDANCE WITH THE LATEST NATIONAL ELECTRICAL CODE (NFPA 70), THE LIFE SAFETY CODE (NFPA 101), OSHA, STATE AND LOCAL CODES.

ALL MATERIALS USED ON THIS PROJECT SHALL BE NEW, UL APPROVED, UNLESS NOTED OTHERWISE.

ALL CIRCUIT CONDUCTORS SHALL BE COPPER TYPE THHN #10 AWG MINIMUM. ADJUST WIRE SIZE FOR VOLTAGE DROP AS REQUIRED.

ALL BRANCH CIRCUIT WIRING SHALL BE INSTALLED IN SCHEDULE 80 PVC CONDUIT AS INDICATED ON THE DRAWINGS. MINIMUM CONDUIT SIZE SHALL BE 2" TRADE SIZE. CONCRETE EMBEDDED FEEDER CONDUIT SHALL BE CORROSION RESISTANT GALVANIZED IMC OR RIGID METAL CONDUIT WITH THREADED FITTINGS. SET SCREW FITTINGS ARE NOT PERMITTED. EMPTY CONDUIT SHALL BE PROVIDED WITH PULL STRING INSTALLED AND ENDS CAPPED.

PLAN:

PROVIDE BRANCH CIRCUIT WIRING TO LIGHT POLES USING #6 WIRE TO FIRST POLE AND #8 WIRE TO REMAINING POLES ON RUN.

DEMOLITION OF EXISTING ELECTRICAL

REMOVAL AND SALVAGE OF GATES AND TICKET DISPENCERS, INCLUDE THE PROPOER TERMINATION AND REMOVAL OF ALL ELECTRICAL CABLES INCEDENTAL TO REMOVAL EACH ITEM.

LIGHTS & BASE REMOVAL SHALL INCLUDE THE REMOVAL OF ALL CABLES AND PROPOER TERMINATION OF POWER CABLES. ALSO INCLUDES NESSESARY CABLES CONNECTION TO KEEP LIGHTS TO REMAIN OPERATIONAL INCEDENTAL TO EACH ITEM.

UTILITY NOTES:

1. CONTRACTOR SHALL COORDINATE WITH MP&L TO PLACE ELECTRICAL MANHOLE UNDER THE MP&L ALLOWANCE, RECEIVE QUOTES AND BILLING COORDINATE WITH DAA, RPR FOR OFF PEAK OUTAGES.

2. CONTRACTOR SHALL COORDINATE WITH QWEST TO PLACE COMM MANHOLE UNDER THE QUEST ALLOWANCE, RECEIVE QUOTES AND BILLING COORDINATE WITH DAA, RPR FOR OUTAGES.

LIGHT FIXTURE & POLE NOTES

LIGHTING NOTES:

CONTRACTOR SHALL MATCH EXISTING INSTALLED KIM LIGHTING OR EQUAL

KIM LIGHTING CATALOG NUMBERS
TYPE: A & B, 1A/AR3/210MC277/DB-P

ELECTRICAL MODULE
210MC277= PHILIPS MASTER COLOR BALLAST 210 WATT
PHILIPS
PRODUCT# 22062-4, ORDERING CODE# CDM ELITE MW 210/T9/930/U/E 210W

KIM LIGHTING POLES
KSS30-5180A/DB-P
KSS30-5180B/DB-P

BANNER ARM
NAFCO INTERNATIONAL CLAMP ON BANNER ARM (TO MATCH EXISTING) ONE (1) PER POLE (INCIDENTAL TO POLE)

GENERAL:

ALL POLES – LIGHTING SHALL HAVE FUSIBLE CONNECTIONS IN BASE FOR EACH CIRCUIT. (INCIDENTAL ITEM)

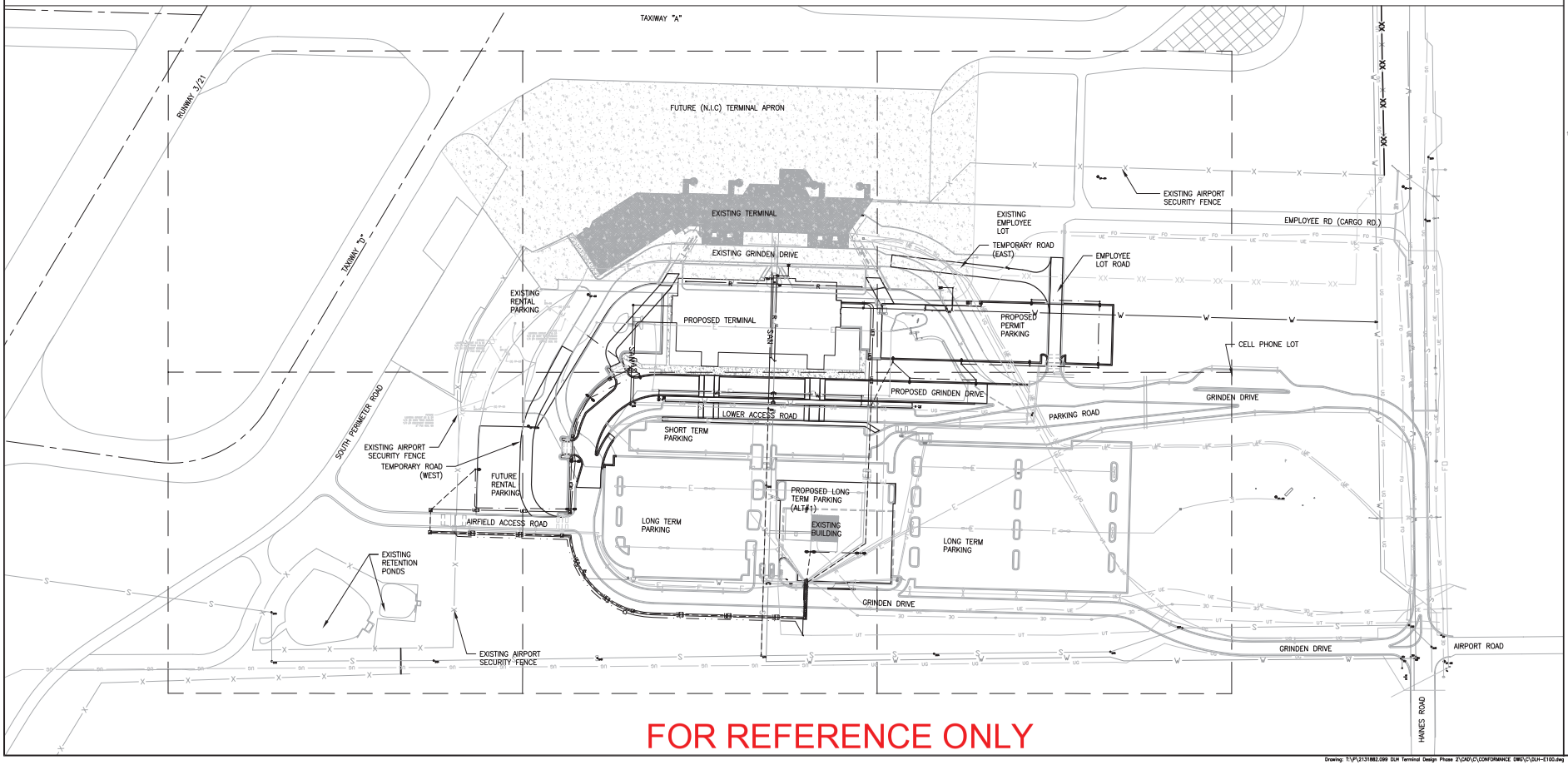
NOTE:

1. PRIOR TO DIGGING THE CONTRACTOR SHALL VERIFY LOCATION OF UNDERGROUND UTILITIES. THE CONTRACTOR SHALL CONTACT GOPHER STATE ONE CALL. 1-800-252-1166

2. THE CONTRACTOR SHALL BE RESPONSIBLE TO MARK, MAINTAIN, AND REMARK IF NECESSARY, ALL PRIVATE (DAA) OWNED UTILITIES.

NORTH

0 100' 200'



FOR REFERENCE ONLY

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4625 Airport Approach Rd, Ste A
Duluth, Minnesota 55811
218-722-2227 Fax: 218-722-1062
www.rsandh.com

DULUTH AIRPORT AUTHORITY

DULUTH INTERNATIONAL AIRPORT DULUTH, MN

NEW TERMINAL DESIGN

CONSULTANTS

Interior Architects:
SJA ARCHITECTS
11 E Superior Street Suite 340, Duluth MN 55802
TEL: (218) 724-8578 / FAX: (218) 724-8717

Structural Engineers:
MBJ CONSULTING ENG.
501 Lake Avenue South, Suite 300, Duluth MN 55802
TEL: (218) 722-1056 / FAX: (218) 722-4506

M/E/P/FP Engineers:
COSENTINI ASSOCIATES INC.
1 South Wacker Drive, 37th Floor, Chicago IL 60606
TEL: (312) 201-7408 / FAX: (312) 201-0031

Baggage Handling Systems Consultants:
BNP ASSOCIATES INC.
101 East Ridge Office Park, Suite 103, Danbury CT 06810
TEL: (203) 792-3000 / FAX: (203) 792-4900

Landscaping Consultants:
APPOLD DESIGN
2432 East First Street, Duluth MN 55812
TEL: (218) 591-3079

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 or Architect under the laws of the State of Minnesota.

Print Name: PETER J. BUTLER

Signature:

Date: 07/12/2010 Reg. No.: 46953

REVISIONS

NO.	DESCRIPTION	DATE
	CONFORMANCE SET	7.12.10

DATE ISSUED: 07-12-2010
REVIEWED BY: CBP
DRAWN BY: LAD
DESIGNED BY: PJB

AEP PROJECT NUMBER
213-1882-091

SHEET TITLE

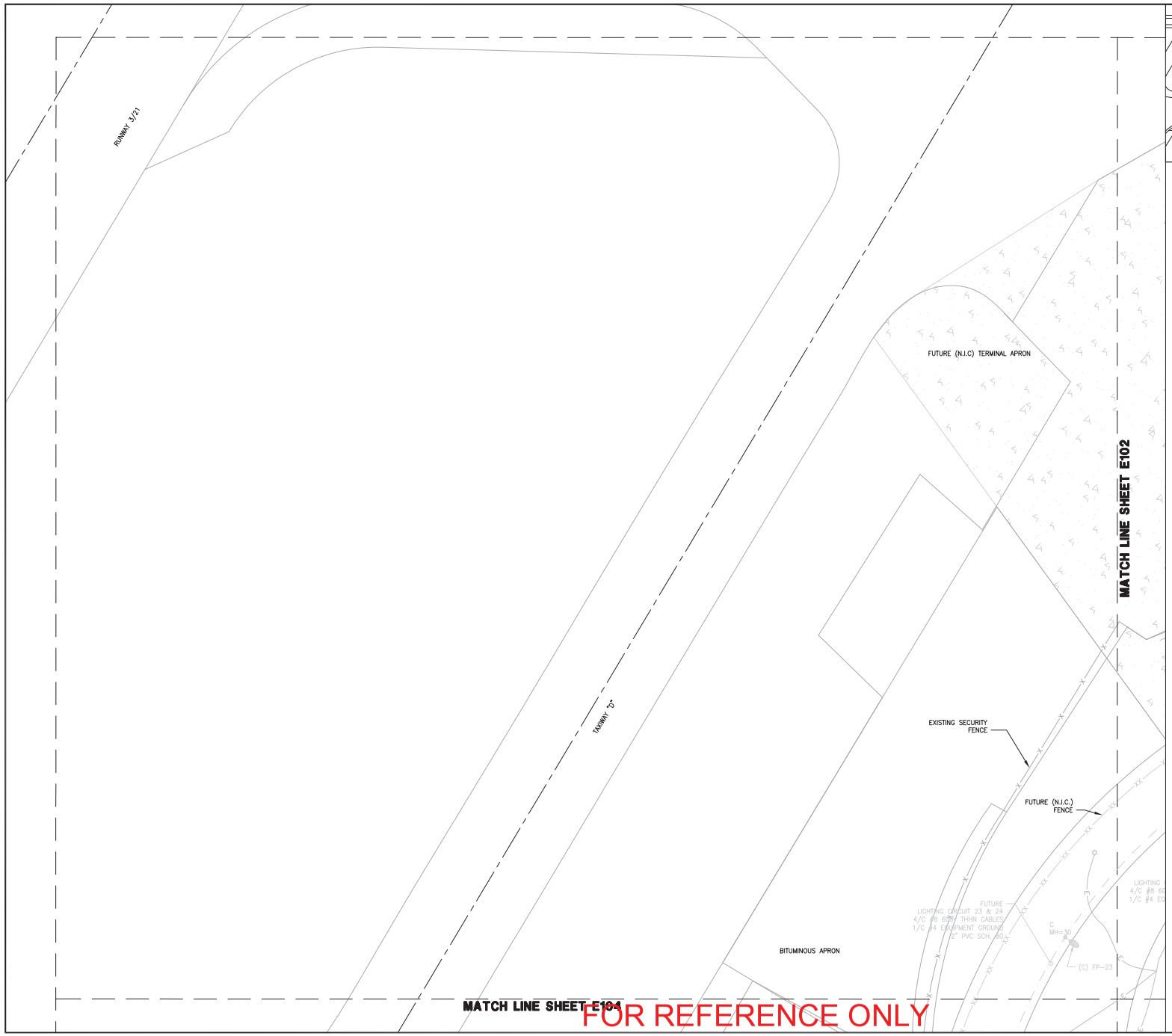
SITE ELECTRICAL AND COMMUNICATION OVERALL PLAN AND NOTES

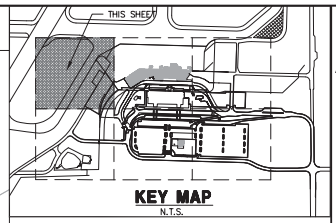
SHEET NUMBER

E100

BID PACKAGE 1 CONFORMANCE

Drawing: T:\P\2131882.099 DLH Terminal Design Phase 2\CAD\C\CONFORMANCE DWG\C\DLH-E100.dwg Plotted on: 6/29/2010 8:59 AM Plotted by: Dixon, Lukas





KEY MAP
N.T.S.

NORTH

0 30' 60'

LEGEND

- 4/C #6 THHN 600V, 1/C #4 GRD. IN CONDUIT
- 4/C #8 THHN 600V, 1/C #4 GRD. IN CONDUIT
- PROPOSED CONDUIT DUCTS
- 2~2/C 18 GA SHIELDED
- EXISTING OVERHEAD ELECT.
- EXISTING POWER POLE
- PROPOSED ELECT. MANHOLE
- PROPOSED LIGHT POLES
- PROPOSED PHONE PEDESTAL
- PROPOSED COMM MANHOLE
- EXISTING UNDERGROUND ELECT.
- EXISTING –PRIVATE– ELECT.
- EXISTING LIGHT & POLE
- PROPOSED PHONE CABLES
- EXISTING PHONE CABLES
- EXISTING CATV CABLES
- EXISTING FIBER OPTIC CABLE
- EXISTING PARKING GATE
- EXISTING ELECT. MANHOLE
- PROPOSED WATERMAIN
- EXISTING WATERMAIN
- EXISTING SANITARY
- PROPOSED SANITARY
- EXISTING SANITARY MANHOLE
- PROPOSED SANITARY MANHOLE
- EXISTING GAS LINE
- PROPOSED GAS LINE
- EXISTING HYDRANT
- PROPOSED HYDRANT
- FUTURE (N.I.C.) GATES AND LOOPS

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2432 East First Street, Duluth MN 55812
TEL: (218) 591-5079

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 or Architect under the laws of the State of Minnesota.

Print Name: PETER J. BUTLER

Signature:

Date: 07/12/2010 Reg. No.: 46953

REVISIONS

NO.	DESCRIPTION	DATE
	CONFORMANCE SET	7.12.10

DATE ISSUED: 07-12-2010
REVIEWED BY: CEP
DRAWN BY: LAD
DESIGNED BY: PJB

AEP PROJECT NUMBER
213-1852-091

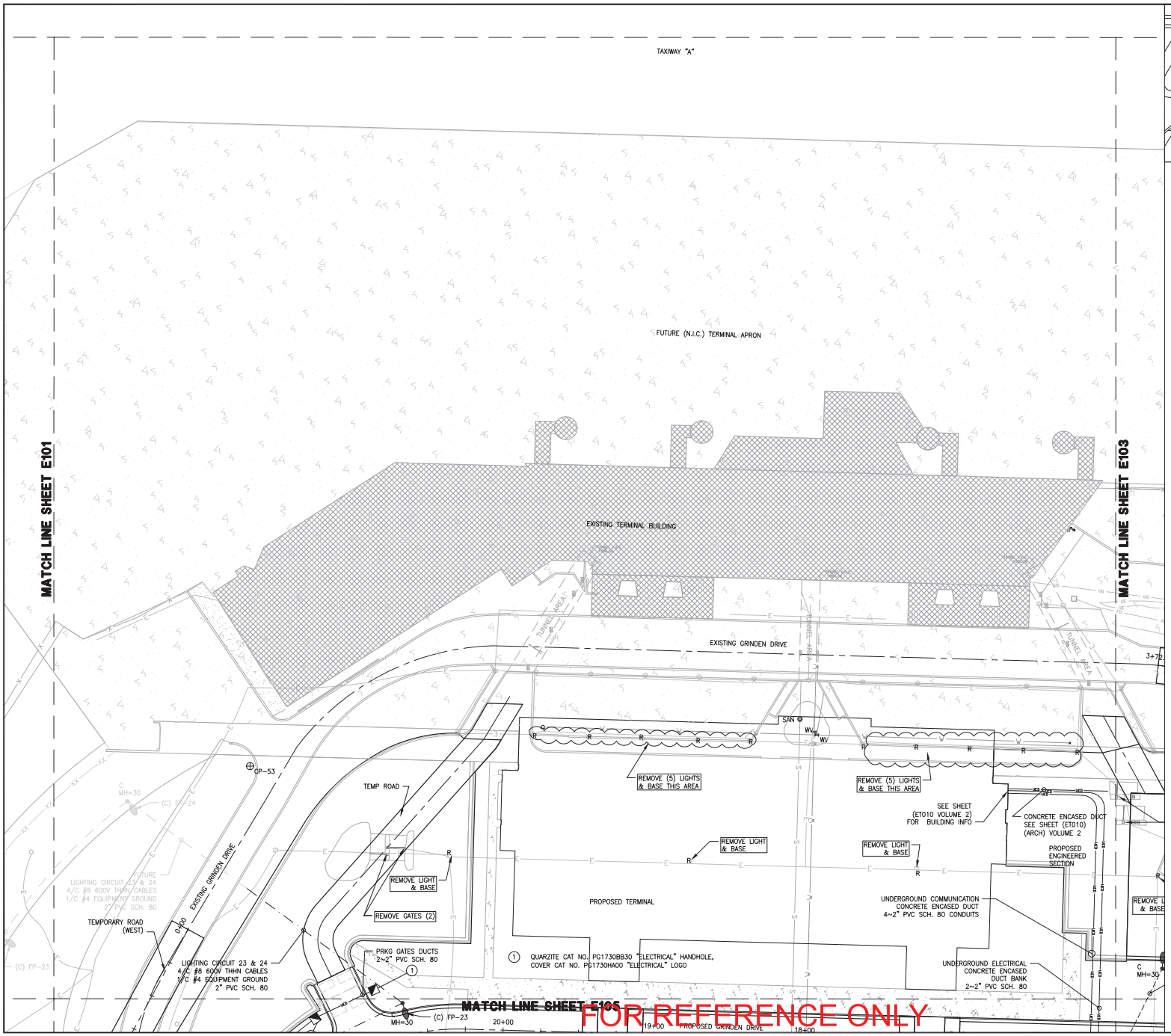
SHEET TITLE

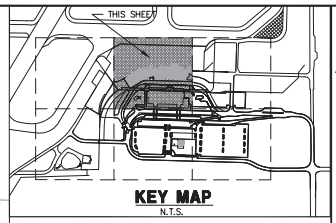
SITE ELECTRICAL AND COMM. PLAN (SHEET 1 OF 6)

SHEET NUMBER
E101

BID PACKAGE 1 CONFORMANCE

Drawing: T:\P\2131852.099 DLH Terminal Design Phase 2\CAD\C\CONFORMANCE DWG\C\DLH-E101.dwg Plotted on: 6/29/2010 9:07 AM Plotted by: Dixon, Lukas





KEY MAP
N.T.S.

NORTH

0 30' 60'

LEGEND

- 4/C #6 THHN 600V, 1/C #4 GRD. IN CONDUIT
- 4/C #8 THHN 600V, 1/C #4 GRD. IN CONDUIT
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- EXISTING SANITARY
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- PROPOSED SANITARY MANHOLE
- EXISTING GAS LINE
- PROPOSED GAS LINE
- EXISTING HYDRANT
- PROPOSED HYDRANT
- FUTURE (N.I.C.) GATES AND LOOPS

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Print Name: PETER J. BUTLER

Signature:

Date: 07/12/2010 Reg. No.: 46953

REVISIONS

NO.	DESCRIPTION	DATE
	CONFORMANCE SET	7.12.10

DATE ISSUED: 07-12-2010
REVIEWED BY: CEP
DRAWN BY: LAD
DESIGNED BY: PJB

AEP PROJECT NUMBER
213-1882-091

SHEET TITLE

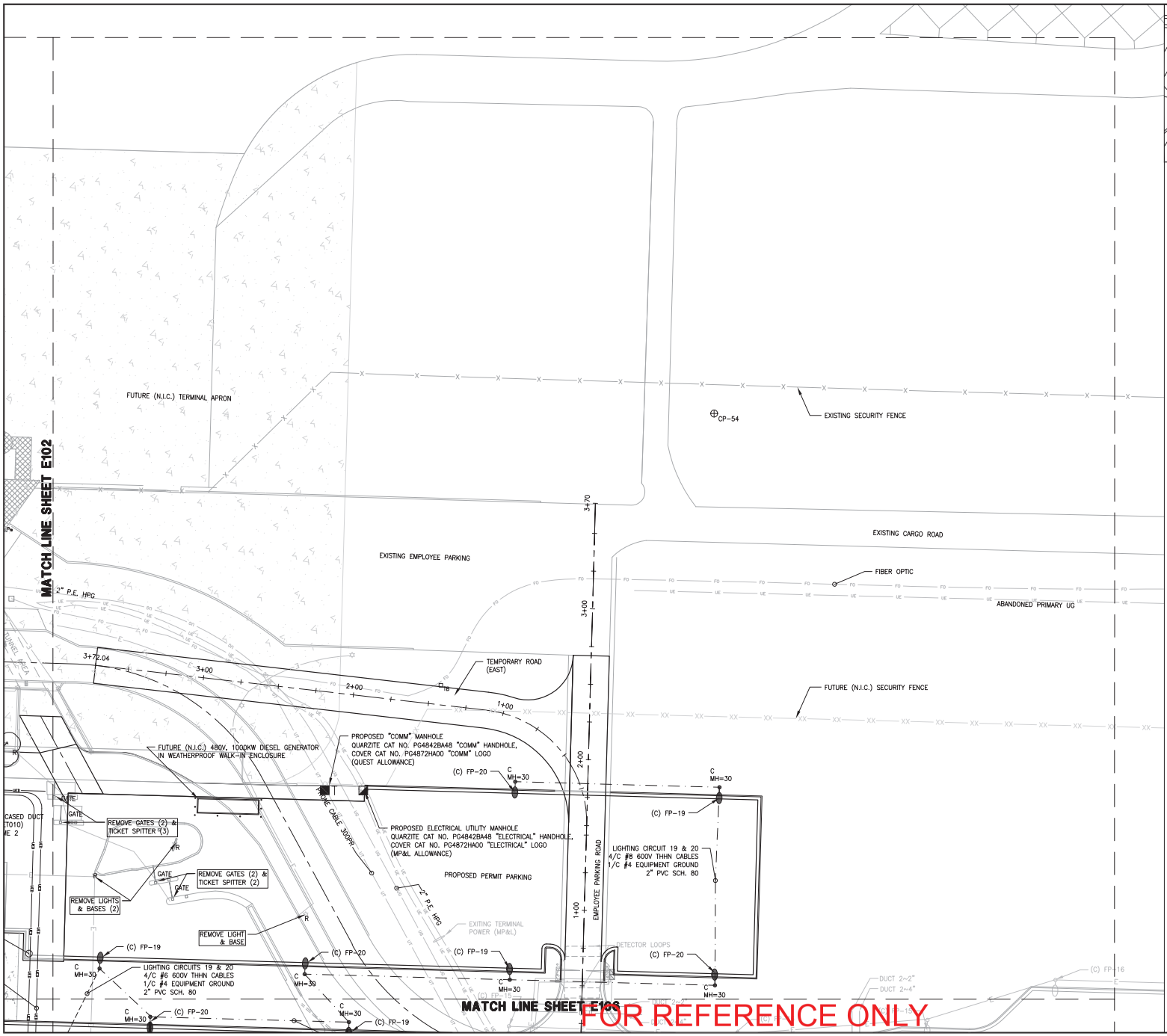
SITE ELECTRICAL AND COMM. PLAN (SHEET 2 OF 6)

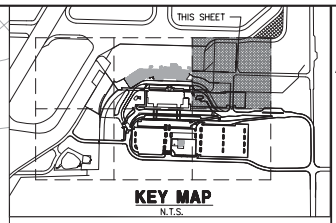
SHEET NUMBER

E102

BID PACKAGE 1 CONFORMANCE

Drawing: T:\P\2131882.099 DLH Terminal Design Phase 2\CAD\C\CONFORMANCE DWG\C\DLH-E102.dwg Plotted on: 6/29/2010 9:10 AM Plotted by: Dixon, Lukas





KEY MAP
N.T.S.

NORTH

0 30' 60'

LEGEND

- 4/C #6 THHN 600V, 1/C #4 GRD. IN CONDUIT
- 4/C #8 THHN 600V, 1/C #4 GRD. IN CONDUIT
- PROPOSED CONDUIT DUCTS
- 2~2/C 18 GA SHIELDED
- EXISTING OVERHEAD ELECT.
- EXISTING POWER POLE
- PROPOSED ELECT. MANHOLE
- PROPOSED LIGHT POLES
- PROPOSED PHONE PEDESTAL
- PROPOSED COMM MANHOLE
- EXISTING UNDERGROUND ELECT.
- EXISTING –PRIVATE– ELECT.
- EXISTING LIGHT & POLE
- PROPOSED PHONE CABLES
- EXISTING PHONE CABLES
- EXISTING CATV CABLES
- EXISTING FIBER OPTIC CABLE
- EXISTING PARKING GATE
- EXISTING ELECT. MANHOLE
- PROPOSED WATERMAIN
- EXISTING WATERMAIN
- EXISTING SANITARY
- PROPOSED SANITARY
- EXISTING SANITARY MANHOLE
- PROPOSED SANITARY MANHOLE
- EXISTING GAS LINE
- PROPOSED GAS LINE
- EXISTING HYDRANT
- PROPOSED HYDRANT
- FUTURE (N.I.C.) GATES AND LOOPS

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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 or Architect under the laws of the State of Minnesota.

Print Name: PETER J. BUTLER

Signature:

Date: 07/12/2010 Reg. No.: 46953

REVISIONS

NO.	DESCRIPTION	DATE
	CONFORMANCE SET	7.12.10

DATE ISSUED: 07-12-2010
REVIEWED BY: CEP
DRAWN BY: LAD
DESIGNED BY: PJB

AEP PROJECT NUMBER
213-1882-091

SHEET TITLE

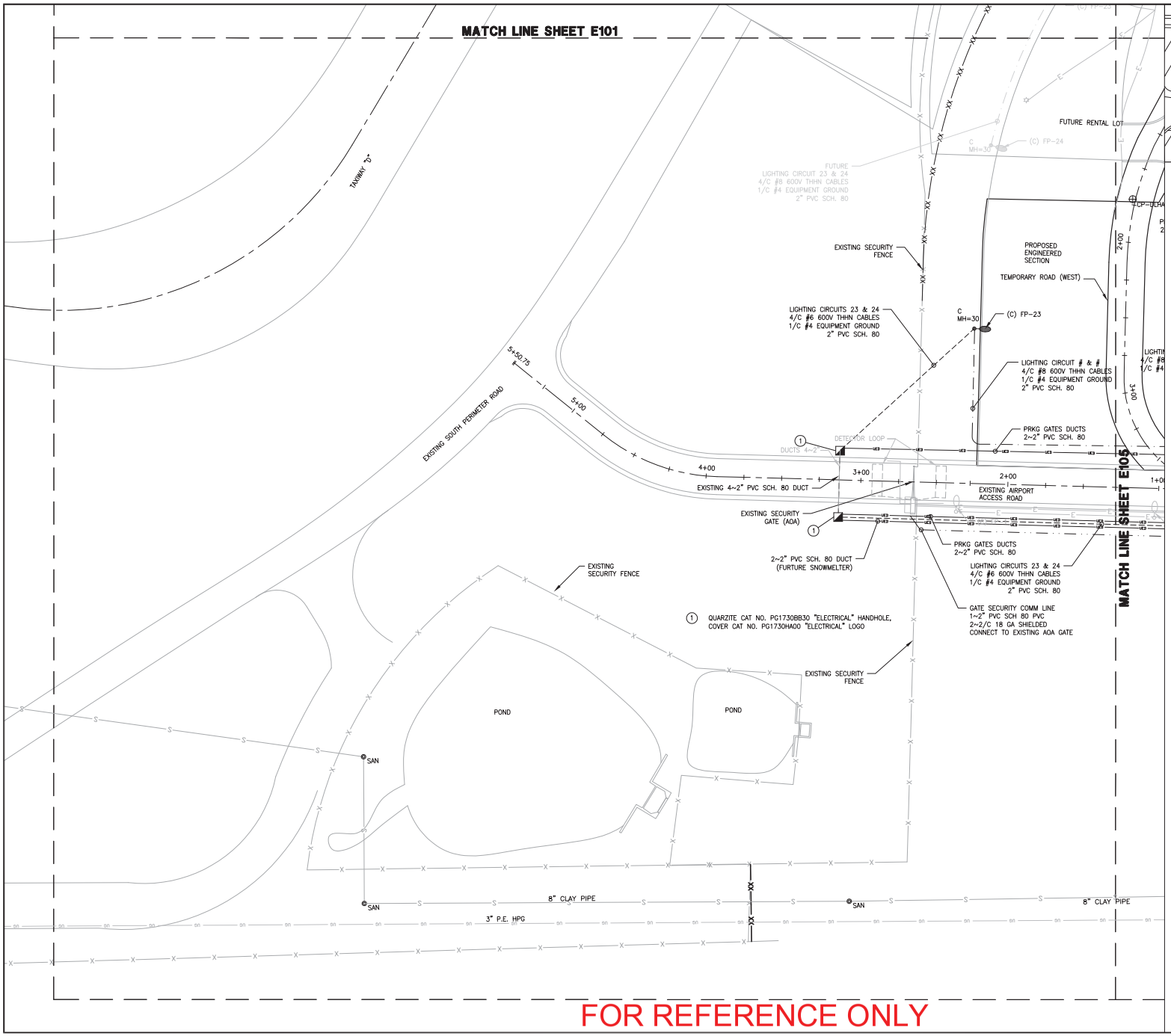
SITE ELECTRICAL AND COMM. PLAN (SHEET 3 OF 6)

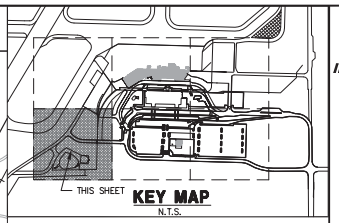
SHEET NUMBER

E103

BID PACKAGE 1 CONFORMANCE

Drawing: T:\P\2131882.099 DLH Terminal Design Phase 3\CAD\C\CONFORMANCE DWG\C\DLH-E103.dwg Plotted on: 6/29/2010 9:24 AM Plotted by: Dixon, Lukas





NORTH

0 30' 60'

LEGEND

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- 2~2/C 18 GA SHIELDED
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- EXISTING POWER POLE
- PROPOSED ELECT. MANHOLE
- PROPOSED LIGHT POLES
- PROPOSED PHONE PEDESTAL
- PROPOSED COMM MANHOLE
- EXISTING UNDERGROUND ELECT.
- EXISTING –PRIVATE– ELECT.
- EXISTING LIGHT & POLE
- PROPOSED PHONE CABLES
- EXISTING PHONE CABLES
- EXISTING CATV CABLES
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- EXISTING PARKING GATE
- EXISTING ELECT. MANHOLE
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- EXISTING WATERMAIN
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- PROPOSED SANITARY
- EXISTING SANITARY MANHOLE
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Signature:

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DRAWN BY: LAD
DESIGNED BY: PJB

AEP PROJECT NUMBER
213-1882-091

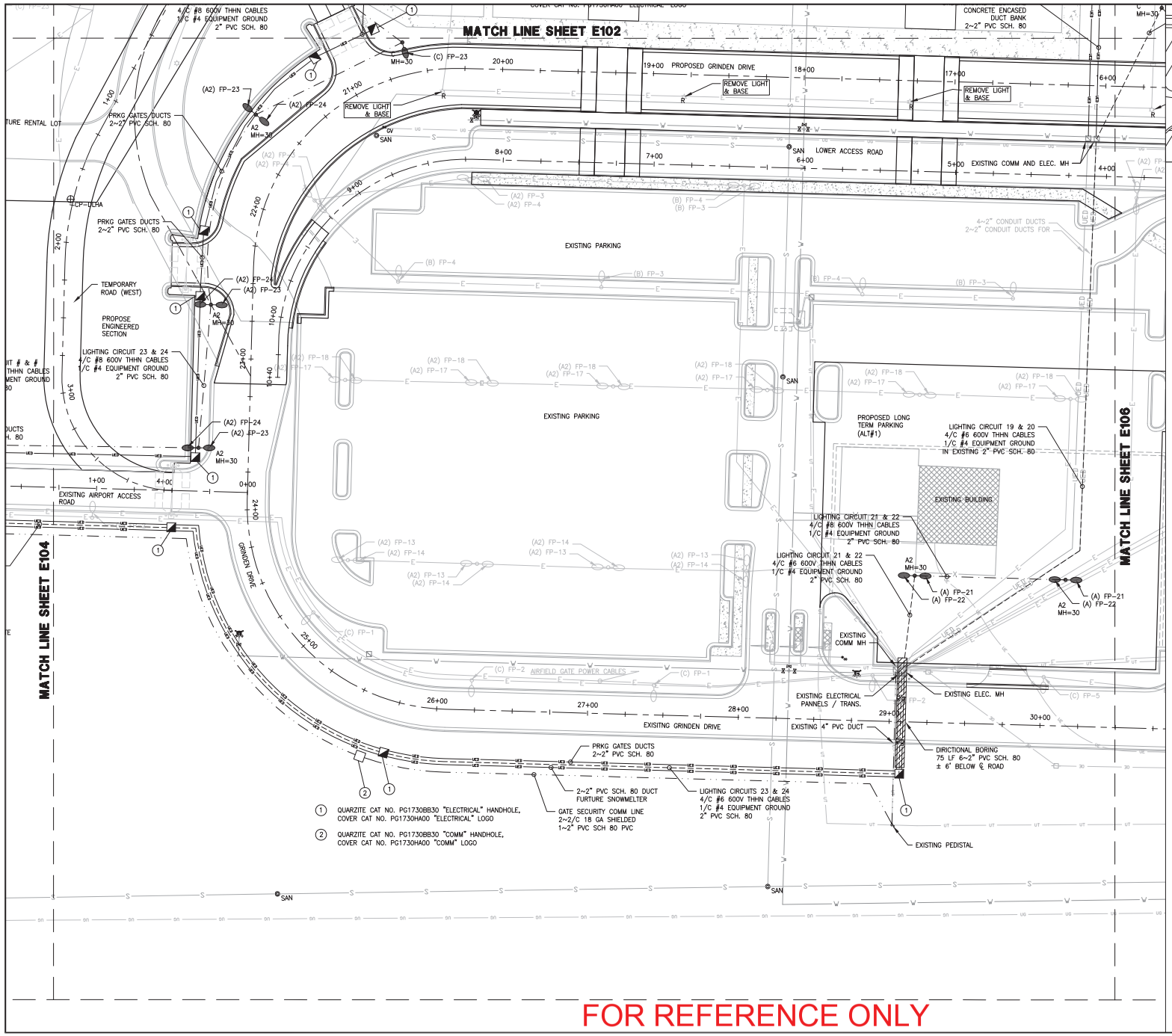
SHEET TITLE

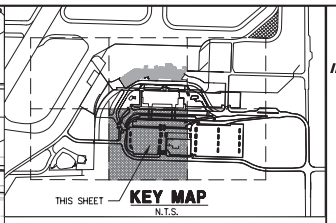
SITE ELECTRICAL AND COMM. PLAN (SHEET 4 OF 6)

SHEET NUMBER
E104

BID PACKAGE 1 CONFORMANCE

Drawing: T:\P\2131882.099 DLH Terminal Design Phase 2\CAD\C\CONFORMANCE DWG\C\DLH-E104.dwg Plotted on: 6/29/2010 9:27 AM Plotted by: Dixon, Lukas





NORTH

0 30' 60'

LEGEND

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DRAWN BY: LAD
DESIGNED BY: PJB

AEP PROJECT NUMBER
213-1882-091

SHEET TITLE

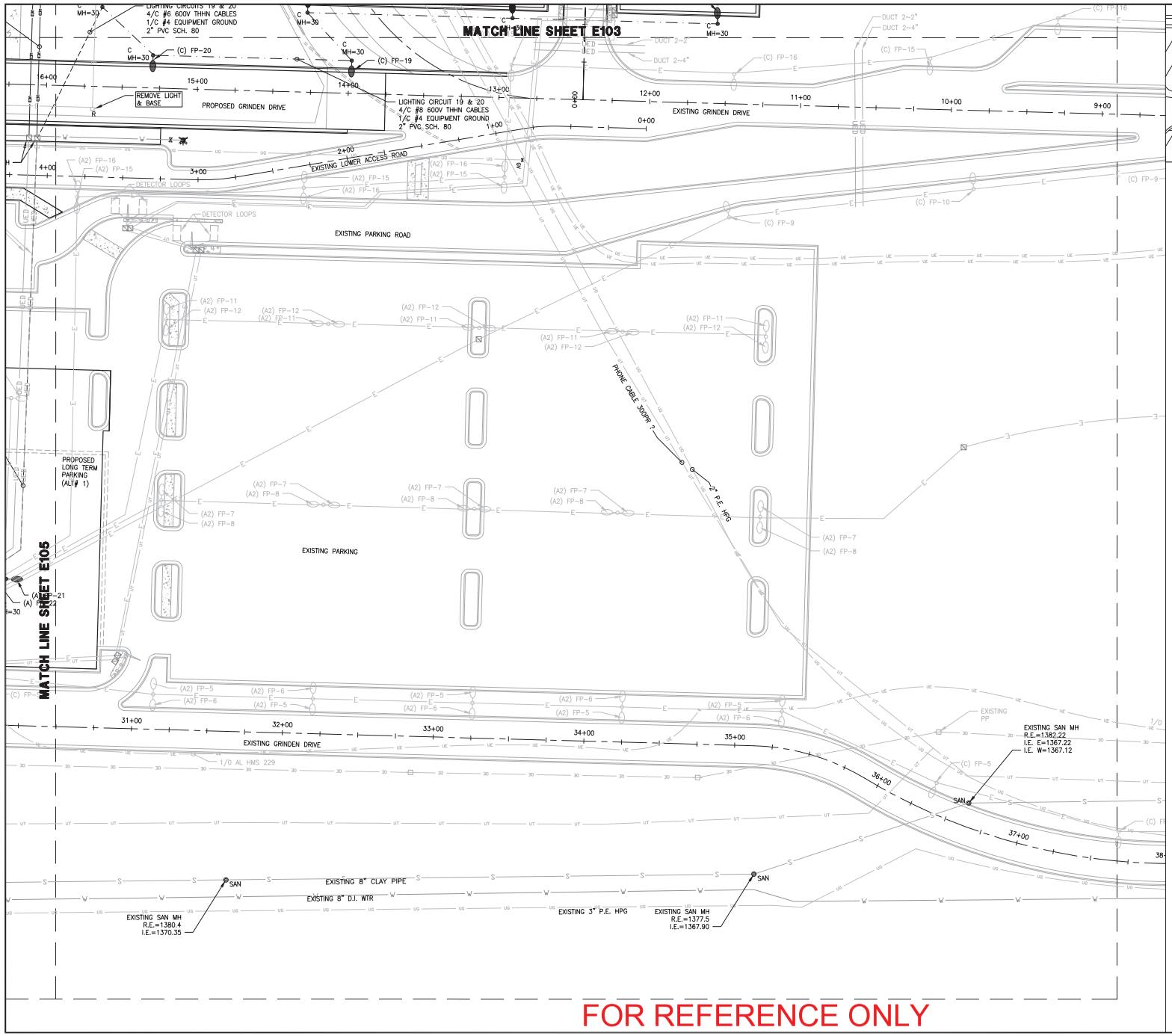
SITE ELECTRICAL AND COMM. PLAN (SHEET 5 OF 6)

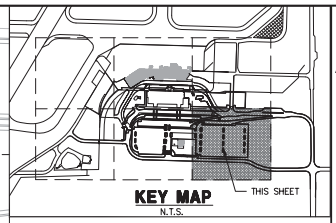
SHEET NUMBER

E105

BID PACKAGE 1 CONFORMANCE

Drawing: T:\P\2131882.099 DLH Terminal Design Phase 2\CAD\C\CONFORMANCE DWG\C\DLH-E105.dwg Plotted on: 6/29/2010 9:42 AM Plotted by: Dixon, Lukas





NORTH

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LEGEND

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- PROPOSED HYDRANT
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DATE ISSUED: 07-12-2010
REVIEWED BY: CEP
DRAWN BY: LAD
DESIGNED BY: PJB

AEP PROJECT NUMBER
213-1882-091

SHEET TITLE

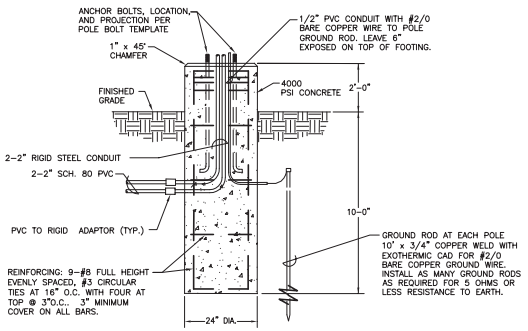
SITE ELECTRICAL AND COMM. PLAN (SHEET 6 OF 6)

SHEET NUMBER

E106

BID PACKAGE 1 CONFORMANCE

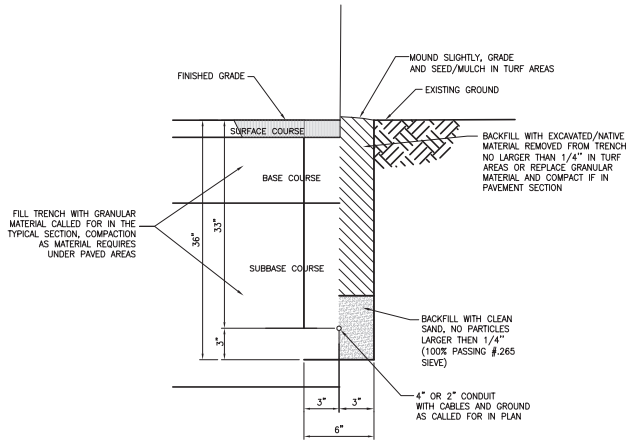
Drawing: T:\P\2131882.099 DLH Terminal Design Phase 2\CAD\C\CONFORMANCE DWG\C\DLH-E106.dwg Plotted on: 6/29/2010 9:44 AM Plotted by: Dixon, Lukas



1 30' LIGHT POLE FOUNDATION DETAIL
N.T.S.

LIGHTING FIXTURE SCHEDULE NOTES:

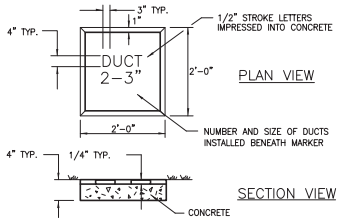
1. THE LIGHTING FIXTURE SCHEDULE AND CATALOG NUMBERS INDICATE MAJOR REQUIREMENTS FOR THE LIGHTING FIXTURES. WHETHER SPECIFIED BY THE CATALOG NUMBERS OR NOT THE CONTRACTOR SHALL PROVIDE ALL COMPONENTS, HARDWARE AND RELATED ITEMS TO PROVIDE A COMPLETE LIGHTING FIXTURE TO MEET THE REQUIREMENTS AS SPECIFIED IN THE DRAWINGS AND SPECIFICATIONS.
2. WHERE APPROVED EQUAL OR SINGLE MANUFACTURER FIXTURE IS INDICATED, THE CONTRACTOR MAY SUBMIT A FIXTURE WHICH IS EQUAL OR BETTER TO THE A/E FOR SHOP DRAWING APPROVAL. THE A/E'S DETERMINATION FOR APPROVED EQUAL SHALL GOVERN. PROVIDE A COMPLETE DETAIL OF THE EQUAL FIXTURE WITH A COMPARISON TO THE SPECIFIED FIXTURE. PHOTOMETRIC (POINT-TO-POINT) LAYOUT OF LIGHTED AREA SHALL ALSO BE PROVIDED BY THE CONTRACTOR FROM THE MANUFACTURER.
3. PROVIDE COLD WEATHER BALLASTS FOR FIXTURES LOCATED OUTSIDE.
4. PROVIDE ANCHOR BOLTS. DIAMETER AND LENGTH AS REQUIRED TO MEET EPA (90 MPH) WIND REQUIREMENTS.
5 PROVIDE FUSEABLE CONNECTIONS IN ALL BASES



2 CABLE / CONDUIT TRENCH DETAIL
N.T.S.

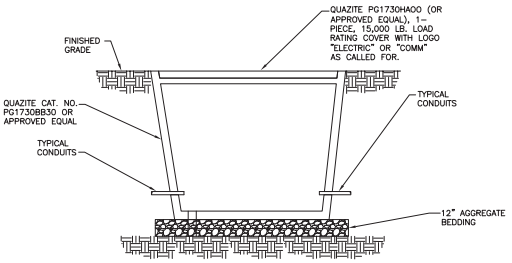
NTS

NOTE:
FOR MULTIPLE CABLE CONDUIT TRENCHES, CONDUITS SHALL BE SEPARATED 2" MIN WIDEN TRENCH ACCORDINGLY.

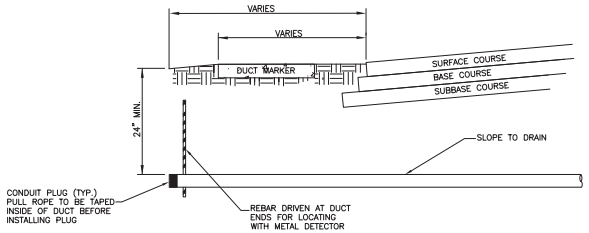


NOTES:
1. CONTRACTOR SHALL INSTALL NEW DUCT MARKERS WITH APPROPRIATE INFORMATION 5' OFF EDGE AND ON BOTH SIDES OF PAVEMENT WHEN EXISTING DUCT IS DISCOVERED OR NEW DUCT IS INSTALLED UNDER PAVEMENT.
2. EDGE EXPOSED CONCRETE WITH A "1/4" RADIUS TOOL.

3 DUCT MARKER DETAIL IN TURF
N.T.S.



4 ELECTRICAL HANDHOLE (IN TURF) DETAIL
N.T.S.



5 ELECTRICAL DUCT DETAIL
N.T.S.

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DRAWN BY: LAD
DESIGNED BY: PJB

AEP PROJECT NUMBER
213-1852-091

SHEET TITLE

ELECTRICAL, COMM. NOTES AND DETAILS

SHEET NUMBER
E400

BID PACKAGE 1 CONFORMANCE

Drawing: T:\P\2131852.099 DLH Terminal Design Phase 2\CAD\C\CONFORMANCE DWG\C\DLH-E400.dwg Plotted on: 6/29/2010 9:48 AM Plotted by: Dixon, Lukas

SITE ELECTRICAL NOTES

ELECTRICAL NOTES:

GENERAL:
ALL WORK SHALL BE PERFORMED IN STRICT ACCORDANCE WITH THE LATEST NATIONAL ELECTRICAL CODE (NFPA 70), THE LIFE SAFETY CODE (NFPA 101), OSHA, STATE AND LOCAL CODES.

ALL MATERIALS USED ON THIS PROJECT SHALL BE NEW, UL APPROVED, UNLESS NOTED OTHERWISE.

ALL CIRCUIT CONDUCTORS SHALL BE COPPER TYPE THHN #10 AWG MINIMUM. ADJUST WIRE SIZE FOR VOLTAGE DROP AS REQUIRED.

ALL BRANCH CIRCUIT WIRING SHALL BE INSTALLED IN SCHEDULE 80 PVC CONDUIT AS INDICATED ON THE DRAWINGS. MINIMUM CONDUIT SIZE SHALL BE 1" TRADE SIZE. CONCRETE EMBEDDED FEEDER CONDUIT SHALL BE CORROSION RESISTANT GALVANIZED IMC OR RIGID METAL CONDUIT WITH THREADED FITTINGS. SET SCREW FITTINGS ARE NOT PERMITTED. EMPTY CONDUIT SHALL BE PROVIDED WITH PULL STRING INSTALLED AND ENDS CAPPED.

PLAN:
COORDINATE INSTALLATION OF NEW 480 V. O.H. ELECTRIC SERVICE W/ MINNESOTA POWER TO MH LOCATION AS SHOWN. PROVIDE ENTRANCE & METER HARDWARE REQUIRED.

PROVIDE CONCRETE BASE FOR MOUNTING PANEL FP ON EMBEDDED GALVANIZED STEEL STRUT. PROVIDE TWO 3" GRS CONNECTIONS TO MANHOLE.

PANEL FP SHALL BE SERVICE ENTRANCE RATED NEMA 4X SS 480/277 V, 3 PHASE, 125A, 42 POLE, WITH COPPER BUS, & BOLT ON PROGRAMMABLE CIRCUIT BREAKERS. SQUARE D TYPE NF POWERLINK G3 OR APPROVED EQUAL (SEE SPECIFICATIONS). PROVIDE A TYPEWRITTEN CIRCUIT DIRECTORY IN STEEL FRAME ON INSIDE OF DOOR.

PROVIDE PHOTOCELL CONTROL MOUNTED AT NORTH SIDE OF NEAREST TICKET BOOTH ROOF. CONNECT TO PANEL FP CONTROLLER.

PROVIDE BRANCH CIRCUIT WIRING TO LIGHT POLES & TICKET DISPENSERS USING #6 WIRE TO FIRST POLE/DISPENSER AND #8 WIRE TO REMAINING POLES ON RUN.

PROVIDE 480 V TO 208 V TRANSFORMER AT PANELBOARD FOR GATE OPERATOR AND TEMPORARY CONNECTIONS FOR EXISTING OUTDOOR LIGHTING.

PROVIDE TWO 2" PVC CONDUIT CONNECTIONS BETWEEN ADJACENT ENTRY/EXIT ISLANDS AND BETWEEN ADJACENT TICKET BOOTHS STUBBED 6" AFG. CONNECT NEAREST TICKET BOOTH TO POWER MH AND TO COMM MH WITH A SINGLE 2" PVC CONDUIT.

PROVIDE TWO 2" GRS CONDUIT, CONCRETE ENCASED TO NEW AIRFIELD ACCESS ROAD GATE OPERATOR, STUBBED 6" AFG. PROVIDE A 1" PVC CONDUIT CONNECTION BETWEEN THE GATE OPERATOR AND EACH CARD ACCESS STATION.

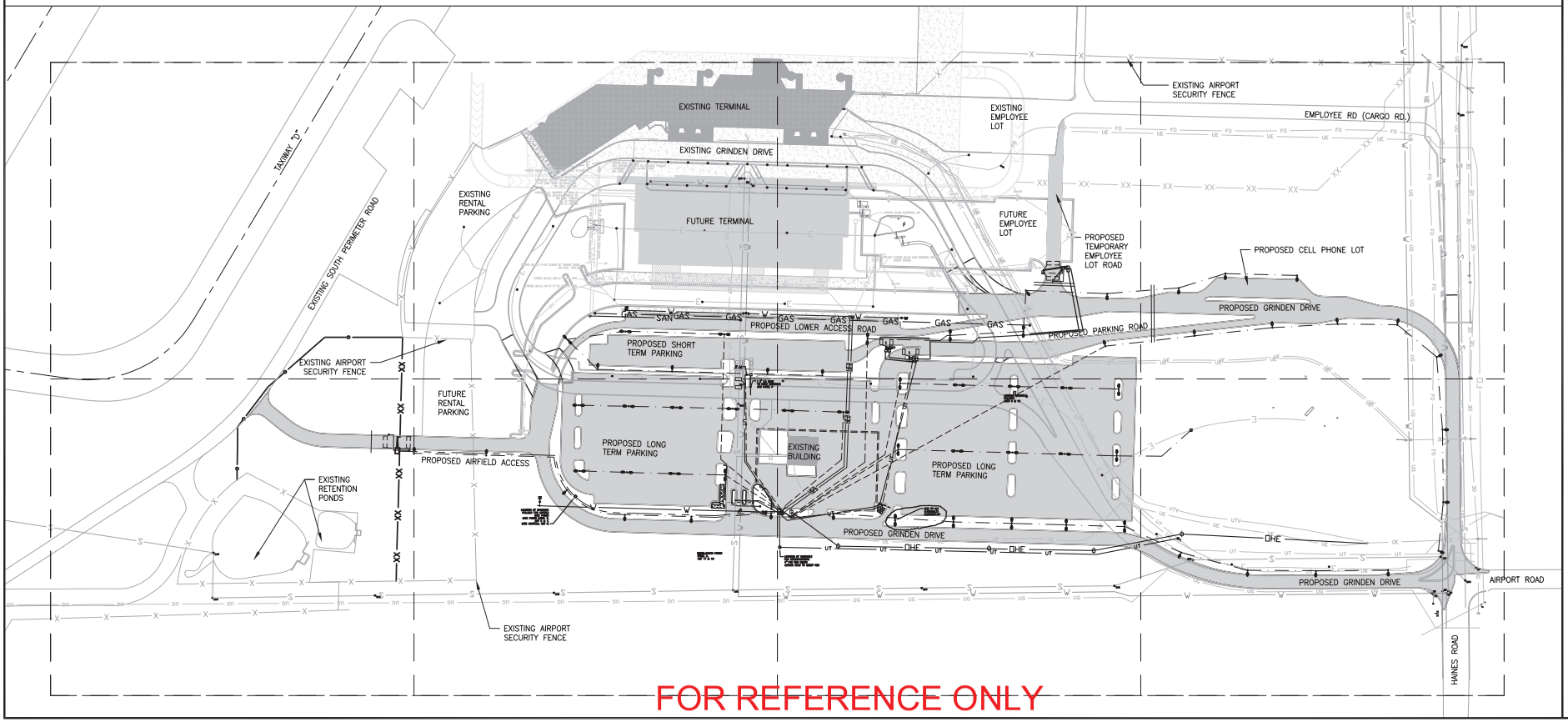
NORTH

0 100' 200'

RECORD DRAWINGS:
THESE RECORD DRAWINGS HAVE BEEN PREPARED BASED ON INFORMATION SUBMITTED, IN PART, BY OTHERS. WHILE IT IS BELIEVED TO BE RELIABLE, REYNOLDS, SMITH, & HILLS, INC. IS NOT RESPONSIBLE FOR ITS ACCURACY, NOR FOR ERRORS OR OMISSIONS WHICH MAY HAVE BEEN INCORPORATED INTO THIS DOCUMENT AS A RESULT.

NOTE:

1. PRIOR TO DIGGING THE CONTRACTOR SHALL VERIFY LOCATION OF UNDERGROUND UTILITIES. THE CONTRACTOR SHALL CONTACT GOPHER STATE ONE CALL. 1-800-252-1166
2. THE CONTRACTOR SHALL BE RESPONSIBLE TO MARK, MAINTAIN, AND REMARK IF NECESSARY, ALL PRIVATE (DAA) OWNED UTILITIES.



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DULUTH INTERNATIONAL AIRPORT

REPLACEMENT TERMINAL AREA DEVELOPMENT, LANDSIDE SITE PHASE I

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

Typed Name JOHN E. HIPPCHEN

Date 01/14/2011 Reg. No. 22088

REVISIONS

NO.	DESCRIPTION	DATE

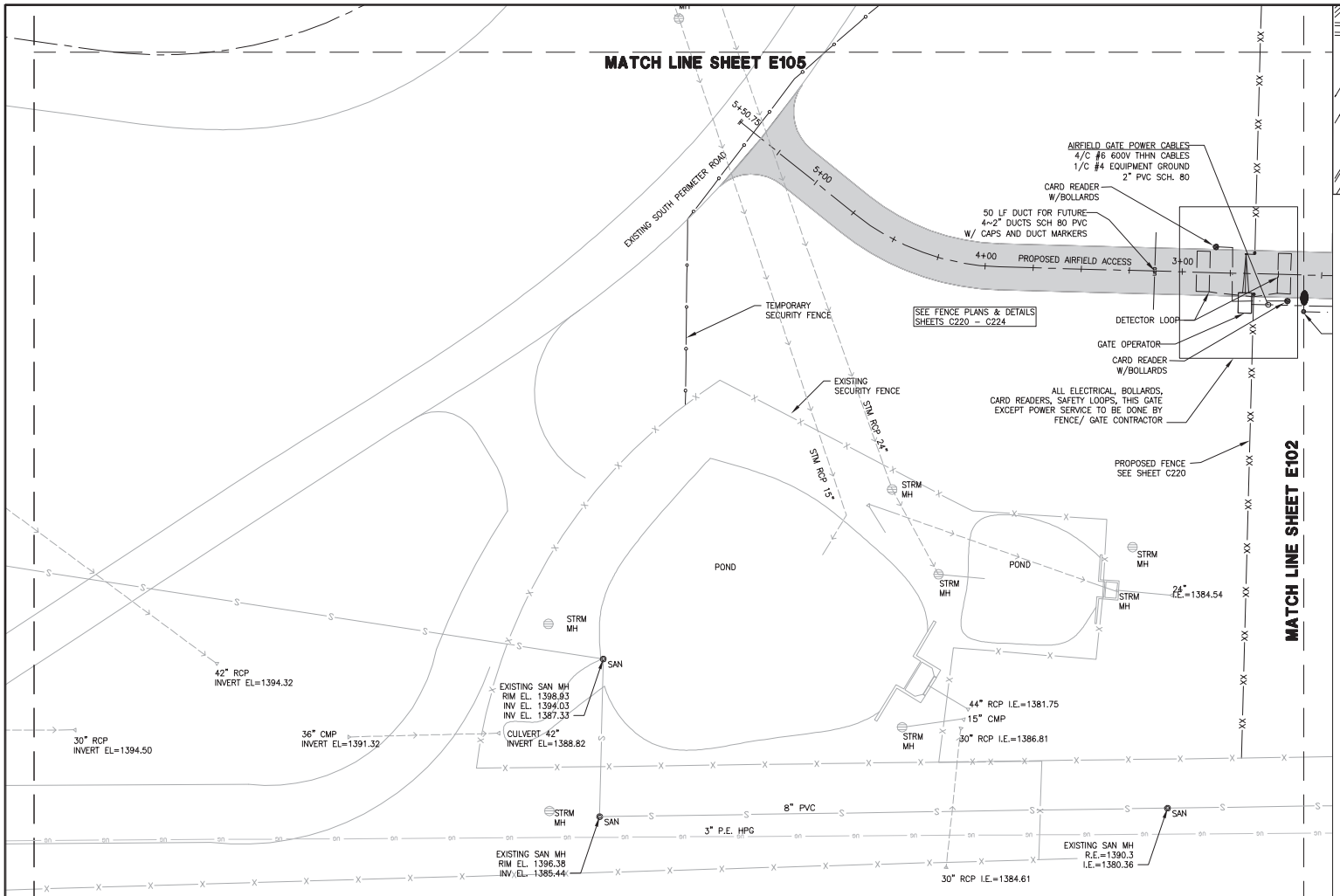
DATE ISSUED: 01-14-2011
REVIEWED BY: BCT
DRAWN BY: LAD
DESIGNED BY: B A

AEP PROJECT NUMBER
214-1882-093 & 095

SHEET TITLE
SITE ELECTRICAL & COMM. OVERALL PLAN AND NOTES

SHEET NUMBER
E100

RECORD DOCUMENTS



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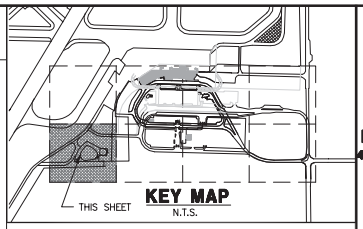

KEY MAP
N.T.S.

NORTH
0 30' 60'

NOTE:
ALL NORTHINGS, EASTINGS AND ELEVATIONS LABELED ON THESE PLANS ARE IN:
MINNESOTA STATE PLANE NORTH (1996)
VERTICAL DATUM IS NAVD 88
HORIZONTAL DATUM IS NAD83

LEGEND

- 2/C #6 THHN 600V, 1/C #4 GRD. IN CONDUIT
- 4/C #8 THHN 600V, 1/C #4 GRD. IN CONDUIT
- 2/C #8 THHN 600V, 1/C #4 GRD. IN CONDUIT
- PROPOSED CONDUIT DUCTS
- PROPOSED OVERHEAD ELECT.
- EXISTING OVERHEAD ELECT.
- EXISTING POWER POLE
- PROPOSED POWER POLE
- PROPOSED ELECT. MANHOLE
- PROPOSED LIGHT POLES
- PROPOSED PHONE PEDESTAL
- PROPOSED COMM MANHOLE
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REVISIONS

NO.	DESCRIPTION	DATE

DATE ISSUED: 01-14-2011
REVIEWED BY: BCT
DRAWN BY: LAD
DESIGNED BY: BOA

AEP PROJECT NUMBER
214-1882-093 & 095

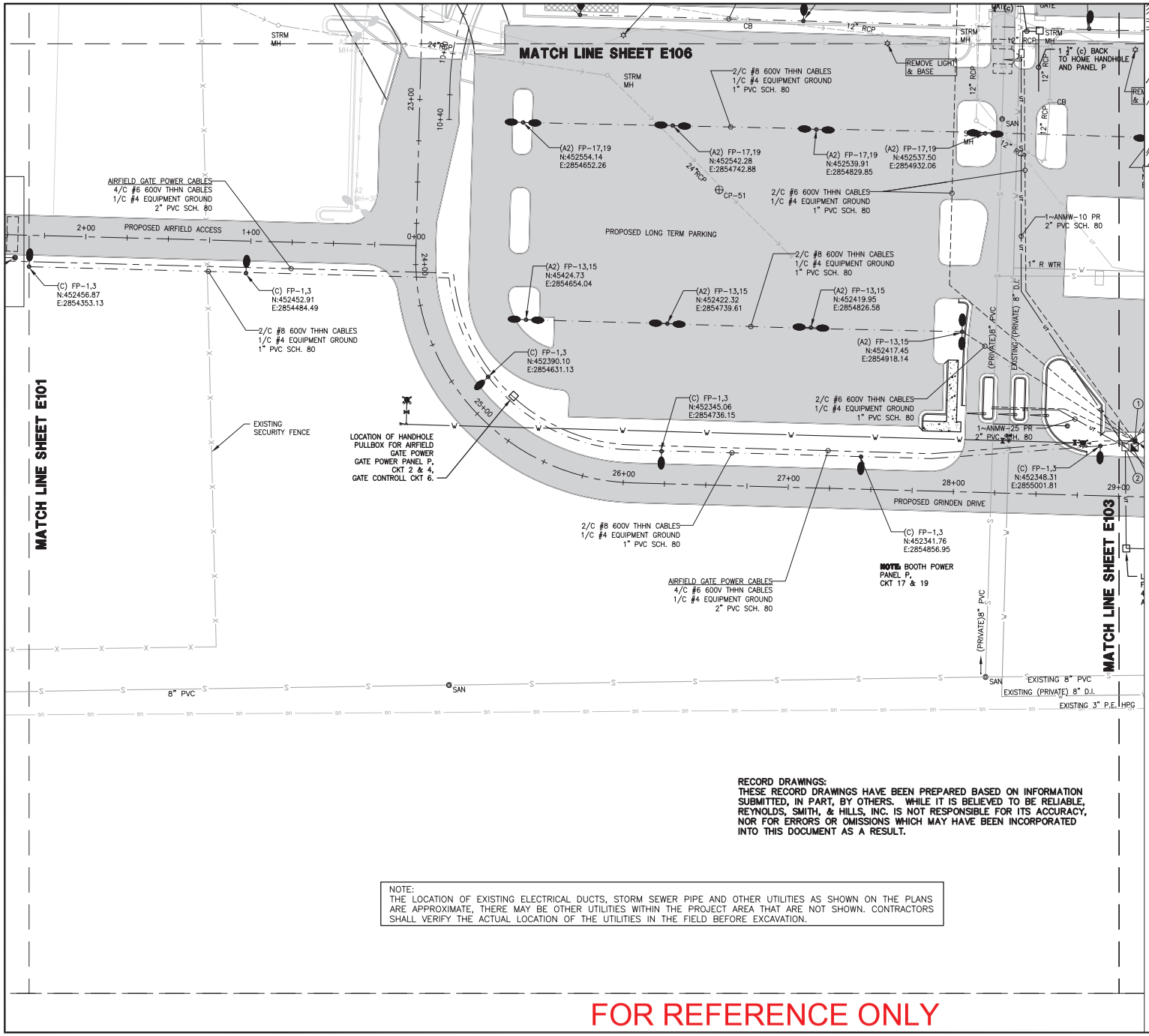
SHEET TITLE

SITE ELECTRICAL PLAN (SHEET 1 OF 8)

SHEET NUMBER

E101

RECORD DOCUMENTS



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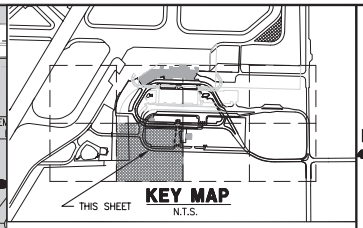

KEY MAP
N.T.S.

NORTH
0 30' 60'

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LEGEND

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- 4/C #8 THHN 600V, 1/C #4 GRD. IN CONDUIT
- 2/C #8 THHN 600V, 1/C #4 GRD. IN CONDUIT
- PROPOSED CONDUIT DUCTS
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DESIGNED BY: BOA

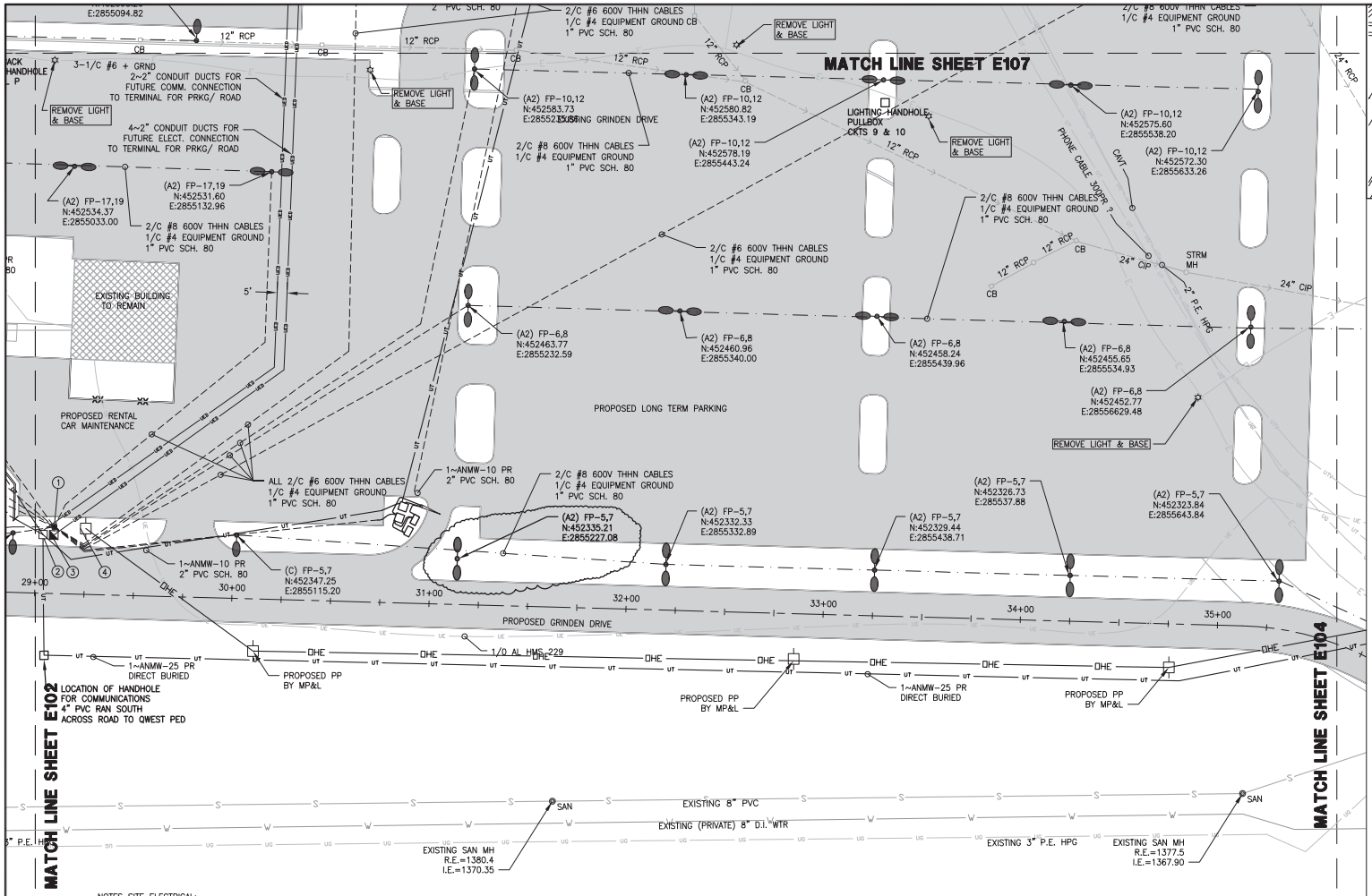
AEP PROJECT NUMBER
214-1882-093 & 095

SHEET TITLE

SITE ELECTRICAL PLAN (SHEET 2 OF 8)

SHEET NUMBER
E102

RECORD DOCUMENTS



NOTES SITE ELECTRICAL:

1. PANEL FP SHALL BE SERVICE ENTRANCE RATED NEMA 4X SS 480/277 V, 3 PHASE, 125A, 42 POLE, WITH COPPER BUS, & BOLT ON PROGRAMMABLE CIRCUIT BREAKERS. SQUARE D TYPE NF POWERLINK G3 OR APPROVED EQUAL (SEE SPECIFICATIONS). PROVIDE A TYPEWRITTEN CIRCUIT DIRECTORY IN STEEL FRAME ON INSIDE OF DOOR. (LOCATION N: 452351.34, E: 2855022.80) PROVIDE TWO BOLLARDS (SEE SHEET C224) ON EACH SIDE OF ELECTRICAL SERVICE.
2. NEW HAND HOLES:QUAZITE PG2436HA00, 1 PIECE, 15,000 LBS/25,000LBS LOAD RATED COVER WITH LOGO "COMMUNICATION" AND QUAZITE PG2436BB36 BOX OR EQUAL. (LOCATION N:452347.48, E: 2855017.03)
3. NEW HAND HOLES:QUAZITE PG2436HA00, 1 PIECE, 15,000 LBS/25,000LBS LOAD RATED COVER WITH LOGO "ELECTRIC" AND QUAZITE PG2436BB36 BOX OR EQUAL. (LOCATION N: 452347.25, E: 2855022.50)
4. TEMPORARY 3ϕ SERVICE RISER TO IN ELECTRICAL SERVICE ENTRANCE (SEE NOTE 1).

RECORD DRAWINGS:
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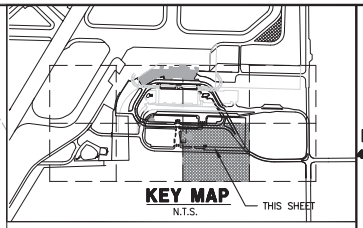

NORTH

0 30' 60'

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VERTICAL DATUM IS NAVD 88
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LEGEND

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REPLACEMENT TERMINAL AREA DEVELOPMENT, LANDSIDE SITE PHASE I

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Signature

Typed Name JOHN E. HIPPCHEN

Date 01/14/2011 Reg. No. 22088

REVISIONS

NO.	DESCRIPTION	DATE
	ESI 4 REVISION 09-02-09	

DATE ISSUED: 01-14-2011
REVIEWED BY: BCT
DRAWN BY: LAD
DESIGNED BY: BOA

AEP PROJECT NUMBER
214-1882-093 & 095

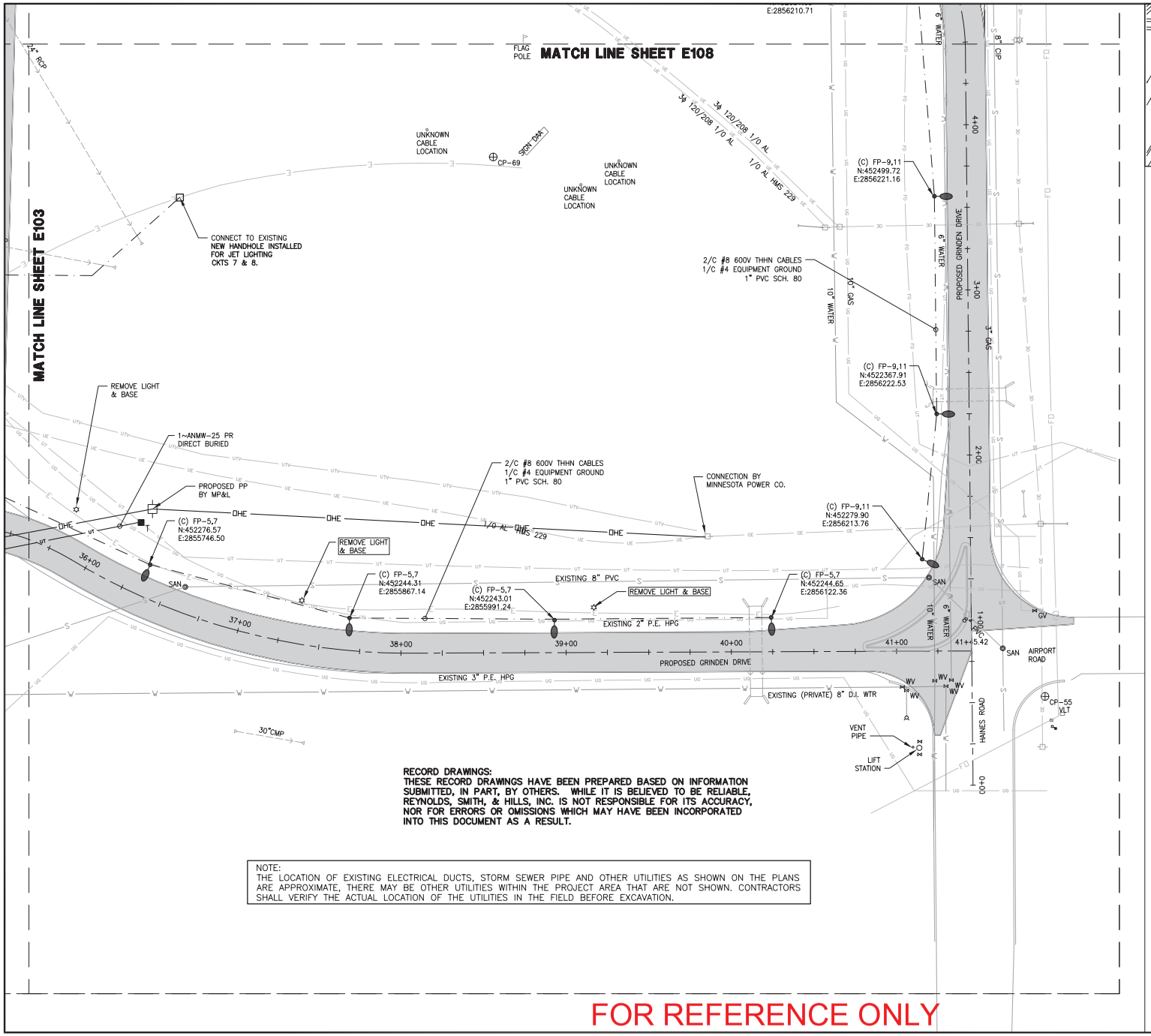
SHEET TITLE

SITE ELECTRICAL PLAN (SHEET 3 OF 8)

SHEET NUMBER

E103

RECORD DOCUMENTS



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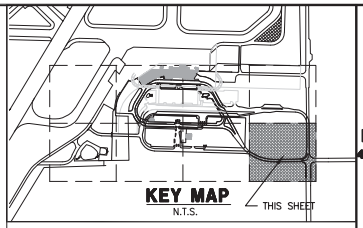

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DRAWN BY: LAD
DESIGNED BY: BOA

AEP PROJECT NUMBER
214-1882-093 & 095

SHEET TITLE

SITE ELECTRICAL PLAN (SHEET 4 OF 8)

SHEET NUMBER

E104

RECORD DOCUMENTS

NOTE:
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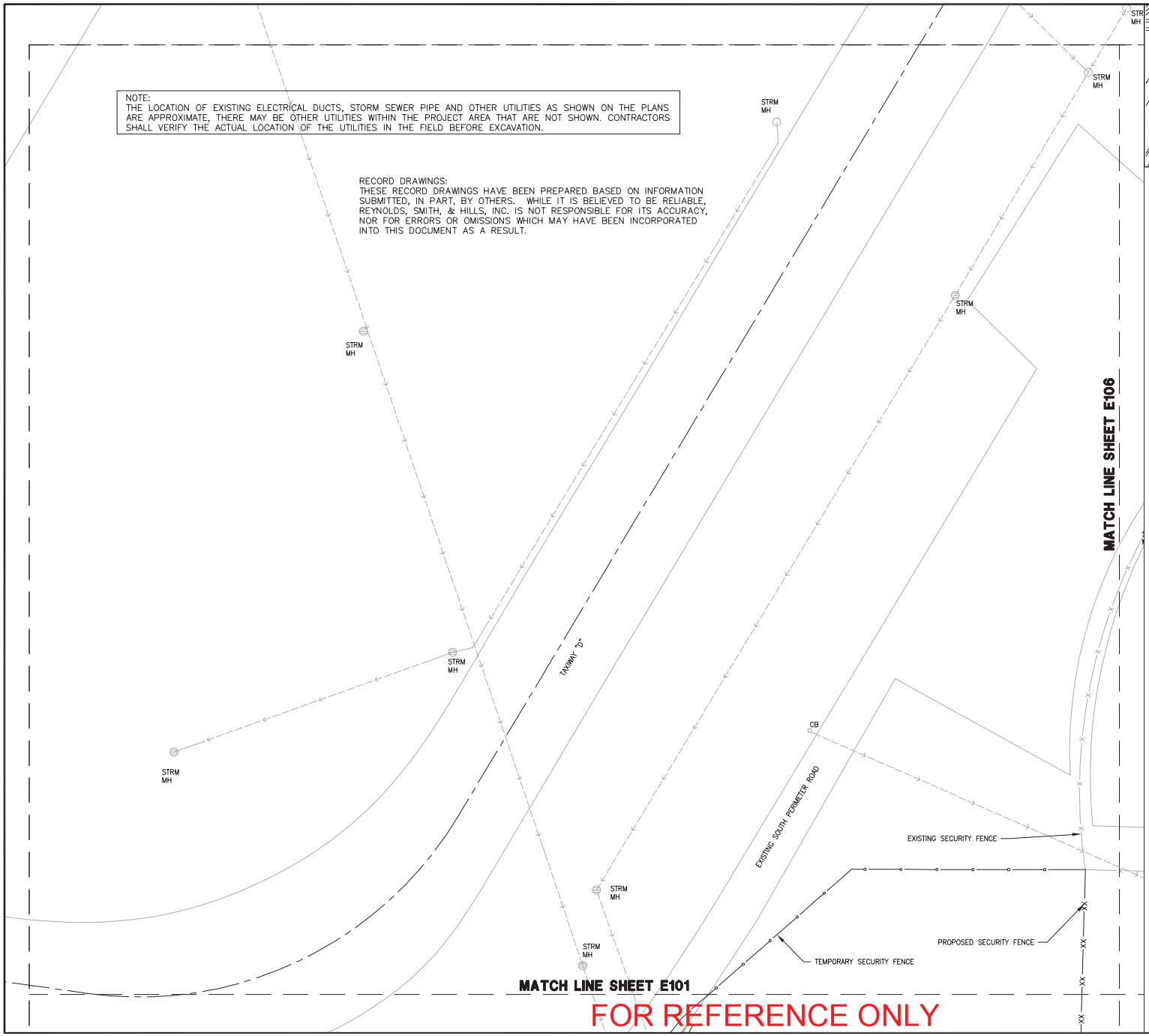

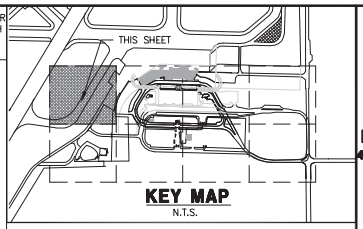

KEY MAP
N.T.S.

NORTH
0 30' 60'

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DESIGNED BY: BOA

AEP PROJECT NUMBER
214-1882-093 & 095

SHEET TITLE

SITE ELECTRICAL PLAN (SHEET 5 OF 8)

SHEET NUMBER

E105

RECORD DOCUMENTS

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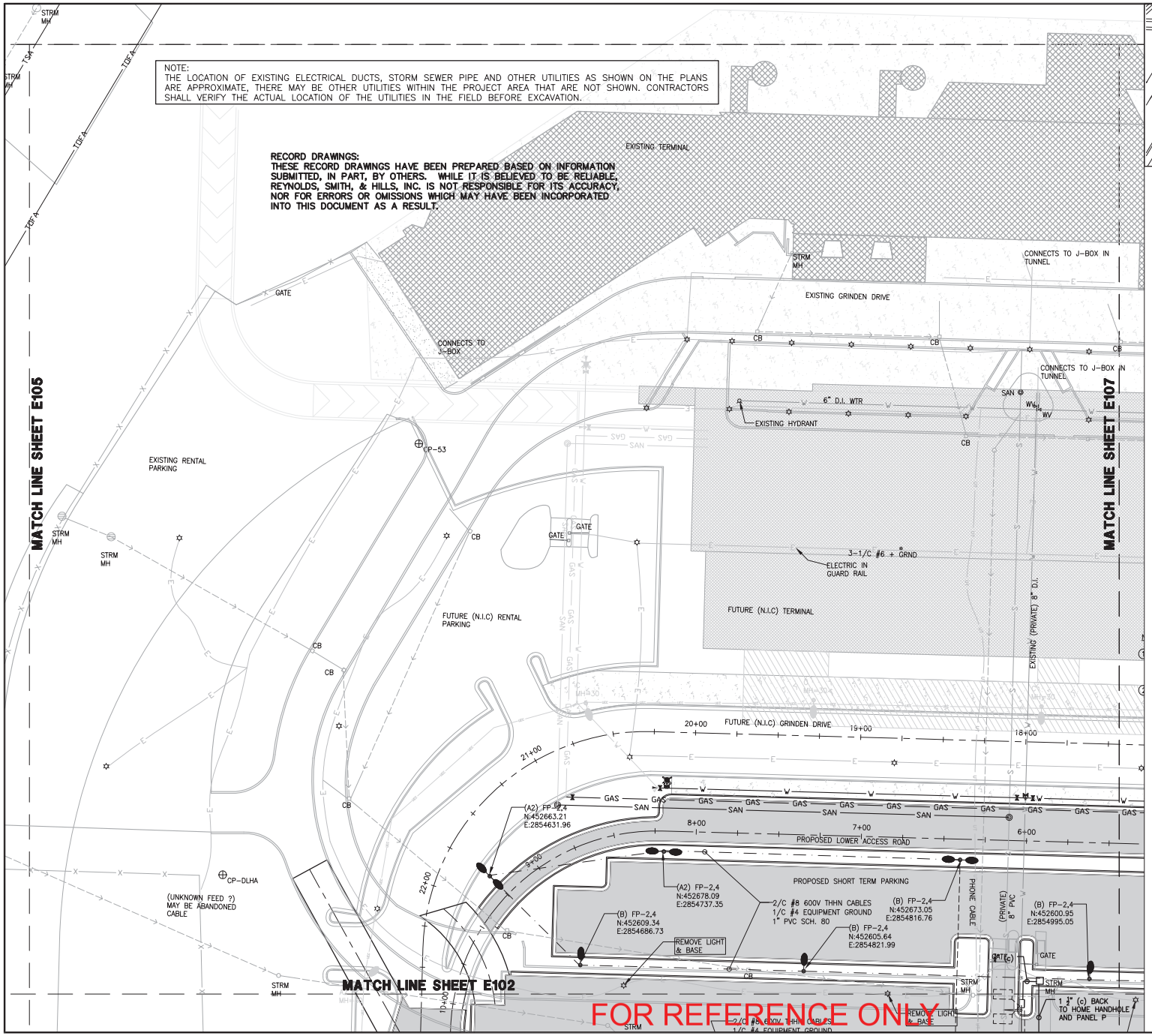

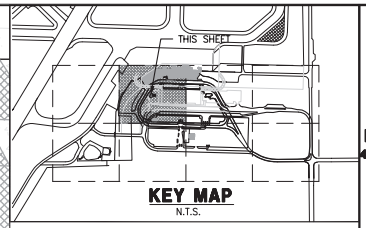

KEY MAP
N.T.S.

NORTH
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VERTICAL DATUM IS NAVD 88
HORIZONTAL DATUM IS NAD83

LEGEND

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- PROPOSED OVERHEAD ELECT.
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214-1882-093 & 095

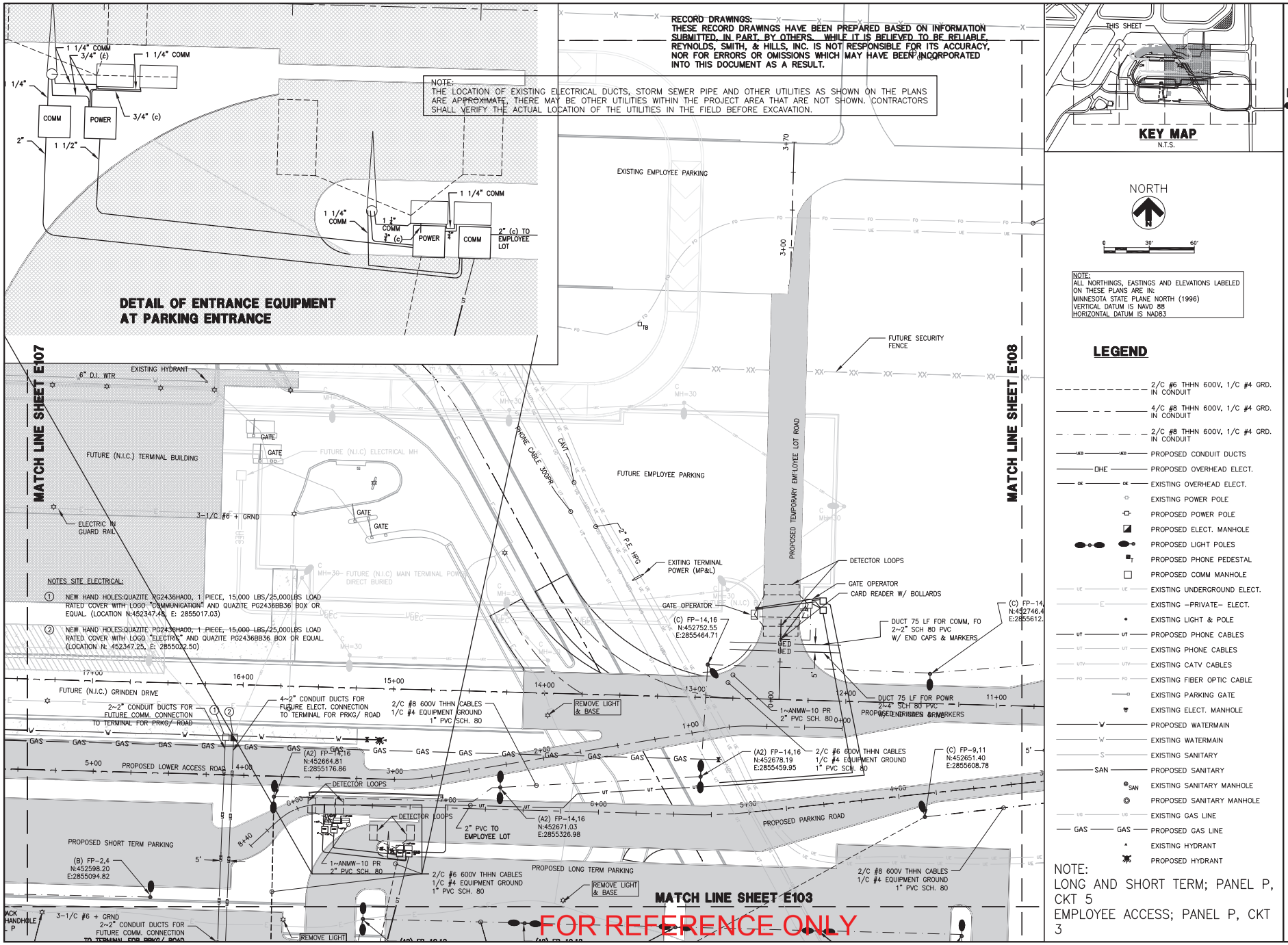
SHEET TITLE

SITE ELECTRICAL PLAN (SHEET 6 OF 8)

SHEET NUMBER

E106

RECORD DOCUMENTS



KEY MAP
N.T.S.

NORTH

0 30' 60'

NOTE:
ALL NORTHINGS, EASTINGS AND ELEVATIONS LABELED ON THESE PLANS ARE IN:
MINNESOTA STATE PLANE NORTH (1996)
VERTICAL DATUM IS NAVD 88
HORIZONTAL DATUM IS NAD83

LEGEND

- 2/C #6 THHN 600V, 1/C #4 GRD. IN CONDUIT
- 4/C #8 THHN 600V, 1/C #4 GRD. IN CONDUIT
- 2/C #8 THHN 600V, 1/C #4 GRD. IN CONDUIT
- PROPOSED CONDUIT DUCTS
- PROPOSED OVERHEAD ELECT.
- EXISTING OVERHEAD ELECT.
- EXISTING POWER POLE
- PROPOSED POWER POLE
- PROPOSED ELECT. MANHOLE
- PROPOSED LIGHT POLES
- PROPOSED PHONE PEDESTAL
- PROPOSED COMM MANHOLE
- EXISTING UNDERGROUND ELECT.
- EXISTING –PRIVATE– ELECT.
- EXISTING LIGHT & POLE
- PROPOSED PHONE CABLES
- EXISTING PHONE CABLES
- EXISTING CATV CABLES
- EXISTING FIBER OPTIC CABLE
- EXISTING PARKING GATE
- EXISTING ELECT. MANHOLE
- PROPOSED WATERMAIN
- EXISTING WATERMAIN
- EXISTING SANITARY
- PROPOSED SANITARY
- EXISTING SANITARY MANHOLE
- PROPOSED SANITARY MANHOLE
- EXISTING GAS LINE
- PROPOSED GAS LINE
- EXISTING HYDRANT
- PROPOSED HYDRANT

NOTE:
LONG AND SHORT TERM; PANEL P, CKT 5
EMPLOYEE ACCESS; PANEL P, CKT 3

RS&H
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Reynolds, Smith and Hills, Inc.
4525 Airport Approach Road, Ste A
Duluth, Minnesota 55811
218-722-1227 FAX 218-722-1052
www.rsandh.com

DULUTH INTERNATIONAL AIRPORT

REPLACEMENT TERMINAL AREA DEVELOPMENT, LANDSIDE SITE PHASE I

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

Typed Name JOHN E. HIPPCHEN

Date 01/14/2011 Reg. No. 22088

REVISIONS

NO.	DESCRIPTION	DATE

DATE ISSUED: 01-14-2011
REVIEWED BY: BCT
DRAWN BY: LAD
DESIGNED BY: BOA

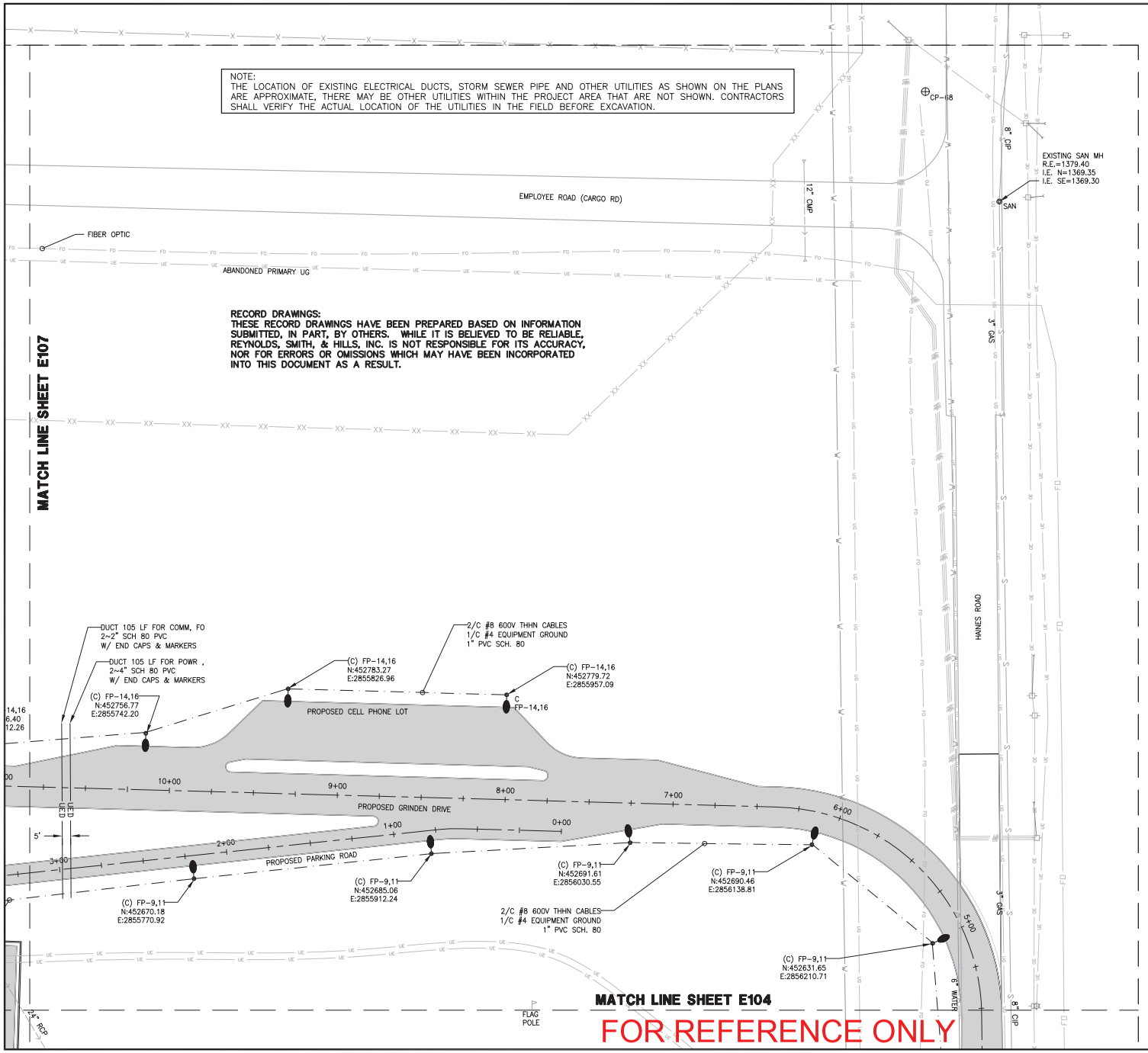
AEP PROJECT NUMBER
214-1882-093 & 095

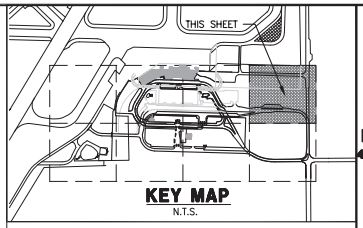
SHEET TITLE

SITE ELECTRICAL PLAN (SHEET 7 OF 8)

SHEET NUMBER
E107

RECORD DOCUMENTS





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DULUTH INTERNATIONAL AIRPORT

REPLACEMENT TERMINAL AREA DEVELOPMENT, LANDSIDE SITE PHASE I

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

Typed Name JOHN E. HIPPCHEN

Date 01/14/2011 Reg. No. 22088

REVISIONS

NO.	DESCRIPTION	DATE

DATE ISSUED: 01-14-2011
REVIEWED BY: BCT
DRAWN BY: LAD
DESIGNED BY: BOA

AEP PROJECT NUMBER
214-1882-093 & 095

SHEET TITLE

SITE ELECTRICAL PLAN (SHEET 8 OF 8)

SHEET NUMBER
E108

RECORD DOCUMENTS

DULUTH INTERNATIONAL AIRPORT **APPENDIX A**
NEW PARKING STRUCTURE AND EXTERIOR WAYFINDING SIGNAGE
BID PACKAGE 2D - ADDENDUM NO. 3

Item	Work Scope	Bidder Questions	Responses
The Jamar Company			
1.	WS 7.10D	I have some concern with the sizes of the ACM (aluminum composite material) that are currently detailed for the underside of the skywalk. Due to maximum width of ACM sheet being 62" wide, I would propose the introduction of an additional joint line, as the panels are currently detailed at 80" wide, 72" wide, and 69" wide.	To be addressed in Addendum 3.
2.	WS 7.10D	Please help I can't find "Division 07 Section Roof Specialties." It is referred to in Spec 075323 EPDM 1.2 B 3. Is there supposed to be a "Roof Specialties" Spec section?	Spec section does not exist. Will revise spec reference in Addendum 3
3.	WS 7.10D	The EPDM Spec calls for insulation adhesive to be used. This adhesive needs 40 degrees minumum for application. With the roofs on the two stair towers being constructed during the winter months, this is not going to work. Please advise of an acceptable mechanical fastener instead of the adhesive.	No, roof will be installed as specified.
Life Safety Hardware Consultants			
1.	WS 8.30D	Section 087100 article 2.1 the project calls for Best cylinders; however, on the actual locksets they have 4 other manufacturers listed and excluded the Best locksets. Just want to know if I can bid the Best lockset to go with the cores?	Manufacturer of locks and keyed cylinders must match items provided on the new terminal project. All cylinders must be keyed into the DAA's existing new terminal PRIMUS XP High Security key system. No substitutions allowed.
Bunting Graphics, Inc.			
1.	WS 10.20D	Please provide details for the following sign types: S1, S2, and S3.	The detail beneath the Sign Schedule on sheet A701 "Example Sign" is the one that applies for those three sign types.
2.	WS 10.20D	Can we assume you will provide the foundations for the 19 large site directional signs?	No, Signage Contractor is responsible for foundations for Signage.
3.	WS 10.20D	Please advise where we can find the mounting details for the banner and the smaller traffic signs?	The banners will hang off of the pre-existing banning arms on the existing light poles.
Northern Door & Hardware, Inc.			
1.	WS 8.30D	Should the locks and cylinders for this project be keyed into the system we just created for the new Terminal?	Manufacturer of locks and keyed cylinders must match items provided on the new terminal project. All cylinders must be keyed into the DAA's existing new terminal PRIMUS XP High Security key system. No substitutions allowed.
2.	WS 8.30D	Where are the corner guards shown on the print?	The detail for the corner guards is 3/A520. It is called out on sheet A100 (corner of room #B05) and sheet A101 (corner of rooms #105 and #106).
Northern Industrial Erectors, Inc.			
1.	WS 5.10D	Just to clarify, are the following assumptions correct: - The steel for the CMU and Precast connections are by the Steel Contractor. - The steel for the Precast Plank and Precast Panels connections are by the Precast Contractor. Reference details, 8/S502, 4/S503, 6/S701, and 4/S702.	Yes to both assumptions.
2.	WS 5.10D	Will the stairs be able to be installed before the precast roofs are set?	No.
3.	WS 5.10D	Will the equipment screen be installed before the rubber roof is installed?	Base plates will need to be installed first, then the EPDM roof will be installed, and then the equipment screen will be installed.
4.	WS 5.10D	Per the Work Scope 5.10D Item W, the architectural drawings do not have any detail that match the existing edge detail. I believe the architect should make a detail and add it to the bid documents.	Detail 6/A526 added to Addendum 3.
Sign Source, Inc.			
1.	WS 10.20D	It appears that the ID and ADA signage is not specified or on the signage schedule for the parking structure interior signage. Where are the details and information for this signage?	No other ADA signage is required except for Area of Refuge sign, which will be added by this addendum.
2.	WS 10.20D	In the exterior wayfinding signs the Banners W202 of the plans item 13. No counts are specified. And Banners are not called out in Section 10 14 00, 1.2, A page 1.	Contractor to provide 85 banners in accordance with specification section 101453 Traffic Signage, to be issued with Addendum 3
3.	WS 10.20D	Also note that Sunbrella fabric is not available in white. White ink cannot be printed on it. There are Vinyl banner fabrics in white available.	Banner detail and spec section 101453 Traffic Coatings(to be issued as part of Addendum 3) say "Sunbrella fabric or equal". If Sunbrella fabric not available in specified colors, submit equal product.
4.	WS 10.20D	This is in reference to pole sizes for wayfinding sign type E.1.1 & E.1.2 elevation also sign type E.2(L) elevation. Lakehead Sign had a local engineer look at the pole sizes on these signs and recommended 14" x 14" poles (instead of 10" x 10") on the double pole mount overhead mounted signs and 14" x 14" or as much as 16" x 16" poles for the flag mounted overhead signs. Will engineering certification be required for these signs?	Yes, refer to Work Scope Description and Specifications for engineering requirements.
5.	WS 10.20D	Are signage contractors required to bid on supports and foundations shown for exterior signage and go through the change order process if our engineered drawings dictate that a larger support or foundation is required?	Contractors are required to provide foundations and supports properly sized as required for the exterior wayfinding signage. Refer to Work Scope Description and Specifications for engineering requirements.
6.	WS 10.20D	Has the "Neon Illuminated FULL" sign been removed from the project?	Yes, it has been removed.

DULUTH INTERNATIONAL AIRPORT **APPENDIX A**
NEW PARKING STRUCTURE AND EXTERIOR WAYFINDING SIGNAGE
BID PACKAGE 2D - ADDENDUM NO. 3

Item	Work Scope	Bidder Questions	Responses
Hunt Electric Corporation			
1.	WS 26.10D	CCTV Alt # 8 indicates we will be installing CAT6 cable for the cameras. Is low, med, or high performance cable required?	See addendum #3 Specification 27.13.00 & 27.15.00
2.	WS 26.10D	Plans show Area of Rescue assistance stations. Is there a specific manufacturer required?	See Specification 27.32.01
3.	WS 26.10D	The plans show communications drops. There is no specifications on this system. What manufacturer is required at the airport?	See addendum #3 Specification 27.11.00, 27.13.00, & 27.15.00
4.	WS 26.10D	The plans show communication drops as a black triangle. How many data drops are required at each location?	See Legend Sheet E001
5.	WS 26.10D	Sheet E601 indicates we'll be providing and installing a 24 strand fiber patch panel. Is there a specific manufacturer required?	None specified. However, Corning was used in the Terminal Bldg
5.	WS 26.10D	Sheet E601 (detail # 2) Technology riser diagram: What is the distance from MDF to GCTC? There is no sheet showing where the MDF is. Is there any more information that can be provided?	MDF is room 217 in Terminal Bldg. GCTC to Skywalk /Terminal column C7 is approximately 350'. See Terminal Bldg 2nd floor plan.
Hinrichs Estimating, Inc.			
1.	WS 9.60D	I have a couple questions regarding the Terrazzo 096623 on this project. I see there is a Work Scope 9.60D for Terrazzo, but it is also listed in 9.65D Flooring as well. I see there are also two separate alternates for this work (3A & 3B) that include the same area. Is a bid form required for terrazzo work? Also, section 096623 1.2.A says section includes flooring and base. I don't see that any base is shown or called for on the drawings. Is terrazzo base required?	Work Scope 9.60D and 9.65D are completely separate work scopes. A bid form is required for all bidders bidding on a work scope. Only one work scope (9.60D or 9.65D) will be awarded depending on how the bids come out. Alt. 3A is for Work Scope 9.60D only. Alt. 3B is for WS 9.65D only. There is no Terrazzo base required.
Rice Lake Construction Group			
1.	WS 3.30D	Based on the schedule in bidding documents, the pouring of the curb in the parking structure would happen during winter months. Will there be provisions to heat this area or the precast plank?	All curbing will be poured starting in April 2014. Curbing in DAA Parking will be poured over the winter as this area is going to be heated by the Construction Manager.
Benson Electric Company			
1.	WS 26.10D	On sheet E601 there is a panel on the riser diagram shown as P1RA. There is no feed shown to this panel and there is also not a panel schedule to indicate the breakers or even the amp rating. What is the amp rating of this panel? What quantity and size should the breakers be for this panel?	See typical lighting control detail on E002
2.	WS 26.10D	There is a specification for the programmable circuit breaker lighting control. The prints do not indicate which panels and which breakers this section relates to. Which panels are to receive programmable breakers and which breakers in that panel should be programmable?	P1RA lighting control panel can be used in lieu of programmable CBs in panel P1MA.
3.	WS 26.10D	There are two type H fixtures mounted to the underside of the skywalk. Are these two also to be changed to LED under alternate 4?	No
4.	WS 26.10D	The riser diagram on sheet E601, keyed note 1 mentions duct bank. The utility transformer appears to be located within 5' from the parking structure. Typically a duct bank would not be required. Please clarify if the feed from the utility transformer to the service panel is required to be in duct bank. If so, is there a specification for the duct bank?	Addendum #3 revised drawing E010 to show utility feed ductbank and detail. Secondary feed ductbank is not required unless required by the utility, based on actual transformer location.
5.	WS 26.10D	There is a specification for the lightning protection system. There is not a lightning protection system shown on the drawings. Is a lightning protection system required? If so, is there a drawing depicting what is required?	Lightning protection is required using 50' air terminal spacing around garage perimeter and along top of skywalk and SW stair tower.
6.	WS 26.10D	Reference sheet E101 near gridline 1 just outside mechanical room 106 near OHD-1. There is an "E" symbol with an arrow and a note that reads "see note 8." There is no note 8 on the plans, please clarify what note 8 is.	Addendum #3 adds note 8 to drawing E101: Provide OH door controls installation and wiring per manfacturer's instructions.
7.	WS 26.10D	Also near this is a symbol EIB shown. This is part of an access control system. There is no access control specification nor are there any other access control symbols shown. Please clarify if this is a typo or what the intent is. If there is supposed to be an access control system, please provide a specification as well as details of what is required.	Addendum # 3 deletes EIB box and DCP circuit P1LA-2 at OH door
8.	WS 26.10D	Alternate 8 references CCTV. There is no CCTV specification. The notes on the prints make reference to the existing cameras system. Please provide a specification for the cameras and the CCTV system.	See E601 revision for Addendum # 2
9.	WS 26.10D	Drawing E010, note 3 appears to require an underground vehicle detection system and references sheet CE101. CE101 is not under this electrical scope according to the Work Scope Description. Please clarify who provides the vehicle detector loop, what work is required at this location and which Work Scope provides this.	Addendum #3 deletes sensor wiring and Note 3.
10.	WS 26.10D	There are communication outlets shown on the prints; however, there are no specs for this section other than the security phones. Please provide a specification to detail the type of cabling, outlets, connectivity, racks, etc., that are to be used.	See addendum #3 Specification 27.11.00, 27.13.00, & 27.15.00
11.	WS 26.10D	Is there a set of electrical drawings for the site lighting that we can refererence for the Exterior Wayfinding Signage power tie in?	See site electrical record drawings "for reference" in this addendum.

DULUTH INTERNATIONAL AIRPORT **APPENDIX A**
NEW PARKING STRUCTURE AND EXTERIOR WAYFINDING SIGNAGE
BID PACKAGE 2D - ADDENDUM NO. 3

Item	Work Scope	Bidder Questions	Responses
Sell Hardware, Inc.			
1.	WS 8.30D	Section 10440 Fire Extinguisher Cabinets and Accessories: Who is the manufacturer of the Safety Flammable Cabinets? All the manufacturers you have listed do not supply it.	"Flammable Cabinet with Manual Close Double Door 44 Gallon", stock #WB237776 by Global Industrial, globalindustrial.com sales@globalindustrial.com (888) 978-7759
2.	WS 8.30D	We are trying to bid Work Scope 8.30D Doors, Frames, Hardware, & Misc. Specialties: The doors, frames, hardware, and fire extinguisher cabinets are fine except as noted above. But the Section 102613 corner guards we have looked over all the plans and we cannot find the Note CG-F and CG-P for corner guards any where on the plans. Please advise.	The detail for the corner guards is 3/A520. It is called out on sheet A100 (corner of room #B05) and sheet A101 (corner of rooms #105 and #106).
SimplexGrinnell			
1.	WS 26.10D	I do not see an Access Control Spec. Is there going to be one?	No Access Control being provided
2.	WS 26.10D	I do not see a CCTV Spec, other than the notes on page E601, addenda #2 drawings. Is there going to be one. NVR's should be added for recording and existing fail-over needs.	E601 Addendum #2 specifies cameras. No specification section issued. No NVR required. Garage CCTV will tie into Terminal system.
3.	WS 26.10D	Existing Airport Terminal cameras are American Dynamics. Should the new cameras match existing?	Cameras should match existing provided they meet specification on E601 Addendum #2.
4.	WS 26.10D	Are there going to be any Card Readers for the parking ramp? I do not see any on the drawings.	No
5.	WS 26.10D	On page E101, there is an EIB (Electric Interface Box for Access Ctrl) on the outside wall of Mechanical Room 105. There is NOT an IFP (Intelligent Field Panel) box to control the EIB. Is the intent that the Tamper Switch on the GCTC cabinet be wired to an IFP?	Addendum # 3 deletes EIB box and DCP circuit P1LA-2 at OH door. GCTC tamper and temperature switches are connected to Terminal access control system. See #1E150.
6.	WS 26.10D	There are no details of the Access Control and its connections back to the Airport Terminal.	GCTC switches are to be connected to Terminal MDF. Coordinate with Airport IT contractor for Access Control connections
7.	WS 26.10D	Here is one for the Fire System that should be clarified: On page E100, Note 7 states to provide a "network connection…….to Terminal Bldg FACP." It does not state specifically what that connection should be. It needs to be 2 strands of Single Mode Fiber, which will communicate both data (alarm / trouble type information) and Voice, so if an announcement is made from the Terminal via Fire System Microphone the Parking Ramp broadcasts that same information.	Addendum #3 adds note 10 to fire alarm notes on drawing E601: Fire alarm system shall operate as network node of the Terminal bldg system.
8.	WS 26.10D	Area of Rescue v.s. Security Telephones: Page E100, note 4 talks about Area of Rescue intercom box and then refers to Specification 273201. Spec 273201 is Security Telephones, and Talk-A-Phone is listed with a part # of ETP-100MB. That is a surface mount device only. ETP-100EB is optional surface or flush mount device. It mounts via a MS-400 Flush Mount Box and per plan note it is to be flush mounted.	Area of Rescue intercom is to be flush mounted.
9.	WS 26.10D	My biggest question / comment is that the terminology "Area of Rescue" typically means there is a head-end of some sort with a light / communication means to each remote box for the fire dept to communicate with whoever is in trouble. There is not any "Area of Rescue" head-end shown, nor does the Spec 273201 ask for one. The ETP-100EB does work independently via a phone line and calls that phone # when activated. I am just being certain this is the desired operation.	The units are to be programmed to call a number designated by the airport, to contact the security center in the airport police office.
10.	WS 26.10D	For the 28 cameras, there will definitely be an NVR added to the system, and possibly a 2nd NVR to meet the failover requirements (again, no CCTV Spec but we do know what is expected). Is there room in the existing rack to add 2 NVR's, or if a rack is needed, is there room in the I.T. room for another rack?	No NVR required. Garage CCTV will tie into Terminal system.
Harmon Sign			
1.	WS 10.20D	Do you have a correct Specification for the programmable LED sign on drawing W724 detail 9? Daktronics model AF-3200-32x96-8A is an obsolete unit.	This unit is currently still listed as an avaialble product line on the Daktronics website. See link: http://www.daktronics.com/ProductsServices/Products/Message-Displays/Outdoor-Monochrome/12-mm/DaktronicsGalaxyAF320012mm/Pages/default.aspx
Dell Comm Inc.			
1.	WS 26.10D	I don't see the Specifications for Voice, Data, Sound, PA, and Intrusion. Is one coming soon?	See addendum #3 Specification 27.11.00, 27.13.00, & 27.15.00. Intrusion and PA are not required.
2.	WS 26.10D	The existing voice and data infrastructure has a 25 year manufactures warranty; will the ramp be included in this? If a different manufacturer of voice/data connectivity is allowed other than what is currently installed, it won't be covered under the warranty the airport has on the existing system.	If the garage system is not covered under the Terminal warranty, it should have its own warranty.
3.	WS 26.10D	Will temporary service be needed to bring the ramp live when the skywalk is under construction?	Yes, this Work Scope is to provide temporary service.

DULUTH INTERNATIONAL AIRPORT **APPENDIX A**
NEW PARKING STRUCTURE AND EXTERIOR WAYFINDING SIGNAGE
BID PACKAGE 2D - ADDENDUM NO. 3

Item	Work Scope	Bidder Questions	Responses
Minnesota Air Inc.			
1.	WS 22.10D	Here is what Minnesota Air would like to get approved: Spec section 238239 ELECTRIC UNIT HEATERS AND BASEBOARD HEATERS– Berko	Substitution requests will not be reviewed until after contract award
2.	WS 22.10D	Here is what Minnesota Air would like to get approved: Spec section 237339 INDOOR DIRECT FIRED HEATING AND VENTILATING UNIT – Rupp	Substitution requests will not be reviewed until after contract award
3.	WS 22.10D	Here is what Minnesota Air would like to get approved: Spec section 239000 BUILDING AUTOMATION SYSTEM – Carrier.	Substitution requests will not be reviewed until after contract award
Hanson Structural Precast, Inc.			
1.	WS 3.40D	This is in regards to the NE stair shaft. The previous documents had the plank connecting to the precast walls, which makes sense because everything could be erected together. The new documents show the plank sitting on interior cmu walls and now it looks like you would have to mobilize multiple times to put the plank on the cmu walls at each level.	The plank connects to the CMU walls as indicated on the drawings.
2.	WS 3.40D	Crane access—will a crane be allowed at the interior of the ramp for erection or is the crane required to sit on the outside of the footprint?	Yes, crane access will allowed at the interior of the ramp for erection.
3.	WS 3.40D	The screed side finish of the exterior walls call for gray color. Is the colored concrete required to wrap around the sides of the panels or can the panels be poured with half colored concrete and half gray concrete?	Colored concrete in both the base bid and alternate bid is for the first 3" of the thickness of the panel only. Color is not required to wrap around openings.
4.	WS 3.40D	Since it is unknown to the bidders how many days the crane will be shut down due to airport restrictions, is there an allowance, or number of hours or days that should be accounted for in the bid? Per the union agreements, I have been told that the crew is still entitled to 2 hours pay plus per diems if the jobsite is shut down. There is also the cost of the delivery trucks that would not be able to be unloaded.	This Work Scope is reponsible to provide a complete bid. Unforeseen conditions will be handled on a case-by-case basis as they arise.
5.	WS 3.40D	Is heat and enclosures to be provided by each trade or is the owner enclosing the ramp and supplying heat?	Review Work Scopes Descriptions "Winter Conditions." Also note that joint sealants will be installed starting April 2014. Joint sealants in the DAA Parking area will be installed over the winter as this area is going to be heated by the Construction Manager.
6.	WS 3.40D	Should the base bid mix design only be grey concrete?	No. Base bid mix design should be as specified.
7.	WS 3.40D	In the 034500-part 2 products, it calls for the base bid to be colored concrete with just the form finish. This is something that is not done with an architectural colored panel. Maybe a thin band or something, but not the entire surface of the panel. You will see any and all form lines, form oil, footprints, etc. Nobody would accept this on the completed ramp and I would be afraid that the design team thinks it is different than what it is and would reject panels. Is this the intent?	Base bid mix design should be as specified. Finish of base bid panels should be Smooth Form Grade A Finish. Form lines should be minimized as much as possible though whatever means possible. Specificiation for preacst units contains language describing the level of finish expected and any/all finish and cleaning requirements. Precast units that do not meet those requirements given in the specifications will be rejected.
8.	WS 3.40D	If you read the description for the grade A form finish, it is the Spec for standard panels that are going to be painted. If they are going to paint the walls, then they don't need to be colored concrete. Is the intent that these panels be painted?	The intent is for the walls to have the finish specified.
Swanson & Youngdale, Inc.			
1.	WS 9.90D	Section 071816 Vehicular Traffic Coatings lists only one manufacturer for product selection and requires the manufacturer's acceptance of subcontractor as an approved applicator. Will an equal product be accepted and who will determine if it is in fact an equal?	See Addendum changes to traffic coating spec.
St. Germain's Glass, Inc.			
1.	WS 8.40D	Hollow metal frame type HM5 is called out to be GL-5 (1/4" clear tempered) but also is called out as 90 min fire rated. If it is to be fire rated, the largest size can be 56" x 46 1/2". Could this be clarified please.	In checking the Door Schedule, door #106 (where this frame is located) is not noted to be a rated door. Not sure where you are getting this question from, but the answer is NO - it is not a rated assembly.
2.	WS 8.40D	The skywalk storefront needs to have something structural to attach it to at both the head and sill conditions and to support the dead load at the sill. The fastening is typically done in the glass pocket area but can also be done using a strap anchor back into the building.	To be addressed in addendum 3 drawings

RS&H IMPROVING YOUR WORLD

Date: June 7, 2013

RE: City of Duluth Bid #13-4401
New Parking Structure and
Exterior Wayfinding Signage
Bid Package 2D

Addendum No. 3

TO: Prospective Bidders

This Addendum forms a part of the Contract Documents and modifies the original Bidding Documents dated May 15, 2013. Acknowledge receipt of this Addendum in the space provided on the Bid Form. Failure to do so may subject the Bidder to disqualification.

1.0 PROJECT MANUAL

1.1 Bid Form:

1.2 Table of Contents:

Volume 2 of 2 – Part 11 Division 10 – Specialties: **Add Section 10 14 53 Traffic Signage to the table of contents**

Volume 2 of 2 – Part 11: **Add Division 21 – Fire Suppression to the table of contents**

Volume 2 of 2 – Part 11 Division 26 – Electrical: **Add the following sections to the table of contents:**
27 11 00 Communications Equipment Room Fittings
27 13 00 Communications Backbone Cabling
27 15 00 Communications Horizontal Cabling

1.3 Technical Specifications:

Volume 2 – Part 11 Division 1-49 Technical Specifications, Division 7 Thermal and Moisture Protection
Revise Specification Section 071816 Vehicular Traffic Coatings: Section 2.1 to read:

A. Basis of Design Product: Provide CCW-5123 Deck Coating System as manufactured by Carlisle Coatings and Waterproofing, Incorporated, 900 Hensley Lane, Wylie, Texas 75098, Phone: (800) 527-7092, Fax: (972) 442-0076.

B. Acceptable alternative products:
1. "Autogard II - FC" – Neogard Corporation.
2. "Iso-Flex 760 U HL HVT AR" – LymTal International, Inc.
3. Flexodeck Mark 170.2" – Poly-Carb.
4. "Sikalastic 720/745 Traffic System" – Sika.
5. "Conipur II" – Sonneborn (BASF).

C. System shall be manufacturer's "Medium duty" system in parking stall and driving areas, and "Heavy Duty" in turning lanes.

D. The traffic coating color shall be gray.

E. Use VOC compliant traffic coatings not exceeding 400 grams/liter.

F. Aggregates for Traffic Coating: Provide aggregate with a minimum hardness of 6.5 on Mohr's Hardness Scale with #16-#30 grit that is approved by traffic coating manufacturer.

1. Approved Products:
    a. "1630 FRAC" – Badger Mining Corporation (phone: 414-361-2388).
    b. "Grade 4" – Flint Rock Products (phone: 918-673-1737).
    c. "#3 Q-ROK" – U.S. Silica (phone: 304-258-2500).
    d. "16/30 Silica Sand" – Texas Mining (phone: 915-597-0721).
    e. "Granusil 2095" – Unimin.

Volume 2 – Part 11 Division 1-49 Technical Specifications, Division 7 Thermal and Moisture Protection
Revise Specification Section 071816 Vehicular Traffic Coatings: Section 2.2 to read:
"2.2 Basis of Design Product Description"

Volume 2 – Part 11 Division 1-49 Technical Specifications, Division 7 Thermal and Moisture Protection
Revise Specification Section 075323 Ethylene-Propylene Diene-Monomer (EPDM) Roofing: Section 1.2 B to read:

B. Related Sections:
1. Division 06 Section 061000 "Rough Carpentry" for wood nailers, curbs and blocking.
2. Division 07 Section 076200 "Sheet Metal Flashing and Trim" for metal roof penetration flashings, flashings and counterflashings.
3. Division 07 Section 079200 "Joint Sealers" for joint sealants, joint fillers and joint preparation.
4. Division 15 Section "Sanitary, Vent and Storm Drainage Piping" for roof drains.

Volume 2 – Part 11 Division 1-49 Technical Specifications, Division 10 Specialties:
Add: Specification Section 10 14 53 Traffic Signage in its entirety. (9 pages)

Volume 2 – Part 11 Division 1-49 Technical Specifications, Division 21 Fire Suppression:
Add: Specification Section 21 13 16 Dry-Pipe Sprinkler Systems in its entirety. (15 pages)

Volume 2 – Part 11 Division 1-49 Technical Specifications, Division 26 Electrical
Add: Specification Section 27 11 00 Communications Equipment Room Fittings in its entirety. (6 pages)

Volume 2 – Part 11 Division 1-49 Technical Specifications, Division 26 Electrical
Add: Specification Section 27 13 00 Communications Backbone Cabling in its entirety. (22 pages)

Volume 2 – Part 11 Division 1-49 Technical Specifications, Division 26 Electrical
Add: Specification Section 27 11 00 Communications Horizontal Cabling in its entirety. (18 pages)

2.0 DRAWINGS: *Replace drawings listed below with sheets included with this Addendum No. 3*

Structural Drawings: Replace drawings with sheets included with this addendum No. 3.

S002 – General Structural Notes
S101 – First Level Framing Plan
S102 – Second Level Framing Plan
S104 – Skywalk Floor and Roof Framing Plans
S301 – Truss Elevation and Details
S503 – Structural Foundation Details
S702 – Structural Framing Details

Architectural Drawings: Replace drawings with sheets included with this addendum No. 3.

A104 – Enlarged Skywalk Plans
A302 – Enlarged Skywalk Elevations
A403 – Wall Sections - Skywalk
A514 – Plan Details – Skywalk
A521 – Room Finish Schedule & Miscellaneous Details
A522 – Enlarged Roof Plans & Details
A526 – Section Details – Skywalk
A701 – Door & Window Schedules Types & Details
A710 – Signage Schedule & Details

Electrical Drawings: Replace drawings with sheets included with this addendum No. 3.

E010 – Electrical Site Plan

3.0 OTHER:

END OF ADDENDUM NO. 3

NEW PARKING STRUCTURE AND EXTERIOR WAYFINDING SIGNAGE DULUTH INTERNATIONAL AIRPORT DULUTH, MINNESOTA

SECTION 101453 – TRAFFIC SIGNAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Exterior Wayfinding Roadway Signs.
2. Roadway Sign Support Structures and Foundations.
3. Electrical work and lighting for illuminated signs.
4. Regulatory Signage.
5. Banners.

B. Related Requirements:

1. Section 032000 “Concrete Reinforcement”
2. Section 033000 “Cast-in-Place Concrete”
3. Section 051200 “Structural Steel”
4. Section 101400 “Signage" for parking structure signs.
5. Division 26 - Electrical
6. Division 31 - Earthwork

C. The Drawings show design intent are not intended to cover every detail of materials, parts, construction, mounting or installation. Furnish all required engineering, materials, parts, construction, mounting, and installation necessary to complete the entire work, whether or not said details are shown or specified, at no additional cost to the Project.

D. These contract documents are for design intent compliance and should only be used as a guide to produce the finished size, appearance, and function shown. Nothing contained in these contract documents shall be construed as a design for any engineered element.

E. The Manufacturer shall provide all required structural and electrical engineering drawings. Drawings shall be stamped and signed by the respective structural and electrical engineers currently registered in the State of Minnesota.

F. All applicable national, state and local codes, ordinances and safety standards shall take precedence over these contract documents and it shall be the

responsibility of the Manufacturer or his Subcontractor(s) to make certain that these codes, ordinances and safety standards are in compliance.

1.3 DEFINITIONS

A. Accessible: In accordance with the accessibility standard.

1.4 REFERENCES

A. U.S. Access Board's “Americans with Disabilities Act and Architectural Barriers Act Accessibility Guidelines”, 2004 Edition.

B. Federal Aviation Administration Advisory Circular 150/5360-12E “Airport Signing and Graphics”.

C. AASHTO (American Association of State Highway and Transportation Officials) “Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, 5th Edition”, with 2010 and 2011 Interim Revisions.

D. Minnesota Department of Transportation’s “2011 Standard Signs Summary”

E. Minnesota Department of Transportation’s “Minnesota Manual on Uniform Traffic Control Devices”, 2011 Edition.

F. U.S. Department of Transportation’s “Manual on Uniform Traffic Control Devices”, 2009 Edition.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings:

1. Include fabrication and installation details.
2. Show sign mounting heights and accessories.
3. Provide location plans for all signs.
4. Show message list, typestyles, graphic elements**,** and scaled graphic layouts for each sign at least one/eighth full size.

C. Samples:

1. Materials:
   a. Aluminum sheet, with specified finishes, 12” x 12”.
   b. Sign face color samples on specified material, 4” x 4”.
   c. Paint sample for finish of sign structures, 4” x 4”.

2. Wayfinding Signs:
   a. One (1) full-size field sample of Sign Type E.2. When approved, sign may be installed.

b. One (1) full-size field sample of Sign Type E.5. When approved, sign may be installed.

3. Regulatory Signs: One (1) full-size field sample of each of the following sign types:
   a. R1-1
   b. R3-2
   c. R5-1A
   d. R7-C
   e. R7-108
   f. R7-201
   g. R8-3

D. Sign Schedule: Use same designations specified or indicated on Drawings or in a sign schedule.

E. Delegated-Design Submittal:
1. Include complete structural drawings and supporting calculations signed and sealed by a qualified structural engineer licensed in the State of Minnesota.
2. Include complete electrical drawings for roadway sign lighting signed and sealed by a qualified professional engineer licensed in the State of Minnesota.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: Manufacturer and Installer.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For signs to include in maintenance manuals.

1.8 COORDINATION

A. Coordinate sign installations with shop drawings and Manufacturer's data for other construction components that may affect or may be affected by the work.

1.9 QUALITY ASSURANCE

A. Manufacturer Qualifications: Minimum 5 years experience performing the Work required by this section on successful in-service Projects similar in size and scope to this Project.

B. Installer Qualifications: Manufacturer of products or an entity that employs installers and supervisors who are trained and approved by manufacturer.

C. Sole Suppliers: Sign products of similar types shall be supplied by one manufacturer.

1.10 DELIVERY, STORAGE AND HANDLING.

A. Signs and materials shall be delivered to the Project tagged or labeled bearing Manufacturer's name with material or sign identification number and installation location as shown on the Drawings. Signs and materials shall be stored in strict accordance with the Manufacturer's written directions.

1. Finished surfaces shall be adequately protected during all phases of the Work to prevent damage by scratches, stains, discoloration, or other causes. Damage to any surface during fabrication, handling, shipment, storage, and erection shall be remedied by the Contractor at his own expense.

1.11 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
   a. Deterioration of finishes beyond normal weathering.
   b. Deterioration of embedded graphic image.
   c. Separation or delamination of sheet materials and components.

2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer licensed in the State of Minnesota to design sign structures and anchorage for sign types E.1, E.2 and E.3.

B. Loads: Signs shall withstand loads across the total sign area equivalent to 100 miles per hour in any direction:

C. Thermal Movements: For exterior signs, allow for thermal movements from ambient and surface temperature changes.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

D. Accessibility Standard: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's “ADA-ABA Accessibility Guidelines for Buildings and Facilities” for signs.

E. Color, finish, material and process shall match for all work.

2.2 SIGNS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Cummings Signs.
2. Lakehead Sign Co.
3. National Signs.
4. Nordquist Sign Company, Inc.
5. Poblocki Sign Company, LLC.
6. Sign Source
7. Summit Signs.
8. Todd Signs.
9. Western Remac Inc.
10. White Way Signs.

B. Wayfinding Signs: Provide smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:

1. Solid-Sheet Sign and Back: Aluminum sheet with finish specified in "Surface Finish" Subparagraph below and as indicated.

2. Graphics: Characters and symbols die cut from 3- to 3.5-mil thick, weather-resistant reflective pressure-sensitive vinyl film with release liner on the back and carrier film on the front for on-site alignment and application. Manufacturer to produce all pressure-sensitive vinyl graphics on digitally controlled cutting equipment

3. Sign-Panel Perimeter: Finish edges smooth.
   a. Edge Condition: Square cut.
   b. Corner Condition in Elevation: Rounded.

4. Surface Finish:
   a. Baked-Enamel or Powder-Coat Finish protected by a clear coat in colors matching Architect's samples.

5. Flatness Tolerance: Sign panel shall remain flat under installed conditions as indicated and within a tolerance of plus or minus 1/4 inch measured diagonally from corner to corner.

C. Regulatory Signs: Provide smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:

1. Solid-Sheet Sign and Back: Aluminum sheet, 0.080 inch minimum thickness.

2. Sign-Panel Perimeter: Finish edges smooth.
   a. Edge Condition: Square cut.
   b. Corner Condition in Elevation: Rounded.

3. Flatness Tolerance: Sign panel shall remain flat under installed conditions as indicated and within a tolerance of plus or minus 1/4 inch measured diagonally from corner to corner.

4. Unless otherwise indicated, provide in accordance with U.S. Department of Transportation's "Manual on Uniform Traffic Control Devices", 2009 Edition, and Minnesota Department of Transportation's "Minnesota Manual on Uniform Traffic Control Devices", 2011 Edition.

2.3 WAYFINDING SIGN AND SIGN SUPPORT MATERIALS

A. Structural Steel Hollow Structural Sections: ASTM A 500, Grade B.

B. Aluminum Sheet and Plate: ASTM B 209 alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.

C. Aluminum Extrusions: ASTM B 221 alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.

D. Aluminum Pipe: ASTM B 429 alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.

E. Vinyl Film: UV-resistant vinyl film of nominal thickness indicated, with pressure-sensitive, permanent adhesive on back; die cut to form characters or images as indicated and suitable for exterior applications.

F. Paints and Coatings for Sheet Materials: Inks, dyes, and paints that are recommended by manufacturer for optimum adherence to surface and are UV and water resistant for colors and exposure indicated.

2.4 REGULATORY SIGN SUPPORT MATERIALS

A. Posts: Galvanized Steel Pipe, ASTM A 53/A 53M, Type F or Type S, Grade A, Standard Weight (Schedule 40), unless another grade and weight are required by structural loads.

B. Bases: For installation on pavement: Cast iron, either gray iron, ASTM A 48/A 48M, or malleable iron, ASTM A 47/1 47M

2.5 ACCESSORIES

A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signage, noncorrosive and compatible with each material joined, and complying with the following:
   1. Furnish nonferrous-metal or stainless-steel devices unless otherwise indicated.
   2. Exposed Metal-Fastener Components, General:
      a. Fabricated from same basic metal and finish of fastened metal unless otherwise indicated.

b. Fastener Heads: For nonstructural connections, use flathead screws and bolts with tamper-resistant Allen-head slots unless otherwise indicated.

B. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.6 FABRICATION

A. General: Provide sign assemblies according to requirements indicated.

1. Preassemble signs and assemblies in the shop to greatest extent possible. Disassemble signs and assemblies only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation; apply markings in locations concealed from view after final assembly.
2. Form assemblies and joints exposed to weather to resist water penetration and retention.
3. Comply with AWS for recommended practices in welding and brazing. Provide welds and brazes behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed connections of flux, and dress exposed and contact surfaces.
4. Provide rebates, lugs, and brackets necessary to assemble components. Drill and tap for required fasteners.

B. Vinyl: Align vinyl film in final position and apply to surface. Firmly press film from the middle outward to obtain good bond without blisters or fishmouths.

C. Brackets: Fabricate brackets, fittings, and hardware for bracket-mounted signs to suit sign construction and mounting conditions indicated.

2.7 GENERAL FINISH REQUIREMENTS

A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Directional Finishes: Run grain with long dimension of each piece and perpendicular to long dimension of finished trim or border surface unless otherwise indicated.

D. Organic, Anodic, and Chemically Produced Finishes: Apply to formed metal after fabrication but before applying contrasting polished finishes on raised features unless otherwise indicated.

2.8 ALUMINUM FINISHES

A. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

2.9 BANNERS

A. Fabric: 100% Acrylic “Sunbrella” fabric, as manufactured and recommended for its intended use by Glen Raven, Inc., Glen Raven, NC, or equal.
   1. Color and Pattern: As selected by Architect from manufacturer’s standard colors and patterns.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements and other conditions affecting performance of signage work.
   1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.

B. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.

C. Corrosion Protection: Coat concealed surfaces of exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

3.3 ADJUSTING AND CLEANING

A. Remove and replace damaged or deformed signs and signs that do not comply with specified requirements. Replace signs with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.

B. Remove temporary protective coverings and strippable films as signs are installed.

C. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner.

END OF SECTION 101453

NEW PARKING STRUCTURE AND EXTERIOR WAYFINDING SIGNAGE
DULUTH INTERNATIONAL AIRPORT
DULUTH, MINNESOTA

SECTION 27.15.00 - COMMUNICATIONS HORIZONTAL CABLING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
1. Pathways.
2. UTP cabling.
3. Multi-user telecommunications outlet assemblies.
4. Cable connecting hardware, patch panels, and cross-connects.
5. Telecommunications outlet/connectors.
6. Cabling system identification products.
7. Cable management system.

B. Related Sections:
1. Division 16 Section 16710 “Premise Distribution System.”
2. Division 16 Section "Communications Backbone Cabling" for voice and data cabling associated with system panels and devices.
3. Division 16 Section "Communication Equipment Room fittings" for voice and data cabling systems.

1.3 DEFINITIONS

A. BICSI: Building Industry Consulting Service International.

B. Consolidation Point: A location for interconnection between horizontal cables extending from building pathways and horizontal cables extending into furniture pathways.

C. Cross-Connect: A facility enabling the termination of cable elements and their interconnection or cross-connection.

D. EMI: Electromagnetic interference.

E. IDC: Insulation displacement connector.

F. Ladder Cable Tray: A fabricated structure consisting of two longitudinal side rails connected by individual transverse members (rungs).

G. LAN: Local area network.

H. MUTOA: Multi-user telecommunications outlet assembly, a grouping in one location of several telecommunications outlet/connectors.

I. Outlet / Connectors: A connecting device in the work area on which horizontal cable or outlet cable terminates.

J. RCDD: Registered Communications Distribution Designer.

K. UTP: Unshielded twisted pair.

1.4 HORIZONTAL CABLING DESCRIPTION

A. Horizontal cable and its connecting hardware provide the means of transporting signals between the telecommunications outlet/connector and the horizontal cross-connect located in the communications equipment room. This cabling and its connecting hardware are called "permanent link," a term that is used in the testing protocols.
   1. TIA/EIA-568-B.1 requires that a minimum of two telecommunications outlet / connectors be installed for each work area.
   2. Horizontal cabling shall contain no more that one transition point or consolidation point between the horizontal cross-connect and the telecommunications outlet / connector.
   3. Bridged taps and splices shall not be installed in the horizontal cabling.
   4. Splitters shall not be installed as part of the optical fiber cabling.

B. A work area is approximately 100 sq. ft. (9.3 sq. m), and includes the components that extend from the telecommunications outlet/connectors to the station equipment.

C. The maximum allowable horizontal cable length is 295 feet (90 m). This maximum allowable length does not include an allowance for the length of 16 feet (4.9 m) in the horizontal cross-connect to the workstation equipment.

1.5 PERFORMANCE REQUIREMENTS

A. General Performance: Horizontal cabling system shall comply with transmission standards in TIA/EIA-568-B.1, when tested according to test procedures of this standard.

1.6 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings:
   1. System Labeling Schedules: Electronic copy of labeling schedules that are part of the cabling and asset identification system of the software.
   2. Cabling administration drawings and printouts.
   3. Wiring diagrams to show typical wiring schematics, including the following:
      a. Cross-connects.
      b. Patch panels.
      c. Patch cords.

4. Cross-connects and patch panels. Detail mounting assemblies, and show elevations and physical relationship between the installed components.
5. Cable tray layout, showing cable tray route to scale, with relationship between the tray and adjacent structural, electrical, and mechanical elements. Include the following:
   a. Vertical and horizontal offsets and transitions.
   b. Clearances for access above and to side of cable trays.
   c. Vertical elevation of cable trays above the floor or bottom of ceiling structure.
   d. Load calculations to show dead and live loads as not exceeding manufacturer's rating for tray and its support elements.

C. Samples: For workstation outlets, jacks, jack assemblies, in specified finish, one for each size and outlet configuration and faceplates for color selection and evaluation of technical features.

D. Qualification Data: For Installer, qualified layout technician, installation supervisor, and field inspector.

E. Source quality-control reports.

F. Field quality-control reports.

G. Maintenance Data: For splices and connectors to include in maintenance manuals.

H. Software and Firmware Operational Documentation:
1. Software operating and upgrade manuals.
2. Program Software Backup: On magnetic media or compact disk, complete with data files.
3. Device address list.
4. Printout of software application and graphic screens.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: Cabling Installer must have personnel certified by BICSI on staff.
1. Layout Responsibility: Preparation of Shop Drawings, Cabling Administration Drawings, and field testing program development by an RCDD.
2. Installation Supervision: Installation shall be under the direct supervision of Registered Technician who shall be present at all times when Work of this Section is performed at Project site.

B. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
1. Flame-Spread Index: 25 or less.
2. Smoke-Developed Index: 450 or less.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

D. Telecommunications Pathways and Spaces: Comply with TIA/EIA-569-A.

E. Grounding: Comply with ANSI-J-STD-607-A.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Test cables upon receipt at Project site.
   1. Test each pair of UTP cable for open and short circuits.

1.9 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install cables and connecting materials until wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

1.10 COORDINATION

A. Coordinate layout and installation of telecommunications pathways and cabling with Owner's telecommunications and LAN equipment and service suppliers.

B. Coordinate telecommunications outlet/connector locations with location of power receptacles at each work area.

1.11 SOFTWARE SERVICE AGREEMENT

A. Technical Support: Beginning with Substantial Completion, provide software support for two (2) years.

B. Upgrade Service: Update software to latest version at Project completion. Install and program software upgrades that become available within two (2) years from date of Substantial Completion. Upgrading software shall include operating system. Upgrade shall include new or revised licenses for use of software.
   1. Provide thirty (30) days' notice to Owner to allow scheduling and access to system and to allow Owner to upgrade computer equipment if necessary.

1.12 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Patch-Panel Units: One of each type.
   2. Connecting Blocks: One of each type.
   3. Device Plates: 10 of each type.
   4. Multi-user Telecommunications Outlet Assemblies: 10 of each type.

PART 2 - PRODUCTS

2.1 PATHWAYS

A. General Requirements: Comply with TIA/EIA-569-A.

B. Cable Support: NRTL labeled for support of Category 6 cabling, designed to prevent degradation of cable performance and pinch points that could damage cable.
   1. Support brackets with cable tie slots for fastening cable ties to brackets.
   2. Lacing bars, spools, J-hooks, and D-rings.
   3. Straps and other devices.

C. Cable Trays: See specification section 16127

D. Conduit and Boxes: Comply with requirements in Division 16 Section "Raceways and Boxes." Flexible metal conduit shall not be used.
   1. Outlet boxes shall be no smaller than 2 inches (50 mm) wide, 3 inches (75 mm) high, and 2-1/2 inches (64 mm) deep.

2.2 BACKBOARDS

A. Backboards: Plywood, fire-retardant treated, 3/4 by 48 by 96 inches (19 by 1220 by 2440 mm). Comply with requirements in Division 6 Section "Rough Carpentry" for plywood backing panels.

2.3 UTP CABLE

A. Manufacturers: Subject to compliance with requirements of paragraph 1.2 C., Section 16710, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. Belden CDT Inc.; Electronics Division.
   2. Berk-Tek; a Nexans company.
   3. CommScope, Inc.
   4. Genesis Cable Products; Honeywell International, Inc.
   5. KRONE Incorporated.
   6. Mohawk; a division of Belden CDT.
   7. Nordex/CDT; a subsidiary of Cable Design Technologies.
   8. Superior Essex Inc.
   9. SYSTIMAX Solutions; a CommScope, Inc. brand.
   10. Tyco Electronics/AMP Netconnect; Tyco International Ltd.
   11. Or approved equal.

B. Horizontal Wiring: Provide plenum rated 100 Ohm Unshielded Twisted Pair (UTP) cable with the following physical characteristics:
   1. The diameter of the insulated conductor shall be .048 in. maximum and shall consist of (4) 22 to 24 AWG twisted pairs.
   2. Shall be suitable for the environment in which they are to be installed. For Plenum, shall meet applicable requirements of ANSI/ICEA S-80-576. All four pairs must be insulated with F.E.P. No 2x2 or 3x1 construction will be allowed. Plenum rated cable shall be UL certified to conform to UL 910, CMP and shall be marked as such. Riser rated cable shall be third party

certified to conform to UL 1666, CMR, CMG and IEC 332-1 and shall be marked as such.

3. The color-coding of pairs shall be:
   a. Pair 1 W-BL; BL
   b. Pair 2 W-O; O
   c. Pair 3 W-G; G
   d. Pair 4 W-BR;BR

C. Horizontal Category 6 Wiring: Provide high speed data cabling conforming to ANSI/TIA/EIA 568-B.3 Category 6. All Category 6 cables shall conform to ANSI/TIA/EIA 568-B Commercial Building Telecommunications Cabling Standard. Applications standards supported should include, but are not limited to, IEEE 802.3, 10BaseT-T, IEEE 802.5, 4 Mbps, 16 Mbps, 100 Base-T and 155 Mbps ATM1, 1000BaseT Gbps Ethernet, potentially 1.2 Gbps ATM and 2.4 Gbps ATM, Multitasked Split Screen Computing, Virtual Holographic Video Conferencing, 3D CAD/CAM Engineering, Internet-Intranet Communications / Commerce, as well as all 77 channels (550 MHz) of analog broad band video.

1. From each jack location there will be one sheath of plenum rated Inside Wiring Cable to the associated distribution frame.
2. The plenum cable shall be composed of 22 to 24 AWG bare solid copper conductors each with an insulation of Teflon. The insulated conductors are tightly twisted into pairs and jacketed with white low smoke PVC. It shall conform to a UL Type CMP listing for plenum and riser applications.
3. Each sheath shall contain four unshielded copper pairs. Each pair shall have a different twist ratio per foot.
4. The cables shall meet or exceed the following standards:
   a. ANSI/TIA/EIA 568-B “Commercial Building Wiring Standard
   b. UL listed
   c. National Electrical Code – Article 800
5. The cables shall meet the following representative electrical and transmission characteristics:

Frequency	Insertion loss	Pair to Pair	Power Sum	ELFEXT	SRL	Power Sum ELFEXT
MHz	cB/100m	NEXT dB	NEXT dB	DB	dB	dB
1.	2.0	74.3	72.3	67.8	20	64.8
4.	3.8	65.3	63.3	55.8	23	52.8
10.	6.0	59.3	57.3	47.8	25	44.8
16.	7.6	56.2	54.2	43.7	25	40.7
20.	8.5	54.8	52.8	41.8	25	38.8
25.	9.5	53.3	51.3	39.8	24.3	36.8
31.25	10.7	51.9	49.9	37.9	23.6	34.9
62.5	15.4	47.4	45.4	31.9	21.5	28.9
100	19.8	44.3	42.3	27.8	20.1	24.8
200	29.3	39.8	37.8	21.8	18	18.8
250.	32.8	38.3	36.3	19.8	17.3	16.8

6. Cable Manufacturer shall be ISO-9001 certified.

7. The cable packaging shall be constructed so as to prevent kinking and other damage to the cable during shipping and handling. All damaged cable will be replaced.

D. 25 Pair High Speed Data Tie Cable: Provide high speed data cabling conforming to ANSE/TIA/EIA 568-B Category 5e. All cables shall meet applicable requirements of ANSI/ICEA S-80-576. All Category 5e cables shall conform to ANSI/TIA/EIA 568-B Commercial Building Telecommunications Cabling Standard, Horizontal Cable Section. Applications standards supported should include, but are not limited to, IEEE 802.3, 10BaseT-T, IEEE 802.5, 4 Mbps, 16 Mbps and TP-PMD. In addition, these cables shall be capable of supporting evolving high-end applications such as 100 Base-T and 52/155 Mbps ATM.

1. The cable shall be composed of 22 to 24 AWG bare solid copper conductors with a suitable plastic dielectric material.
2. Each cable shall contain 25 unshielded copper pairs. Installed in tight sub-units to meet power sum Near End Crosstalk, swept Insertion loss and SRL requirements. The insulated conductors shall be twisted into pairs and stranded into mini-units. The cable shall employ a honeycomb core construction, consisting of multiple three and four pair tightly stranded sub-units. A total of seven unjacketed sub-units will be stranded to comprise the cable core.
3. The cables shall meet or exceed the following standards:
   a. ANSI/TIA/EIA 568-B “Commercial Building Wiring Standard,” Category 5e Backbone
   b. Cable Section
   c. Certified Category 5e Cable under UL’s LAN Cable Certification Program
   d. UL Listed CMR or CMP as required, UL Verified Cat 5e
   e. National Electrical Code – Article 800
4. The cables shall meet the TIA/EIA electrical and transmission characteristics.

a.	Outside Diameter	.48 inches
b.	Mutual Capacitance	5.6 nF/100m
c.	Impedance Z	100 ± 15% Ohms from 1-100 MHZ
d.	DC Resistance – Max.	9.38 Ohms/100 m

5. Cable Manufacturer shall be ISO-9001 certified.
6. The cable packaging shall be constructed so as to prevent kinking and other damage to the cable during shipping and handling. All damaged cable will be replaced.

2.4 UTP CABLE HARDWARE

A. Manufacturers: Subject to compliance with requirements of paragraph 1.2 C of Section 16710, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. American Technology Systems Industries, Inc.
2. Dynacom Corporation.
3. Hubbell Premise Wiring.
4. KRONE Incorporated.
5. Leviton Voice & Data Division.
6. Molex Premise Networks; a division of Molex, Inc.
7. Nordex/CDT; a subsidiary of Cable Design Technologies.
8. Panduit Corp.

9. Tyco Electronics/AMP Netconnect; Tyco International Ltd.
10. or approved equal.

B. General Requirements for Cable Connecting Hardware: Comply with TIA/EIA-568-B.2, IDC type, with modules designed for punch-down caps or tools. Cables shall be terminated with connecting hardware of same category or higher.

C. Connecting Blocks: 110-style IDC for Category 6. Provide blocks for the number of cables terminated on the block, plus 25 percent spare. Integral with connector bodies, including plugs and jacks where indicated.

D. Patch Panel: Modular panels housing multiple-numbered jack units with IDC-type connectors at each jack for permanent termination of pair groups of installed cables.
1. Number of Jacks per Field: One for each four-pair UTP cable indicated, plus 20% spares and blank positions adequate to suit specified expansion criteria.

E. Jacks and Jack Assemblies: Modular, color-coded, eight-position modular receptacle units with integral IDC-type terminals.

F. Patch Cords: Factory-made, four-pair cables in 72-inch lengths; terminated with eight-position modular plug at each end.
1. Patch cords shall have bend-relief-compliant boots and color-coded icons to ensure Category 6 performance. Patch cords shall have latch guards to protect against snagging.

2.5 CONSOLIDATION POINTS

A. Manufacturers: Subject to compliance with requirements of paragraph 12. C of Section 16710, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. American Technology Systems Industries, Inc.
2. Chatsworth Products, Inc.
3. Dynacom Corporation.
4. Hubbell Premise Wiring.
5. Molex Premise Networks; a division of Molex, Inc.
6. Nordex/CDT; a subsidiary of Cable Design Technologies.
7. Ortronics, Inc.
8. Panduit Corp.
9. Siemon Co. (The).
10. Or approved equal.

B. Description: Consolidation points shall comply with requirements for cable connecting hardware.
1. Number of Terminals per Field: One for each conductor in assigned cables.
2. Number of Connectors per Field:
   a. One for each four-pair conductor group of indicated cables, plus 25 percent spare positions.
3. Mounting: Recessed in ceiling, wall, desk or furniture as shown on drawings.
4. NRTL listed as complying with UL 50 and UL 1863.

5. When installed in plenums used for environmental air, NRTL listed as complying with UL 2043.

2.6 MULTIUSER TELECOMMUNICATIONS OUTLET ASSEMBLY (MUTOA)

A. Manufacturers: Subject to compliance with requirements of paragraph 12. C of Section 16710 , available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Chatsworth Products, Inc.
2. Hubbell Premise Wiring.
3. Molex Premise Networks; a division of Molex, Inc.
4. Nordex/CDT; a subsidiary of Cable Design Technologies.
5. Ortronics, Inc.
6. Panduit Corp.

B. Modular Category 6 Jacks: The category 6 jack shall meet or exceed the following standards:

C. ANSI/TIA/EIA 568-B “Commercial Building Wiring Standard”.

D. FCC Part 68, Subpart “F”
1. The Category 6 modular jacks shall meet the following physical requirements:
2. Connector-insulation displacement connectors accepting 22 and 24 gauge AWG solid conductor wire
3. Jack wires-square copper alloy wires with 50 micro-inch lubricated gold plating over 100 micro-inch nickel plate
4. High impact, flame retardant UL-rated 94V-O thermoplastic
5. The Category 6 modular jacks shall meet the following mechanical requirements:
   a. Plug insertion life – minimum 750 plug insertions
   b. Contact Force – 100 grams minimum using FCC-approved modular plugs
   c. Plug Retention Force –(133N) minimum between modular plug and jack
   d. Temperature Range - -40° to 66°C
6. The outlet shall be approved to work in all applications up to 250 MHz, including, but are not limited to 1000BaseT Gigabit Ethernet.

Frequency	Insertion loss	Pair to Pair	FEXT dB	SRL
MHz	dB/100 m	NEXT dB	dB/100 m	dB
		dB/100 m		dB/100 m
1.	.1	75	75	19.8
4.	.1	75	71.1	21.6
10.	.1	74	63.1	22.8
16.	.1	69.9	59	23.4
20.	.1	68	57.1	23.7
25.	.1	66	55.1	24
31.25	.11	64.1	53.2	23
62.5	.16	58.1	47.2	20
100	.2	54	43.1	18

200	.28	48	37.1	15
250	.32	46	35.1	14

2.7 HIGH SPEED CATEGORY 6 DATA CROSS-CONNECT PATCH PANELS

A. The data patch panels will be co-located on 19-inch racks with the network hubs and the fiber optical interconnection cabinets as designated on the drawings or as required by the owner. The configuration of the patch panels shall be in an arrangement that minimizes patch cord lengths.

B. The modular patch panels shall have eight wires, 8-position modular jacks with 110 terminations on the rear for connection of station cables. The horizontal Category 6 cables to the outlets will be directly connected to 110 insulation displacement hardware associated with each jack on the patch panel. These panels will be designed to operate at 100/250 MHz. Quantities sufficient for all positions of every outlet are required.

C. The patch panel shall be a Category 6 modular jack panel with the following characteristic:
1. The patch panel will utilize a 110 insulation displacement connector field on the back of the panel to terminate the horizontal cables. The 110 field is to remain continuous to the 8-pin modular jack field in the front of the panel.
2. The cross-connect patch panel shall meet the following standards: ANSI/TIA/EIA 568-B “Commercial Building Wiring Standard FCC Part 68, Subpart F.

D. The Cross-connect patch panel shall meet the following physical requirements:
1. Wire termination – insulation displacement, gas tight, slotted beam contact
2. Plug contact force – 100 grams
3. Plug retention force – 133 Newtons

E. The cross-connect patch panel shall meet the following environmental requirements:
1. Operating Environment
Temperature: 32°F to 140°F (0° to 60°C)
Humidity: 5% to 95% (noncondensing)
2. Storage Environment
Temperature -40°F to 150°F (-40° to 66°C)
Humidity: 5% to 95% (noncondensing)

F. The Category 6 panels shall be approved to work in all applications up to 250 MHz, including, but are not limited to, 1000BaseT Gigabit Ethernet.

G. The Category 6 panels shall meet or exceed the following representative electrical and transmission characteristics:

Frequency	Insertion loss	Pair to Pair	FEXT dB	SRL
MHz	dB/100 m	NEXT dB	dB/100 m	dB
		dB/100 m		dB/100 m

1.	.1	75	75	30
4.	.1	75	71.1	30
10.	.1	74	63.1	30
16.	.1	69.9	59	30
20.	.1	68	57.1	30
25.	.1	66	55.1	30
31.25	.11	64.1	53.2	30
62.5	.16	58.1	47.2	28.1
100	.2	54	43.1	24
200	.28	48	37.1	18
250	.32	46	35.1	16

H. Category 5e/6 Modular Patch Cords

1. Provide 100% factory assembled and tested Category 6 plug-end cross-connecting patch cables for each modular patch panel jack. Cable shall be sized for the longest cross-connect and installed in accordance with a schedule developed by the installation contractor. The length of the patch cable or cross-connect jumpers shall not exceed 20 feet. Provide color-coded boot assemblies to match owner's requirements.

2.8 GROUNDING

A. Comply with requirements in Division 16 Section "Grounding and Bonding" for grounding conductors and connectors.

B. Comply with ANSI-J-STD-607-A.

2.9 IDENTIFICATION PRODUCTS

A. Comply with TIA/EIA-606-A and UL 969 for labeling materials, including label stocks, laminating adhesives, and inks used by label printers. Use Panduit Ultimate 10 Network Labeling system or equal.

B. Comply with requirements in Division 16 Section "Electrical Identification."

2.10 CABLE MANAGEMENT SYSTEM

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Basis-of-Design Product: Subject to compliance with requirements, provide comparable product by one of the following:

1. iTRACS Corporation.
2. Telsoft Solutions.
3. Or approved equal.

C. Description: Computer-based cable management system, with integrated database and graphic capabilities.

D. Document physical characteristics by recording the network, TIA/EIA details, and connections between equipment and cable.

E. Information shall be presented in database view, schematic plans, or technical drawings.
   1. AutoCAD drawing software shall be used as drawing and schematic plans software.

F. System shall interface with the following testing and recording devices:
   1. Direct upload tests from circuit testing instrument into the personal computer.
   2. Direct download circuit labeling into labeling printer.

2.11 SOURCE QUALITY CONTROL

A. Factory test UTP and optical fiber cables on reels according to TIA/EIA-568-B.1.

B. Factory test UTP cables according to TIA/EIA-568-B.2.

C. Cable will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 WIRING METHODS

A. Wiring Method: Install cables in raceways and cable trays except within consoles, cabinets, desks, and counters and except in accessible ceiling spaces where unenclosed wiring method may be used. Conceal raceway and cables except in unfinished spaces.
   1. Install plenum cable in environmental air spaces, including plenum ceilings.
   2. Comply with requirements for raceways and boxes specified in Division 16 Section "Raceways and Boxes."

B. Wiring Method: Conceal conductors and cables in accessible ceilings, walls, and floors where possible.

C. Wiring within Enclosures: Bundle, lace, and train cables to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools.

3.2 INSTALLATION OF PATHWAYS

A. Cable Trays: Comply with NEMA VE 2 and TIA/EIA-569-A-7.

B. Comply with requirements for demarcation point, pathways, cabinets, and racks specified in Division 16 Section "Communications Equipment Room Fittings." Drawings indicate general arrangement of pathways and fittings.

C. Comply with TIA/EIA-569-A for pull-box sizing and length of conduit and number of bends between pull points.

D. Comply with requirements in Division 16 Section "Raceways and Boxes" for installation of conduits and wireways.

E. Install manufactured conduit sweeps and long-radius elbows whenever possible.

F. Pathway Installation in Communications Equipment Rooms:
1. Position conduit ends adjacent to a corner on backboard where a single piece of plywood is installed, or in the corner of room where multiple sheets of plywood are installed around perimeter walls of room.
2. Install cable trays to route cables if conduits cannot be located in these positions.
3. Secure conduits to backboard when entering room from overhead.
4. Extend conduits 3 inches (76 mm) above finished floor.
5. Install metal conduits with grounding bushings and connect with grounding conductor to grounding system.

G. Backboards: Install backboards with 96-inch (2440-mm) dimension vertical. Butt adjacent sheets tightly, and form smooth gap-free corners and joints.

3.3 INSTALLATION OF CABLES

A. Comply with NECA 1.

B. General Requirements for Cabling:
1. Comply with TIA/EIA-568-B.1.
2. Comply with BICSI ITSIM, Ch. 6, "Cable Termination Practices."
3. Install 110-style IDC termination hardware unless otherwise indicated.
4. MUTOA shall not be used as a cross-connect point.
5. Consolidation points may be used only for making a direct connection to telecommunications outlet/connectors:
   a. Do not use consolidation point as a cross-connect point, as a patch connection, or for direct connection to workstation equipment.
   b. Locate consolidation points for UTP at least 49 feet (15 m) from communications equipment room.
6. Terminate conductors; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, cross-connects, and patch panels.
7. Cables may not be spliced. Secure and support cables at intervals not exceeding 30 inches (760 mm) and not more than 6 inches (150 mm) from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
8. Install lacing bars to restrain cables, to prevent straining connections, and to prevent bending cables to smaller radii than minimums recommended by manufacturer.
9. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIM, "Cabling Termination Practices" Chapter. Install lacing bars and distribution spools.
10. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove

and discard cable if damaged during installation and replace it with new cable.

11. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used for heating.
12. In the communications equipment room, install a 10-foot- (3-m-) long service loop on each end of cable.
13. Pulling Cable: Comply with BICSI ITSIM, Ch. 4, "Pulling Cable." Monitor cable pull tensions.

C. UTP Cable Installation:
1. Comply with TIA/EIA-568-B.2.
2. Do not untwist UTP cables more than 1/2 inch (12 mm) from the point of termination to maintain cable geometry.

D. Optical Fiber Cable Installation:
1. Comply with TIA/EIA-568-B.3.
2. Cable may be terminated on connecting hardware that is rack or cabinet mounted.

E. Open-Cable Installation:
1. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
2. Suspend UTP cable not in a wireway or pathway a minimum of 8 inches (200 mm) above ceilings by cable supports not more than 60 inches (1524 mm) apart.
3. Cable shall not be run through structural members or in contact with pipes, ducts, or other potentially damaging items.

F. Installation of Cable Routed Exposed under Raised Floors:
1. Install plenum-rated cable only.
2. Install cabling after the flooring system has been installed in raised floor areas.
3. Coil cable 6 feet (1800 mm) long not less than 12 inches (300 mm) in diameter below each feed point.

G. Group connecting hardware for cables into separate logical fields.

H. Separation from EMI Sources:
1. Comply with BICSI TDMM and TIA/EIA-569-A for separating unshielded copper voice and data communication cable from potential EMI sources, including electrical power lines and equipment.
2. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment shall be as follows:
   a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 5 inches (127 mm).
   b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 12 inches (300 mm).
   c. Electrical Equipment Rating More Than 5 kVA: A minimum of 24 inches (610 mm).

3. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:
   a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 2-1/2 inches (64 mm).
   b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 6 inches (150 mm).
   c. Electrical Equipment Rating More Than 5 kVA: A minimum of 12 inches (300 mm).
4. Separation between communications cables in grounded metallic raceways and power lines and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:
   a. Electrical Equipment Rating Less Than 2 kVA: No requirement.
   b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 3 inches (76 mm).
   c. Electrical Equipment Rating More Than 5 kVA: A minimum of 6 inches (150 mm).
5. Separation between Communications Cables and Electrical Motors and Transformers, 5 kVA or HP and Larger: A minimum of 48 inches (1200 mm).
6. Separation between Communications Cables and Fluorescent Fixtures: A minimum of 5 inches (127 mm).

3.4 FIRESTOPPING

A. Comply with requirements in Division 7 Section "Through-Penetration Firestop Systems."

B. Comply with TIA/EIA-569-A, Annex A, "Firestopping."

C. Comply with BICSI TDMM, "Firestopping Systems" Article.

3.5 GROUNDING

A. Install grounding according to BICSI TDMM, "Grounding, Bonding, and Electrical Protection" Chapter.

B. Comply with ANSI-J-STD-607-A.

C. Locate grounding bus bar to minimize the length of bonding conductors. Fasten to wall allowing at least 2-inch (50-mm) clearance behind the grounding bus bar. Connect grounding bus bar with a minimum No. 4 AWG grounding electrode conductor from grounding bus bar to suitable electrical building ground.

D. Bond metallic equipment to the grounding bus bar, using not smaller than No. 6 AWG equipment grounding conductor.

3.6 IDENTIFICATION

A. Using cable management system software specified in Part 2, develop Cabling Administration Drawings for system identification, testing, and management. Use unique, alphanumeric designation for each cable and label cable, jacks, connectors, and terminals to which it connects with same designation. At

completion, cable and asset management software shall reflect as-built conditions.

B. Comply with requirements in Division 9 Section "Interior Painting" for painting backboards. For fire-resistant plywood, do not paint over manufacturer's label.

C. Paint and label colors for equipment identification shall comply with TIA/EIA-606-A for Class 3 level of administration, including optional identification requirements of this standard.

D. Cable Schedule: Post in prominent location in each equipment room and wiring closet. List incoming and outgoing cables and their designations, origins, and destinations. Protect with rigid frame and clear plastic cover. Furnish an electronic copy of final comprehensive schedules for Project.

E. Cabling Administration Drawings: Show building floor plans with cabling administration-point labeling. Identify labeling convention and show labels for telecommunications closets, backbone pathways and cables, entrance pathways and cables, terminal hardware and positions, horizontal cables, work areas and workstation terminal positions, grounding buses and pathways, and equipment grounding conductors. Follow convention of TIA/EIA-606-A. Furnish electronic record of all drawings, in software and format selected by Owner.

F. Cable and Wire Identification:
   1. Label each cable within 4 inches (100 mm) of each termination and tap, where it is accessible in a cabinet or junction or outlet box, and elsewhere as indicated.
   2. Each wire connected to building-mounted devices is not required to be numbered at device if color of wire is consistent with associated wire connected and numbered within panel or cabinet.
   3. Exposed Cables and Cables in Cable Trays and Wire Troughs: Label each cable at intervals not exceeding 15 feet (4.5 m).
   4. Label each terminal strip and screw terminal in each cabinet, rack, or panel.
      a. Individually number wiring conductors connected to terminal strips, and identify each cable or wiring group being extended from a panel or cabinet to a building-mounted device shall be identified with name and number of particular device as shown.
      b. Label each unit and field within distribution racks and frames.
   5. Identification within Connector Fields in Equipment Rooms and Wiring Closets: Label each connector and each discrete unit of cable-terminating and connecting hardware. Where similar jacks and plugs are used for both voice and data communication cabling, use a different color for jacks and plugs of each service.
   6. Uniquely identify and label work area cables extending from the MUTOA to the work area. These cables may not exceed the length stated on the MUTOA label.

G. Labels shall be preprinted or computer-printed type with printing area and font color that contrasts with cable jacket color but still complies with requirements in TIA/EIA-606-A.
   1. Cables use flexible vinyl or polyester that flex as cables are bent.

3.7 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:
   1. Visually inspect UTP and optical fiber cable jacket materials for NRTL certification markings. Inspect cabling terminations in communications equipment rooms for compliance with color-coding for pin assignments, and inspect cabling connections for compliance with TIA/EIA-568-B.1.
   2. Visually confirm Category 6, marking of outlets, cover plates, outlet / connectors, and patch panels.
   3. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.

C. UTP Performance Tests:
   1. Test for each outlet and MUTOA. Perform the following tests according to TIA/EIA-568-B.1 and TIA/EIA-568-B.2:
      a. Wire map.
      b. Length (physical vs. electrical, and length requirements).
      c. Insertion loss.
      d. Near-end crosstalk (NEXT) loss.
      e. Power sum near-end crosstalk (PSNEXT) loss.
      f. Equal-level far-end crosstalk (ELFEXT).
      g. Power sum equal-level far-end crosstalk (PSELFEXT).
      h. Return loss.
      i. Propagation delay.
      j. Delay skew.
   2. Final Verification Tests: Perform verification tests for UTP systems after the complete communications cabling and workstation outlet/connectors are installed.
      a. Voice Tests: These tests assume that dial tone service has been installed. Connect to the network interface device at the demarcation point. Go off-hook and listen and receive a dial tone. If a test number is available, make and receive a local, long distance, and digital subscription line telephone call.
      b. Data Tests: These tests assume the Information Technology Staff has a network installed and is available to assist with testing. Connect to the network interface device at the demarcation point. Log onto the network to ensure proper connection to the network.

D. Document data for each measurement. Data for submittals shall be printed in a summary report that is formatted similar to Table 10.1 in BICSI TDMM, or transferred from the instrument to the computer, saved as text files, and printed and submitted.

E. End-to-end cabling will be considered defective if it does not pass tests and inspections.

F. Prepare test and inspection reports.

3.8 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel in cable-plant management operations, including changing signal pathways for different workstations, rerouting signals in failed cables, and keeping records of cabling assignments and revisions when extending wiring to establish new workstation outlets. Include training in cabling administration software.

END OF SECTION 27.15.00

NEW PARKING STRUCTURE AND EXTERIOR WAYFINDING SIGNAGE
DULUTH INTERNATIONAL AIRPORT
DULUTH, MINNESOTA

SECTION 21 13 16 – DRY-PIPE SPRINKLER SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Pipes, fittings, and specialties.
2. Fire-protection valves.
3. Fire-department connections.
4. Sprinklers.
5. Alarm devices.
6. Manual control stations.
7. Control panels.
8. Pressure gages.

1.3 DEFINITIONS

A. Standard-Pressure Sprinkler Piping: Dry-pipe sprinkler system piping designed to operate at working pressure of 175 psig maximum.

1.4 SYSTEM DESCRIPTIONS

A. Dry-Pipe Sprinkler System: Automatic sprinklers are attached to piping containing compressed air. Opening of sprinklers releases compressed air and permits water pressure to open dry-pipe valve. Water then flows into piping and discharges from sprinklers that are open.

1.5 PERFORMANCE REQUIREMENTS

A. Standard-Pressure Piping System Component: Listed for 175-psig minimum working pressure.

B. Provide working drawings from the contract drawings for sprinkler systems using requirements and design criteria indicated. Provide hydraulic calculations, where necessary. Coordinate location and elevation of sprinklers and piping with all building components, systems and architectural features. All piping shall be located above minimum garage clearances. Where

piping has to be installed below the minimum clearances (e.g. at beams), the areas shall be out of the drive lanes and shall be approved by the architect/engineer.

C. Sprinkler system shall be approved by authorities having jurisdiction. Obtain all required permits and provide required fees.

1.6 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For wet-pipe sprinkler systems. Include plans, elevations, sections, details, and attachments to other work.

1. Wiring Diagrams: For power, signal, and control wiring.

C. Coordination Drawings: Sprinkler systems, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Items penetrating finished ceiling.

D. Qualification Data: For qualified Installer.

E. Approved Sprinkler Piping Drawings: Working plans, prepared according to NFPA 13, that have been approved by authorities having jurisdiction and Boeing Fire Protection Engineering, including hydraulic calculations prior to installation.

F. Welding certificates.

G. Field Test Reports and Certificates: Indicate and interpret test results for compliance with performance requirements and as described in NFPA 13. Include "Contractor's Material and Test Certificate for Aboveground Piping."

H. Field quality-control reports.

I. Operation and Maintenance Data: For sprinkler specialties to include in emergency, operation, and maintenance manuals.

1.7 QUALITY ASSURANCE

A. Installer Qualifications:

1. Installer's responsibilities include designing, fabricating, and installing sprinkler systems.

B. Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

D. NFPA Standards: Sprinkler system equipment, specialties, accessories, installation, and testing shall comply with the following:

1. NFPA 13, "Installation of Sprinkler Systems."

1.8 PROJECT CONDITIONS

A. Interruption of Existing Sprinkler Service: Do not interrupt sprinkler service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary sprinkler service according to requirements indicated:

1. Notify Owner no fewer than 2 days in advance of proposed interruption of sprinkler service.
2. Do not proceed with interruption of sprinkler service without Owner's written permission.

1.9 COORDINATION

A. Coordinate layout and installation of sprinklers with other construction that penetrates ceilings, including light fixtures, HVAC equipment, and partition assemblies.

1.10 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Sprinkler Cabinets: Finished, wall-mounted, steel cabinet with hinged cover, and with space for minimum of six spare sprinklers plus sprinkler wrench. Include number of sprinklers required by NFPA 13 and sprinkler wrench. Include separate cabinet with sprinklers and wrench for each type of sprinkler used on Project.

1.11 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For sprinkler specialties to include in emergency, operation, and maintenance manuals.

1.12 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Sprinkler Cabinets: Finished, wall-mounted, steel cabinet with hinged cover, and with space for minimum of six spare sprinklers plus sprinkler wrench. Include number of sprinklers required by NFPA 13 and sprinkler wrench. Include separate cabinet with sprinklers and wrench for each type of sprinkler used on Project.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Comply with requirements in Part 3 and pipe, tube, and fittings shall be limited to those listed below.

2.2 STEEL PIPE AND FITTINGS

A. Standard Weight, Galvanized Steel Pipe: ASTM A 53/A 53M, Schedule 40 steel pipe for welded, grooved, and threaded joints. Pipe ends may be factory or field formed to match joining method.

B. Thinwall, Galvanized Steel Pipe: ASTM A 135 or ASTM A 795/A 795M, Schedule 10 steel pipe for sizes over 2" and welded and rolled-groove joints. Pipe ends may be factory or field formed to match joining method.

C. Galvanized Steel Pipe Nipples: ASTM A 733, made of ASTM A 53/A 53M, standard-weight, seamless steel pipe with threaded ends.

D. Galvanized, Steel Couplings: ASTM A 865, threaded.

E. Galvanized Fittings in first paragraph below are available in NPS 1/4 to NPS 12.

F. Galvanized Gray-Iron Threaded Fittings: ASME B16.4, Class 125, standard pattern.

G. Galvanized Unions in first paragraph below are available in NPS 1/4 to NPS 3 (DN 8 to DN 80), but NFPA limits them to NPS 2 (DN 50) and smaller.

H. Galvanized Malleable- or Ductile-Iron Unions: UL 860.

I. Cast-Iron Flanges: ASME 16.1, Class 125.

J. Steel Flanges and Flanged Fittings: ASME B16.5, Class 150.

K. Galvanized Fittings in first paragraph below are available in NPS 1/2 to NPS 48 (DN 15 to DN 1200).

L. Steel Welding Fittings: ASTM A 234/A 234M and ASME B16.9.

M. Galvanized or Coated Grooved-Joint, Steel-Pipe Appurtenances:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Anvil International, Inc.
b. Tyco Fire & Building Products LP.
c. Victaulic Company.

2. Pressure Rating: 175 psig minimum.

3. Grooved-End Fittings for Steel Piping: ASTM A 47/A 47M, malleable-iron casting or ASTM A 536, ductile-iron casting; with dimensions matching steel pipe.
4. Grooved-End-Pipe Couplings for Steel Piping: AWWA C606 and UL 213, rigid pattern, unless otherwise indicated, for steel-pipe dimensions. Include ferrous housing sections, EPDM-rubber gasket, and bolts and nuts.

2.3 PIPING JOINING MATERIALS

A. Pipe-Flange Gasket Materials: AWWA C110, rubber, flat face, 1/8 inch thick or ASME B16.21, nonmetallic and asbestos free.

1. Class 125, Cast-Iron Flanges and Class 150, Bronze Flat-Face Flanges: Full-face gaskets.

B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.

C. Welding Filler Metals: Comply with AWS D10.12M/D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

2.4 LISTED FIRE-PROTECTION VALVES

A. General Requirements:

1. Valves shall be UL listed and FM approved.
2. Minimum Pressure Rating for Standard-Pressure Piping: 175 psig.

B. Check Valves:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Clow Valve Company; a division of McWane, Inc.
   b. Globe Fire Sprinkler Corporation.
   c. Kennedy Valve; a division of McWane, Inc.
   d. Milwaukee Valve Company.
   e. NIBCO INC.
   f. Tyco Fire & Building Products LP.
   g. Victaulic Company.
   h. Viking Corporation.

2. Standard: UL 312.
3. Pressure Rating: 250 psig minimum.
4. Type: Swing check.
5. Body Material: Cast iron.
6. End Connections: Flanged or grooved.

C. Indicating-Type Butterfly Valves:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Global Safety Products, Inc.
   b. Kennedy Valve; a division of McWane, Inc.

c. Milwaukee Valve Company.
d. NIBCO INC.
e. Tyco Fire & Building Products LP.
f. Victaulic Company.

2. Standard: UL 1091.
3. Pressure Rating: 175 psig minimum.
4. Valves NPS 2 and Smaller:

a. Valve Type: Ball or butterfly.
b. Body Material: Bronze.
c. End Connections: Threaded.

5. Valves NPS 2-1/2 and Larger:

a. Valve Type: Butterfly.
b. Body Material: Cast or ductile iron.
c. End Connections: Flanged, grooved, or wafer.

6. Valve Operation: Integral electrical, 115-V ac, prewired, two-circuit, supervisory switch and visual indicating device.

2.5 TRIM AND DRAIN VALVES

A. General Requirements:

1. Standard: UL's "Fire Protection Equipment Directory" listing and "Approval Guide," published by FM Global, listing.
2. Pressure Rating: 175 psig minimum.

2.6 SPECIALTY VALVES

A. General Requirements:

1. Standard: UL's "Fire Protection Equipment Directory" listing and "Approval Guide," published by FM Global, listing.
2. Pressure Rating:

a. Standard-Pressure Piping Specialty Valves: 175 psig minimum.

3. Body Material: Cast or ductile iron.
4. Size: Same as connected piping.
5. End Connections: Flanged or grooved.

B. Automatic (Ball Drip) Drain Valves:

1. Standard: UL 1726.
2. Pressure Rating: 175 psig minimum.
3. Type: Automatic draining, ball check.

4. Size: NPS 3/4.
5. End Connections: Threaded.

C. Dry-Pipe Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. AFAC Inc.
   b. Globe Fire Sprinkler Corporation.
   c. Reliable Automatic Sprinkler Co., Inc.
   d. Tyco Fire & Building Products LP.
   e. Victaulic Company.
   f. Viking Corporation.

2. Standard: UL 260
3. Design: Differential-pressure type.
4. Include UL 1486, quick-opening devices, trim sets for air supply, drain, priming level, alarm connections, ball drip valves, pressure gages, priming chamber attachment, and fill-line attachment.
5. Air-Pressure Maintenance Device:

   a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

      1) AFAC Inc.
      2) Globe Fire Sprinkler Corporation.
      3) Reliable Automatic Sprinkler Co., Inc.
      4) Tyco Fire & Building Products LP.
      5) Victaulic Company.
      6) Viking Corporation.

   b. Standard: UL 260.
   c. Type: Automatic device to maintain minimum air pressure in piping.
   d. Include shutoff valves to permit servicing without shutting down sprinkler piping, bypass valve for quick filling, pressure regulator or switch to maintain pressure, strainer, pressure ratings with 14- to 60-psig adjustable range, and **175-psig** outlet pressure.

6. Air Compressor:
   a. Basis-of-Design Product: Subject to compliance with requirements, provide comparable product by one of the following:

      1) Gast Manufacturing Inc.
      2) General Air Products, Inc,
      3) Viking Corporation.

   b. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
   c. Motor Horsepower: Fractional.
   d. Power: 120-V ac, 60 Hz, single phase.

2.7 FIRE-DEPARTMENT CONNECTIONS

A. Exposed-Type, Fire-Department Connection:
   1. Existing connections may be relocated or provide new valves subject to compliance with requirements, provide products by one of the following:
      a. Elkhart Brass Mfg. Company, Inc.
      b. Fire-End & Croker Corporation.
      c. Guardian Fire Equipment, Inc.
      d. Tyco Fire & Building Products LP.

   2. Standard: UL 405.
   3. Type: Exposed, projecting, for wall mounting.
   4. Pressure Rating: 175 psig minimum.
   5. Body Material: Corrosion-resistant metal.
   6. Inlets: Brass with threads according to NFPA 1963 and matching local fire-department sizes and threads. Include extension pipe nipples, brass lugged swivel connections, and check devices or clappers.
   7. Caps: Brass, lugged type, with gasket and chain.
   8. Escutcheon Plate: Round, brass, wall type.
   9. Number of Inlets and size: As indicated
   10. Escutcheon Plate Marking: Similar to "AUTO SPKR."
   11. Finish: Rough brass or bronze.

2.8 SPRINKLER SPECIALTY PIPE FITTINGS

A. Sprinkler Inspector's Test Fittings:

   1. Standard: UL's "Fire Protection Equipment Directory" listing and "Approval Guide," published by FM Global, listing.
   2. Pressure Rating: 175 psig minimum.
   3. Body Material: Cast- or ductile-iron housing with sight glass.
   4. Size: Same as connected piping.
   5. Inlet and Outlet: Threaded.

2.9 SPRINKLERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Globe Fire Sprinkler Corporation.
   2. Reliable Automatic Sprinkler Co., Inc.
   3. Tyco Fire & Building Products LP.
   4. Victaulic Company.
   5. Viking Corporation.

B. General Requirements:

   1. Standard: UL's "Fire Protection Equipment Directory" listing and "Approval Guide," published by FM Global, listing.

2. Pressure Rating for Automatic Sprinklers: 175 psig minimum.

C. Automatic Sprinklers with Heat-Responsive Element:

1. Nonresidential Applications: UL 199.
2. Characteristics: Discharge Coefficient K as indicated for "Ordinary" temperature classification rating unless otherwise required by application.

D. Sprinkler Finishes:

1. Chrome plated.
2. Bronze.
3. Painted.

E. Special Coatings:

1. Corrosion-resistant paint.

F. Sprinkler Escutcheons: Materials, types, and finishes for the following sprinkler mounting applications. Escutcheons for concealed, flush, and recessed-type sprinklers are specified with sprinklers.

1. Ceiling Mounting: Chrome-plated steel, two piece, with 1-inch vertical adjustment.
2. Sidewall Mounting: Chrome-plated steel, one piece, flat.

G. Sprinkler Guards:

1. Standard: UL 199.
2. Type: Wire cage with fastening device for attaching to sprinkler.

2.10 ALARM DEVICES

A. Alarm-device types shall match piping and equipment connections.

A. Electrically Operated Alarm Bell:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Fire-Lite Alarms; a Honeywell company.
b. Notifier; a Honeywell company.
c. Potter Electric Signal Company.

2. Standard: UL 464.
3. Type: Vibrating, metal alarm bell.
4. Finish: Red-enamel factory finish, suitable for outdoor use.

B. Pressure Switches:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. AFAC Inc.
b. Potter Electric Signal Company.
c. System Sensor; a Honeywell company.
d. Tyco Fire & Building Products LP.
e. Viking Corporation.

2. Standard: UL 346.
3. Type: Electrically supervised water-flow switch with retard feature.
4. Components: Single-pole, double-throw switch with normally closed contacts.
5. Design Operation: Rising pressure signals water flow.

C. Valve Supervisory Switches:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Fire-Lite Alarms, Inc.; a Honeywell company.
b. Kennedy Valve; a division of McWane, Inc.
c. Potter Electric Signal Company.
d. System Sensor; a Honeywell company.

2. Standard: UL 346.
3. Type: Electrically supervised.
4. Components: Single-pole, double-throw switch with normally closed contacts.
5. Design: Signals that controlled valve is in other than fully open position.

2.11 PRESSURE GAGES

A. Standard: UL 393.

B. Dial Size: 3-1/2- to 4-1/2-inch diameter.

C. Pressure Gage Range: 0 to 250 psig minimum.

2.12 BACKFLOW PREVENTERS

A. General: ASSE standard backflow preventers, of size indicated for maximum flow rate indicated and maximum pressure loss indicated.
1. Working Pressure: 150 psig minimum except where indicated otherwise.
2. Bronze, cast iron, steel, or stainless steel body with flanged ends.
3. Interior Lining: FDA approved epoxy coating, for backflow preventers having cast iron or steel body.
4. Interior Components: Corrosion resistant materials.
5. Strainer on inlet, where strainer is indicated.

B. Double Check Backflow Prevention Assemblies: ASSE 1015, consisting of shutoff valves on inlet and outlet and strainer on inlet. Include test cocks with 2 positive seating check valves for continuous pressure application.
1. Pressure Loss: 5 psig maximum at the design system flow rate.

PART 3 - EXECUTION

3.1 WATER-SUPPLY CONNECTIONS

A. Connect sprinkler piping to water-distribution piping.

B. Install shutoff valve, backflow preventer**,** pressure gage, drain, and other accessories indicated at connection to water-distribution piping. See civil for additional information.

C. Install shutoff valve, check valve, pressure gage, and drain at connection to water supply.

3.2 PIPING INSTALLATION

A. All dry-pipe system piping (pipe, fittings, hangers, etc.) shall be galvanized.
   1. Exception: factory-painted grooved fittings are permitted in lieu of galvanized fittings.

B. Locations and Arrangements: Drawings indicate general locations, sizes, and arrangement of piping. Install piping as indicated; coordinate with all other trades and building components.

   1. Deviations from approved working plans for piping require written approval from authorities having jurisdiction. File written approval with Architect before deviating from approved working plans.

C. Piping Standard: Comply with requirements for installation of sprinkler piping in NFPA 13.

D. Use listed fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.

E. Install unions adjacent to each valve in pipes NPS 2 and smaller.

F. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 and larger end connections.

G. Install "Inspector's Test Connections" in sprinkler system piping, complete with shutoff valve, and sized and piped from the most remote area of each sprinkler system.

H. Install sprinkler piping with drains for complete system drainage. Drains serving more than 5 gallons shall discharge to exterior with splash protection

I. Install automatic (ball drip) drain valve at each check valve for fire-department connection, to drain piping between fire-department connection and check valve. Install drain piping to and spill over to outside building.

J. Connect compressed-air supply to dry-pipe sprinkler piping.

K. Connect air compressor to the following piping and wiring:

L. Pressure gages and controls.

M. Electrical power system.

N. Fire-alarm devices, including low-pressure alarm.

O. Install alarm devices in piping systems.

P. Install hangers and supports for sprinkler system piping according to NFPA 13. Comply with requirements for hanger materials in NFPA 13.

Q. Install pressure gages on riser or feed main and at each sprinkler test connection. Include pressure gages with connection not less than NPS 1/4 and with soft metal seated globe valve, arranged for draining pipe between gage and valve. Install gages to permit removal, and install where they will not be subject to freezing.

R. Drain dry-pipe sprinkler piping.

S. Pressurize and check dry-pipe sprinkler system piping air compressors.

T. Install sleeves for piping penetrations of walls, ceilings, and floors.

U. Install sleeve seals for piping penetrations of concrete walls and slabs.

V. Install escutcheons for piping penetrations of walls, ceilings, and floors.

3.3 JOINT CONSTRUCTION

A. Install couplings, flanges, flanged fittings, unions, nipples, and transition and special fittings that have finish and pressure ratings same as or higher than system's pressure rating for aboveground applications unless otherwise indicated.

B. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 and larger end connections.

C. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

D. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.

E. Flanged Joints: Select appropriate gasket material in size, type, and thickness suitable for water service. Join flanges with gasket and bolts according to ASME B31.9.

F. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.

G. Welded Joints: Construct joints according to AWS D10.12M/D10.12, using qualified processes and welding operators according to "Quality Assurance" Article.

1. Shop weld pipe joints where welded piping is indicated. Do not use welded joints for galvanized-steel pipe.

H. Steel-Piping, Cut-Grooved Joints: Cut square-edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe joints.

I. Steel-Piping, Roll-Grooved Joints: Roll rounded-edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe grooved joints.

J. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.

3.4 VALVE AND SPECIALTIES INSTALLATION

A. Install listed fire-protection valves, trim and drain valves, specialty valves and trim, controls, and specialties according to NFPA 13 and authorities having jurisdiction.

B. Install listed fire-protection shutoff valves supervised open, located to control sources of water supply except from fire-department connections. Install permanent identification signs indicating portion of system controlled by each valve.

C. Install check valve in each water-supply connection.

D. Specialty Valves:

1. General Requirements: Install in vertical position for proper direction of flow, in main supply to system.

E. Dry-Pipe Valves: Install trim sets for air supply, drain, priming level, alarm connections, ball drip valves, pressure gages, priming chamber attachment, and fill-line attachment.

F. Install air compressor and compressed-air supply piping.

G. Air-Pressure Maintenance Device: Install shutoff valves to permit servicing without shutting down sprinkler system; bypass valve for quick system filling; pressure regulator or switch to maintain system pressure; strainer; pressure ratings with 14- to 60-psig adjustable range; and 175-psig maximum inlet pressure.

H. Install compressed-air supply piping from building's compressed-air piping system

3.5 SPRINKLER INSTALLATION

A. Install dry-type sprinklers with water supply from heated space. Do not install pendent or sidewall, wet-type sprinklers in areas subject to freezing.

3.6 FIRE-DEPARTMENT CONNECTION INSTALLATION

A. Install wall-type, fire-department connections.

B. Install automatic (ball drip) drain valve at each check valve for fire-department connection.

3.7 IDENTIFICATION

A. Install labeling and pipe markers on equipment and piping according to requirements in NFPA 13.

B. Identify system components, wiring, cabling, and terminals.

3.8 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:

1. Leak Test: After installation, charge systems and test for leaks. Repair leaks and retest until no leaks exist.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
3. Flush, test, and inspect sprinkler systems according to NFPA 13, "Systems Acceptance" Chapter.
4. Energize circuits to electrical equipment and devices.
5. Coordinate with fire-alarm tests. Operate as required.
6. Verify that equipment hose threads are same as local fire-department equipment.

C. Sprinkler piping system will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

3.9 CLEANING

A. Clean dirt and debris from sprinklers and escutcheons.

B. Remove and replace sprinklers with paint other than factory finish.

3.10 DEMONSTRATION

A. Engage qualified engineer(s) and/or technicians that are qualified and trained in the proper operation and maintenance of their respective equipment to train Owner's maintenance personnel. The training shall include all modes of operation and shall include all phases of localized maintenance and troubleshooting that does not require specialized equipment.

3.11 PIPING SCHEDULE

A. Piping between Fire-Department Connections and Check Valves: Galvanized steel pipe.

B. Provide integral test/drain valves.

C. Use piping and fittings as identified in Part 2.

3.12 SPRINKLER SCHEDULE

A. Use sprinkler types as indicated on the drawings.

END OF SECTION 21 13 13

NEW PARKING STRUCTURE AND EXTERIOR WAYFINDING SIGNAGE DULUTH INTERNATIONAL AIRPORT DULUTH, MINNESOTA

SECTION 27.11.00 - COMMUNICATIONS EQUIPMENT ROOM FITTINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
1. Telecommunications mounting elements.
2. Backboards.
3. Telecommunications equipment racks and cabinets.
4. Telecommunications service entrance pathways.
5. Grounding.

B. Related Sections:
1. Division 16 Section 16710 “Premise Distribution System.”
2. Division 16 Section 16716 "Communications Backbone Cabling" for voice and data cabling associated with system panels and devices.
3. Division 16 Section 16717 "Communications Horizontal Cabling" for voice and data cabling associated with system panels and devices.

1.3 DEFINITIONS

A. BICSI: Building Industry Consulting Service International.

B. Ladder Cable Tray: A fabricated structure consisting of two longitudinal side rails connected by individual transverse members (rungs).

C. LAN: Local area network.

D. RCDD: Registered Communications Distribution Designer.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for equipment racks and cabinets. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Shop Drawings: For communications equipment room fittings. Include plans, elevations, sections, details, and attachments to other work.

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Equipment Racks and Cabinets: Include workspace requirements and access for cable connections.
3. Grounding: Indicate location of grounding bus bar and its mounting detail showing standoff insulators and wall mounting brackets.

C. Qualification Data: For Installer, qualified layout technician, installation supervisor, and field inspector.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Cabling Installer must have personnel certified by BICSI on staff.
1. Layout Responsibility: Preparation of Shop Drawings shall be under the direct supervision of RCDD.
2. Installation Supervision: Installation shall be under the direct supervision of Registered Technician, who shall be present at all times when Work of this Section is performed at Project site.
3. Field Inspector: Currently registered by BICSI as RCDD to perform the on-site inspection.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Telecommunications Pathways and Spaces: Comply with TIA/EIA-569-A.

D. Grounding: Comply with ANSI-J-STD-607-A.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install equipment frames and cable trays until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and work above ceilings is complete.

1.7 COORDINATION

A. Coordinate layout and installation of communications equipment with Owner's telecommunications and LAN equipment and service suppliers. Coordinate service entrance arrangement with local exchange carrier.
1. Meet jointly with telecommunications and LAN equipment suppliers, local exchange carrier representatives, and Owner to exchange information and agree on details of equipment arrangements and installation interfaces.
2. Record agreements reached in meetings and distribute them to other participants.
3. Adjust arrangements and locations of distribution frames, cross-connects, and patch panels in equipment rooms to accommodate and optimize arrangement and space requirements of telephone switch and LAN equipment.

4. Adjust arrangements and locations of equipment with distribution frames, cross-connects, and patch panels of cabling systems of other communications, electronic safety and security, and related systems that share space in the equipment room.

B. Coordinate location of power raceways and receptacles with locations of communications equipment requiring electrical power to operate.

PART 2 - PRODUCTS

2.1 PATHWAYS

A. General Requirements: Comply with TIA/EIA-569-A.

B. Cable Support: NRTL labeled. Cable support brackets shall be designed to prevent degradation of cable performance and pinch points that could damage cable. Cable tie slots fasten cable ties to brackets.
1. Comply with NFPA 70 and UL 2043 for fire-resistant and low-smoke-producing characteristics.
2. Support brackets with cable tie slots for fastening cable ties to brackets.
3. Lacing bars, spools, J-hooks, and D-rings.
4. Straps and other devices.

C. Cable Trays:
1. Refer to Section 16127 “Cable Trays” for specification information.

D. Conduit and Boxes: Comply with requirements in Division 16 Section "Raceways and Boxes." Flexible metal conduit shall not be used.
1. Outlet boxes shall be no smaller than 2 inches (50 mm) wide, 3 inches (75 mm) high, and 2-1/2 inches (64 mm) deep.

2.2 BACKBOARDS

A. Backboards: Plywood, fire-retardant treated, 3/4 by 48 by 96 inches (19 by 1220 by 2440 mm). Comply with requirements for plywood backing panels specified in Division 6 Section "Rough Carpentry."

B. Provide prefabricated backboard as indicated on the drawings.

2.3 EQUIPMENT FRAMES

A. Manufacturers: Subject to compliance with requirements of paragraph 1.2 C of Section 16710, provide products by one of the following:
1. ADC.
2. Aim Electronics; a brand of Emerson Electric Co.
3. AMP; a Tyco International Ltd. company.
4. Cooper B-Line, Inc.
5. Hubbell Premise Wiring.
6. KRONE Incorporated.
7. Leviton Voice & Data Division.
8. Middle Atlantic Products, Inc.
9. Nordex/CDT; a subsidiary of Cable Design Technologies.
10. Ortronics, Inc.

11. Panduit Corp.
12. Siemon Co. (The).

B. General Frame Requirements:
1. Distribution Frames: Freestanding and wall-mounting, modular-steel units designed for telecommunications terminal support and coordinated with dimensions of units to be supported.
2. Module Dimension: Width compatible with EIA 310 standard, 19-inch (480-mm) panel mounting.
3. Finish: Manufacturer's standard, baked-polyester powder coat.

C. Floor-Mounted Racks: Modular-type, steel or aluminum construction.
1. Vertical and horizontal cable management channels, top and bottom cable troughs, grounding lug, and a power strip.
2. Baked-polyester powder coat finish.

D. Modular Freestanding Cabinets:
1. Removable and lockable side panels.
2. Hinged and lockable front and rear doors.
3. Adjustable feet for leveling.
4. Screened ventilation openings in the roof and rear door.
5. Cable access provisions in the roof and base.
6. Grounding bus bar.
7. Rack-mounted, 550-cfm (260-L/s) fan with filter.
8. Power strip.
9. Baked-polyester powder coat finish.
10. All cabinets keyed alike.

E. Modular Wall Cabinets:
1. Wall mounting.
2. Steel or aluminum construction.
3. Treated to resist corrosion.
4. Lockable front and rear doors.
5. Louvered side panels.
6. Cable access provisions top and bottom.
7. Grounding lug.
8. Rack-mounted, 250-cfm (118-L/s) fan.
9. Power strip.
10. All cabinets keyed alike.

F. Cable Management for Equipment Frames:
1. Metal, with integral wire retaining fingers.
2. Baked-polyester powder coat finish.
3. Vertical cable management panels shall have front and rear channels, with covers.
4. Provide horizontal crossover cable manager at the top of each relay rack, with a minimum height of two rack units each.

2.4 POWER STRIPS

A. Power Strips: Comply with UL 1363.
1. Rack mounting.
2. Six 20-A, 120-V ac, NEMA WD 6, Configuration 5-20R receptacles.

3. LED indicator lights for power and protection status.
4. LED indicator lights for reverse polarity and open outlet ground.
5. Circuit Breaker and Thermal Fusing: Unit continues to supply power if protection is lost.
6. Close-coupled, direct plug-in line cord.
7. Rocker-type on-off switch, illuminated when in on position.

2.5 GROUNDING

A. Comply with requirements in Division 16 Section "Grounding and Bonding" for grounding conductors and connectors.

B. Telecommunications Main Bus Bar:
1. Connectors: Mechanical type, cast silicon bronze, solderless compression-type wire terminals, and long-barrel, two-bolt connection to ground bus bar.
2. Ground Bus Bar: Copper, minimum 1/4 inch thick by 4 inches wide (6 mm thick by 100 mm wide) with 9/32-inch (7.14-mm) holes spaced 1-1/8 inches (28 mm) apart.
3. Stand-Off Insulators: Comply with UL 891 for use in switchboards, 600 V. Lexan or PVC, impulse tested at 5000 V.

C. Comply with ANSI-J-STD-607-A.

2.6 LABELING

A. Comply with TIA/EIA-606-A and UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.

PART 3 - EXECUTION

3.1 ENTRANCE FACILITIES

A. Contact telecommunications service provider and arrange for installation of demarcation point, protected entrance terminals, and housing when so directed by service provider.

B. Install underground pathways complying with recommendations in TIA/EIA-569-A, "Entrance Facilities" Article.
1. Install underground entrance pathway complying with applicable Division 16 Sections.

3.2 INSTALLATION

A. Comply with NECA 1.

B. Comply with BICSI TDMM for layout and installation of communications equipment rooms.

C. Cable Trays: Comply with Specification Section 16127 and TIA/EIA-569-A-7.

D. Bundle, lace, and train conductors and cables to terminal points without exceeding manufacturer's limitations on bending radii. Install lacing bars and distribution spools.

3.3 FIRESTOPPING

A. Comply with requirements in Division 7 Section "Through-Penetration Firestop Systems."

B. Comply with TIA/EIA-569-A, Annex A, "Firestopping."

C. Comply with BICSI TDMM, "Firestopping Systems" Article.

3.4 GROUNDING

A. Install grounding according to BICSI TDMM, "Grounding, Bonding, and Electrical Protection" Chapter.

B. Comply with ANSI-J-STD-607-A.

C. Locate grounding bus bar to minimize the length of bonding conductors. Fasten to wall allowing at least 2-inch (50-mm) clearance behind the grounding bus bar. Connect grounding bus bar with a minimum No. 4 AWG grounding electrode conductor from grounding bus bar to suitable electrical building ground.

D. Bond metallic equipment to the grounding bus bar, using not smaller than No. 6 AWG equipment grounding conductor.
   1. Bond the shield of shielded cable to the grounding bus bar in communications rooms and spaces.

3.5 IDENTIFICATION

A. Identify system components, wiring, and cabling complying with TIA/EIA-606-A. Comply with requirements in Division 16 Section "Electrical Identification."

B. Comply with requirements in Division 9 Section "Interior Painting" for painting backboards. For fire-resistant plywood, do not paint over manufacturer's label.

C. Paint and label colors for equipment identification shall comply with TIA/EIA-606-A for Class 3 level of administration including optional identification requirements of this standard.

D. Labels shall be preprinted or computer-printed type.

END OF SECTION 27.11.00

NEW PARKING STRUCTURE AND EXTERIOR WAYFINDING SIGNAGE
DULUTH INTERNATIONAL AIRPORT
DULUTH, MINNESOTA

SECTION 27.13.00 - COMMUNICATIONS BACKBONE CABLING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
1. Pathways.
2. UTP cable.
3. Optical fiber cabling.
4. Coaxial cable.
5. Cable connecting hardware, patch panels, and cross-connects.
6. Cabling identification products.

B. Related Sections:
1. Division 16 Section 16710 “Premise Distribution System.”
2. Division 16 Section 16714 “Communication Equipment Room Fittings.”
3. Division 16 Section 16717 “Communication Horizontal Cabling.”

1.3 DEFINITIONS

A. BICSI: Building Industry Consulting Service International.

B. CCITT

C. Cross-Connect: A facility enabling the termination of cable elements and their interconnection or cross-connection.

D. EMI: Electromagnetic interference.

E. IDC: Insulation displacement connector.

F. LAN: Local area network.

G. RCDD: Registered Communications Distribution Designer.

H. TIPS

I. UTP: Unshielded twisted pair.

1.4 BACKBONE CABLING DESCRIPTION

A. Backbone cabling system shall provide interconnections between communications equipment rooms, main terminal space, and entrance facilities in the telecommunications cabling system structure. Cabling system consists of backbone cables, intermediate and main cross-connects, mechanical terminations, and patch cords or jumpers used for backbone-to-backbone cross-connection.

B. Backbone cabling cross-connects may be located in communications equipment rooms or at entrance facilities. Bridged taps and splitters shall not be used as part of backbone cabling.

1.5 PERFORMANCE REQUIREMENTS

A. General Performance: Backbone cabling system shall comply with transmission standards in TIA/EIA-568-B.1, when tested according to test procedures of this standard.

1.6 SUBMITTALS

A. Product Data: For each type of product indicated.
   1. For coaxial cable, UTP , and Optical Fiber cable include the following installation data for each type used:
      a. Nominal OD.
      b. Minimum bending radius.
      c. Maximum pulling tension.

B. Shop Drawings:
   1. System Labeling Schedules: Electronic copy of labeling schedules that are part of the cabling and asset identification system of the software.
   2. Cabling administration drawings and printouts.
   3. Wiring diagrams to show typical wiring schematics including the following:
      a. Cross-connects.
      b. Patch panels.
      c. Patch cords.
   4. Cross-connects and patch panels. Detail mounting assemblies, and show elevations and physical relationship between the installed components.
   5. Cable tray layout, showing cable tray route to scale, with relationship between the tray and adjacent structural, electrical, and mechanical elements. Include the following:
      a. Vertical and horizontal offsets and transitions.
      b. Clearances for access above and to side of cable trays.
      c. Vertical elevation of cable trays above the floor or bottom of ceiling structure.
      d. Load calculations to show dead and live loads as not exceeding manufacturer's rating for tray and its support elements.

C. Qualification Data: For Installer, qualified layout technician, installation supervisor, and field inspector.

D. Source quality-control reports.

E. Field quality-control reports.

F. Maintenance Data: For splices and connectors to include in maintenance manuals.

G. Software and Firmware Operational Documentation:
1. Software operating and upgrade manuals.
2. Program Software Backup: On magnetic media or compact disk, complete with data files.
3. Device address list.
4. Printout of software application and graphic screens.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: Cabling Installer must have personnel certified by BICSI on staff.
1. Layout Responsibility: Preparation of Shop Drawings Cabling Administration Drawings, and field testing program development by an RCDD.
2. Installation Supervision: Installation shall be under the direct supervision of Registered Technician, who shall be present at all times when Work of this Section is performed at Project site.
3. Testing Supervisor: Currently certified by BICSI as an RCDD to supervise on-site testing.

B. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
1. Flame-Spread Index: 25 or less.
2. Smoke-Developed Index: 450 or less.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

D. Telecommunications Pathways and Spaces: Comply with TIA/EIA-569-A.

E. Grounding: Comply with ANSI-J-STD-607-A.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Test cables upon receipt at Project site.
1. Test optical fiber cable to determine the continuity of the strand end to end. Use optical loss test set.
2. Test optical fiber cable while on reels. Use an optical time domain reflectometer to verify the cable length and locate cable defects, splices, and connector, including the loss value of each. Retain test data and include the record in maintenance data.
3. Test each pair of UTP cable for open and short circuits.

1.9 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install cables and connecting materials until wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

1.10 COORDINATION

A. Coordinate layout and installation of telecommunications pathways and cabling with Owner's telecommunications and LAN equipment and service suppliers.

1.11 SOFTWARE SERVICE AGREEMENT

A. Technical Support: Beginning with Substantial Completion, provide software support for two (2) years.

B. Upgrade Service: Update software to latest version at Project completion. Install and program software upgrades that become available within two (2) years from date of Substantial Completion. Upgrading software shall include operating system. Upgrade shall include new or revised licenses for use of software.
   1. Provide thirty (30) days' notice to Owner to allow scheduling and access to system and to allow Owner to upgrade computer equipment if necessary.

1.12 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Patch-Panel Units: One of each type.
   2. Connecting Blocks: One of each type.

PART 2 - PRODUCTS

2.1 PATHWAYS

A. General Requirements: Comply with TIA/EIA-569-A.

B. Cable Support: NRTL labeled for support of Category 6 cabling, designed to prevent degradation of cable performance and pinch points that could damage cable.
   1. Support brackets with cable tie slots for fastening cable ties to brackets.
   2. Lacing bars, spools, J-hooks, and D-rings.
   3. Straps and other devices.

C. Cable Trays:
   1. Refer to section 16127 for cable tray specifications

D. Conduit and Boxes: Comply with requirements in Division 16 Section "Raceways and Boxes." Flexible metal conduit shall not be used.

E. Outlet boxes shall be no smaller than 2 inches (50 mm) wide, 3 inches (75 mm) high, and 2-1/2 inches (64 mm) deep.

2.2 BACKBOARDS

A. Backboards: Plywood, fire-retardant treated, 3/4 by 48 by 96 inches (19 by 1220 by 2440 mm). Comply with requirements in Division 6 Section "Rough Carpentry" for plywood backing panels.

2.3 UTP CABLE

A. Manufacturers: Subject to compliance with requirements of paragraph 1.2 C of Section 16710, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Belden CDT Inc.; Electronics Division.
2. Berk-Tek; a Nexans company.
3. CommScope, Inc.
4. Mohawk; a division of Belden CDT.
5. Nordex/CDT; a subsidiary of Cable Design Technologies.
6. Superior Essex Inc.
7. SYSTIMAX Solutions; a CommScope Inc. brand.
8. Tyco Electronics/AMP Netconnect; Tyco International Ltd.
9. or approved equal.

B. Description: 100-ohm, 100-pair or as shown on the drawings, UTP, formed into 25-pair binder groups covered with a gray thermoplastic jacket.
1. Comply with ICEA S-90-661 for mechanical properties.
2. Comply with TIA/EIA-568-B.1 for performance specifications.
3. Comply with TIA/EIA-568-B.2, Category 6.
4. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444 and NFPA 70 for the following types:
a. Communications, General Purpose: Type CM or CMG
b. Communications, Plenum Rated: Type CMP, complying with NFPA 262.
c. Communications, Riser Rated: Type CMR, complying with UL 1666.
d. Communications, Limited Purpose: Type CMX.
e. Multipurpose: Type MP.
f. Multipurpose, Plenum Rated: Type MPP, complying with NFPA 262.
g. Multipurpose, Riser Rated: Type MPR complying with UL 1666.

2.4 UTP CABLE HARDWARE

A. Manufacturers: Subject to compliance with requirements of paragraph 1.2 C of Section 16710, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. American Technology Systems Industries, Inc.
2. Dynacom Corporation.
3. Hubbell Premise Wiring.
4. KRONE Incorporated.

5. Leviton Voice & Data Division.
6. Nordex/CDT; a subsidiary of Cable Design Technologies.
7. Panduit Corp.
8. Tyco Electronics/AMP Netconnect; Tyco International Ltd.
9. or approved equal

B. General Requirements for Cable Connecting Hardware: Comply with TIA/EIA-568-B.2, IDC type, with modules designed for punch-down caps or tools. Cables shall be terminated with connecting hardware of same category or higher.

C. Connecting Blocks: 110-style IDC for Category 6. Provide blocks for the number of cables terminated on the block, plus 25 percent spare. Integral with connector bodies, including plugs and jacks where indicated.

D. Patch Panel: Modular panels housing multiple-numbered jack units with IDC-type connectors at each jack for permanent termination of pair groups of installed cables.
1. Number of Jacks per Field: One for each four-pair UTP cable indicated conductor group of indicated cables, plus 20% spares and blank positions adequate to suit specified expansion criteria.

E. Jacks and Jack Assemblies: Modular, color-coded, eight-position modular receptacle units with integral IDC-type terminals.

F. Patch Cords: Factory-made, 4-pair cables in 72-inch lengths; terminated with 8-position modular plug at each end.
1. Patch cords shall have bend-relief-compliant boots and color-coded icons to ensure Category 6 performance. Patch cords shall have latch guards to protect against snagging.

2.5 OPTICAL FIBER CABLE

A. Manufacturers: Subject to compliance with requirements, provide products by the following:
1. Sumitomo Air blown fiber system as shown on the drawings.
2. Superior Essex.
3. Allen Tel.
4. Owens Corning.
5. or approved equal.

B. Air Blown Fiber Installation (ABF)
1. Furnish all labor, materials, tools and equipment to provide air blown fiber through compact cable infrastructure tubes. The air blown fiber equipment manufacture shall have at least 5 years of successful manufacturing of products with characteristics and capacities required by this section. All work shall comply with all applicable codes and standards.
2. Provide rack and key lockable wall-mounted enclosures to terminate optical fibers from the air blown fiber bundles. The enclosures shall support and organize the fibers for termination. All accessories shall include, but are not limited to, breakout cables, tube couplings, plugs,

caps and organizers. All couplings and caps shall be pressure rated to 200 psi.

3. Install the system and all materials in accordance with manufacturer instructions.
4. Provide all cable blowing heads and all equipment necessary for blowing the fiber in the tubes including any air or nitrogen gas required.
5. All optical fibers shall be sufficiently free of surface imperfections and inclusions to meet the optical, mechanical and environmental requirements of this specification. All fibers in the fiber bundles must be usable.
6. The fiber coating and buffer shall be removable with commercially available stripping tools without damaging the fiber.
7. All fibers in the bundles shall meet industry standards on attenuation, bandwidth and dispersion specifications outlined below. Attenuation specification shall be a maximum attenuation for each fiber over the entire operating temperature range of the cable.

C. Multimode Fiber 62.5/125 micron:

1. The multimode fiber utilized in the cable specified herein shall meet TIA/EIA standards. The 62.5/125 micron grade-index multimode optical fiber shall be plenum or non-plenum rated as required and shall meet the following optical characteristics:

850 nm:	maximum attenuation	3.5 dB/km
	typical attenuation	3.0 dB/km
	minimum LED bandwidth	200 MHz•km
	minimum Gigabit distance	500 m
1300 nm	maximum attenuation	1.0 dB/km
	typical attenuation	1.0 dB/km
	minimum LED bandwidth	600 MHz•km
	minimum Gigabit distance	1000m

2. The multimode fiber utilized in the cable specified herein shall conform to the following specifications:

Fiber Core:	62.5/125 micron
Cladding Diameter:	62.5 ± 3 µm
Fiber Identification:	Individually color-coded per TIA/EIA standards
Operating Temperature	-22°F to 158°F

D. Multimode Fiber 50/125 micron

1. The multimode fiber utilized in the cable specified herein shall meet TIA/EIA standards. The 50/125 micron grade-index multimode optical fiber shall be plenum or non-plenum rated as required and shall meet the following optical characteristics:

850 nm:	maximum attenuation	3.0 dB/km
	minimum bandwidth	500 MHz•km
1300 nm	maximum attenuation	1.0 dB/km
	minimum bandwidth	500 MHz•km

2. The multimode fiber utilized in the cable specified herein shall conform to the following specifications:

Fiber Core:	50/125 micron
Cladding Diameter:	50 ± 3 µm

Fiber Identification: Individually color-coded per TIA/EIA standards

Operating Temperature -40°F to 158°F

E. Singlemode Fiber:

1. The singlemode fiber utilized in the cable specified herein shall meet TIA/EIA standards. The 8.3 micron singlemode optical fiber shall be plenum or non-plenum rated as required and shall meet the following optical characteristics:

1310 nm:	maximum attenuation	.40 dB/km
1550 nm	maximum attenuation	.30 dB/km

F. Outdoor Fiber Tubes

1. The multi-tube shall have a polyethylene outer jacket with a dry tape waterblocked cable core and meet TIA/EIA standards. The operating temperature range shall be -40°F to 158°F. The minimum bending radius shall be 20 cable diameters during installation and 10 cable diameters after installation.

G. Indoor Plenum Rated Fiber Tubes

1. The plenum rated multi-tube shall have a low smoke, flame resistant outer jacket and meet TIA/EIA standards. The operating temperature range shall be 32°F to 122°F. The minimum bending radius shall be 20 cable diameters during installation and 10 cable diameters after installation. UL 910 OFNP Rated.

H. Tube Distribution Equipment

1. Provide rack and key lockable wall-mounted enclosures to terminate optical fibers from the air blown fiber bundles. The enclosures shall support and organize the fibers for termination. Include all accessories including but are not limited to breakout cables, tube couplings, plugs, caps and organizers. All couplings and caps shall be pressure rated to 200 psi.

2.6 OPTICAL FIBER CABLE HARDWARE

A. Manufacturers: Subject to compliance with requirements of paragraph 1.2 C of Section 16710, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. ADC.
2. American Technology Systems Industries, Inc.
3. Berk-Tek; a Nexans company.
4. Corning Cable Systems.
5. Dynacom Corporation.
6. Hubbell Premise Wiring.
7. Molex Premise Networks; a division of Molex, Inc.
8. Nordex/CDT; a subsidiary of Cable Design Technologies.
9. Optical Connectivity Solutions Division; Emerson Network Power.
10. Siemon Co. (The).

B. Cross-Connects and Patch Panels: Modular panels housing multiple-numbered, duplex cable connectors.

C. Patch Cords: Factory-made, dual-fiber cables in 72-inch lengths.

D. Cable Connecting Hardware:
1. Comply with Optical Fiber Connector Intermateability Standards (FOCIS) specifications of TIA/EIA-604-2, TIA/EIA-604-3-A, and TIA/EIA-604-12. Comply with TIA/EIA-568-B.3.
2. Quick-connect, simplex and duplex, Type SC connectors. Insertion loss not more than 0.75 dB.
3. Type SFF connectors may be used in termination racks, panels, and equipment packages.

E. Fiber SC Termination
1. The fiber building cable shall be terminated at the Fiber Interconnect cabinets, work area outlets and the communication equipment. The connector shall allow many reconnections with consistent repeatable performance.

F. Multimode
1. The only approved method of termination is the T568 SC multimode connector, manufacturer approved for the cable supplied. The connector shall be an approved component and meet the following requirements:

Mean Loss	0.3 dB
Standard Deviation	0.2 dB
Fiber OD	125 micron
Cable OD	3.0 mm
Loss Repeat	<0.3 dB, 200 insertions
Axial Load	30 lbs.
Temperature Stability	<0.3 dB Max. change
Connector Tip material	Ceramic
Connector Cap material	Poly Sulfone

2. The connector shall be installed on the fiber utilizing an approved tool kit. This kit contains all tools and instructions to mount the connector quickly and easily, utilizing the Manufacturer’s installation procedures.

G. Single-mode
1. The only approved method of termination is the T568 SC single-mode connector, manufacturer approved for the cable supplied. The connector shall be an approved component and meet the following requirements:

Mean Loss	0.2dB
Standard Deviation	0.1dB
Fiber OD	125 micron
Cable OD	3.0 mm
Loss Repeat	<0.2dB, 200 insertions
Axial Load	30 lbs.
Temperature Stability	<0.3 dB Max. change
Connector Tip material	Zirconia Ceramic
Connector Cap material	Poly Sulfone

2. The connector shall be installed on the fiber utilizing an approved tool kit. This kit contains all tools and instructions to mount the connector quickly and easily, utilizing the Manufacturer's installation procedures.

2.7 FIBER JUMPER CABLES

A. Provide dual fiber FDDI grade fiber optic patch jumper assemblies for each fiber interconnect cabinet connector. Fiber cable shall be sized for the longest connection and installed in accordance with a schedule developed by the installation contractor. Fiber connectors shall match the fiber connector specifications. The patch cord fiber shall match the optical characteristics and specifications for the fiber cable specified and shall be covered by Aramid yarn and a jacket of flame-retardant PVC. The fiber patch cord shall meet the following specifications:

Minimum bend radius:	1.00 inch (2.54 cm)
Operating temperature:	-4°F to 158°F (-20°C to 70°C)
Mated connector loss:	0.4 dB
minimum bandwidth:	200MHz•km at 850nm, 500MHz•km at 1300nm
maximum attenuation	3.4 dB/km @ 850 nm, 1.0 dB/km @ 1300nm
ISO 9001 Certified Manufacturer	

B. Multimode Fiber Patch Cord Specifications

Mated Connector Loss	$\mu = 0.3$dB, s = 0.2dB
Operating temperature	-4°F to 158°F (-20°C to 70°C)
Cable Retention:	50 lb. (220 N) minimum
Connection Repeatability:	0.20 dB maximum changer per 100 reconnects

C. Single-mode Fiber Patch Cord Specifications

Return Loss:	-50 dB maximum
Mated connector loss	$\mu = 0.35$ dB, $\sigma = 0.2$dB
Cable Retention:	50 lb. (220 N) minimum
Connection Repeatability:	0.20 dB maximum changer per 200 reconnects

2.8 OPTICAL FIBER TELECOMMUNICATION OUTLETS

A. Provide fiber optical outlets with connectors as designated on the drawings or as required by the owner in single gang, dual gang, fiber optic and office furniture configurations. Provide recessed angled jacks to protect mating cables. Its modular design shall allow the adoption of interchangeable units for standard or customized voice, video, and data applications. The outlets shall include a decorative cover and all associated mounting hardware, modules, couplings, adapters and connectors. Submit color selection during submittal process, color to be determined after submittal. Covers shall come with recessed label space for circuit identifications.

B. All outlets shall be identified with clear permanent typewritten labels matching the numbering plan indicated on the drawings. Each module shall be labeled as to its current function using color-coded icons. All labeling must be permanent. All

labeling shall be a minimum 12-point in size. All labeling systems shall be submitted to the owner's representative for approval prior to fabrication. Labeling shall last as long as the system is in use.

C. Provide a surface mounted enclosure that attaches directly over the standard electrical box provided.

D. Provide a means of securing the fiber cables while maintaining a minimum bend radius of 30 mm. This fiber ring shall store a minimum of 1 meter of two-count fiber.

2.9 OPTICAL FIBER CABLE INTERCONNECT CABINET

A. All fiber cables will be terminated at the telecommunication room sites in fiber interconnect cabinets. These cabinets will be wall or rack mounted, as designated on the drawings, or as required by the Owner. Rack mounted interconnect cabinets shall be placed at the top of the rack and located to minimize jumper distance to electronic equipment. Provide quantities and configurations as shown on the drawings. The fiber interconnect cabinet shall be a certified component and will directly terminate the fiber building cable.

B. Assure that the connectors for each cabling segment are installed in the correct orientation to ensure proper polarity of an optical fiber system from the main cross-connect to the telecommunications outlet/connector.

2.10 OPTICAL FIBER CABLE SPLICES & CLOSURES

A. Fiber Splicing: All fiber cable splicing shall be performed using the fusion splicing method unless the client specifically requires the mechanical method.
   1. Fusion – The fiber splicer shall be fully automatic, calibrated and operate under the various jobsite environmental conditions (e.g. temperature, humidity, altitude, etc.) for all types of fiber cable being deployed.
      a. The mean splice loss for identical dispersion-unshifted singlemode fibers shall be equal to 0.05 dB at 1310 nm and 1550 nm wavelengths in accordance with CCITT G.652.
      b. The microprocessor controlled automatic positioning system shall control the fiber alignment, cleaning, gap-setting correlation of fiber positioning and fusing.
      c. The fusion splicer shall measure and document the splice losses of each splice. These measurements shall be saved and submitted to the TIPS Project Manager.
      d. Heat shrink protection shall be provided for each splice.
   2. Mechanical – The fiber splice module shall meet the following specifications:
      a. Accept 250 and 900 micron fibers.
      b. Reenterable, rearrangable and reusable.
      c. Require no polishing.
      d. Require no adhesives.
      e. No loose parts.
      f. Mean splice loss 0.15 dB.
      g. Blind splice loss < 0.5 dB.
      h. One part index matching gel.

i. Stable from -40°C to 75°C.

B. Splice Closures: The fiber splice canister closure shall seal, bond, anchor and protect fiber optic cable splices. The splice closure shall be re-enterable with a maximum of six (6) cable entries in a butt-end configuration. The cap shall be capable of accepting additional cables without disturbing existing splices. The slice closure shall be designed for application required i.e., aerial, underground and direct buried. It shall use corrosion free construction designed for splicing fibers. The unit shall include slack storage and the splice trays required or the specific project installation.

2.11 COAXIAL CABLE

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Alpha Wire Company.
2. Belden CDT Inc.; Electronics Division.
3. Coleman Cable, Inc.
4. CommScope, Inc.
5. or approved equal.

B. General Coaxial Cable Requirements: Broadband type, recommended by cable manufacturer specifically for broadband data transmission applications. Coaxial cable and accessories shall have 75-ohm nominal impedance with a return loss of 20 dB maximum from 7 to 806 MHz.

C. RG-11/U: NFPA 70, Type CATV.
1. No. 14 AWG, solid, copper-covered steel conductor.
2. Gas-injected, foam-PE insulation.
3. Double shielded with 100 percent aluminum polyester tape and 60 percent aluminum braid.
4. Jacketed with sunlight-resistant, black PVC or PE.
5. Suitable for outdoor installations in ambient temperatures ranging from minus 40 to plus 85 C.

D. RG-6/U: NFPA 70, Type CATV or CMP
1. No. 16 AWG, solid, copper-covered steel conductor; gas-injected, foam-foam fluorinated ethylene propylene insulation.
2. Double shielded with 100 percent aluminum-foil shield and 60 percent aluminum braid.
3. Copolymer jacket.
4. Suitable for indoor installations.

E. NFPA and UL compliance, listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 1655 and with NFPA 70, "Radio and Television Equipment" and "Community Antenna Television and Radio Distribution" Articles.

2.12 COAXIAL CABLE HARDWARE

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. Aim Electronics; a brand of Emerson Electric Co.
   2. Leviton Voice & Data Division.
   3. Siemon Co. (The).

B. Coaxial-Cable Connectors: Type BNC, 75 ohms.

2.13 GROUNDING

A. Comply with requirements in Division 16 Section "Grounding and Bonding" for grounding conductors and connectors.

B. Communication bonding and grounding shall be in accordance with the NEC, NFPA, NESC and ANSI/TIA/EIA Standard 607. Horizontal cables shall be grounded in compliance with ANSI/NFPA 70 and local requirements and practices. Horizontal equipment includes cross-connect frames, patch panels and racks, active telecommunication equipment and test apparatus and equipment.

C. #6 AWG stranded copper wire cable shall be extended between new ground bars located at each intermediate cross-connect and the building main service ground point. This ground conductor shall be utilized for equipment, termination, equipment rack and computer equipment grounding.

D. When the Telecommunications Rooms contains an electrical panel, provide a telecommunications ground utilizing a #6 AWG or larger bonding conductor that provides direct bonding between telecommunications rooms ground bar and connected to the telecommunications room electrical panel Alternating Current Equipment Ground buss ACEG.

E. All outside plant installation metallic cable elements shall be grounded at the building entry points and at each splice location.

2.14 TELECOMMUNICATIONS BACKBOARD

A. Provide ¾ inch, 8-foot high, void-free, A/C grade plywood as designated on the drawings or as required by the owner. Paint the backboard with one prime coat and one finish coat of fire retardant pearl gray latex paint. Securely fasten the backboard to the wall to support the weight of the attached cable, termination and equipment.

2.15 ELEVATOR CONDUIT & CABLE

A. Provide a one-inch conduit from the telecommunication room to each elevator control room. The conduit shall originate in the vicinity of the 110 termination blocks and terminate in a 4 square telecommunication outlet box, with a voice jack, located as requested by the elevator contractor. Provide one Category 5e cable from the outlet box to the voice demarcation point.

2.16 FIRE ALARM CONDUIT & CABLE

A. Provide a one-inch conduit from the telecommunication room located closest to the fire alarm panel. The conduit shall originate in the vicinity of the 110 termination blocks and terminate in a 4 square telecommunication outlet box, with two voice jacks, located as requested by the fire alarm contractor. Provide two Category 5e cables from the outlet box to the voice demarcation point.

2.17 T1 TRANSMISSION

A. Provide outlets and circuit wiring for video teleconferencing over T1 transmission lines. The T1 service cable shall be run from the T1 outlet jack to the T1 demarcation outlets as required by the project. Each T1 demarcation outlet shall include a RJ48X miniature, non-keyed, 8-position 8-wire jack for each T1 outlet. Each T1 outlet shall include two ANSI/TIA/EIA-568-B 8-position Category 5e modular voice (telephone) jacks connected to a four pair UTP Category 6 cable and one RJ48X miniature. This T1 jack shall be non-keyed, 8-position 8-wire jack with shorting bars on pins 1 & 4 and 2 & 5, 110 type terminations shall be connected to a four pair UTP Category 5e cable.

2.18 TELECOMMUNICATIONS BONDING BACKBONE

A. Provide a Telecommunications Bonding Backbone, as required, utilizing a #6 AWG or larger bonding conductor that provides direct bonding between equipment rooms and Telecommunications Rooms. This is part of the grounding and bonding infrastructure (part of the telecommunications pathways and spaces in the building structure), and is independent of equipment or cable. The permanent infrastructure for telecommunications grounding and bonding is independent of telecommunications cabling. The co-routed bonding conductor shall be installed as follows:

B. All cables entering a building must conform to the bonding and grounding requirements in the NEC.

C. Provide copper bonding conductors installed through every major telecommunications backbone pathway and directly terminated on a grounding busbar in each telecommunication equipment location. The grounding busbar shall be directly bonded to building structural steel and other permanent metallic systems. Each pathway bonding conductor must be terminated on the busbar. The busbar shall be visibly labeled and physically secured.

D. Route the #6 AWG copper conductor along each backbone cable route. Ensure a minimal separation between the conductor and the cables along the entire distance.

E. Bond each end at the nearest approved ground in the area that the associated cables terminate or are spliced/cross-connected onto other cables. Such bonding shall be done with a grounding busbar.

F. The main busbar shall be directly bonded to the electrical service grounding electrode system. The telecommunications grounding system shall be directly attached to the closet point in the building’s electrical service grounding system.

G. Telecommunication installers shall use the grounding busbars as the local approved ground. Backbone cabling shall be bonded at each sheath opening. All metallic cable trays shall be grounded.

H. Provide telecommunications bonding connections in accessible locations. Make all bonding connections with listed bolts, crimp pressure connectors, clamps, or lugs. Multiple grounding busbars placed in the building shall be directly bonded with a #6 AWG copper conductor.

I. Bonding conductors shall be routed with a minimum number of bends. The bends placed in the conductor shall be swiping.

2.19 PUBLIC AREA TELEPHONES

A. Provide a one-inch conduit from the telecommunication room located closest to each public area telephone location. The conduit shall originate in the vicinity of the 110 termination blocks and terminate in a 4 square telecommunication outlet box, with a voice jack, for each telephone. The telephone outlet box shall be located at a height that will permit the installation of both normal and ADA handicapped mounts without exposure of the telephone outlets for either location. Provide one Category5e cable from each outlet box to the voice demarcation point.

2.20 IDENTIFICATION PRODUCTS

A. Comply with TIA/EIA-606-A and UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers. Use Panduit Ultimate ID Network Labeling System or equal.

2.21 SOURCE QUALITY CONTROL

A. Factory test cables on reels according to TIA/EIA-568-B.1.

B. Factory test UTP cables according to TIA/EIA-568-B.2.

C. Factory test multimode optical fiber cables according to TIA/EIA-526-14-A and TIA/EIA-568-B.3.

D. Cable will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 ENTRANCE FACILITIES

A. Coordinate backbone cabling with the protectors and demarcation point provided by communications service provider.

3.2 WIRING METHODS

A. Wiring Method: Install cables in raceways and cable trays except within consoles, cabinets, desks. Conceal raceway and cables except in unfinished spaces.
   1. Install plenum cable in environmental air spaces, including plenum ceilings.
   2. Comply with requirements for raceways and boxes specified in Division 16 Section "Raceways and Boxes."

B. Wiring within Enclosures: Bundle, lace, and train cables within enclosures. Connect to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools.

3.3 INSTALLATION OF PATHWAYS

A. Cable Trays: Comply with NEMA-VE-2 and TIA/EIA-569-A.

B. Comply with requirements for demarcation point, pathways, cabinets, and racks specified in Division 16 Section "Communications Equipment Room Fittings." Drawings indicate general arrangement of pathways and fittings.

C. Comply with TIA/EIA-569-A for pull-box sizing and length of conduit and number of bends between pull points.

D. Comply with requirements in Division 16 Section "Raceways" for installation of conduits and wireways.

E. Install manufactured conduit sweeps and long-radius elbows whenever possible.

F. Pathway Installation in Communications Equipment Rooms:
   1. Position conduit ends adjacent to a corner on backboard where a single piece of plywood is installed, or in the corner of room where multiple sheets of plywood are installed around perimeter walls of room.
   2. Install cable trays to route cables if conduits cannot be located in these positions.
   3. Secure conduits to backboard when entering room from overhead.
   4. Extend conduits 3 inches (76 mm) above finished floor.
   5. Install metal conduits with grounding bushings and connect with grounding conductor to grounding system.

G. Backboards: Install backboards with 96-inch (2440-mm) dimension vertical. Butt adjacent sheets tightly, and form smooth gap-free corners and joints.

H. Air Blown Optical Fiber Cable: Install the system and all materials in accordance with manufacturer’s instructions.
   1. Do not install the fiber until fiber tube cable system is complete
   2. Do not exceed manufacturer’s maximum bending radius on tubes and fiber bundles.
   3. All spare strands shall be installed into spare splice trays, unless otherwise indicated on drawings.

3.4 INSTALLATION OF CABLES

A. Comply with NECA 1.

B. General Requirements for Cabling:
1. Comply with TIA/EIA-568-B.1.
2. Comply with BICSI ITSIM, Ch. 6, "Cable Termination Practices."
3. Install 110-style IDC termination hardware unless otherwise indicated.
4. Terminate all conductors; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, cross-connects, and patch panels.
5. Cables may not be spliced. Secure and support cables at intervals not exceeding 30 inches (760 mm) and not more than 6 inches (150 mm) from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
6. Install lacing bars to restrain cables, to prevent straining connections, and to prevent bending cables to smaller radii than minimums recommended by manufacturer.
7. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIM, "Cabling Termination Practices" Chapter. Use lacing bars and distribution spools.
8. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
9. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used for heating.
10. In the communications equipment room, install a 10-foot- (3-m-) long service loop on each end of cable.
11. Pulling Cable: Comply with BICSI ITSIM, Ch. 4, "Pulling Cable." Monitor cable pull tensions.

C. UTP Cable Installation:
1. Comply with TIA/EIA-568-B.2.
2. Do not untwist UTP cables more than 1/2 inch (12 mm) from the point of termination to maintain cable geometry.

D. Optical Fiber Cable Installation:
1. Comply with TIA/EIA-568-B.3.
2. Cable may be terminated on connecting hardware that is rack or cabinet mounted.

E. Open-Cable Installation:
1. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
2. Suspend UTP cable not in a wireway or pathway, a minimum of 8 inches (200 mm) above ceilings by cable supports not more than 60 inches (1524 mm) apart.
3. Cable shall not be run through structural members or in contact with pipes, ducts, or other potentially damaging items.

F. Outdoor Coaxial Cable Installation:
   1. Install outdoor connections in enclosures complying with NEMA 250, Type 4X. Install corrosion-resistant connectors with properly designed O-rings to keep out moisture.
   2. Attach antenna lead-in cable to support structure at intervals not exceeding 36 inches (915 mm).

G. Group connecting hardware for cables into separate logical fields.

H. Separation from EMI Sources:
   1. Comply with BICSI TDMM and TIA/EIA-569-A recommendations for separating unshielded copper voice and data communication cable from potential EMI sources, including electrical power lines and equipment.
   2. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment shall be as follows:
      a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 5 inches (127 mm).
      b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 12 inches (300 mm).
      c. Electrical Equipment Rating More Than 5 kVA: A minimum of 24 inches (610 mm).
   3. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:
      a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 2-1/2 inches (64 mm).
      b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 6 inches (150 mm).
      c. Electrical Equipment Rating More Than 5 kVA: A minimum of 12 inches (300 mm).
   4. Separation between communications cables in grounded metallic raceways and power lines and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:
      a. Electrical Equipment Rating Less Than 2 kVA: No requirement.
      b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 3 inches (76 mm).
      c. Electrical Equipment Rating More Than 5 kVA: A minimum of 6 inches (150 mm).
   5. Separation between Communications Cables and Electrical Motors and Transformers, 5 kVA or HP and Larger: A minimum of 48 inches (1200 mm).
   6. Separation between Communications Cables and Fluorescent Fixtures: A minimum of 5 inches (127 mm).

3.5 FIRESTOPPING

A. Comply with requirements in Division 7 Section "Through-Penetration Firestop Systems."

B. Comply with TIA/EIA-569-A; Annex A, "Firestopping."

C. Comply with BICSI TDMM, "Firestopping Systems" Article.

3.6 GROUNDING

A. Install grounding according to BICSI TDMM, "Grounding, Bonding, and Electrical Protection" Chapter.

B. Comply with ANSI-J-STD-607-A.

C. Locate grounding bus bar to minimize the length of bonding conductors. Fasten to wall allowing at least 2-inch (50-mm) clearance behind the grounding bus bar. Connect grounding bus bar with a minimum No. 4 AWG grounding electrode conductor from grounding bus bar to suitable electrical building ground.

D. Bond metallic equipment to the grounding bus bar, using not smaller than No. 6 AWG equipment grounding conductor.

3.7 IDENTIFICATION

A. Identify system components, wiring, and cabling complying with TIA/EIA-606-A. Comply with requirements for identification specified in Division 16 Section "Electrical Identification."
   1. Administration Class: 3.
   2. Color-code cross-connect fields and apply colors to voice and data service backboards, connections, covers, and labels.

B. Comply with requirements in Division 9 Section "Interior Painting" for painting backboards. For fire-resistant plywood, do not paint over manufacturer's label.

C. Paint and label colors for equipment identification shall comply with TIA/EIA-606-A for Class 3 level of administration including optional identification requirements of this standard.

D. Comply with requirements in Division 16 Section "Communications Horizontal Cabling" for cable and asset management software.

E. Cable Schedule: Install in a prominent location in each equipment room and wiring closet. List incoming and outgoing cables and their designations, origins, and destinations. Protect with rigid frame and clear plastic cover. Furnish an electronic copy of final comprehensive schedules for Project.

F. Cabling Administration Drawings: Show building floor plans with cabling administration-point labeling. Identify labeling convention and show labels for telecommunications closets, backbone pathways and cables, entrance pathways and cables, terminal hardware and positions, horizontal cables, work areas and workstation terminal positions, grounding buses and pathways, and equipment grounding conductors.

G. Cable and Wire Identification:

1. Label each cable within 4 inches (100 mm) of each termination and tap, where it is accessible in a cabinet or junction or outlet box, and elsewhere as indicated.
2. Each wire connected to building-mounted devices is not required to be numbered at device if color of wire is consistent with associated wire connected and numbered within panel or cabinet.
3. Exposed Cables and Cables in Cable Trays and Wire Troughs: Label each cable at intervals not exceeding 15 feet (4.5 m).
4. Label each terminal strip and screw terminal in each cabinet, rack, or panel.
   a. Individually number wiring conductors connected to terminal strips and identify each cable or wiring group being extended from a panel or cabinet to a building-mounted device with name and number of particular device as shown.
   b. Label each unit and field within distribution racks and frames.
5. Identification within Connector Fields in Equipment Rooms and Wiring Closets: Label each connector and each discrete unit of cable-terminating and connecting hardware. Where similar jacks and plugs are used for both voice and data communication cabling, use a different color for jacks and plugs of each service.

H. Labels shall be preprinted or computer-printed type with printing area and font color that contrasts with cable jacket color but still complies with requirements in TIA/EIA 606-A, for the following:

I. Cables use flexible vinyl or polyester that flexes as cables are bent.

3.8 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Testing Requirements
1. Testing shall be performed after all components have been labeled and prior to system cutover. Test results shall meet or exceed manufacturer documentation data. All test equipment shall utilize the latest firmware and software recommended by the manufacturer. All test equipment shall be calibrated, tested and certified within one year of the commencement of the project testing. Otherwise, follow the manufacturer recommendations.
2. Telecommunications Bonding Backbone (TBB) Testing shall verify the integrity of all bonding connections and compliance to the NEC.
3. All cables and termination hardware shall be 100% tested for defects in installation and to verify cabling system performance under installed conditions according to the requirements of ANSI/TIA/EIA-568-B (B.1, B.2, and B.3). All pairs of each installed cable shall be verified prior to system acceptance. Any defect in the cabling system installation including but are not limited to cable, connectors, feed through couplers, patch panels, and connector blocks shall be repaired or replaced in order to ensure 100% usable conductors in all cables installed. All cables shall be tested in accordance with this document, the ANSI/TIA/EIA standards, the manufacturer's requirements and BICSI Standards. If any of these are in conflict, the contractor shall bring any discrepancies to the attention

of the project team for clarification and resolution. Verify proper grounding at service entrance and at all surge suppression devices.

C. Tests and Inspections:
1. Visually inspect UTP and optical fiber jacket materials for NRTL certification markings. Inspect cabling terminations in communications equipment rooms for compliance with color-coding for pin assignments, and inspect cabling connections for compliance with TIA/EIA-568-B.1.
2. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
3. Test UTP copper cabling for DC loop resistance, shorts, opens, intermittent faults, and polarity between conductors. Test operation of shorting bars in connection blocks. Test cables after termination but not cross-connection.
   a. Test instruments shall meet or exceed applicable requirements in TIA/EIA-568-B.2. Perform tests with a tester that complies with performance requirements in "Test Instruments (Normative)" Annex, complying with measurement accuracy specified in "Measurement Accuracy (Informative)" Annex. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.
4. Optical Fiber Cable Tests:
   a. Test instruments shall meet or exceed applicable requirements in TIA/EIA-568-B.1. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.
   b. Link End-to-End Attenuation Tests:
      1) Horizontal and multimode backbone link measurements: Test at 850 or 1300 nm in 1 direction according to TIA/EIA-526-14-A, Method B, One Reference Jumper.
      2) Attenuation test results for backbone links shall be less than 2.0 dB. Attenuation test results shall be less than that calculated according to equation in TIA/EIA-568-B.1.
   c. OTDR (Optical Time-Domain Reflectometer).
      1) Fiber testing shall be performed on all fibers in the completed end to end system.
      2) Testing shall consist of a bidirectional end to end OTDR trace performed per TIA/EIA 455-61. The system loss measurements shall be provided at 850 and 1300 nanometers for multimode fibers and 1310 and 1550 for single mode fibers. The OTDR shall be used only to determine the length and the attenuation of that cable. A power meter shall be used to determine the overall link attenuation, including connectors.
      3) Any link not meeting the requirements of the standard shall be brought into compliance by the Contractor, at no charge to the Owner.
      4) Provide both hard copy and PDF copy on CD-ROM to the A/E for approval.

D. Data for each measurement shall be documented. Data for submittals shall be printed in a summary report that is formatted similar to Table 10.1 in

BICSI TDMM, or transferred from the instrument to the computer, saved as text files, and printed and submitted.

E. Remove and replace cabling where test results indicate that they do not comply with specified requirements.

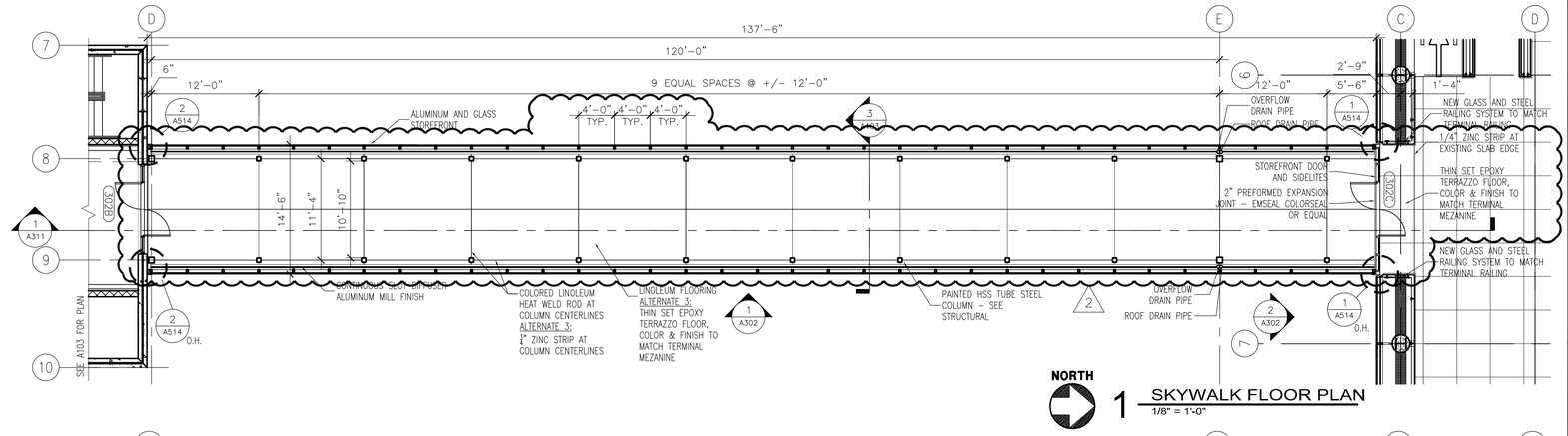
F. End-to-end cabling will be considered defective if it does not pass tests and inspections.

G. Prepare test and inspection reports.

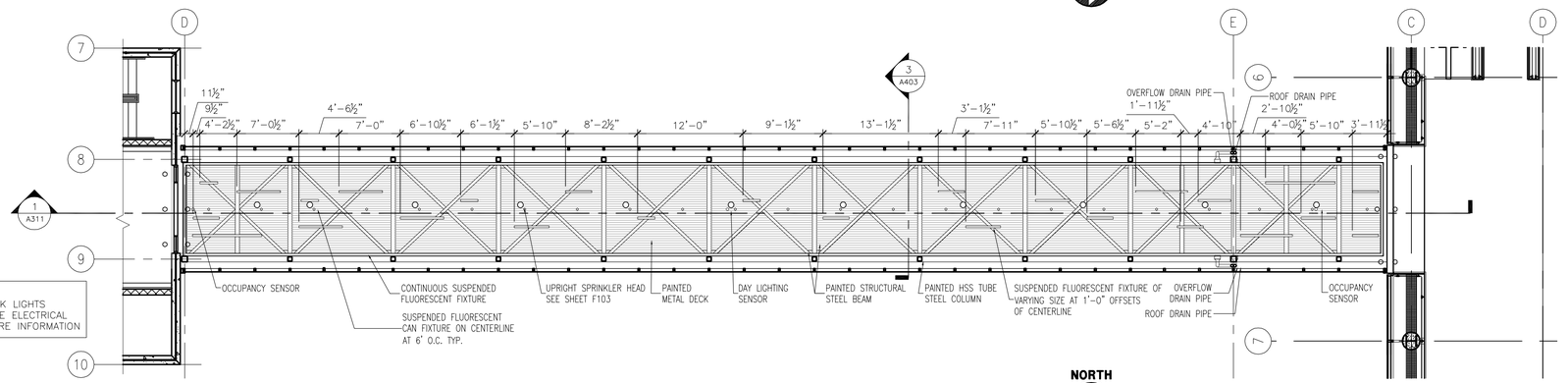
3.9 SYSTEM ACCEPTANCE

A. Upon completion of the aforementioned tests and before system acceptance, sample system operations shall also be performed with contractor provided test equipment and documentation to verify that the system is operational and ready for acceptance. Testing shall be performed on a sample basis (10% of installed outlets) on various portions of the network as determined by the A/E. The test shall be performed by the contractor, and witnessed by the A/E or owner's representative.

END OF SECTION 27.13.00

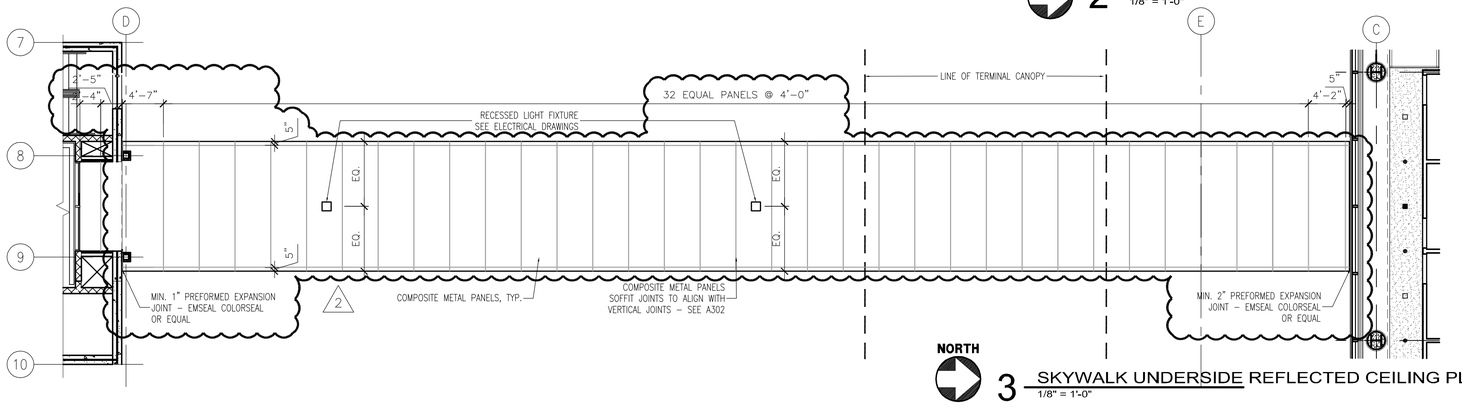


1 SKYWALK FLOOR PLAN
1/8" = 1'-0"

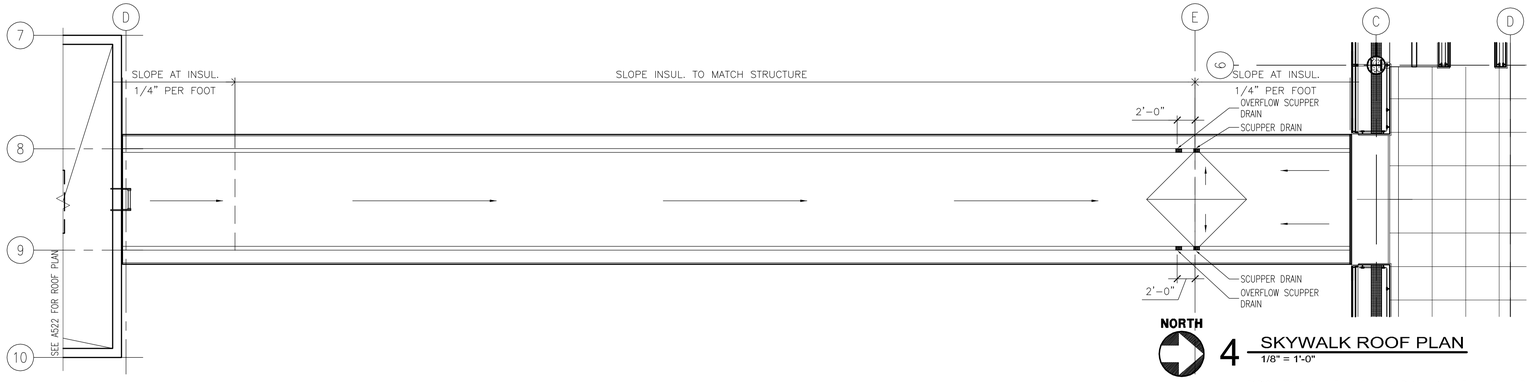


ALTERNATE 5:
REPLACE FLUORESCENT SKYWALK LIGHTS WITH LED LIGHT FIXTURES. SEE ELECTRICAL DRAWINGS AND SPECS FOR MORE INFORMATION

2 SKYWALK REFLECTED CEILING PLAN
1/8" = 1'-0"



3 SKYWALK UNDERSIDE REFLECTED CEILING PLAN
1/8" = 1'-0"



4 SKYWALK ROOF PLAN
1/8" = 1'-0"

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ARCHITECTURAL CERTIFICATION
I hereby certify that the architectural plans, specifications or report was prepared by me or under my direct supervision and that I am a duly licensed Professional Architect under the laws of the State of Minnesota.

Print Name: Mark Ip

Signature:

Date: 05-15-13 Reg. No.: 46001

REVISIONS

NO.	DESCRIPTION	DATE
1	ADDENDUM 2	5-31-13
2	ADDENDUM 3	6-7-13

DATE ISSUED: 05/15/2013
REVIEWED BY:
DRAWN BY: MKG
DESIGNED BY:

AEP PROJECT NUMBER
213-1882-114

SHEET TITLE
SKYWALK PLAN REFLECTED CEILING PLAN AND ROOF PLANS

SHEET NUMBER
A104

ISSUED FOR BID

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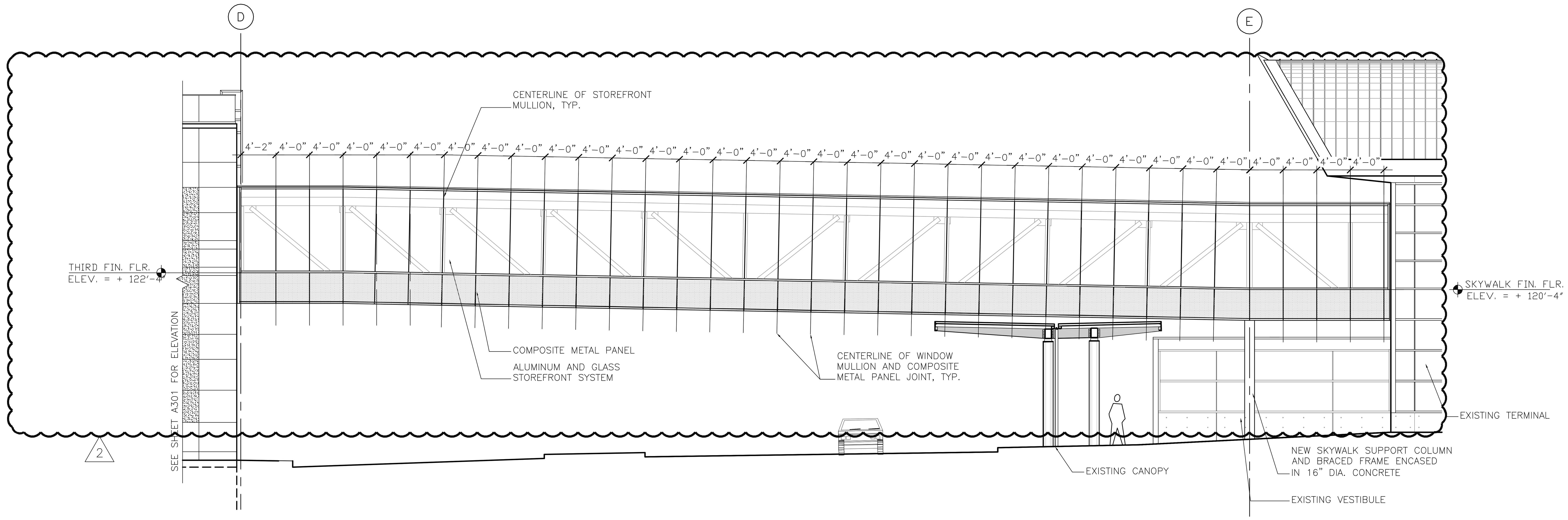
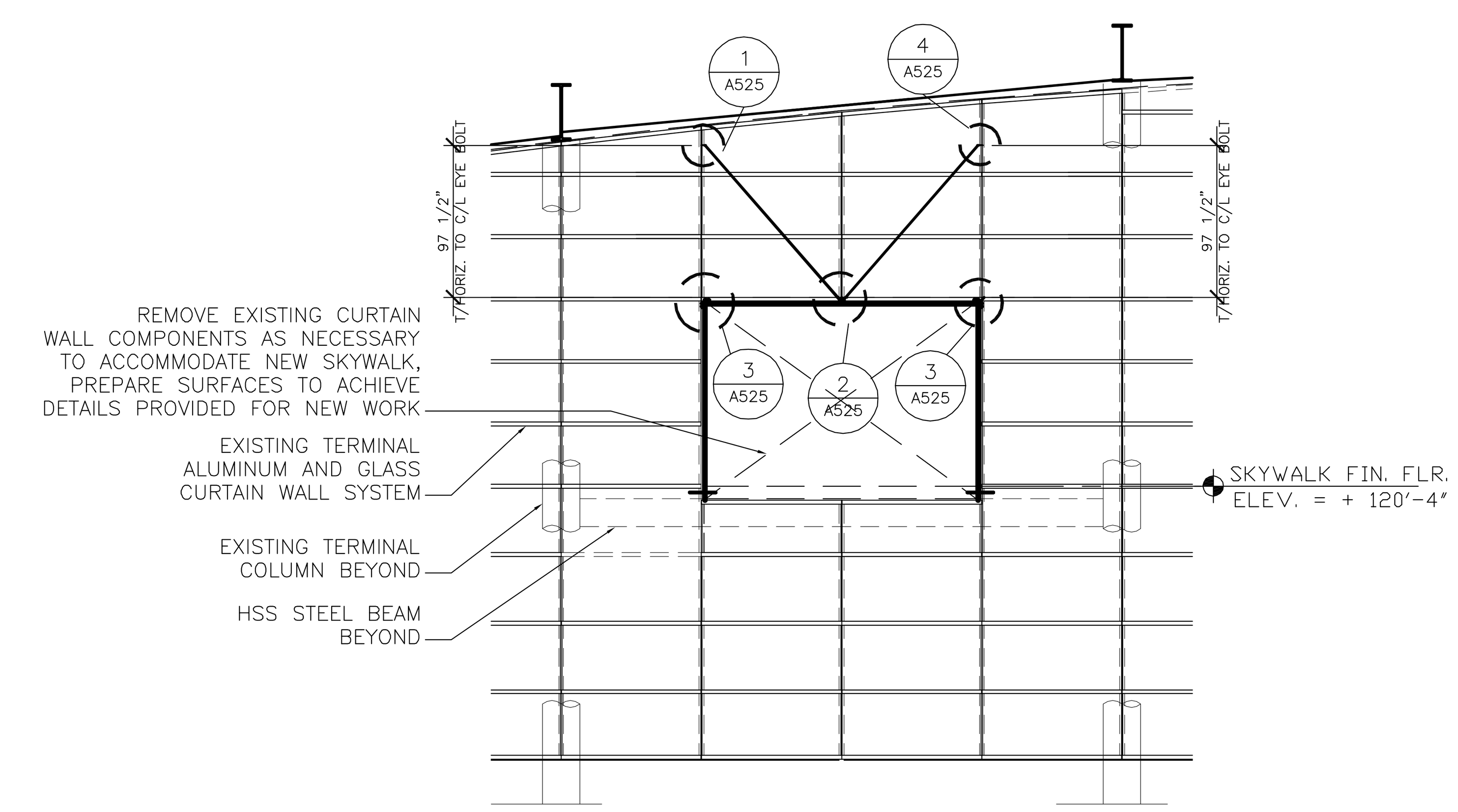


1 EAST SKYWALK ELEVATION
1/8" = 1'-0" WEST ELEVATION SIMILAR



2 CURTAIN WALL ELEVATION @ EXISTING TERMINAL
1/8" = 1'-0"

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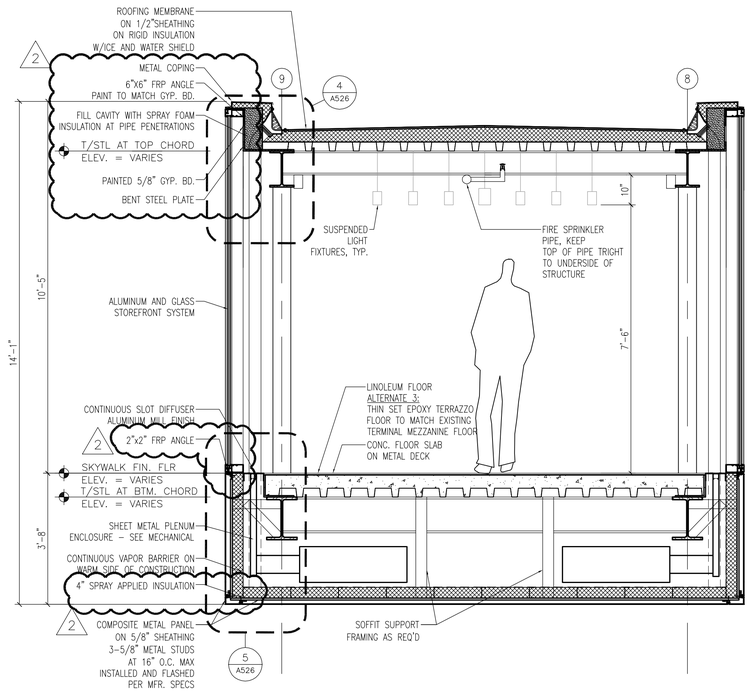
REVIEWED BY:
DRAWN BY: MKG
DESIGNED BY:

AEP PROJECT NUMBER
213-1882-114

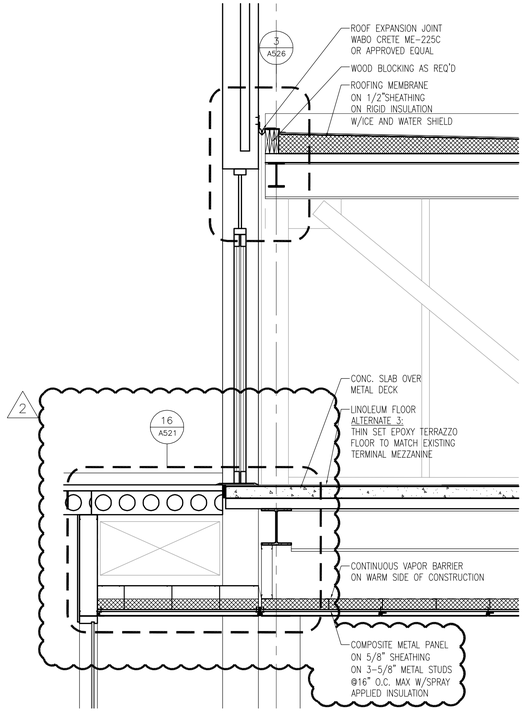
SHEET TITLE
ENLARGED SKYWALK ELEVATIONS

SHEET NUMBER
A302

ISSUED FOR BID



3 WALL SECTION
1/2" = 1'-0"



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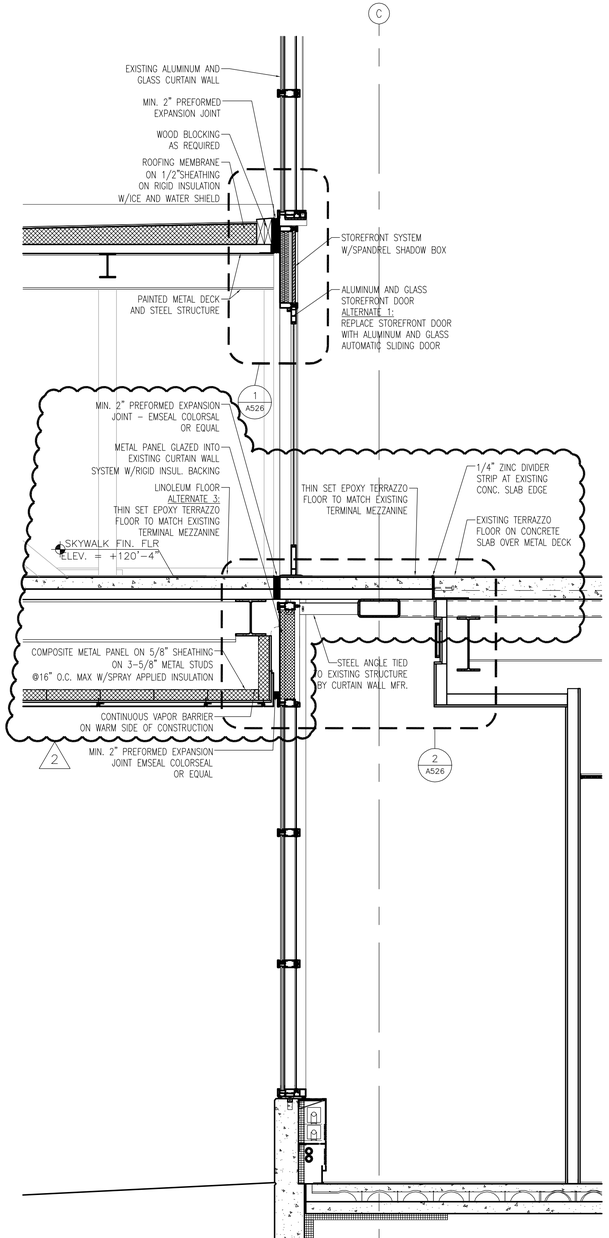

1 WALL SECTION
1/2" = 1'-0"

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1	ADDENDUM 2	5-31-13
2	ADDENDUM 3	6-7-13

DATE ISSUED: 05/15/2013
REVIEWED BY:
DRAWN BY: MKG
DESIGNED BY:

AEP PROJECT NUMBER
213-1882-114

SHEET TITLE

WALL SECTIONS

SHEET NUMBER

A403

ISSUED FOR BID

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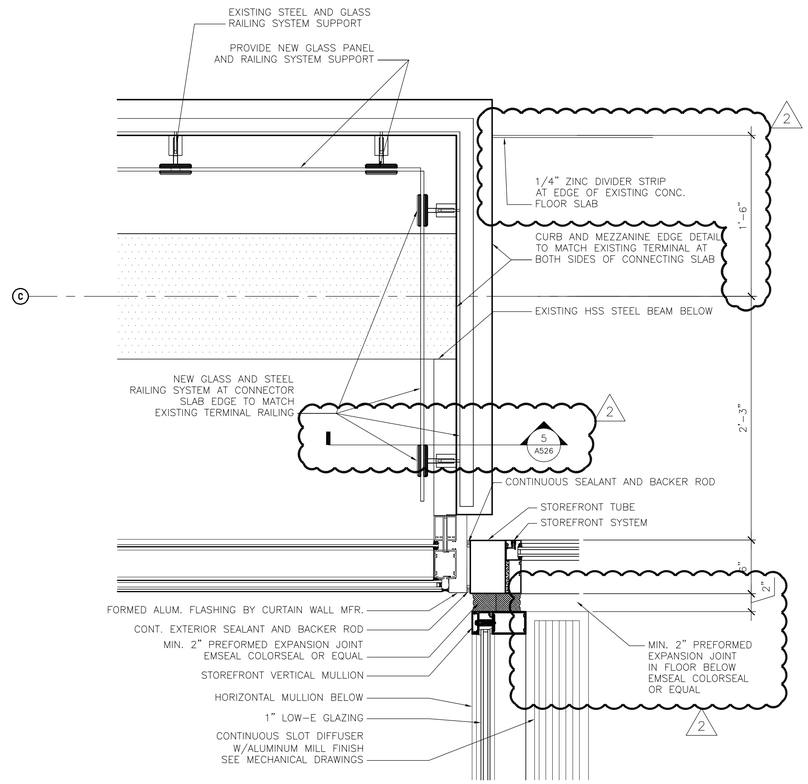
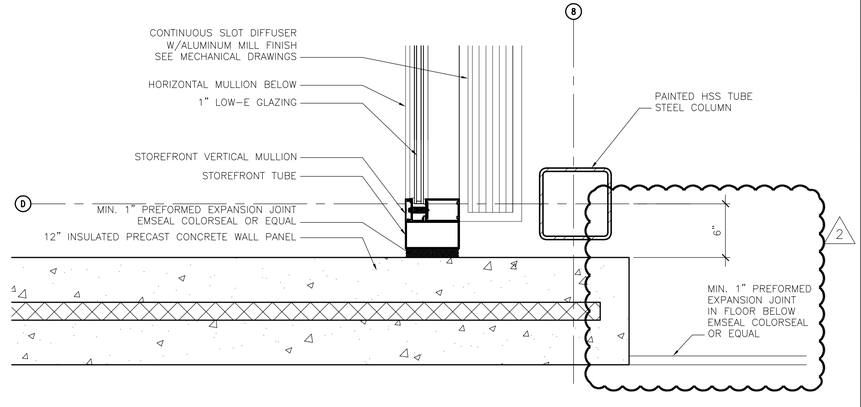


1 PLAN DETAIL @ SKYWALK END NORTH
1 1/2" = 1'-0"



2 PLAN DETAIL @ SKYWALK END SOUTH
1 1/2" = 1'-0"

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DATE ISSUED: 05/15/2013
REVIEWED BY:
DRAWN BY: MKG
DESIGNED BY:

AEP PROJECT NUMBER
213-1882-114

SHEET TITLE

PLAN DETAILS SKYWALK

SHEET NUMBER

A514

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ROOM FINISH SCHEDULE

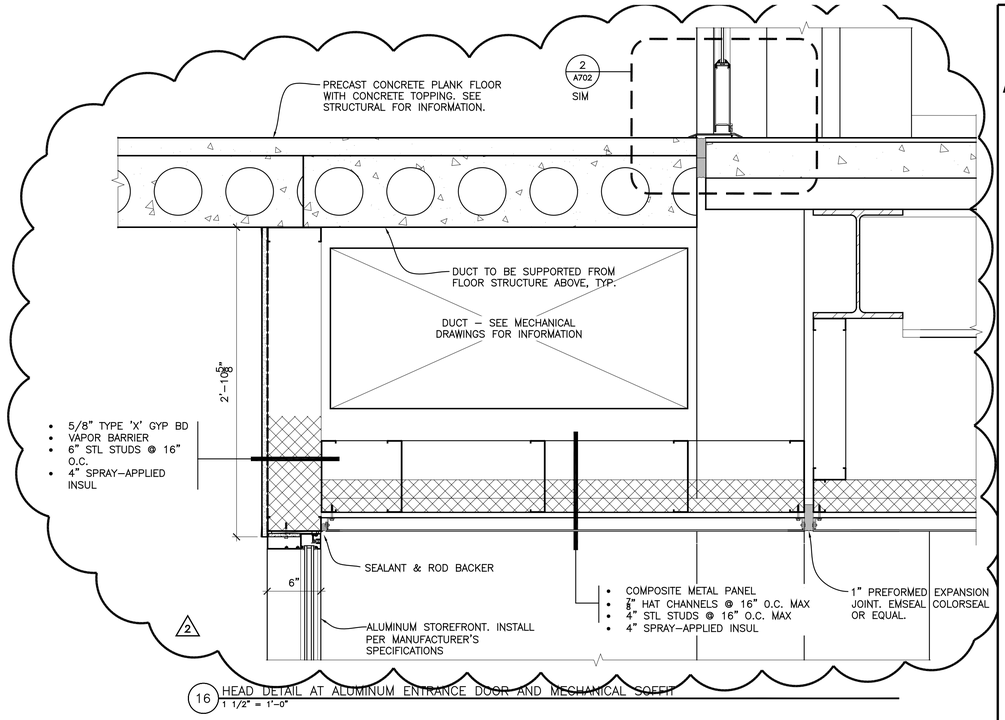
ROOM NO.	ROOM NAME	FLOOR	BASE	NORTH WALL		EAST WALL		SOUTH WALL		WEST WALL		CEILING			REMARKS *
				MATERIAL	FINISH	MATERIAL	FINISH	MATERIAL	FINISH	MATERIAL	FINISH	MATERIAL	FINISH	HEIGHT	
LOWER LEVEL															
B01	STAIR 'A'	SC	–	PC	PT–1	CMU	PT–1	CMU	PT–1	PC	PT–1	N/A	–	–	–
B02	LOBBY	SC	–	PC	PT–1	CMU	PT–1	CMU	PT–1	CMU	PT–1	OPEN	–	–	–
B03	SPRINKLER RISER RM.	CONC	–	PC	–	PC	–	–	–	–	–	OPEN	–	–	–
B04	ELECTRICAL ROOM	CONC	–	PC	–	CMU	–	–	–	–	–	OPEN	–	–	–
B05	ELEVATOR MECH. RM.	CONC	–	CMU	–	CMU	–	CMU	–	CMU	–	OPEN	–	–	–
B06	RENTAL CAR PARKING	CONC	–	CONC	–	CONC	–	CONC	–	CONC	–	CONC	–	–	1
B07	STAIR 'B'	SC	–	PC	–	–	–	–	–	–	–	N/A	–	–	–
FIRST LEVEL															
101	STAIR 'A'	SC	–	PC	PT–1	CMU	PT–1	CMU	PT–1	PC	PT–1	N/A	–	–	–
102	LOBBY	SC	–	PC	PT–1	CMU	PT–1	CMU	PT–1	CMU	PT–1	OPEN	–	–	2
103	PUBLIC PARKING	CONC	–	PC	–	PC	–	PC	–	PC	–	OPEN	–	–	2
104	DAA PARKING	CONC	–	GWB	PT–1	GWB	PT–1	GWB	PT–1	GWB	PT–1	OPEN	–	–	1
105	MECHANICAL ROOM	CONC	–	–	–	–	–	–	–	–	–	OPEN	–	–	–
106	BREAK ROOM	SC	–	GWB	PT–1	CMU	PT–1	CMU	PT–1	CMU	PT–1	OPEN	–	–	–
107	STAIR 'B'	SC	–	PC	–	PC	–	PC	–	PC	–	N/A	–	–	–
SECOND LEVEL															
201	STAIR 'A'	SC	–	PC	PT–1	CMU	PT–1	CMU	PT–1	PC	PT–1	N/A	–	–	–
202	LOBBY	SC	–	PC	PT–1	CMU	PT–1	CMU	PT–1	CMU	PT–1	OPEN	–	–	2
203	PUBLIC PARKING	CONC	–	PC	–	PC	–	PC	–	PC	–	OPEN	–	–	2
204	STAIR 'B'	SC	–	PC	–	PC	–	PC	–	PC	–	N/A	–	–	–
THIRD LEVEL															
301	STAIR 'A'	SC	–	PC	PT–1	CMU	PT–1	CMU	PT–1	PC	PT–1	OPEN	PT–2	–	–
302	LOBBY	SC	–	PC/CMU	PT–1	CMU	PT–1	CMU	PT–1	CMU	PT–1	OPEN	PT–2	–	2
303	PUBLIC PARKING	CONC	–	PC	–	PC	–	PC	–	PC	–	OPEN	–	–	2
304	STAIR 'B'	SC	–	PC	–	PC	–	PC	–	PC	–	OPEN	PT–2	–	–
305	SKYWALK	LINO	–	GLAZING	–	GLAZING	–	CMU	PT–4	GLAZING	–	OPEN	PT–3	–	3

REMARKS

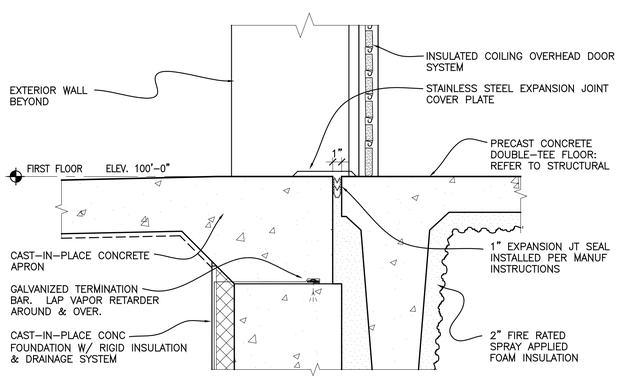
1	INSTALL FIRE–RESISTANT SPRAY–APPLIED INSULATION OVER EXPOSED PRECAST CONCRETE CEILING AS INDICATED.
2	APPLY TRAFFIC MEMBRANE TO FLOOR AREAS SHOWN SHADED.
3	ALL EXPOSED STRUCTURAL MEMBERS AND SURFACES OTHER THAN FLOORS AND STOREFRONT TO RECEIVE PT–4 U.N.O.
4	NOT USED.

ROOM FINISH ABBREVIATIONS

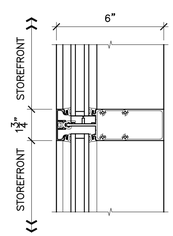
OPEN	ACOUSTICAL CEILING TILE
CMU	CONCRETE MASONRY UNITS
CONC	CONCRETE
PC	PRECAST CONCRETE
PT	PAINT
SC	SEALED CONCRETE
LINO	LINOLEUM
–	–



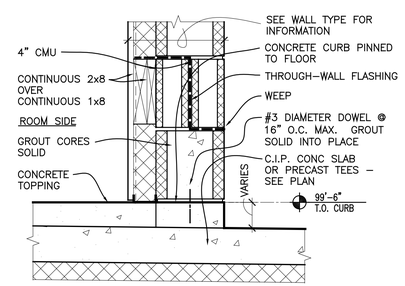
16 HEAD DETAIL AT ALUMINUM ENTRANCE DOOR AND MECHANICAL SOFFIT
1 1/2" = 1'–0"



3 SILL DETAIL AT OVERHEAD DOOR
1 1/2" = 1'–0"



2 TYPICAL MULLION AT STOREFRONT
3" = 1'–0"



1 CONDITION AT CMU WALL BASE/CURB
1 1/2" = 1'–0"

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REVISIONS

NO.	DESCRIPTION	DATE
1	ADDENDUM 2	5-31-13
2	ADDENDUM 3	6-7-13

DATE ISSUED: 05/15/2013
REVIEWED BY: BDM
DRAWN BY: KSM
DESIGNED BY: RS&H

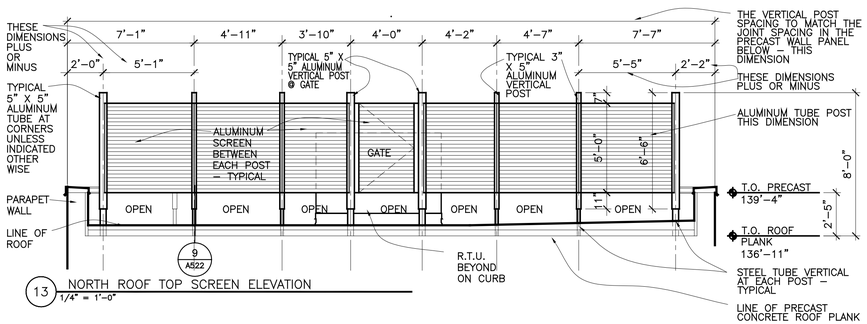
AEP PROJECT NUMBER
213-1882-114

SHEET TITLE
ROOM FINISH SCHEDULE & MISCELLANEOUS DETAILS

SHEET NUMBER
A521

ISSUED FOR BID

Drawing: W:\Projects\120010.00 daa parking ramp\DRAW\duluth airport parking ramp\Sheets\A521 Room Finish Schedule & Miscellaneous Details.dwg Plotted on: 6/7/2013 10:31 AM Plotted by: Kim S. Meldahl



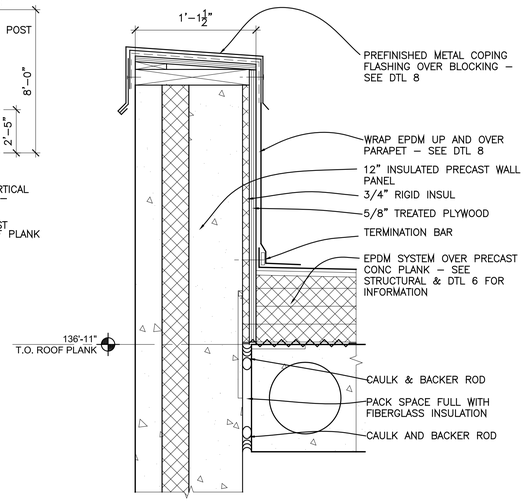
13 NORTH ROOF TOP SCREEN ELEVATION
1/4" = 1'–0"

NOTES

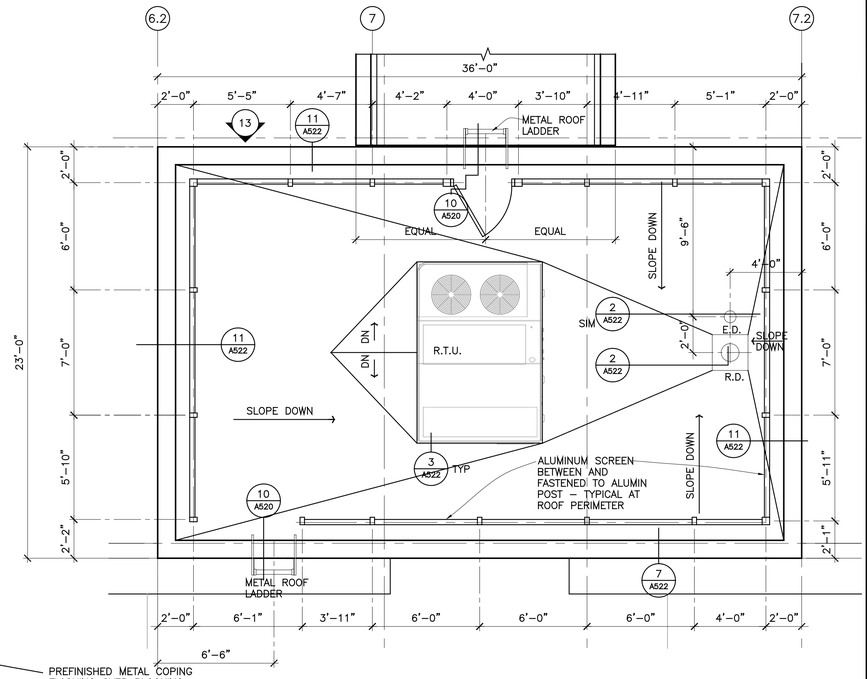
- SCREEN AT THE NORTH EAST STAIR
1. ELEVATION '13' INDICATES THE TYPICAL CONSTRUCTION FOR THE SCREEN ON THE ROOF PERIMETER OF THE STAIR TOWER AT THE R.T.U.
2. THE SPACING OF THE VERTICAL POST SHALL VARY FROM ONE ELEVATION TO THE OTHER ELEVATION. VERTICAL POST SPACING SHALL MATCH THE SPACING OF THE PRECAST CONCRETE WALL PANEL JOINTS AND OR THE VERTICAL REVEALS IN THE PRECAST CONCRETE WALL PANEL JOINTS OF THE EXTERIOR WALL BELOW THE SCREEN. COORDINATE LOCATION OF POSST/COLUMNS WITH THE PRECAST WALL PANELS
3. GATE:
   A. PROVIDE FURNISH AND INSTALL: HINGES AND LATCH SET SIZE TO CARRY THE LOAD OF THE GATE AND RELATED CONSTRUCTION.
4. ALUMINUM POST:
   A. POST NOTED AS 5"X5" SHALL BE 5"X5"X¼" THICK ALUMINUM TUBES
   B. POST NOTED AS 5"X3" SHALL BE 5"X3"X¼" ALUMINUM TUBES
   C. ALL ALUMINUM POST TO RECEIVE WELDED 1" ALUMINUM CAP AT THE TOP OF THE POST. CAP TO BE SIZE TO SIZE OF COLUMN/POST. CONTINUOUS WELD CAP TO POST AND GRIND WELD SMOOTH.
5. STEEL POST/COLUMNS:
   A. THE STEEL POST/COLUMN SIZE AT 5"X5" ALUMINUM POST SHALL BE 4"X4"X¼" STEEL TUBE COLUMNS.
   B. THE STEEL POST/COLUMN SIZE AT 5"X3" ALUMINUM POST SHALL BE 4"X2"X¼" STEEL TUBE COLUMNS.
   C. REFER TO DETAIL 9/A522 AND ELEVATION 13/A522.

ROOF SYMBOLS

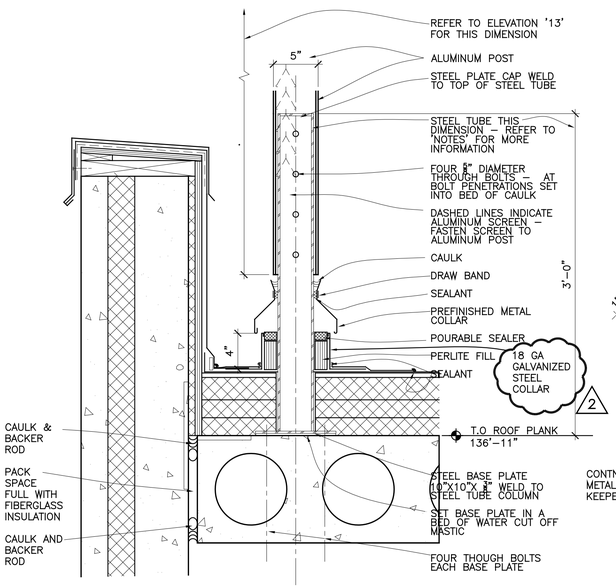
SLOPE DOWN → DENOTES ROOF SLOPE AT ¼" PER FOOT



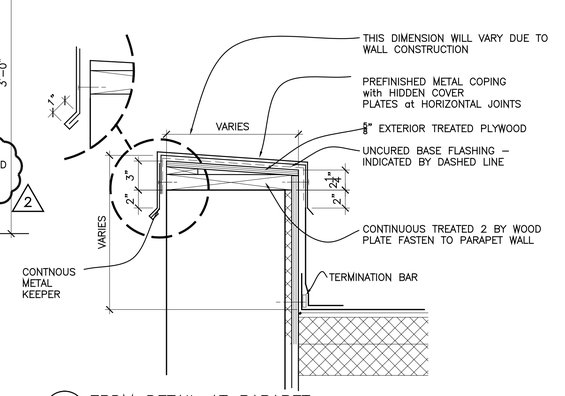
11 PARAPET AT PRECAST WALL PANEL
1 1/2" = 1'–0"



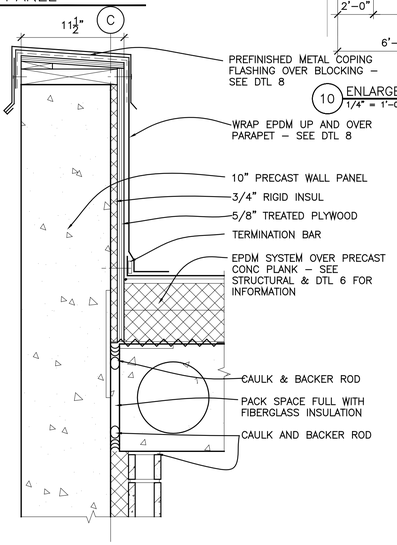
10 ENLARGED ROOF PLAN AT NORTH CIRCULATION TOWER
1/4" = 1'–0"



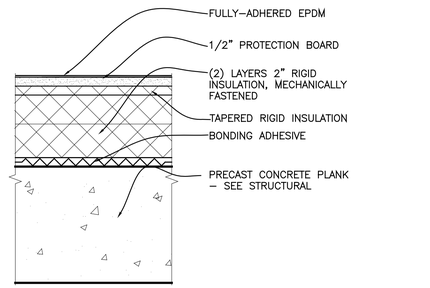
9 SCREEN MOUNTING DETAIL TO ROOF PLANK
1–1/2" = 1'–0"



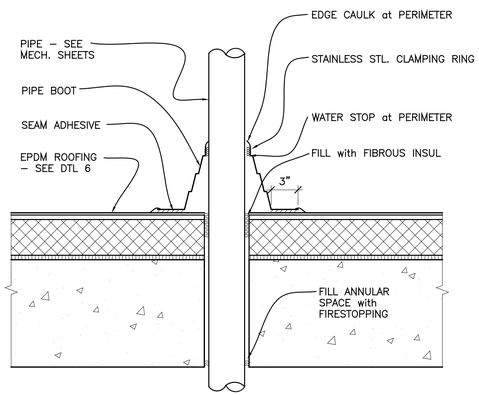
8 EPDM DETAIL AT PARAPET
1–1/2" = 1'–0"



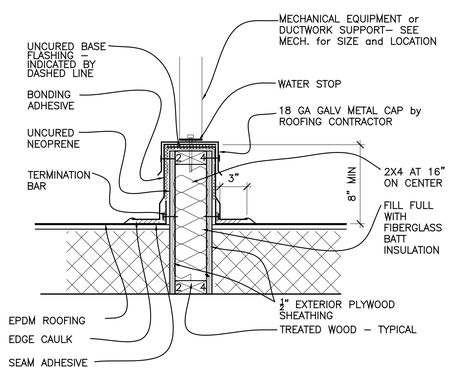
7 PARAPET AT PRECAST WALL PANEL
1 1/2" = 1'–0"



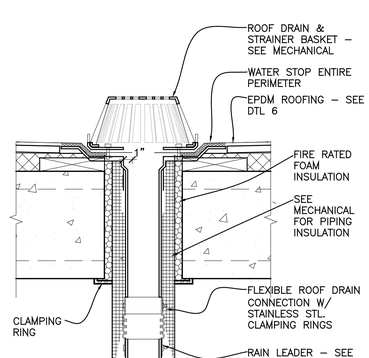
6 TYPICAL EPDM ROOF CONSTRUCTION
3" = 1'–0"



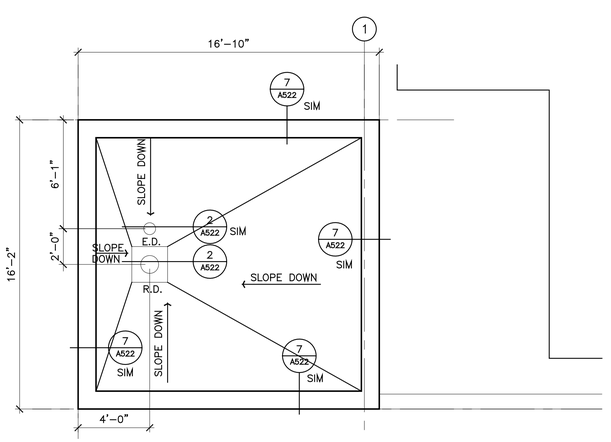
4 PIPE PENETRATION AT EPDM
1–1/2" = 1'–0"



3 EQUIPMENT SUPPORT CURB DETAIL
1–1/2" = 1'=0"



2 ROOF DRAIN AT EPDM
1–1/2" = 1'–0"



1 ENLARGED ROOF PLAN AT STAIR TOWER 'B'
1/4" = 1'–0"

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ARCHITECTURAL CERTIFICATION
I hereby certify that the architectural plans, specifications or report was prepared by me or under my direct supervision and that I am a duly licensed Professional Architect under the laws of the State of Minnesota.

Print Name: Brian D. Morse

Signature:

Date: 5/15/13 Reg. No.: 20092

REVISIONS

NO.	DESCRIPTION	DATE

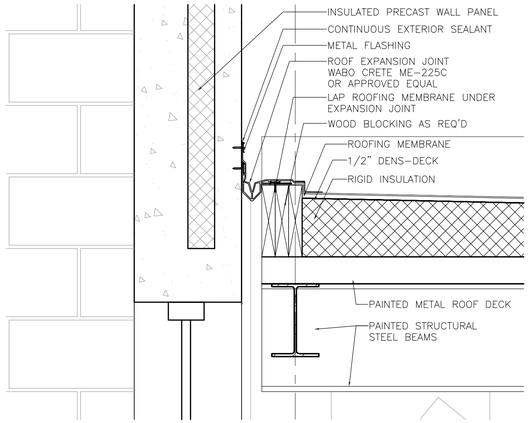
DATE ISSUED: 05/15/2013
REVIEWED BY: BDM
DRAWN BY: KSM
DESIGNED BY: RS&H

AEP PROJECT NUMBER
213-1882-114

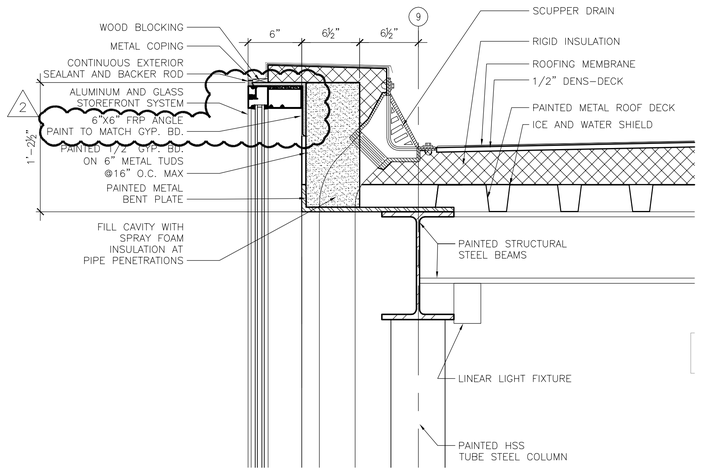
SHEET TITLE
ENLARGED ROOF PLANS & DETAILS

SHEET NUMBER
A522
OF
ISSUED FOR BID

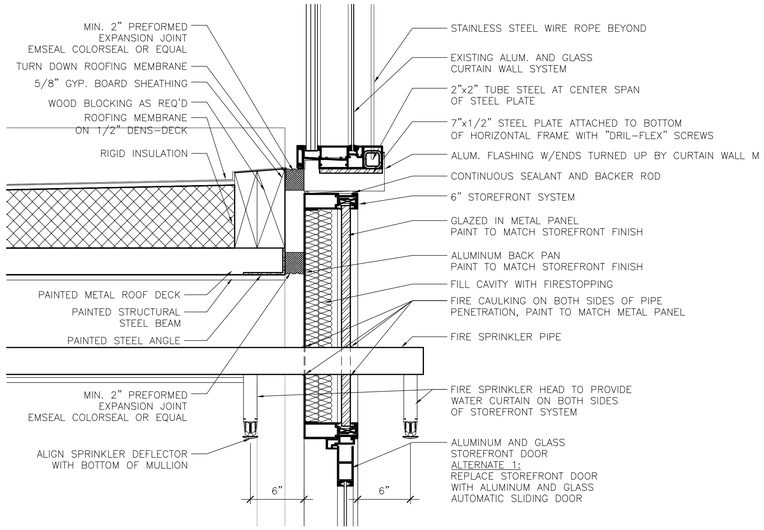
Drawing: W:\Projects\120010.00 daa parking ramp\DRAW\duluth airport parking ramp\Sheets\A522 Enlarged Roof Plans & Details.dwg Plotted on: 6/7/2013 9:50 AM Plotted by: Kim S. Meldahl



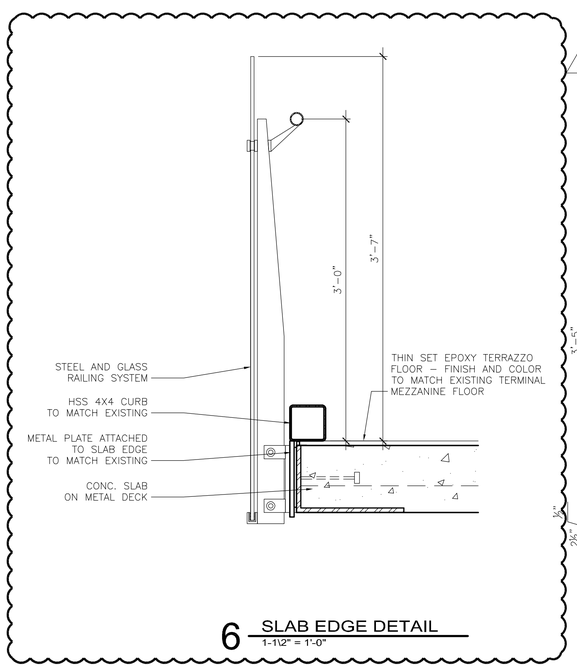
3 SECTION DETAIL @ SKYWALK GARAGE END HEAD
1-1\2" = 1'-0"



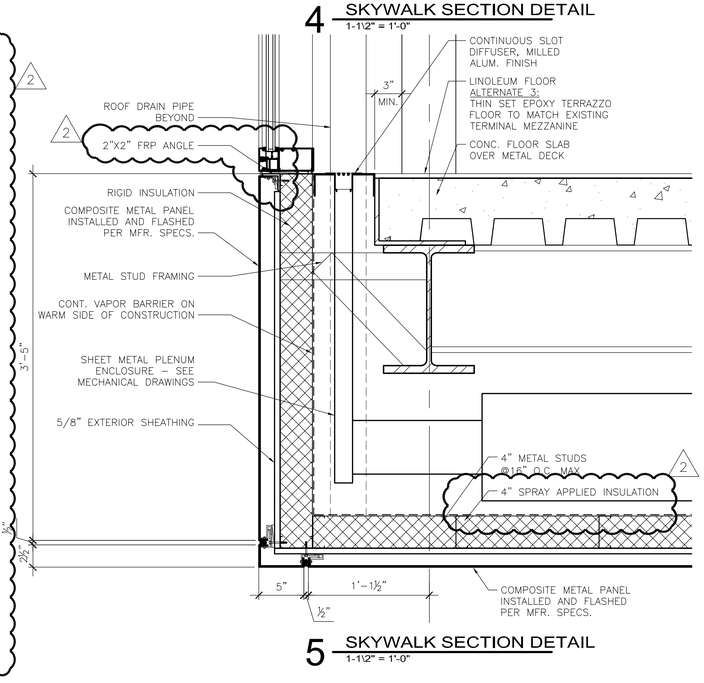
4 SKYWALK SECTION DETAIL
1-1\2" = 1'-0"



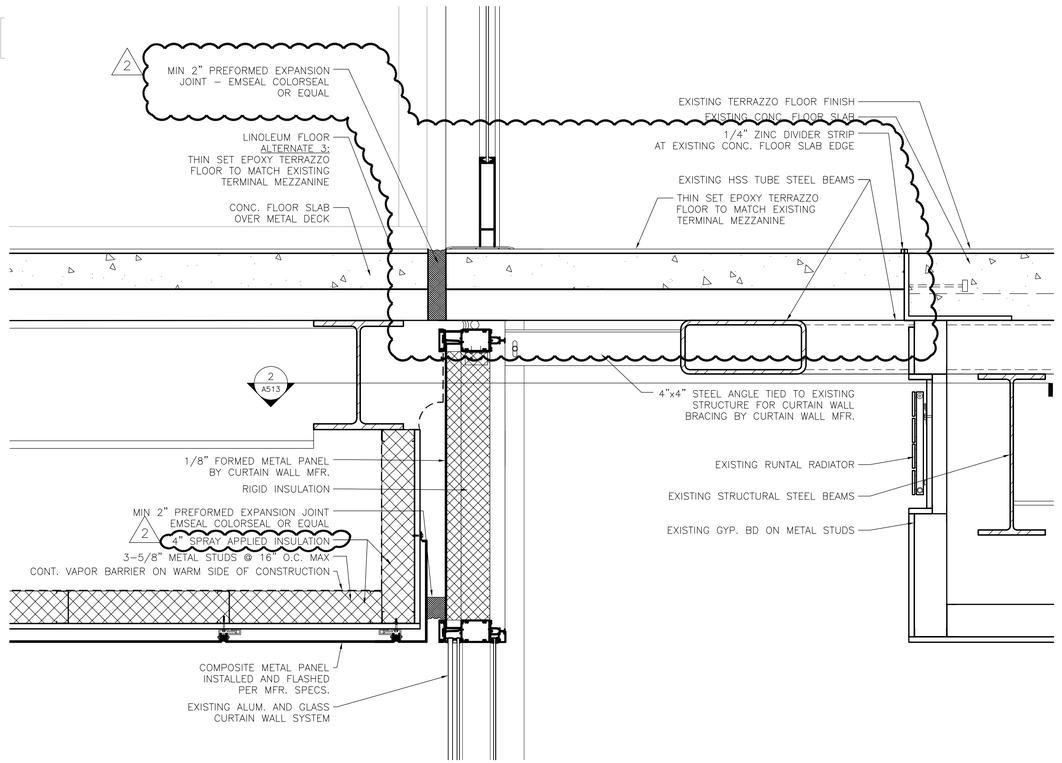
1 SECTION DETAIL @ SKYWALK TERMINAL END HEAD
1-1\2" = 1'-0"



6 SLAB EDGE DETAIL
1-1\2" = 1'-0"



5 SKYWALK SECTION DETAIL
1-1\2" = 1'-0"



2 SECTION DETAIL @ SKYWALKTERMINAL END SILL
1-1\2" = 1'-0"

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ARCHITECTURAL CERTIFICATION
I hereby certify that the architectural plans, specifications or report was prepared by me or under my direct supervision and that I am a duly licensed Professional Architect under the laws of the State of Minnesota.

Print Name: Mark Ip

Signature:

Date: 05-15-13 Reg. No.: 46001

REVISIONS

NO.	DESCRIPTION	DATE
1	ADDENDUM 2	5-31-13
2	ADDENDUM 3	6-7-13

DATE ISSUED: 05/15/2013
REVIEWED BY:
DRAWN BY: MKG
DESIGNED BY:

AEP PROJECT NUMBER
213-1882-114

SHEET TITLE

SECTION DETAILS SKYWALK

SHEET NUMBER

A526

ISSUED FOR BID

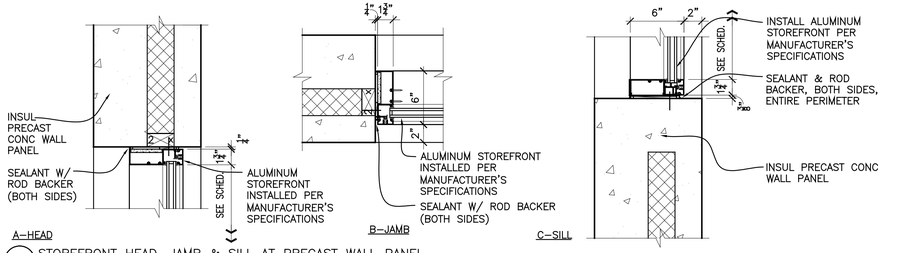
Drawing: T:\P\2131882.114 Duluth Parking Structure\CAD\A\Sheets\A526 Section Details - Skywalk.dwg Plotted on: 6/7/2013 11:04 AM Plotted by: Godzino, Marc

DOOR SCHEDULE

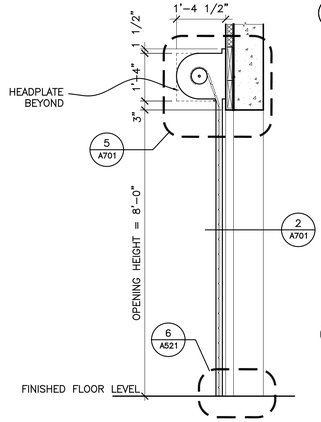
DOOR NO.	DOOR SIZE	DOOR MAT'L	DOOR ELEV	FRAME MAT'L	FRAME ELEV	FRAME HEAD DTL	FRAME JAMB DTL	FRAME SILL DTL	HDWE GROUP	LINTEL	LABEL	REMARKS *
LOWER LEVEL												
B01	3'-0" x 7'-0"	HM	N1	HM	3	7A/A701	7B/A701	–	5	–	90 MIN	4, FIRE RATED GLASS 2
B02	3'-0" x 7'-0"	HM	F1	HM	3	7A/A701	7B/A701	–	9	–	–	–
B03	3'-0 x 7'-0"	HM	F1	HM	3	7A/A701	7B/A701	–	9	–	90 MIN	–
B04	(2) 3'-0" x 7'-2"	AL	A1	AL	W5	10/A702	5/A702	3/A702	1	–	–	3, 5 – GLASS TYPE 1
B05	3'-0 x 7'-0"	HM	F2	HM	3	7A/A701	7B/A701	–	9	–	–	–
B07	3'-0 x 7'-0"	HM	N1	HM	1	6A/A701	6B/A701	–	4	–	90 MIN	5, FIRE RATED GLASS
FIRST LEVEL												
101A	3'-0" x 7'-0"	HM	F2	HM	1	3A/A701	3B/A701	4/A701	4	–	90 MIN	–
101B	3'-0" x 7'-0"	HM	N1	HM	3	7A/A701	7B/A701	–	5	–	90 MIN	4, FIRE RATED GLASS
102A	(2) 3'-0" x 7'-2"	AL	A1	AL	W5	8/A702	6/A702	1/A702	1	–	–	3, 5 – GLASS TYPE 1
102B	(2) 3'-0" x 7'-2"	AL	A1	AL	W5	12/A702	5/A702	2/A702	1	–	–	3, 5 – GLASS TYPE 1
103	3'-0" x 7'-0"	HM	F1	HM	1	6A/A701	6B/A701	4/A701	4	–	–	–
104A	3'-0" x 7'-0"	HM	F2	HM	1	6A/A701	6B/A701	4/A701	4	–	–	–
104B	3'-0" x 7'-0"	HM	N2	HM	1	7A/A701	7B/A701	–	6	–	–	5
104C	24'-0 x 8'-4"	–	C	–	–	5/A701	2/A701	3/A521	–	–	–	–
105	(2) 3'-0" x 7'-0"	HM	F1	HM	4	7A/A701	7B/A701	–	8	–	–	–
106	3'-0" x 7'-0"	HM	N1	HM	5	7A/A701	7B/A701	–	7	–	–	4
107	3'-0" x 7'-0"	HM	F1	HM	1	6A/A701	6B/A701	4/A701	4	–	90 MIN	–
SECOND LEVEL												
201	3'-0" x 7'-0"	HM	N1	HM	3	7A/A701	7B/A701	–	5	–	90 MIN	4, FIRE RATED GLASS
202	(2) 3'-0" x 7'-2"	AL	A1	AL	W5	12/A702	5/A702	2/A702	1	–	–	3, 5 – GLASS TYPE 1
204	3'-0" x 7'-0"	HM	N1	HM	1	6A/A701	6B/A701	–	5	–	90 MIN	4, FIRE RATED GLASS
THIRD LEVEL												
301	3'-0" x 7'-0"	HM	N1	HM	1	7A/A701	7B/A701	–	5	–	90 MIN	4, FIRE RATED GLASS 1
302A	(2) 3'-0" x 7'-2"	ALUM	A1	AL	W5	11/A702	5/A702	2/A702	1	–	–	3, 5 – GLASS TYPE 1
302B	(2) 3'-0" x 7'-2"	ALUM	A1	AL	W7	9/A702	6/A702	2/A702 SIM.	2	–	–	1, 2, 3, 4 – GLASS TYPE 5
302C	(2) 3'-0" x 7'-0"	ALUM	A1	AL	W6	1/A526	1/A514	1/A526	3	–	–	1, 2, 3, 4
304	3'-0" x 7'-0"	HM	N1	HM	1	6A/A701	6B/A701	–	5	–	90 MIN	4, FIRE RATED GLASS

REMARKS

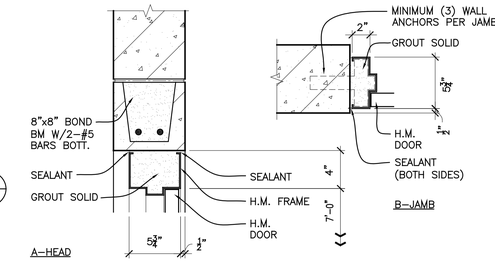
1	PROVIDE SPRINKLER PER IBC 3104.5.1
2	DOUBLE–EGRESS PAIR – ALUMINUM ENTRANCE DOORS
3	ALTERNATE: 10'–0" x 7'–6" AUTOMATIC DOOR, TYPE A2, NO FRAME, HARDWARE BY DOOR MANUFACTURER. ALTERNATE DETAILS ON SHEET A703.
4	GLAZING TYPE: GL–5
5	GLAZING TYPE: GL–1



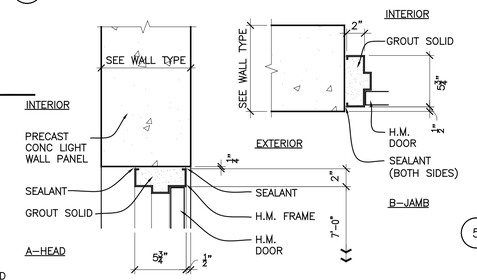
10 STOREFRONT HEAD, JAMB & SILL AT PRECAST WALL PANEL
1 1/2" = 1'–0"

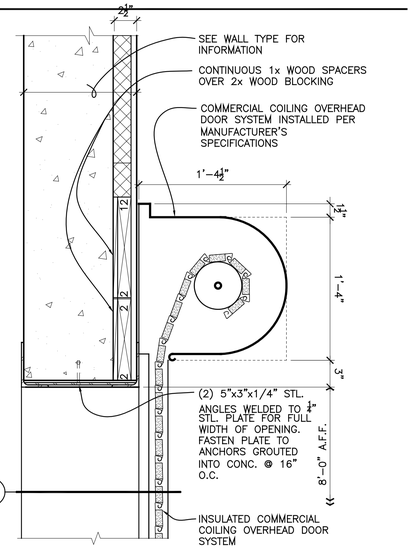


8 SECTION AT OVERHEAD DOOR
1/2" = 1'–0"

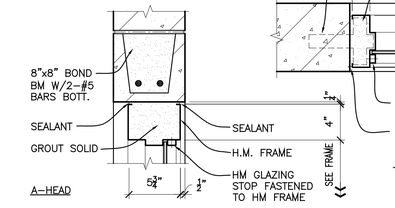


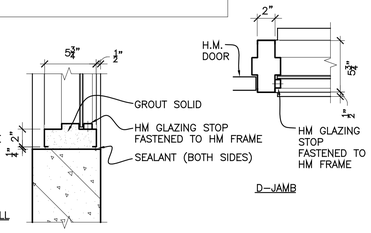
7 HM DOOR HEAD & JAMB AT CMU
1 1/2" = 1'–0"



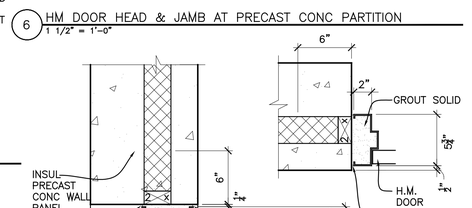


5 HEAD DETAIL AT OVERHEAD DOOR
1 1/2" = 1'–0"



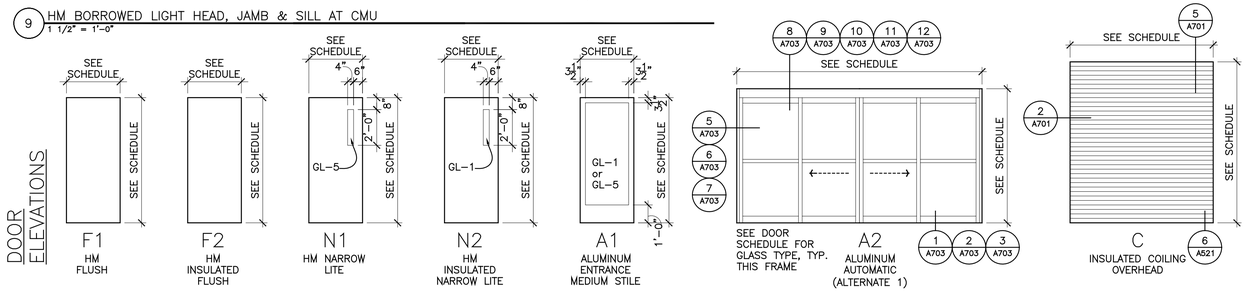


4 SILL AT HM DOOR
3" = 1'–0"

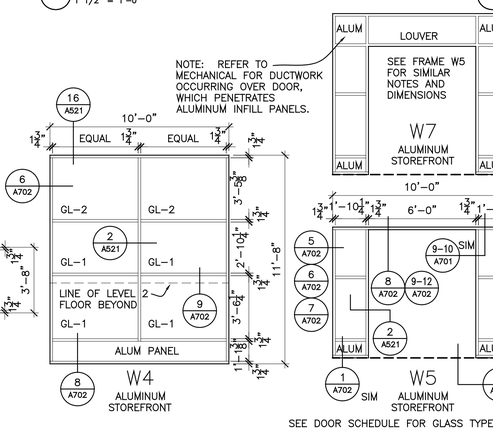


6 HM DOOR HEAD & JAMB AT PRECAST CONC PARTITION
1 1/2" = 1'–0"

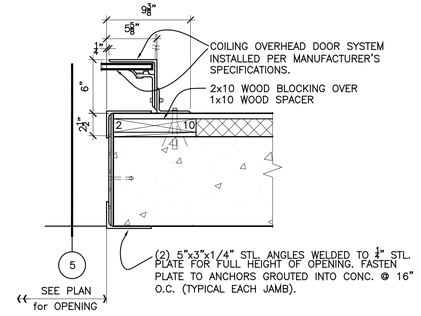
9 HM BORROWED LIGHT HEAD, JAMB & SILL AT CMU
1 1/2" = 1'–0"

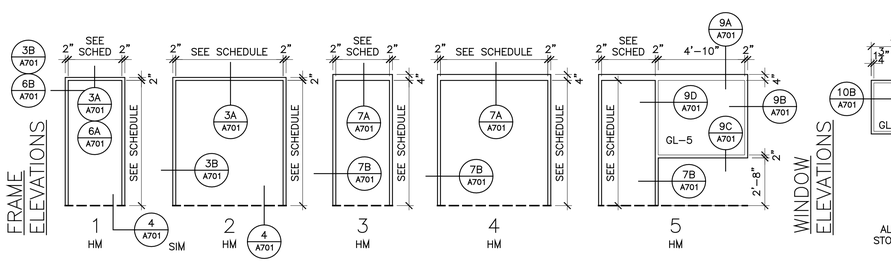


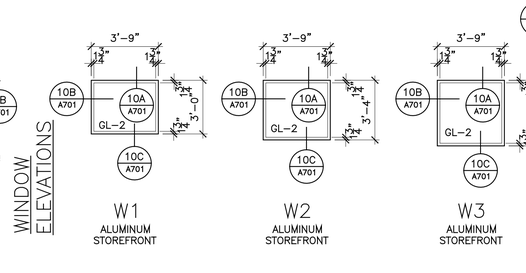
3 HM DOOR HEAD & JAMB AT PRECAST WALL PANEL
1 1/2" = 1'–0"

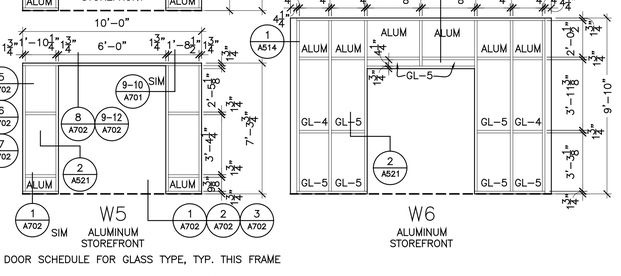


2 JAMB DETAIL AT OVERHEAD DOOR
1 1/2" = 1'–0"









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Duluth, Minnesota 55811
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Landscape Architects:
ARCHITECTURAL RESOURCES
126 East Superior Street, Duluth MN 55802
TEL: (218) 727-8481 / FAX: (218) 727-8483

ARCHITECTURAL CERTIFICATION
I hereby certify that the architectural plans, specifications or report was prepared by me or under my direct supervision and that I am a duly licensed Professional Architect under the laws of the State of Minnesota.

Print Name: Brian D. Morse

Signature:

Date: 5/15/13 Reg. No.: 20092

REVISIONS

NO.	DESCRIPTION	DATE

DATE ISSUED: 05/15/2013
REVIEWED BY: BDM
DRAWN BY: KSM
DESIGNED BY: RS&H

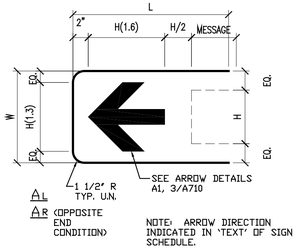
AEP PROJECT NUMBER
213-1882-114

SHEET TITLE
DOOR & WINDOW SCHEDULES, TYPES & DETAILS

SHEET NUMBER
A701

ISSUED FOR BID

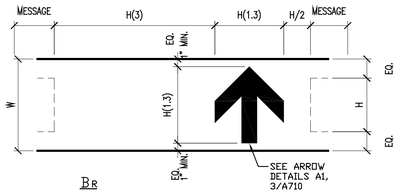
Drawing: W:\Projects\120010.00 daa parking ramp\DRAW\duluth airport parking ramp\Sheets\A701 DOOR & WINDOW SCHEDULES TYPES & DETAILS.dwg Plotted on: 6/7/2013 9:42 AM Plotted by: Kim S. Meidahl



AL
AR (OPPOSITE END CONDITION)

NOTE: ARROW DIRECTION INDICATED IN 'TEXT' OF SIGN SCHEDULE.

SIGN COMPONENT A



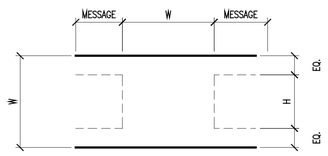
BR
BL (OPPOSITE END CONDITION)

NOTE: ARROW DIRECTION INDICATED IN 'TEXT' OF SIGN SCHEDULE.

SIGN COMPONENT B

NOT USED

SIGN COMPONENT C



EL
ER (OPPOSITE END CONDITION)

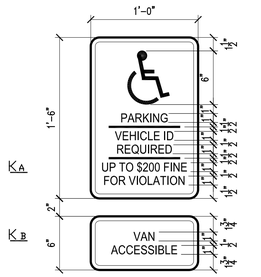
SIGN COMPONENT E

NOT USED

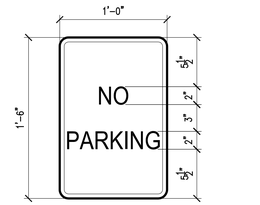
SIGN COMPONENT F

F

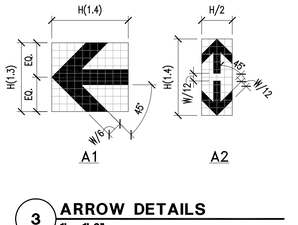
SIGN COMPONENT D



1 SIGN DETAIL S8 & S9
1" = 1'-0"



2 SIGN DETAIL S7
1" = 1'-0"

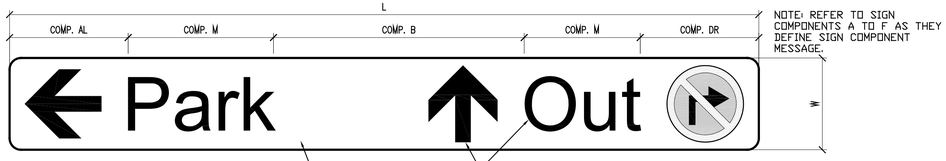


3 ARROW DETAILS
1" = 1'-0"

SIGN SCHEDULE

MARK	SIZE W	SIZE L	TEXT/MESSAGE	SIGN TYPE	BACKGROUND COLOR	LETTERS/SYMBOLS H	LETTERS/SYMBOLS COLOR	MOUNTING DETAIL	MOUNTING HT.	SIGN DETAIL	REMARKS
S1	2'-0"	8'-0"	Entrance	EP	WHITE	1'-0"	BLACK	2/A711	8'-6"		
S2	2'-0"	8'-0"	Rental Car Parking Only	EP	WHITE	1'-0"	BLACK	2/A711	8'-6"		
S3	2'-0"	8'-0"	Restricted Parking Only	EP	WHITE	1'-0"	BLACK	2/A711	8'-6"		
S4	1'-6"	1'-0"	SPEED LIMIT 10 MPH	R	WHITE		BLACK	10/A711	5'-0"		
S5	2'-6"	2'-6"	STOP	R				2/A711	5'-0"		MUTCD W1-1
S6	8"ø	10'-0"	8'-4" MAX. VEHICLE HEIGHT	PVC	YELLOW	6"	BLACK	1/A711	8'-2"		SEE SPECIFICATIONS FOR COLOR
S7	1'-6"	1'-0"	NO PARKING	R	WHITE		BLACK	5/A711	5'-0"		
S8	1'-6"	1'-0"	♿	R				10/A711	5'-0"	1/A710	PER STATE OF MINNESOTA REQUIREMENTS
S9	4"	1'-0"	VAN ACCESSIBLE	R				10/A711		1/A710	MOUNT 2" BELOW SIGN S8
S10	1'-6"	1'-0"	MAINTENANCE DEPARTMENT PARKING ONLY	R	WHITE	1"	BLACK	10/A711	5'-0"		
S11	8"ø	10'-0"	8'-0" MAX. VEHICLE HEIGHT	PVC	YELLOW	6"	BLACK	1/A711	8'-0"		SEE SPECIFICATIONS FOR COLOR
S12	1'-4"	8'-0"	↑ ELEVATOR ↑	V	WHITE	6"	BLACK	3/A711	8'-2"		
S13	1'-4"	8'-0"	→ ELEVATOR →	V	WHITE	6"	BLACK	3/A711	8'-2"		
S14	1'-4"	8'-0"	← ELEVATOR ←	V	WHITE	6"	BLACK	3/A711	8'-2"		
S15	1'-4"	8'-0"	↑↓ TWO-WAY TRAFFIC - KEEP RIGHT	V	WHITE	6"	BLACK	3/A711	8'-2"		
S16	1'-4"	8'-0"	← EXIT PARK ↑	V	WHITE	6"	BLACK	3/A711	8'-2"		
S17	1'-4"	8'-0"	↑ PARK EXIT →	V	WHITE	6"	BLACK	3/A711	8'-2"		
S18	1'-4"	8'-0"	PARK → EXIT →	V	WHITE	6"	BLACK	3/A711	8'-2"		
S19	1'-4"	8'-0"	← EXIT ←	V	WHITE	6"	BLACK	3/A711	8'-2"		
S20	1'-4"	8'-0"	→ EXIT →	V	WHITE	6"	BLACK	3/A711	8'-2"		
S21	1'-4"	8'-0"	← PARK ←	V	WHITE	6"	BLACK	3/A711	8'-2"		
S22	1'-4"	8'-0"	→ PARK →	V	WHITE	6"	BLACK	3/A711	8'-2"		
S23	1'-4"	8'-0"	→ PARK →	V	WHITE	6"	BLACK	3/A711	8'-4"		
S24	1'-4"	8'-0"	← PARK EXIT ↑	V	WHITE	6"	BLACK	3/A711	8'-4"		
S25	1'-6"	2'-0"	LEVEL B	EV	BLUE		WHITE	10/A711	5'-0"	4/A710	SEE SPECIFICATIONS FOR COLOR
S26	1'-6"	2'-0"	LEVEL 1	EV	YELLOW		WHITE	10/A711	5'-0"	4/A710	SEE SPECIFICATIONS FOR COLOR
S27	1'-6"	2'-0"	LEVEL 2	EV	RED		WHITE	10/A711	5'-0"	4/A710	SEE SPECIFICATIONS FOR COLOR
S28	1'-6"	2'-0"	LEVEL 3	EV	GREEN		WHITE	10/A711	5'-0"	4/A710	SEE SPECIFICATIONS FOR COLOR
S29	8"	8-1/4"	SEE STAIR SIGN SCHEDULE	PP			WHITE		5'-0"	5/A710	
S30	8"	1'-1/4"	SEE STAIR SIGN SCHEDULE	PP			WHITE		5'-0"	7/A710	
S31	8"	1'-4"	SEE DETAIL	PP	RED		WHITE	11/A711	7'-0"	6/A710	SEE SPECIFICATIONS FOR COLOR
S32	1'-6"	1'-0"	SMALL CAR PARKING ONLY	R	WHITE	1"	BLACK	10/A711	5'-0"		
S33	8"	8-1/4"	SEE STAIR SIGN SCHEDULE	PP			WHITE		5'-0"	5/A710	

2



NOTE: REFER TO SIGN COMPONENTS A TO F AS THEY DEFINE SIGN COMPONENT MESSAGE.

EXAMPLE SIGN

NOTE: SIGN INDICATED IS FOR ILLUSTRATIVE PURPOSES ONLY. NOT IN CONTRACT

* SPACE BETWEEN LETTERS IS EQUAL TO VERT. STROKE WIDTH OF LETTERS (UNLESS REQUIRED TO MAKE SIGN DIMENSIONS WORK ±25% OF STROKE WIDTH)

FEDERAL SIGNS

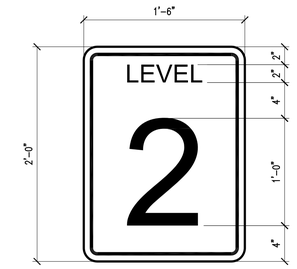
R1-1	STOP
R1-2	YIELD
R3-1	NO RIGHT TURN
R3-2	NO LEFT TURN
R5-1	DO NOT ENTER
R5-1a	WRONG WAY
W17-1	SPEED HUMP
W11-2	PEDESTRIAN CROSSWALK

SIGN TYPES LEGEND

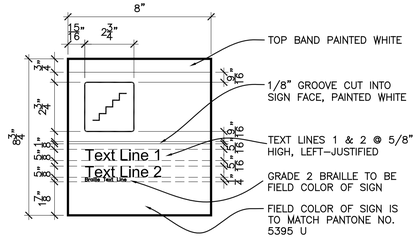
MARK	TYPE
V -	VEHICULAR
R -	(REFLECTIVE)
PP -	REGULATORY
PVC -	(REFLECTIVE)
EP -	PEDESTRIAN PANEL PVC CLEARANCE EXTERIOR PANEL

SIGNAGE GENERAL NOTES

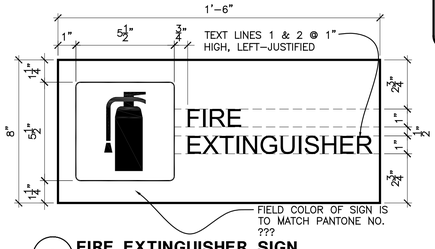
1. LETTERFORMS SHALL BE HELVETICA MEDIUM, OF SIZE AS SHOWN ON SIGN SCHEDULE, UNLESS NOTED. UPPER AND LOWER CASE SHALL BE USED ON ALL DIRECTIONAL TRAFFIC AND PEDESTRIAN SIGNS, UNLESS NOTED.
2. SIGN CONTRACTOR SHALL REVIEW SIGN LOCATIONS PRIOR TO INSTALLATION WITH ENGINEER TO COORDINATE WITH LIGHTING SYSTEM. SIGN AND LIGHT LOCATIONS PER SPECIFICATIONS.
3. SIGNS SHALL BE MOUNTED LEVEL AND PLUMB, UNLESS NOTED.
4. WHERE TWO (2) SIGNS ARE MOUNTED BACK TO BACK, SMALLEST L DIMENSION SHALL INCREASE TO MATCH LARGEST L DIMENSION.
5. MAXIMUM BOLT INSERT EMBEDMENT LENGTH 1-1/4", UNLESS NOTED.
6. DO NOT SCALE DRAWINGS.
7. BACKS AND EDGES OF ALL ALUMINUM SIGNS MOUNTED DIRECTLY TO STRUCTURE SHALL BE PAINTED (SIGN BACKGROUND COLOR) TO PREVENT CATHODIC REACTION.
8. SEE ARCHITECTURAL PLANS FOR PARKING LAYOUT AND SIGN LOCATIONS.
9. SIGN MOUNTING DETAILS REFERENCE DETAILS ON DRAWING A711.
10. REFLECTIVE GRAPHICS AND COPY COLORS ARE 3M. ALL NON-REFLECTIVE COLORS ARE PANTONE.



4 SIGN DETAIL S27-S30
1" = 1'-0"



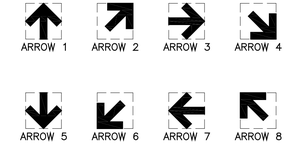
5 SIGN DETAIL S29
1" = 1'-0"



6 FIRE EXTINGUISHER SIGN
1" = 1'-0"

NOTES:

1. REFER TO SIGNAGE SCHEDULE FOR SYMBOLS AND TEXT USED ON ALL SIGNAGE.
2. STAIR SIGNS SHALL BE SECURED TO PARTITIONS WITH HIDDEN FASTENERS OR CLEAR ADHESIVE AS REQUIRED.
3. ALL TEXT AND SYMBOLS SHALL BE RAISED 1/8" OFF SIGN FACE.
4. TYPE FACE ON SIGNAGE SHALL BE TIRESIAS SIGNFONT. TEXT AND SYMBOLS SHALL BE WHITE.



DASHED BOX SHOWN AROUND ARROW SYMBOLS IS FOR ALIGNMENT PURPOSES ONLY.

SIGN NUMBER	SIGN TYPE	TEXT LINE 1 (5/8")	TEXT LINE 2 (5/8")	TEXT LINE 3 (3/8")	TEXT LINE 4 (3/8")	TEXT LINE 5 (3/8")	TEXT LINE 6 (3/8")	ARROW SYMBOL
S29.1	S29	STAIR 'A'	NO ROOF ACCESS					
S29.2	S29	STAIR 'B'	NO ROOF ACCESS					
S29.3	S29	STAIR 'A'	NO ROOF ACCESS					
S29.4	N/A							
S29.5	S29	STAIR 'A'	NO ROOF ACCESS					
S29.6	S29	STAIR 'B'	NO ROOF ACCESS					
S29.7	S29	STAIR 'A'	NO ROOF ACCESS					
S29.8	S29	STAIR 'B'	NO ROOF ACCESS					
S30.1	S30	STAIR 'A'	LEVEL B	NO ROOF ACCESS	SERVES B THRU 3	EXIT UP	TO OUTSIDE	01
S30.2	S30	STAIR 'B'	LEVEL B	NO ROOF ACCESS	SERVES B THRU 3	EXIT UP	TO OUTSIDE	01
S30.3	S30	STAIR 'A'	LEVEL 1	NO ROOF ACCESS	SERVES B THRU 3	EXIT RIGHT	TO OUTSIDE	03
S30.4	S30	STAIR 'B'	LEVEL 1	NO ROOF ACCESS	SERVES B THRU 3	EXIT RIGHT	TO OUTSIDE	03
S30.5	S30	STAIR 'A'	LEVEL 2	NO ROOF ACCESS	SERVES B THRU 3	EXIT DOWN	TO OUTSIDE	05
S30.6	S30	STAIR 'B'	LEVEL 2	NO ROOF ACCESS	SERVES B THRU 3	EXIT DOWN	TO OUTSIDE	05
S30.7	S30	STAIR 'A'	LEVEL 3	NO ROOF ACCESS	SERVES B THRU 3	EXIT DOWN	TO OUTSIDE	05
S30.8	S30	STAIR 'B'	LEVEL 3	NO ROOF ACCESS	SERVES B THRU 3	EXIT DOWN	TO OUTSIDE	05
S33*	S33	AREA OF REFUGE						

REMARKS:
* USE INTERNATIONAL SYMBOL OF ACCESSIBILITY (WHEELCHAIR) INSTEAD OF STAIR GRAPHIC

2

7 SIGN DETAIL S30
1" = 1'-0"

8 ARROW SYMBOLS
1" = 1'-0"

9 STAIR SIGN SCHEDULE
1" = 1'-0"

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Landscape Architects:
ARCHITECTURAL RESOURCES
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ARCHITECTURAL CERTIFICATION
I hereby certify that the architectural plans, specifications or report was prepared by me or under my direct supervision and that I am a duly licensed Professional Architect under the laws of the State of Minnesota.

Print Name: Brian D. Morse

Signature:

Date: 5/15/13 Reg. No.: 20092

REVISIONS

NO.	DESCRIPTION	DATE

DATE ISSUED: 05/15/2013
REVIEWED BY: BDM
DRAWN BY: KSM
DESIGNED BY: RS&H

AEP PROJECT NUMBER
213-1882-114

SHEET TITLE
SIGNAGE SCEDULE AND DETAILS

SHEET NUMBER
A710

ISSUED FOR BID

Drawing: W:\Projects\120010.00 daa parking ramp\DRAW\duluth airport parking ramp\Sheets\A710 SIGNAGE SCHEDULE AND DETAILS.dwg Plotted on: 6/7/2013 10:46 AM Plotted by: Kim S. Meldahl

TYPICAL NOTES:
These notes specify the requirements for the design represented in these documents. The construction and materials shall comply with all the pertinent codes and references, plans, and details, including (but not limited to) those shown in architectural, civil, mechanical and electrical drawings.

The contractor shall verify all dimensions and existing conditions in the field that affect construction prior to commencing work on the affected element or shop drawing submittals. Resolve any discrepancies with the architect prior to construction.

The contract structural drawings and specifications represent the completed structure. The contractor is responsible for bracing and shoring (without overstressing) all structural elements as necessary at any stage of construction until completion of the project. The Structural Engineer is not responsible for the contractor's means, methods, sequences or procedures of construction. Contractor shall recognize and consider effects of thermal movements of structural elements during construction period.

The contractor is solely responsible for site safety including all temporary precautionary measures and safety programs. Site observation visits by the Structural Engineer do not include review of the contractor's safety precautions.

Refer to architectural, mechanical and electrical drawings for locations, elevations, dimensions, and details of sleeves, inserts, openings, recesses, curbs, housekeeping pads, etc. that are not shown on the structural drawings and do not damage structural members.

Information shown in the structural drawings regarding existing conditions represents the current and general field conditions related to the new work, to the best of our knowledge. Report all discrepancies to the Architect for resolution prior to performing related new work.

Requests for information shall be submitted in writing and shall reference the part of the construction documents that is in question.

SPECIAL INSPECTIONS:
Contractor shall read and understand their duties in the specification and under the building code for special inspections and coordinate as necessary the owner's responsibilities.

The special inspectors shall be provided and shall only use approved shop drawings.

Special inspection reports are to be submitted immediately to the SER, Architect, and Contractor daily when inspections are performed.

The general contractor shall provide timely notice to the special inspector and sufficient time for the inspector to perform their inspection.

SHOP DRAWINGS:
All engineering design provided by others and submitted for review shall bear the certification stamp and signature of a qualified professional engineer who is licensed in the state where the project is located.

Submit shop drawing schedule with construction schedule that includes consideration for review period. See specification for additional information.

SPECIAL INSPECTION SCHEDULE:

SPECIAL INSPECTIONS REQUIRED OF STRUCTURAL ELEMENTS (PER IBC 2006, CHAPTER 17):

	Continuous	Periodic	Not Req'd	See Arch.	
1. Steel *	☐	■	☐	☐	Table 1704.3
1.1 Welding	☐	■	☐	☐	
1.2 Details	☐	■	☐	☐	
1.3 High-strength Bolts	☐	■	☐	☐	
2. Concrete					Table 1704.4
2.1 Reinforcing steel including Prestressing tendons	☐	■	☐	☐	
2.2 Bolts installed in concrete	☐	■	☐	☐	
2.3 Required design mix	☐	■	☐	☐	
2.4 Sampling	☐	■	☐	☐	
2.5 Shotcrete	☐	☐	■	☐	
2.6 Curing techniques	☐	■	☐	☐	
2.7 Prestressed concrete forces and grouting	☐	☐	■	☐	
2.8 Erection of precast concrete members	☐	■	☐	☐	
2.9 Verification of IN-SITU concrete strength	☐	☐	■	☐	
3. Masonry					
3.1 Level 1 Special Inspection *	☐	☐	■	☐	1704.5.1, 1704.5.2, Table 1704.5.1
3.2 Level 2 Special Inspection	☐	☐	■	☐	1704.5.3, Table 1704.5.3
4. Wood	☐	☐	■	☐	1704.6
5. Soils	☐	■	☐	☐	1704.7
6. Pile Foundations	☐	☐	■	☐	1704.8
7. Pier Foundations	☐	☐	■	☐	1704.9
8. Wall Panel and Veneers	☐	☐	☐	■	1704.10
9. Sprayed Fire-Resistant Materials	☐	☐	☐	■	1704.11
10. Exterior Insulation and Finish Systems (EIFS)	☐	☐	☐	■	1704.12
11. Special Cases	☐	☐	☐	■	1704.13
12. Smoke Control Systems	☐	☐	☐	■	1704.14

* Please see referenced tables for exceptions.

DEFERRED SUBMITTALS:
The following items shall be issued as deferred submittals per IBC:
Precast Concrete
2 Steel Connections
Light Gauge
All items issued as deferred submittals shall be issued a minimum of 30 days prior to installation and shall not be installed until their design and submittal documents have been reviewed for general conformance to the drawings by the general contractor, the engineer of record and the building official. A copy of the deferred submittal shall be forwarded to the city after the engineer of record has reviewed the documents and prior to erection of the deferred submittal items.

DESIGN CODES AND STANDARDS:
Minnesota State Building Code, MSBC 2007

2006 International Building Code, as amended and adopted by the MSBC 2007

ACI 318-05 Building Code Requirements for Reinforced Concrete

ACI 530-05 Building Code Requirements for Masonry Structures, Allowable Stress Design

ACI 530.1-05 Masonry Structures

AISC 360-05 Specification for Structural Steel Buildings

AISI NAS-01 North American Specification for the design of Cold-Formed Steel Structural Members including 2004 supplement.

ASCE 7-05 Minimum design loads for buildings and other structures including supplement NO. 1 and excluding Chapter 14 and Appendix 11A.

ASCE 3-01 Structural Design of Composite Slabs

MATERIAL PROPERTIES:
Reinforcing Steel (Fy):

Typical (all reinforcing and accessories shall be epoxy coated)	60,000 psi	ATSM A615 Grade 60
Weldable	60,000 psi	ASTM A706 Grade 60

Cast-in-Place Concrete (f'c) at 28 days, UNO:

Controlled Low Strength Material (CLSM)	1,200 psi Maximum 50 psi Minimum	
Footings	4,000 psi	
Concrete for Underpinning	3,000 psi	
Piers, Walls, Slabs and Beams	4,000 psi	
Columns	4,000 psi	
Concrete placed over Metal Floor Deck	4,000 psi	
Slabs on Grade	4,000 psi	
Exterior Concrete	4,000 psi	
Masonry Corefill Concrete	3,000 psi	
All Concrete not otherwise noted	4,000 psi	

Concrete Masonry- Prism (f'm):

Typical Units:	2,000 psi

Structural Steel (Fy):

Wide Flanges	50,000 psi	ASTM A992
Angles, Channels, Plates, and Bars	36,000 psi	ASTM A36
Grade B Rectangular HSS	46,000 psi	ASTM A500
Grade B Round HSS	42,000 psi	ASTM A500
Grade B Steel Pipe	35,000 psi	ASTM AS3

MATERIAL PROPERTIES (Cont):
Structural Fasteners:

Typical High-Strength Bolts	92,000 psi	ASTM A325
High-Strength Bolts as noted on plan	150,000 psi	ASTM A490
Grade 36 Anchor Rods, UNO	36,000 psi	ASTM F1554
Threaded Rods	36,000 psi	ASTM A36
Anchor Rods, Grade 55 as noted on plan	55,000 psi	ASTM F1554
Anchor Rods Grade 105 as noted on plan	105,000 psi	ASTM F1554
Direct -Tension Indicator Washers as noted on plan		ASTM F959

Cold-formed Light Gauge Metal Framing (Fy):

Studs, Joists, Braces-16 ga. and heavier	50,000 psi	ASTM A653
Studs, Joists, Braces-18 ga. and lighter	33,000 psi	ASTM A653
Track, Channels and Accessories	33,000 psi	ASTM A653

DESIGN LOADS:
LATERAL LOADS:
Primary Frame Wind Data:
Basic Wind Speed: 90 mph
Wind Importance Factor: 1.0
Exposure: C

Primary Seismic Data: No design required

Component Loads:
Exterior Component/Cladding: Supplier to develop based on MSBC 2007 and to indicate on shop drawings.

GRAVITY LOADS:
Roof Snow Load:

Ground Snow Load, Pg:	60 psf
Flat-Roof Snow Load, Pf:	42 psf
Snow Exposure Factor, Ce:	1.0
Snow Load Importance Factor, I:	1.0
Unbalanced/Drift Snow Load:	Refer to plan, UNO

Stairs, Corridors and Lobbies:	100 psf
Stair Tread Concentrated Load:	300 lbs
Mechanical Rooms:	125 psf
Mechanical Room Hanging Loads:	40 psf

Supported Parking Loads:

Parking Deck, Covered (non-reducible):	40 psf
Parking Deck, Uncovered (non-reducible):	
Drive Lane:	42 psf
Parking Stall:	82 psf
Vehicle Impact at 18" AFF:	6000 lbs
Parking Concentrated Load:	2000 lbs

Exterior Site Surcharge Loads:

Fire Trucks:	250 psf
Sidewalk:	250 psf

FOUNDATIONS:
Refer to Geotechnical report number DU-12-02390 prepared by Braun Intertec, dated 9/28/2012.

The contractor shall verify the location of all existing and new underground utilities and tanks prior to beginning excavation and contact Gopher State One Call.

The minimum dimension from exterior grade to bottom of footing and foundation shall be 60" adjacent to heated areas, and 72" in unheated areas unless frost protection is provided by insulation.

For underground utilities adjacent to foundations and through foundations reference drawings for detail showing step footings below utilities as required to avoid undermining of structure by utilities.

CONVENTIONAL FOOTINGS:
Footings are designed for a minimum allowable soil bearing pressure of 4000 pounds per square foot. It shall be the owner's responsibility to retain a Geotechnical Engineer to verify that this value may be achieved at the bottom of footing elevation without damaging, differential settlement.

All topsoil, fill, organic swamp deposits, and/or other unsuitable bearing material shall be removed below the footings and/or within the building area to the depths indicated in the geotechnical engineering report and extent of removal shall be field verified by the Geotechnical Engineer.

All excavations shall be observed by a qualified Geotechnical Engineer to verify removal of all unsuitable material, and confirm the proper preparation of bearing conditions. Rock excavation for individual footings is not expected. Blasting is not permitted.

For footings that do not bear on natural undisturbed soil, extend engineered fill laterally beyond bottom edge of footing for a distance equal to the depth of engineered fill. Reference drawings for details.

Foundation and retaining walls shall be back filled with free draining fill approved by the Geotechnical Engineer. Provide drain tile required by the contract documents and verify with architect and civil engineer.

Backfill equally on both sides of foundation walls to prevent overturning or lateral wall movement, or brace as necessary.

For stepping of wall footings reference drawings for detail.

REINFORCED CONCRETE:
The detailing, fabrication and erection of all reinforcing shall be done in accordance with the latest edition of ACI-315, "Manual of Standard Practice for Detailing Reinforced Concrete Structures and ACI-318, "Building Code Requirements for Structural Concrete."

All reinforcing bars are deformed and continuous, unless noted otherwise. Refer to drawings for reinforcing lap length schedule.

Provide suitable wire spacers, chairs, etc. for support of reinforcing steel in proper position while placing concrete. All bars shall be tied to prevent displacement while placing concrete. All chairs and slab bolsters shall be plastic or steel with plastic tips. When reinforcing steel is epoxy coated or pit tendons are fully encapsulated, all chairs and slab bolsters shall be epoxy coated or plastic and all support bars shall be epoxy coated. Chairs are to be stable and resist tipping. Acceptable products are GTI or approved equal.

The fabricator shall submit a complete list of accessories and placing details with the shop drawings.

No horizontal construction joints shall be placed in beams, joists, or slabs, unless shown on drawings.

Locate vertical construction joints in beams and slabs at central one third of span. Refer to drawings for details. Submit proposed construction joint locations to the Structural Engineer of Record for review prior to placement of concrete. Where new concrete is placed against existing concrete, the existing concrete shall be roughened to a minimum 1/4" amplitude.

Refer to drawings and ACI 318 Chapter 6 for placement guidelines of embedded pipes, sleeves, and conduits. Conduits are not permitted in slabs 3 inches or less in thickness.

Provide a 3/4 inch chamfer for all exposed concrete corners. See Architectural drawings for details and additional requirements.

The general contractor shall notify the Special Inspector a sufficient period in advance of placing concrete to allow required inspections and testing to occur in a timely fashion.

Aluminum conduit, aluminum sleeves and aluminum embeds are not permitted in concrete.

Exterior concrete to have 6% +/- 1% entrained air.
All concrete used in parking ramp slabs, beams and columns to contain corrosion inhibiting admixtures.

Calcium chloride is not permitted as a concrete additive.

Concrete Cover on Reinforcing:

Topping Slab:	3/4" clear top
Slab on Grade:	upper third of slab

Concrete covers are intended to meet the requirements of the IBC 2000 section 719 prescriptive fire protection.

Footings and Caissons:	3" clear bottom and sides 2" clear top
Walls:	#5 and smaller 1 1/2" clear earth or weather face #6 and greater 2" clear earth or weather face 3/4" interior face
Columns and Beams:	1 1/2" clear to ties or stirrups
Joists:	1" clear top 3/4" clear bottom and sides
Slabs:	1" clear top 3/4" clear bottom carbonate aggregate 1" clear bottom siliceous aggregate

PRECAST CONCRETE - STRUCTURAL:
Comply with MNL-116 and /or MNL-117 of the Precast Concrete Institute, ACI- 318, and "Recommendations for Concrete Members Prestressed with Unbonded Tendons" by ACI-ASCE Joint Committee 423.

Precast, prestressed members shall be design for "in place" loads, including superimposed loads shown on the drawings.

Prestressing strands shall conform to the ASTM - A416, "Standard Specification for Steel Strand, Uncoated Seven-Wire for Prestressed Concrete"(including supplements) Grade 250K or 270K.

Precast manufacturer is to design, provide calculations, and furnish steel headers for openings as necessary or as shown on the drawings. Refer to the architectural drawings for fire protection requirements for the steel headers.

The welders for steel connections in precast shall be certified in accordance with AWS D1.1.

Refer to Architectural drawings for fire rating requirements. All members, planks and beams, shall be designed for unrestrained conditions.

Provide dovetail masonry anchor slots in precast, prestressed concrete members when used as back-up for masonry veneer. Refer to Architectural drawings.

The precast manufacturer shall submit for review certified shop drawings and design calculations prepared by a qualified Professional Engineer who is registered in the state where the project occurs.

Precast elements used as a diaphragm system shall be designed to resist all lateral forces as noted on the documents. The precast manufacturer shall be responsible for the complete design of the precast components and all connections necessary to provide a fully functional diaphragm.

Precast wall elements used as part of the lateral load resisting system shall be designed to resist all diaphragm reactions. The precast manufacturer shall be responsible for the complete design of the elements and all connections necessary to support in plane and out of plane forces.

Wall panels and connections to roof and floor structure shall be designed for lateral loads required by the referenced building code as well as the loads shown on plan. Where no load is shown parallel to the wall panels, design for a minimum in-plane load of 50 plf over the entire wall length. Anchorage of each wall panel to the structure at each level shall include a minimum design load of 200 pounds per linear foot perpendicular to the plane of the wall. (REVIEW ACI 16.5.1.2)

CONCRETE SLABS ON GRADE:
The control or construction joints shall be placed as shown on the drawings. The joints shall be spaced at 12'-0" on center each direction.

The panels formed by control or construction joints shall not be "L" shaped and a rectangular panel's aspect ratio shall not exceed 1.5.

Refer to the drawings for the typical slab on grade construction and saw cut control joint detail. Control and construction joints must be continuous and not offset.

Refer to drawings for detail of isolation diamonds or circles at columns.

Refer to drawings for reinforcing at re-entrant corners. Bend bars as necessary at obstructions.

Refer to the specification for the existence, type, and thickness of interior ground vapor retard. Locate a vapor retarder directly beneath the slab on grade on top of a 6 inch compactable granular base. Refer to the specification for requirements for the compactable granular base.

Mechanically vibrate concrete around trench drains, floor ducts, construction joint dowels, loading docks, architectural features and other embedded items.

Refer to the specification for slab on grade pre-pour meeting.

Refer to the specification for acceptable methods of curing the concrete.

Refer to flooring manufacturer's specification for levelness, flatness and curing of concrete slabs on grade to receive special architectural floor finishes.

REINFORCED MASONRY:
All masonry units are placed in running bond fashion. Corners shall have a standard bond by overlapping units.

Special shapes shall be provided for jambs, columns, pilasters, control joints, corners, and lintels.

All masonry walls shall have horizontal joint reinforcing spaced at 16" o.c. Horizontal joint reinforcing shall be truss style and fabricated with galvanized nine-gauge wire and shall include corner and intersecting wall pieces. Provide minimum 6" laps at all splices.

Vertical reinforcing shall be held in place by rebar positioners, crossties, chairs, or tying to every other layer of horizontal reinforcing steel. Refer to the detail in the drawings for vertical reinforcing bar location in a core.

Provide concrete cover of minimum 1/2" to face shell.

Refer to detail in the drawings for reinforcing bar lap lengths.

Extend vertical reinforcing from footings to 2" clear top of wall or to beam bearing. Extend vertical reinforcing into the next level of construction and lap in accordance with the lap schedule.

When typical vertical wall reinforcing is interrupted by long wall openings, provide typical vertical wall reinforcing above and below opening, and extend into horizontal bond beams. Refer to the schedule on the drawings, for masonry wall opening lintels. Refer to the detail in the drawings for masonry openings minimum jamb reinforcing.

Provide vertical reinforcing at the ends of walls and at wall intersections to match specified reinforcing. Run reinforcing full height of walls.

All masonry units shall be placed with full face shell mortar coverage on horizontal and vertical face shells. Webs shall also have full mortar coverage around all grouted cells.

Fill block core at vertical reinforcing (8" minimum length along wall) with concrete grout. Filling cores with mortar is not allowed. Vibrate in place. Roding and puddling are not allowed.

Maximum lift height is four feet. For concrete core fill pour height up to maximum 8'-0", provide cleanouts if pour height exceeds 5'-0".

Masonry cement mortar is not allowed.

Calcium chloride or admixtures containing chloride shall not be used in mortar or grout.

For reinforced masonry bond beams, provide bent corner bars at corners and intersections that match reinforcing. Step bond beams as necessary to match roof slopes. Lap reinforcing bars per schedule.

For construction of masonry control joints refer to detail in drawings.

Unless noted otherwise on the drawings place control joints in masonry walls such that no straight run of wall exceeds 24'-0" and within 4'-0" of corners. Do not place control joints within 48 inches of a masonry opening jamb or a steel bearing plate.

Place bond beam reinforcing continuously through control joints. Do not splice bond beam reinforcing within 6'-0" of a control joint.

Provide bond beam with reinforcing at all floor lines, mid-height between floor lines, roof lines, and top of walls. Refer to details in the drawings.

Grout below steel bearing plate and refer to the drawings for additional information.

Refer to drawings for reinforcing schedule, top of wall bracing, thickened bearing slab and lintel schedule for non-bearing masonry walls. Refer to Architectural drawings for location and extent.

MASONRY BEAMS (HIGH-LOW BOND BEAMS):
For all masonry beams use lintel blocks.

Masonry beams are to bear 8" minimum at jambs. Extend vertical reinforcing through masonry beam bearing.

Extend horizontal reinforcing full length. Refer to detail in the drawings for stirrup configuration.

Grout masonry beams solid. Mechanically vibrate grout in place.

For brick angle supported by masonry refer to detail in the drawings.

Provide brick expansion joint vertically at the edge of the masonry opening. Stop brick angle at expansion joint. Refer to plan for wall elevation detail. Locate other brick expansion joints per architectural drawings.

LOOSE ANGLE BRICK LINTELS:
Fit lintel such that vertical leg is tight to back of brick, locate brick ties to backup at first bed joint above angle's vertical leg and provide minimum 8" support each end.

Refer to architectural drawing for locations and to drawings for size span criteria, and loading limits.

EXPANSION AND ADHESIVE ANCHORS:
Anchors in concrete or concrete masonry when not exposed to earth, weather, or corrosive environment shall be as noted below:

Expansion anchors shall be stud type with a single piece three section wedge and zinc plated in accordance with ASTM B633.

Threaded anchor rod for adhesive anchors in concrete shall be ASTM A193, Grade B7, or ASTM A36, as noted in the drawings. The adhesive used for anchors shall be a structural grade, two part epoxy or acrylic material that meets the requirement of ASTM C-881 Types I, II, IV, and V, Grade 3, Classes B and C as noted on plans.

Holes shall be drilled with a bit and cleaned using a method that complies with the manufacturer's guidelines, and specifications. Do not cut or damage reinforcing steel or P-T tendons.

Upon the request of the structural engineer the anchors shall be proof tested by the manufacturer to verify capacity of anchors that do not meet the conditions in the construction documents.

Minimum embedment depths in concrete and concrete masonry for expansion and adhesive anchors shall be as noted below:

Concrete base material:
For 1/2", 5/8", and 3/4" diameter expansion anchors provide 4 3/4"embed, UNO on plan.

For 1/2"and 5/8" diameter adhesive anchors provide 5" embed. For 3/4" diameter adhesive anchors provide 7" embed, UNO on plan.

Grouted solid concrete masonry unit material:
For 1/2", 5/8", and 3/4" diameter expansion anchors provide 4 3/4"embed, UNO on plan.

For adhesive anchors refer to the product's ICBO Report.

Pre-approved manufacturer are as follows: HILTI, ITWR Ramset/Redhead, Powers Fasteners, and Simpson Strong-Tie. For review of alternate products, submit manufacture's product data and product's current ICBO report prior to construction.

Anchors in concrete or concrete masonry when exposed to earth, weather, or corrosive environment shall be manufactured from AISI 304/316 Stainless Steel.

STRUCTURAL STEEL:
Structural steel shall be detailed, fabricated and erected in compliance with AISC Specification for the design, fabrication, erection of structural steel for building, and Code of standard practice, and OSHA steel erection standards.

All beams and girders shall be cambered at mid-span as indicated on the structural drawings. The cambers indicated shall be present in the beam in its erected position after completion of the end connections and shall be verified prior to placing concrete. Cambering tolerances shall be (-0", +1/4"). No center point cambering allowed.

Splicing structural members where not detailed on the drawings is prohibited without prior approval of the structural engineer.

Modification of structural steel members in the field is not allowed without written approval by the structural engineer.

All composite beams using the concrete slab as a compression flange are designed for unshored construction unless noted otherwise.

Anchor rods shall be minimum 3/4" diameter or as detailed in drawings.

STRUCTURAL STEEL CONNECTIONS:
All steel connections shall be designed by the steel fabricator for the criteria indicated on the drawings unless noted or detailed otherwise. Connection design shall conform to the requirements of the AISC Specifications for the design, fabrication, erection of structural and OSHA regulations. Submit calculations certified by a Professional Engineer who is licensed in the state where the project is located.

Non-composite beams: Unless noted otherwise, design simple beam shear connections per the AISC Manual connection tables. The required end reaction shall be based on the maximum allowable uniform load for the given span or the reactions indicated on the plans. Design connections for the reactions based on the above or for the minimum connection requirements indicated in the Connection Schedule, whichever provides the greater capacity.

Composite beams: Design simple composite beam shear connections per the AISC Manual connection tables UNO. Design connections for the reactions indicated on the plans or the minimum connection requirements indicated in the Connection Schedule, whichever provides the greater capacity.

Unless detailed otherwise, beam shop connections may be welded or bolted and field connections are to be bolted. Bolts shall be a minimum 3/4" diameter for connections specified or detailed in the drawings. The fabricator may submit an alternate connection with the calculations that is certified by a professional engineer who is licensed in the state where the project is located.

All beam web copes must be made to a 1 inch minimum radius.

Welded connections shall be made in accordance with ANSI/AWS D1.1 Structural Welding Code using E70XX electrodes unless noted otherwise. Weld sizes not shown or controlled by the required forces shall be AWS code minimum size. Welds shall be visually inspected for compliance with the AWS code visual inspection criteria. Welders shall be qualified in accordance with ANSI/AWS D1.1 and shall be experienced in weld in structural steel.

Full penetration welds shall be tested using NDT methods such as ultrasonic, magnetic particle or other methods referenced in the AWS code. Welds subject to NDT methods shall also have been found compliant with the AWS visual inspection criteria.

STEEL ROOF DECK:
Manufacturer shall be a current member of the Steel Deck Institute (SDI).

Detail, manufacture and install steel roof deck and accessories in accordance with the SDI specifications and codes and OSHA requirements.

Steel roof deck shall be as noted on plan.

Welding shall be in accordance with AWS D1.3. Welders shall be qualified in accordance with AWS D1.3.

Where spray-on fireproofing of the deck is required, the contractor shall verify that the deck finish is compatible with the proposed fireproofing material to ensure proper bonding of the fireproofing. Coordinate fireproofing locations and requirements with the architect.

All steel deck shall span a minimum of three spans, unless otherwise approved by the engineer. Deck ends are to be lapped over supports.

Contractor shall verify the location and extent of acoustical steel deck with the architectural drawings.

Reference drawings for detail on steel roof deck fastening requirements unless noted otherwise. Powder actuated or pneumatically driven fasteners are not allowed.

Provide reinforcement or frames for deck openings as indicated on the drawings.

COMPOSITE STEEL FLOOR DECK:
Manufacturer shall be a current member of the Steel Deck Institute (SDI).
Composite steel floor deck shall be as noted on plan.

Detail, manufacture and install composite steel floor deck and accessories in accordance with the SDI specifications, codes and OSHA steel erection standards.

Refer to drawings for composite steel floor deck fastening requirements unless noted otherwise. Powder actuated or pneumatically driven fasteners are not allowed.

Provide and install pour stops, column closures, end closures, cover plates and girder fillers and other accessories as required by the SDI unless otherwise indicated or detailed.

Where spray-on fireproofing of the deck is required, the contractor shall verify that the deck finish is compatible with the proposed fireproofing material to ensure proper bonding of the fireproofing. Coordinate fireproofing locations and requirements with the architect.

Provide reinforcement or frames for deck openings as indicated on the drawings.

2 LIGHT GAUGE METAL FRAMING:
The design and connection detailing of all light gage material including exterior studs and anchorage shall be by the Light Gauge Supplier. The design for systems shall meet the following criteria:

Stud in exterior walls shall be minimum 6005162-54 (6"-16 gauge) at 16" OC.

Studs shall be cold rolled steel, galvanized, C shape, with minimum 1 5/8" flange and minimum 1/2" return. They are to be punched for utility access and galvanized to G60 coating per ASTM 525. Top and bottom tracks shall be cold rolled or break formed steel, galvanized U shaped and minimum 16 gauge.

Anchor bottom track to concrete or masonry with minimum 5/32" x 1 1/4" power driven fasteners at 16" OC.

Light gauge metal framing fasteners shall be minimum #10 self-drilling sheet metal screws, 16 threads per inch, with low profile head. Provide a minimum of two screws per connection unless noted otherwise.

All framing components shall be squarely cut for attachment to perpendicular members. Stud ends must seat tightly into tracks for all bearing applications.

Wall stud deflection criteria: L/600

The light gauge supplier shall submit certified shop drawings and design calculations prepared by a qualified Professional Engineer registered in the state where the project is located. See project specification manual for additional submittal requirements.

Refer to architectural drawings and specification for size, minimum gage, extent, and location of interior non-bearing light gage framing. Interior light gauge framing is to be designed for 5 psf lateral pressure by the light gauge supplier.

Temporary bracing shall be furnished by the light gauge supplier and framing installer and maintained until permanent systems providing lateral stability are in place.

Welding shall conform to the American Welding Society (AWS) "Structural Welding Code - Sheet Steel, D1.3 - Current Edition." Welders shall be qualified in accordance with AWS D1.3 and shall be experienced in light gage welding. All light gage material to be welded must be nominal 16 gauge or thicker. Touch up all light gage material at welds with zinc-rich paint.

Splices in studs, joists, and headers, are not permitted, unless approved in writing by the structural engineer.

Framing components may be pre-assembled into panels prior to erecting. Prefabricated panels shall be square, with components attached in a manner that prevents racking.

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Landscape Architects:
ARCHITECTURAL RESOURCES
126 East Superior Street, Duluth MN 55802
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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.

Print Name: Paul A. Johnson

Signature: Paul A. Johnson

Date: 05-15-13 Reg. No.: 20379

REVISIONS

NO.	DESCRIPTION	DATE
2	ADDENDUM 3	6-7-13

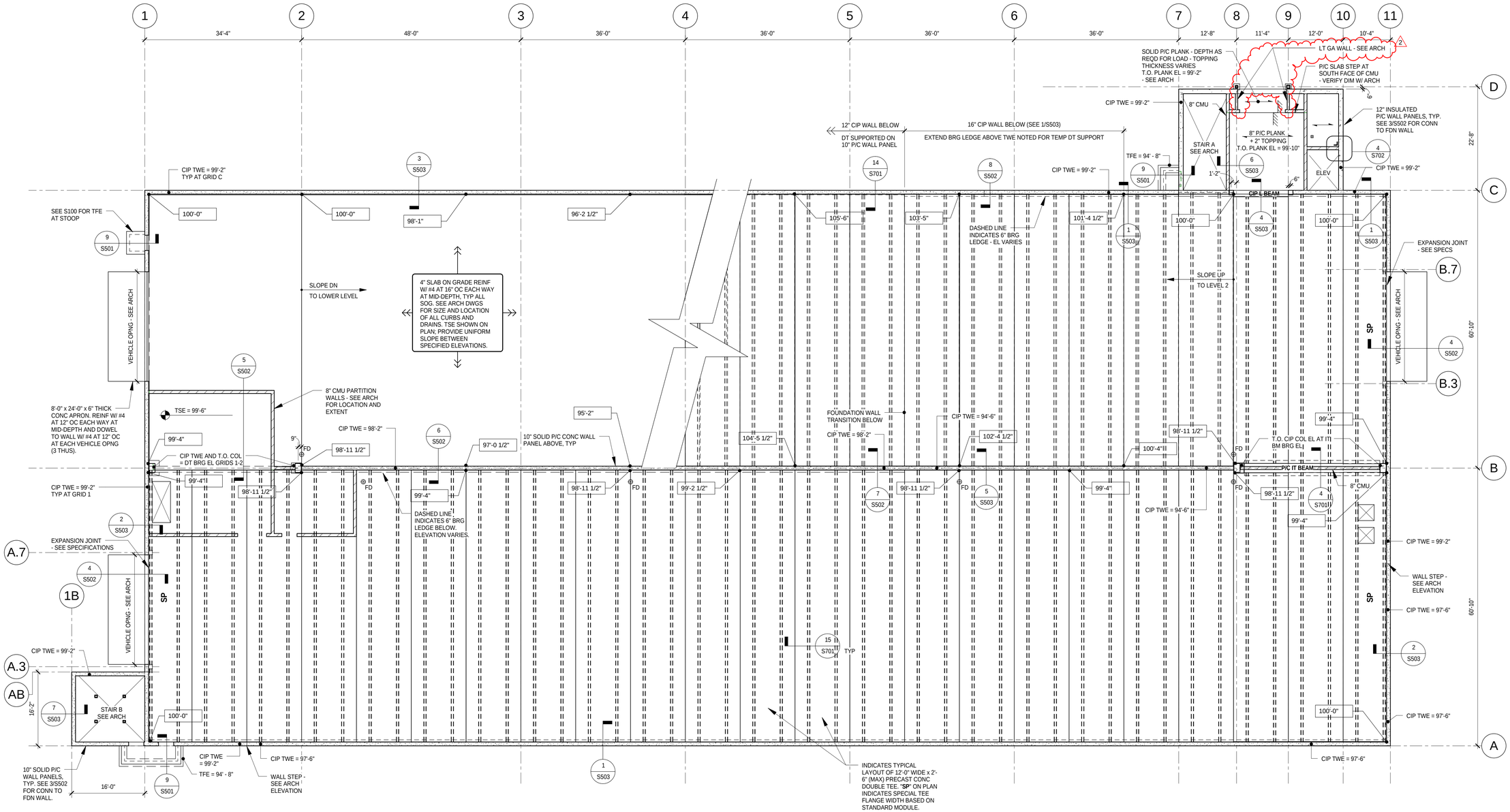
DATE ISSUED: 05/15/2013
REVIEWED BY: PAJ
DRAWN BY: SJL
DESIGNED BY: MDN / PAJ

AEP PROJECT NUMBER
213-1882-114

SHEET TITLE
GENERAL STRUCTURAL NOTES

SHEET NUMBER
S002

ISSUED FOR BID



1 FIRST LEVEL FRAMING PLAN

3/32" = 1'-0"

PLAN NOTES:

1. SEE SHEET S100 FOR TYPICAL PLAN NOTES.
2. CANTILEVERED CONCRETE FOUNDATION WALLS ARE NOT DESIGNED FOR P/C ERECTION CRANES OR OTHER HEAVY EQUIPMENT SURCHARGES. MAINTAIN MINIMUM 20' CLEAR FROM FACE OF FOUNDATION WALLS TO EDGE OF ANY HEAVY EQUIPMENT.
3. SEE S101A, S102A, S103A FOR LOAD MAPS SHOWING GRAVITY AND LATERAL DESIGN LOADS FOR P/C ELEMENTS AND SYSTEMS.

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DULUTH INTERNATIONAL AIRPORT DULUTH, MN

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Print Name: Paul A. Johnson

Signature: Paul A Johnson

Date: 05-15-13 Reg. No.: 20379

REVISIONS

NO.	DESCRIPTION	DATE
2	ADDENDUM 3	6-7-13

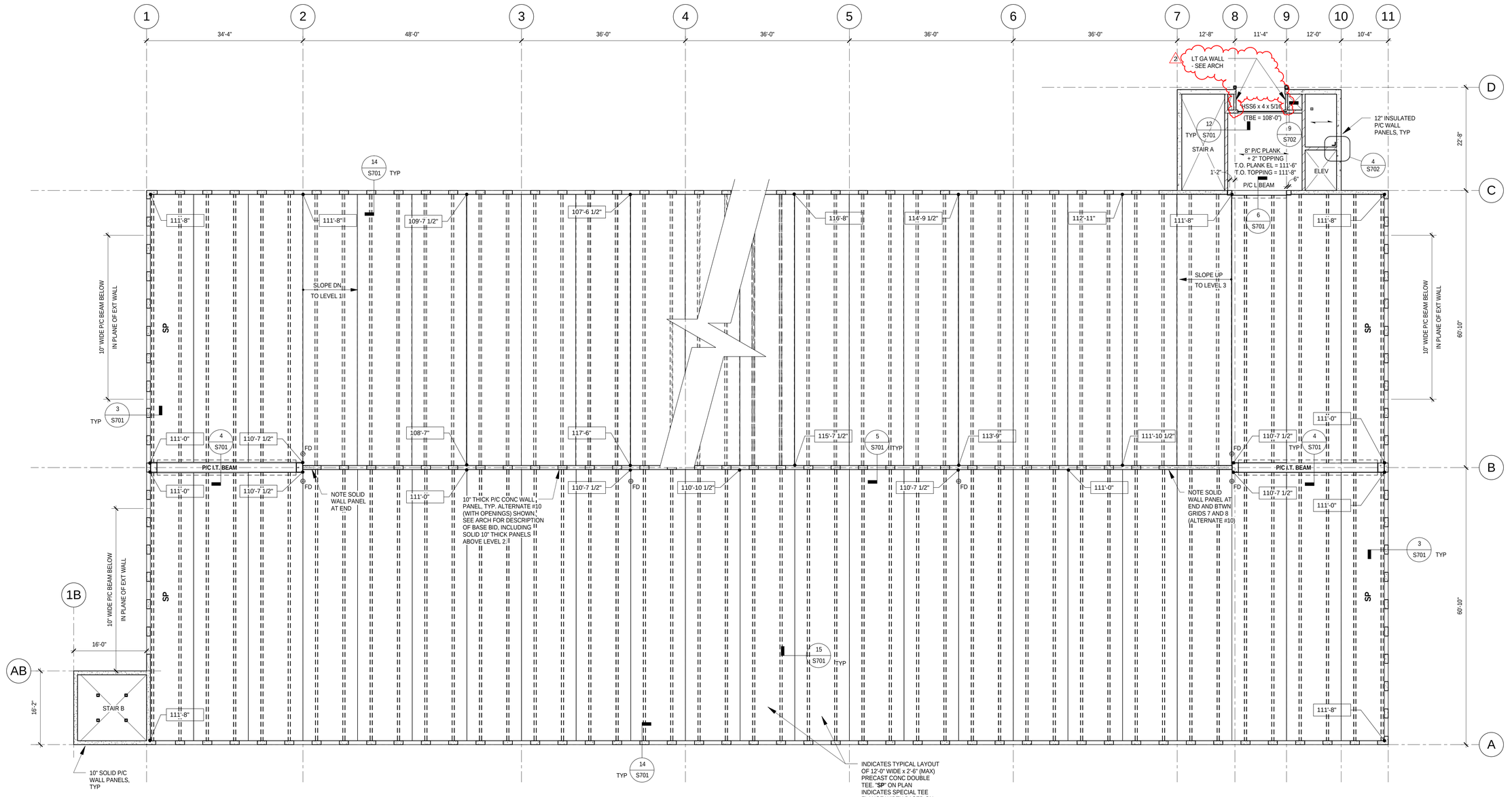
DATE ISSUED: 05/15/2013
REVIEWED BY: PAJ
DRAWN BY: SJL
DESIGNED BY: MDN / PAJ

AEP PROJECT NUMBER
213-1882-114

SHEET TITLE
FIRST LEVEL FRAMING PLAN

SHEET NUMBER
S101

ISSUED FOR BID



NORTH

1 SECOND LEVEL FRAMING PLAN

3/32" = 1'-0"

PLAN NOTES:

1. SEE SHEET S100 FOR TYPICAL PLAN NOTES.
2. SEE S101A, S102A, S103A FOR LOAD MAPS SHOWING GRAVITY AND LATERAL DESIGN LOADS FOR P/C ELEMENTS AND SYSTEMS.

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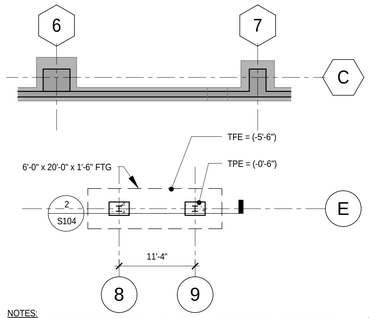
DRAWN BY: SJL
DESIGNED BY: MDN / PAJ

AEP PROJECT NUMBER
213-1882-114

SHEET TITLE
SECOND LEVEL FRAMING PLAN

SHEET NUMBER
S102

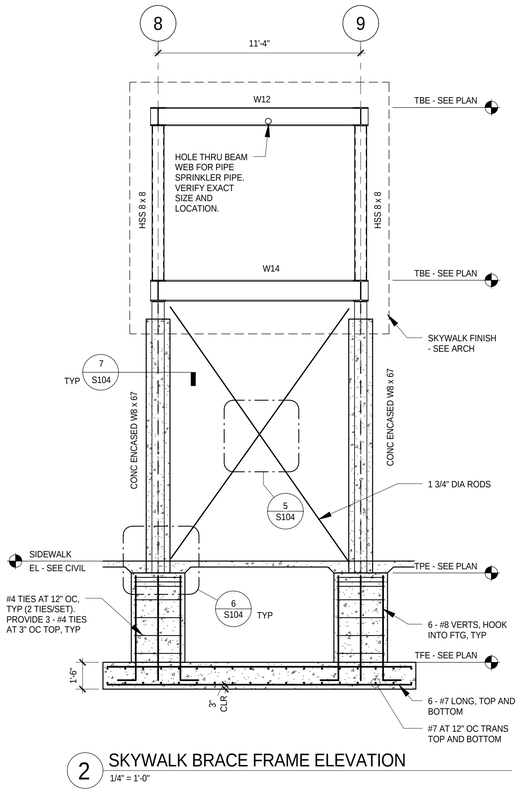
ISSUED FOR BID



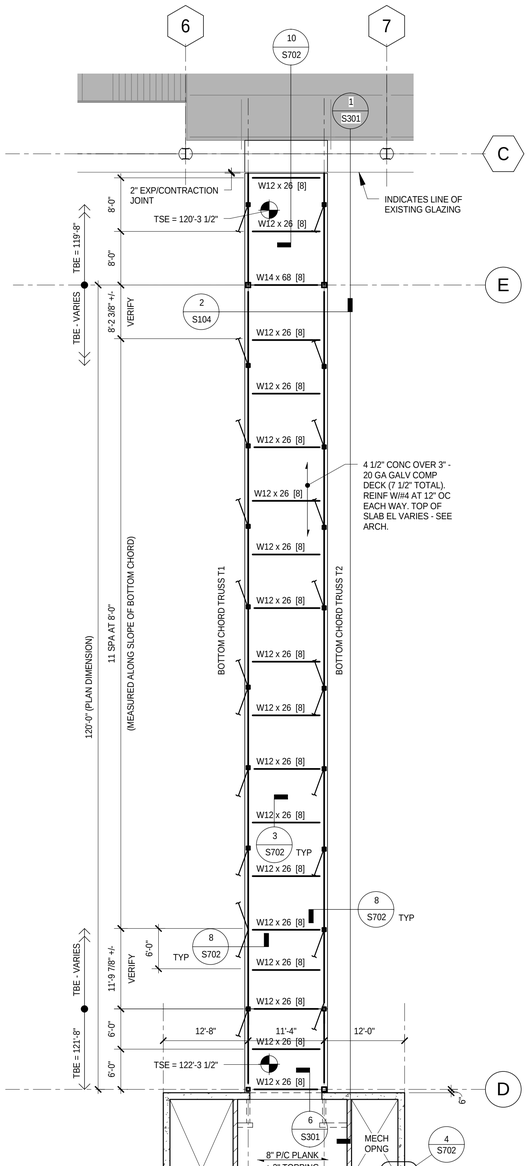
NOTES:
1. SEE S100 FOR TYPICAL NOTES; VALIDATE BEARING PRESSURE (4000 PSI REQD).
2. TFE, TPE NOTED RELATIVE TO EXISTING GRADE (SIDEWALK ELEVATION AT GRADE).

NORTH

1 SKYWALK FOUNDATION PLAN
3/32" = 1'-0"



2 SKYWALK BRACE FRAME ELEVATION
1/4" = 1'-0"

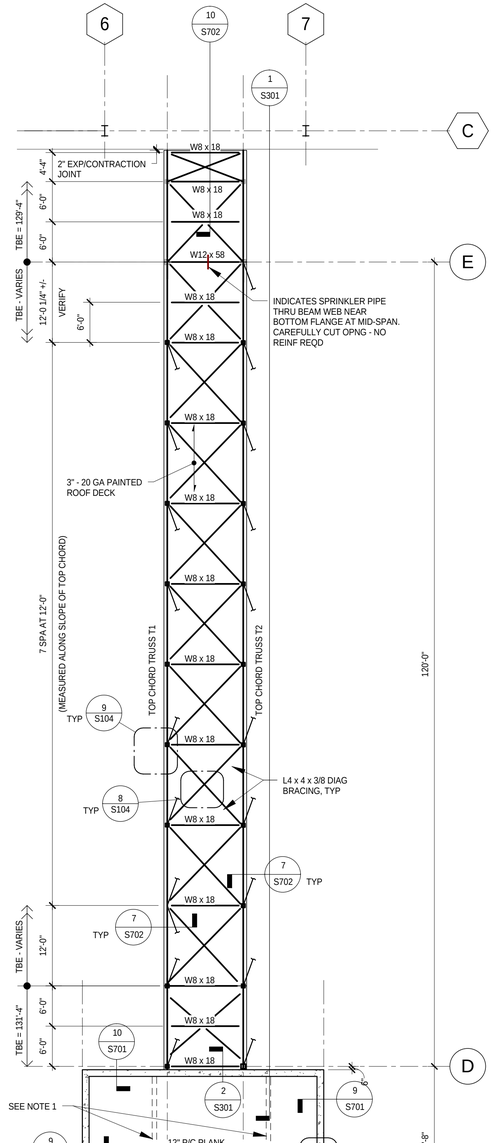


2

3 SKYWALK FLOOR FRAMING PLAN
3/32" = 1'-0"

NORTH

NOTES:
1. SEE SHEET S103 FOR FRAMING SOUTH OF GRID D AND TYPICAL NOTES.
2. TOP OF STEEL ELEVATION VARIES, SEE 1/S301 FOR TRUSS ELEVATION AND DETAILS.
3. [8] ON PLAN INDICATES QUANTITY OF 3/4" DIAMETER x 5" LONG (AFTER WELDING) HEADED STUDS. SEE 3/S702 AND GENERAL STRUCTURAL NOTES.

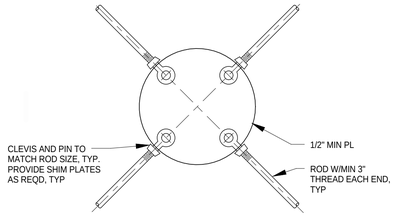


2

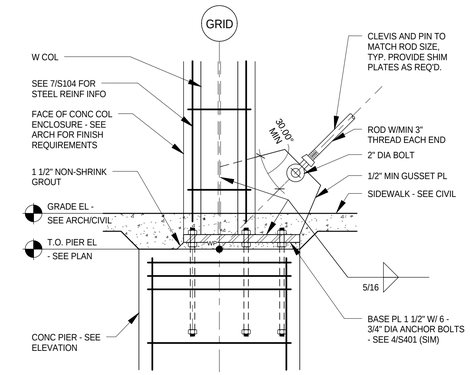
4 SKYWALK ROOF FRAMING PLAN
3/32" = 1'-0"

NORTH

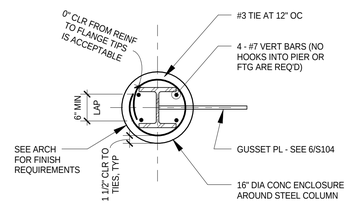
NOTES:
1. 8" CMU THIS PLAN ARE NON-BEARING. SEE 6/S702 (SIM) FOR CONNECTION TO UNDERSIDE OF 12" PLANK.
2. SEE 11/S701 FOR OPENING DETAIL THROUGH PLANK.



5 SECTION AT BRACING INTERSECTION
3/4" = 1'-0"

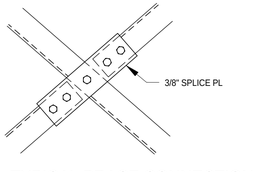


6 SECTION AT COLUMN BASE
3/4" = 1'-0"

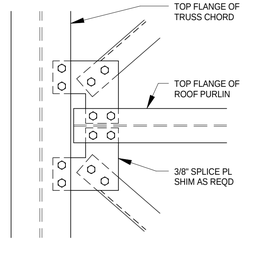


NOTES:
1. SEE PLAN FOR LOCATIONS.

7 CONCRETE ENCASED WIDE FLANGE COLUMN
3/4" = 1'-0"



8 TYPICAL BRACE CONNECTION
1" = 1'-0"



9 TYPICAL BRACE CONNECTION
1" = 1'-0"

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2	ADDENDUM 3	6-7-13

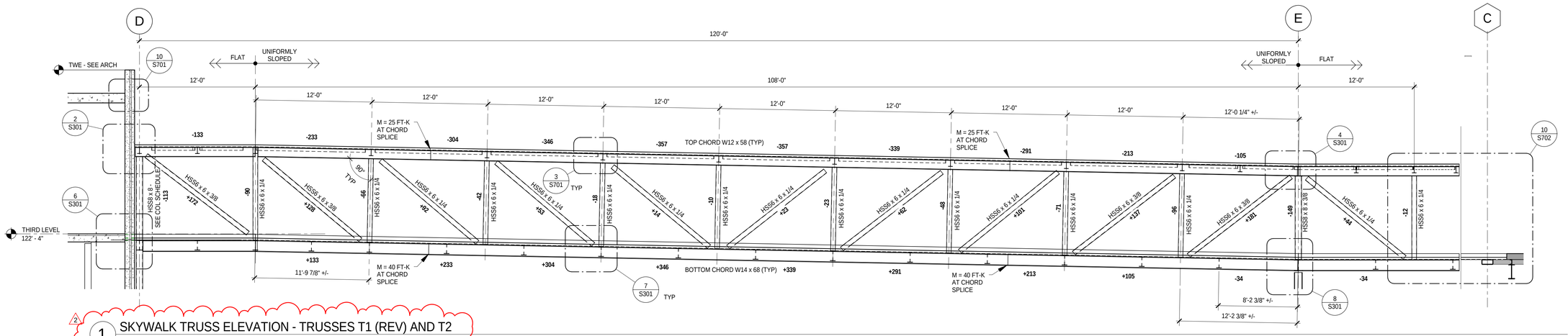
DATE ISSUED: 05/15/2013
REVIEWED BY: PAJ
DRAWN BY: SJL
DESIGNED BY: MDN / PAJ

AEP PROJECT NUMBER
213-1882-114

SHEET TITLE
SKYWALK FLOOR AND ROOF FRAMING PLANS

SHEET NUMBER
S104

ISSUED FOR BID

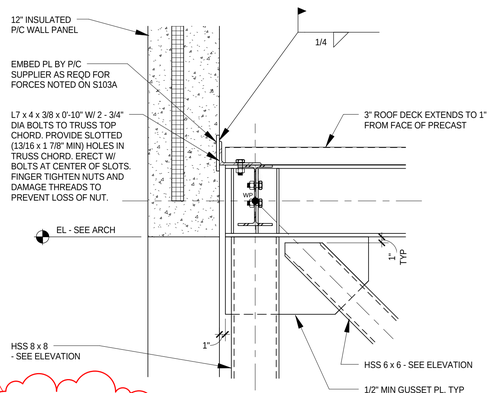


1 SKYWALK TRUSS ELEVATION - TRUSSES T1 (REV) AND T2

3/16" = 1'-0"

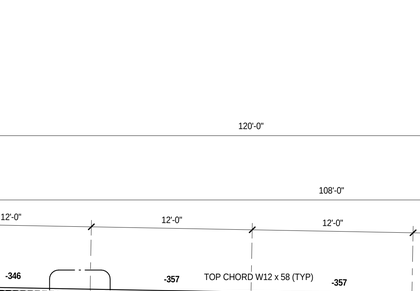
GENERAL SKYWALK TRUSS CONNECTION NOTES:

1. ALL PLATE MATERIAL USED IN CONNECTIONS: ASTM A572-50.
2. ALL ANGLE MATERIAL USED IN CONNECTIONS: ASTM A-36.
3. MINIMUM WELD = 5/16" FILLET, E90xx WELDING ELECTRODES.
4. CONNECTIONS SHOWN ARE CONCEPTUAL; LENGTH OF WELDS AND SIZE OF PLATES WILL VARY AS REQUIRED FOR DESIGN FORCES INDICATED.
5. TRUSS WEB MEMBER CONNECTIONS SHALL BE DESIGNED FOR A MINIMUM 50% OF THE MEMBER GROSS TENSION CAPACITY.
6. MEMBER FORCES INDICATED IN KIPS (K) ARE WORKING (UNFACTORED). COMPRESSION FORCES NOTED (-), TENSION FORCES NOTED (+).
7. PROVIDE 1 1/2" (+0, -1/4") CAMBER AT MIDPOINT OF 120'-0" SPAN.
8. CONTRACTOR TO SUBMIT PROPOSED CHORD SPLICE LOCATION AND DETAILS FOR REVIEW. SEE TRUSS ELEVATION FOR RECOMMENDED SPLICE LOCATIONS.



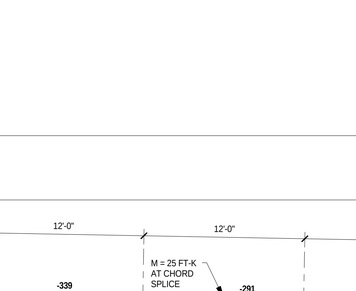
2 SECTION

1" = 1'-0"



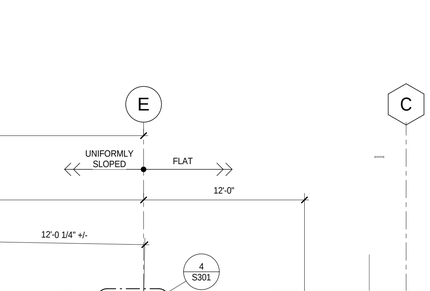
3 TYPICAL DETAIL

1" = 1'-0"



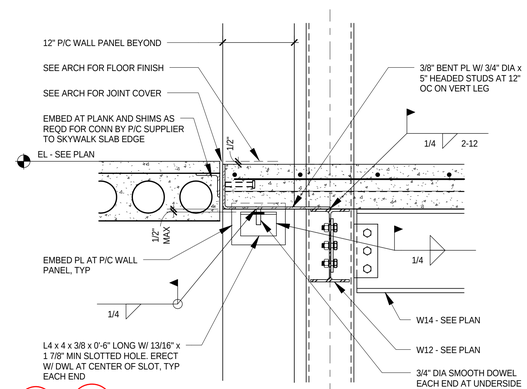
4 DETAIL

1" = 1'-0"



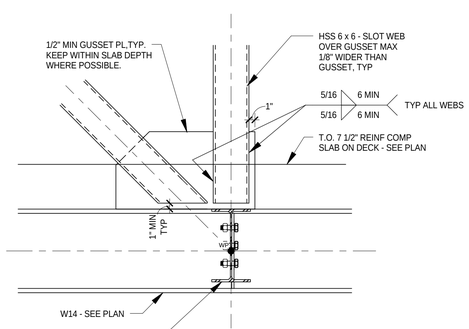
5 PLAN DETAIL

1 1/2" = 1'-0"



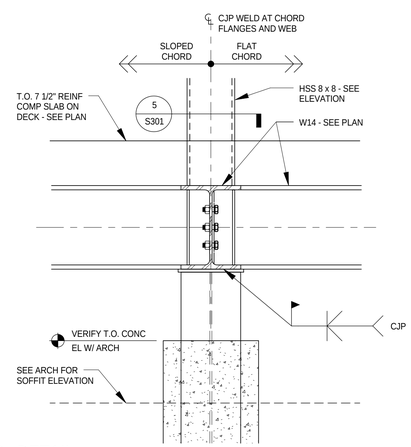
6 SECTION

1" = 1'-0"



7 TYPICAL DETAIL

1" = 1'-0"



8 DETAIL

1" = 1'-0"

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DATE ISSUED: 05/15/2013
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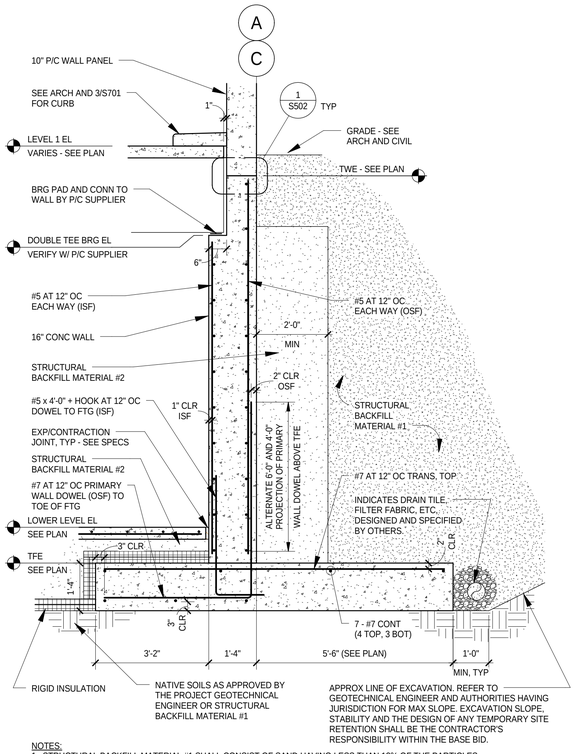
DRAWN BY: SJL
DESIGNED BY: MDN / PAJ

AEP PROJECT NUMBER
213-1882-114

SHEET TITLE
TRUSS ELEVATION AND DETAILS

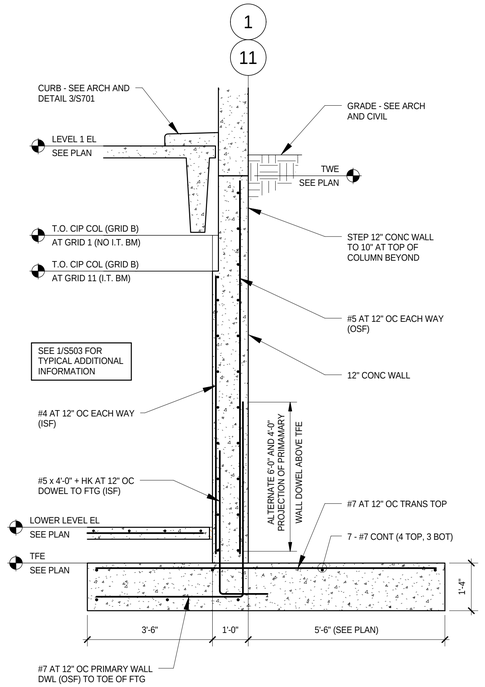
SHEET NUMBER
S301

ISSUED FOR BID

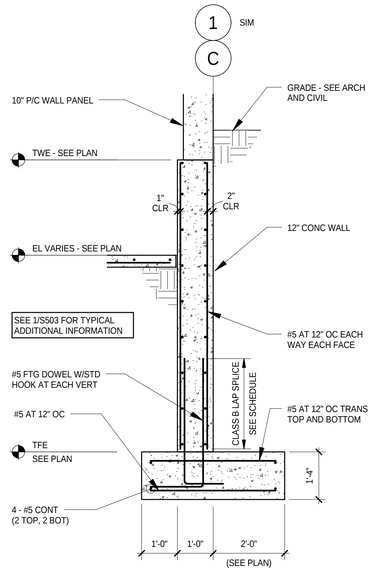


NOTES:
1. STRUCTURAL BACKFILL MATERIAL #1 SHALL CONSIST OF SAND HAVING LESS THAN 12% OF THE PARTICLES BY WEIGHT PASSING A #200 SIEVE. (REFER TO PROJECT GEOTECHNICAL REPORT).
2. STRUCTURAL BACKFILL MATERIAL #2 SHALL CONSIST OF SAND HAVING LESS THAN 50% OF THE PARTICLES BY WEIGHT PASSING A #40 SIEVE AND LESS THAN 5% OF THE PARTICLES BY WEIGHT PASSING A #200 SIEVE. (REFER TO PROJECT GEOTECHNICAL REPORT).
3. REFER TO THE PROJECT GEOTECHNICAL REPORT AND SPECIFICATIONS FOR ADDITIONAL INFORMATION, INCLUDING MAXIMUM BACKFILL LIFTS, COMPACTION, MOISTURE, ETC.
4. SEE ARCHITECTURAL DRAWINGS FOR WATERPROOFING, INSULATION, ETC. SEE S501 FOR CONSTRUCTION JOINT AND OTHER TYPICAL DETAILS.

1 TYPICAL SECTION
1/2" = 1'-0"

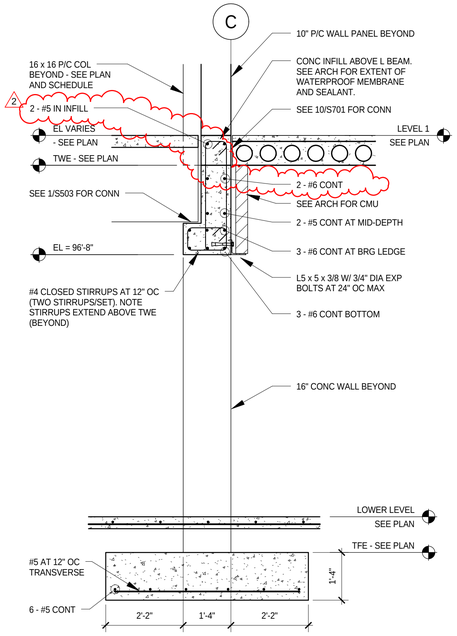


2 SECTION
1/2" = 1'-0"

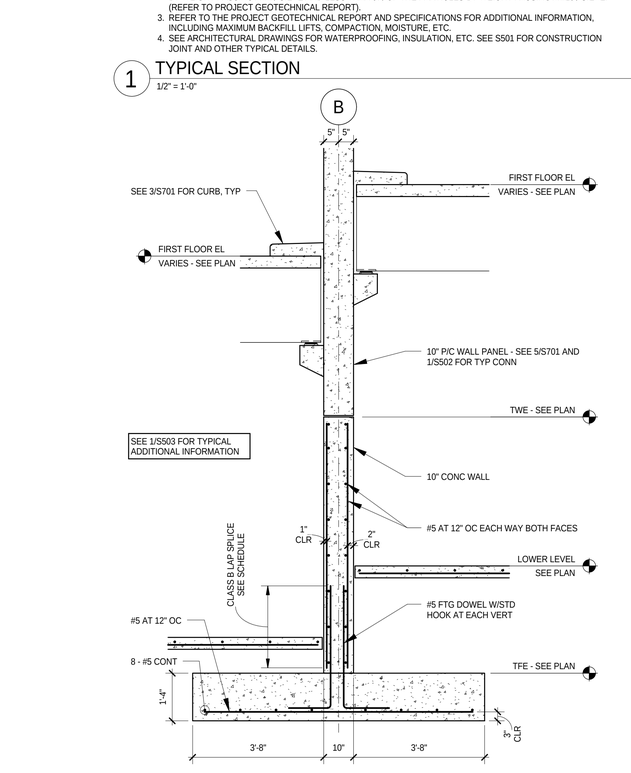


NOTE:
1. MAXIMUM DIFFERENTIAL BACKFILL ELEVATION BETWEEN ISF AND OSF OF WALL = 6'-0" THIS DETAIL ONLY.

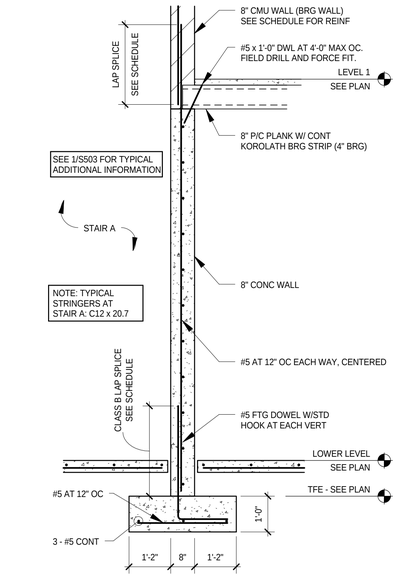
3 SECTION
1/2" = 1'-0"



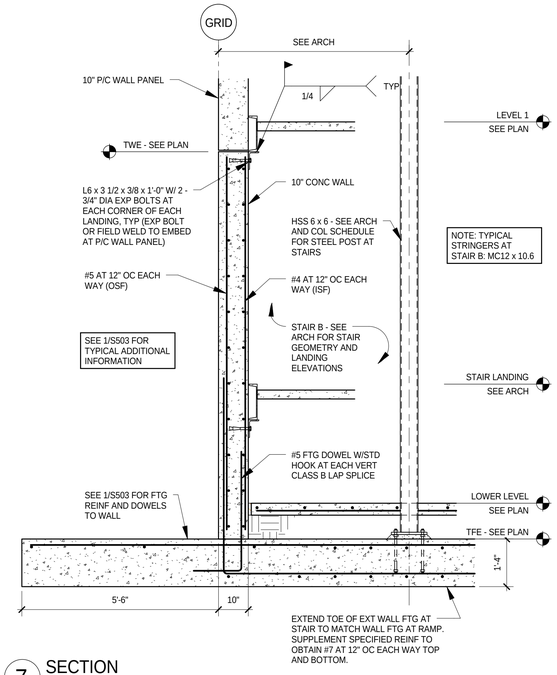
4 SECTION
1/2" = 1'-0"



5 SECTION
1/2" = 1'-0"



6 SECTION
1/2" = 1'-0"



7 SECTION
1/2" = 1'-0"

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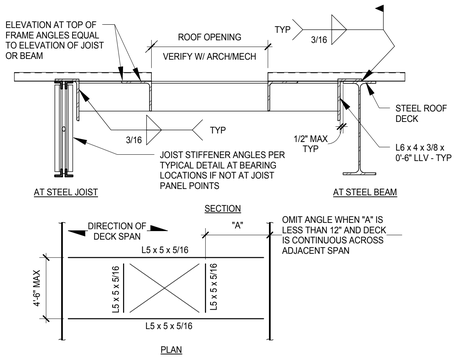
DESIGNED BY: MDN / PAJ

AEP PROJECT NUMBER
213-1882-114

SHEET TITLE
STRUCTURAL FOUNDATION DETAILS

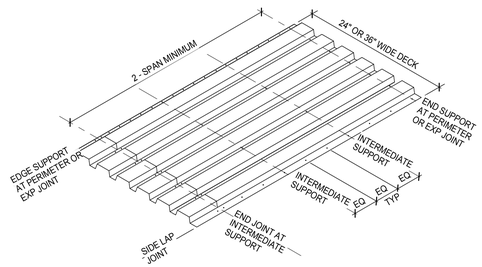
SHEET NUMBER
S503

ISSUED FOR BID



NOTES:
1. VERIFY OPENING SIZES AND LOCATIONS WITH MECHANICAL CONTRACTOR PRIOR TO FABRICATION.
2. WELD DECK AT OPENING AT EACH FLUTE WITH PUDDLE WELDS PER TYPICAL DECK ATTACHMENT DETAILS.
3. DO NOT CUT OPENING IN DECK UNTIL NECESSARY, CONTRACTOR TO COORDINATE.
4. THIS ROOF OPENING FRAME IS NOT DESIGNED TO SUPPORT THE WEIGHT OF ROOF TOP MECHANICAL EQUIPMENT WEIGHING OVER 400 LBS. EQUIPMENT SHALL BE SUPPORTED ON A STRUCTURAL CURB DESIGNED BY THE SUPPLIER TO SPAN TO THE PRIMARY STRUCTURAL FRAMING.

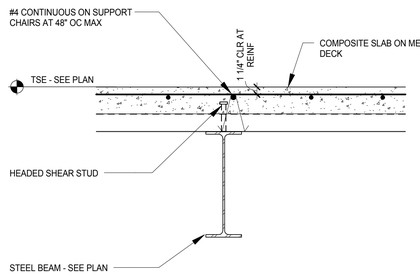
1 TYPICAL 3" ROOF DECK OPENING DETAIL (≤ 4'-6")
NO SCALE



DECK SUPPORT CONDITION	DECK ATTACHMENT
END SUPPORT	PUDDLE WELDS AT EACH LOW FLUTE
EDGE SUPPORT	PUDDLE WELDS AT 12" OC
INTERMEDIATE SUPPORT	PUDDLE WELDS AT EACH LOW FLUTE
END JOINT AT INT SUPPORT	PUDDLE WELDS AT EACH LOW FLUTE, EACH SIDE
SIDE LAP JOINT	#10 TEK SCREWS OR 1 1/2" SEAM WELD AT 36" OC MAX

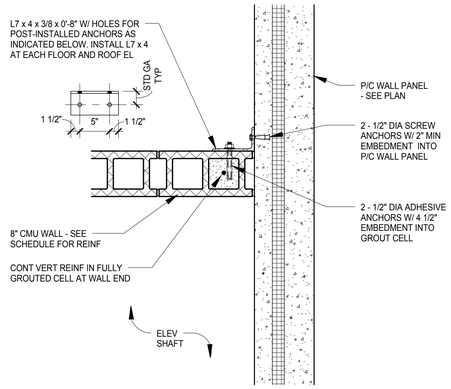
NOTES:
1. ALL PUDDLE (ARC-SPOT) WELDS SHALL BE 5/8" DIAMETER.
2. PROVIDE DECK ATTACHMENTS AT SPACING SHOWN UNLESS NOTED OTHERWISE ON DRAWINGS.
3. DECK SHEETS SHALL BE BUTTED AT END JOINTS. PROVIDE 1 1/2" MINIMUM BEARING.
4. HEADED STUD INSTALLED THROUGH THE DECK MAY BE SUBSTITUTED FOR PUDDLE WELD.

2 TYPICAL COMPOSITE FLOOR DECK ATTACHMENT DETAIL
NO SCALE

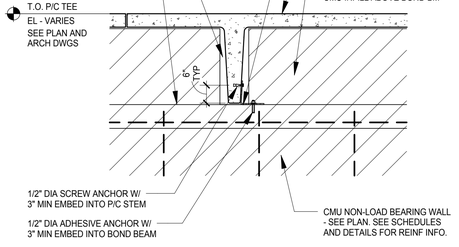


NOTES:
1. SEE TYPICAL DETAILS FOR DECK ATTACHMENT AND HEADED STUD INFORMATION.

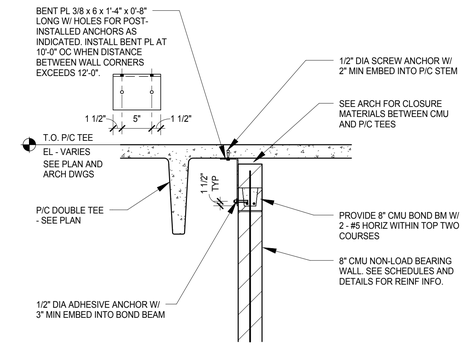
3 TYPICAL COMPOSITE FLOOR DECK PERPENDICULAR TO BEAM DETAIL
NO SCALE



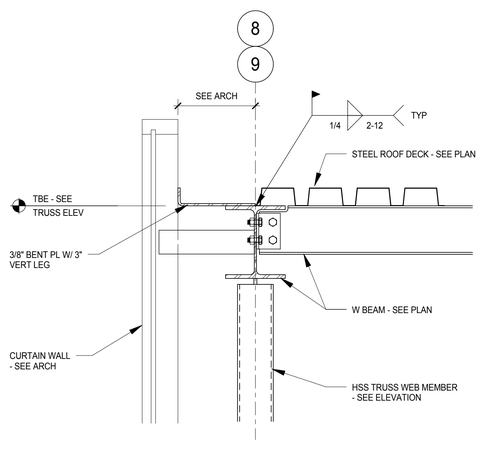
4 PLAN DETAIL
1" = 1'-0"



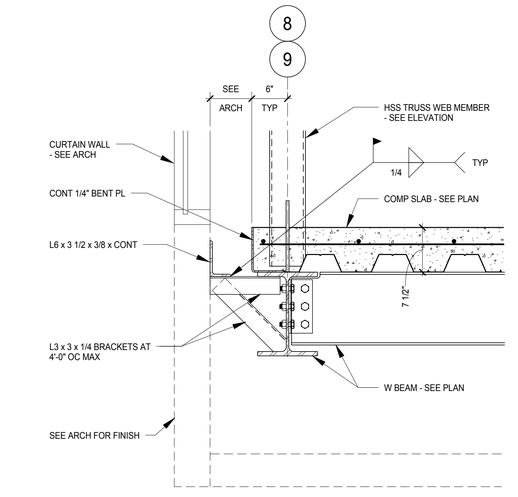
5 SECTION - TOP OF CMU WALL PERPENDICULAR TO P/C TEES
NO SCALE



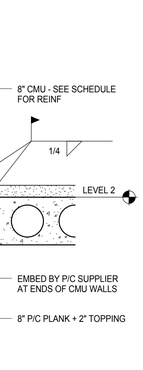
6 SECTION - TOP OF CMU WALL PARALLEL TO P/C TEES
NO SCALE



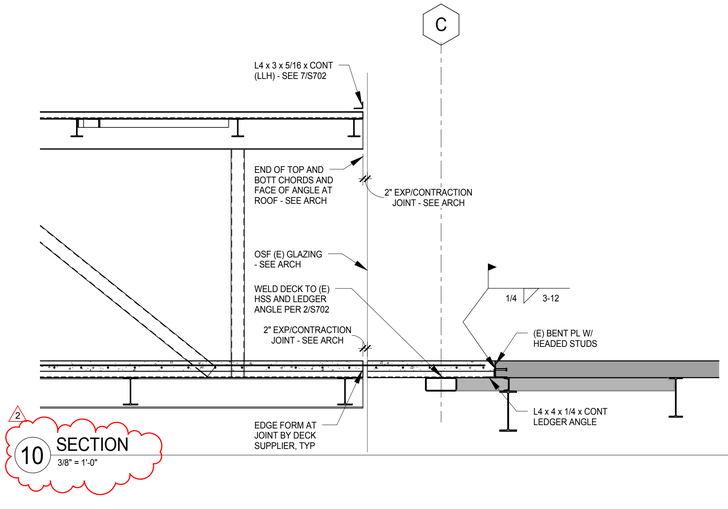
7 SECTION
1" = 1'-0"



8 SECTION
1" = 1'-0"



9 SECTION
1" = 1'-0"



2

10 SECTION
3/8" = 1'-0"

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DULUTH AIRPORT AUTHORITY

DULUTH INTERNATIONAL AIRPORT DULUTH, MN

NEW PARKING STRUCTURE AND EXTERIOR WAYFINDING SIGNAGE

CONSULTANTS

Interior Architects:
TKDA ARCHITECTS
11 E Superior Street Suite 340, Duluth MN 55802
TEL: (218) 724-8578 / FAX: (218) 724-8717

Structural Engineers:
MEYER BORGMAN JOHNSON
501 Lake Avenue South, Suite 300, Duluth MN 55802
TEL: (218) 722-1056 / FAX: (218) 722-9306

Landscape Architects:
ARCHITECTURAL RESOURCES
126 East Superior Street, Duluth MN 55802
TEL: (218) 727-8481 / FAX: (218) 727-8483

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.

Print Name: Paul A. Johnson

Signature:

Date: 05-15-13 Reg. No.: 20379

REVISIONS

NO.	DESCRIPTION	DATE
2	ADDENDUM 3	6-7-13

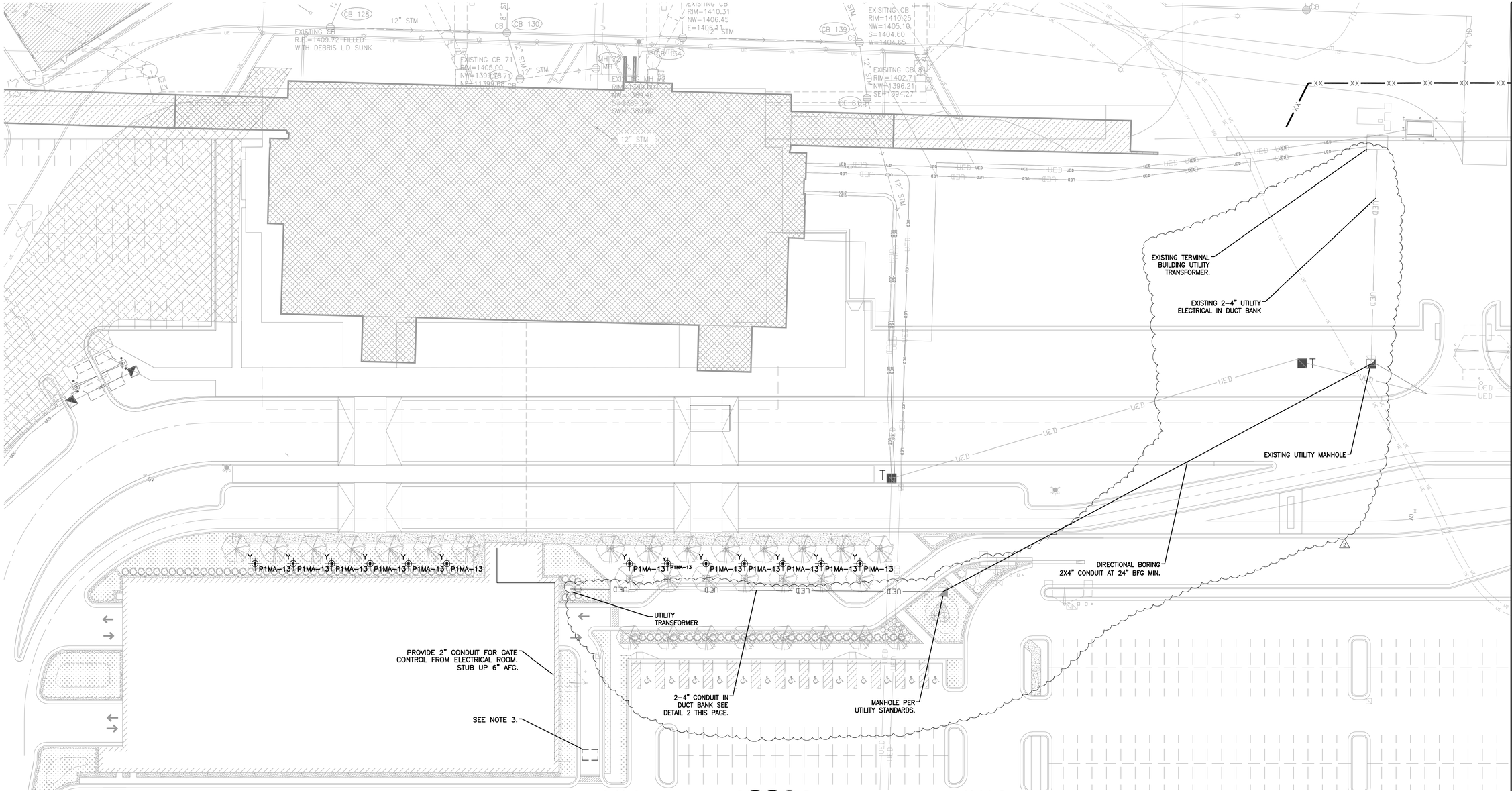
DATE ISSUED: 05/15/2013
REVIEWED BY: PAJ
DRAWN BY: SJL
DESIGNED BY: MDN / PAJ

AEP PROJECT NUMBER
213-1882-114

SHEET TITLE
STRUCTURAL FRAMING DETAILS

SHEET NUMBER
S702

ISSUED FOR BID

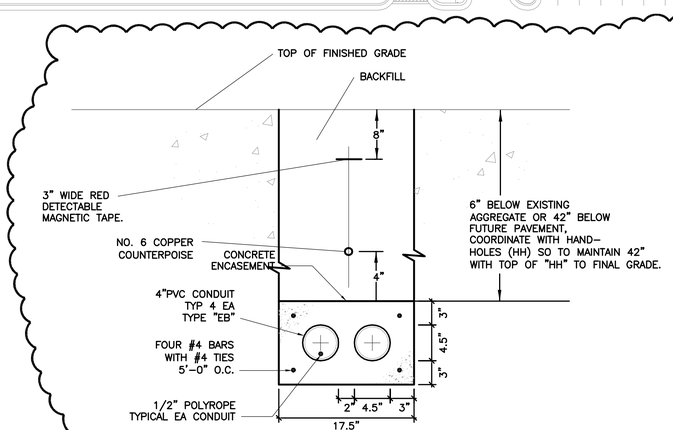


NOTES:

1. SEE DRAWING E002 FOR LIGHT FIXTURE TYPE.
2. SEE DETAILS 2 AND 3 DRAWING E150 FOR BOLLARD BASE AND U/G WIRING.
3. PROVIDE IN-GROUND VEHICLE SENSOR WIRING. SEE CIVIL DWR. CE101.
4. COORDINATE WITH CIVIL WORK FOR EXACT CONDUIT ROUTING AND MANHOLE PLACEMENT FOR THE UTILITY CONDUIT SHOWN. VERIFY CONDUIT SIZE WITH MINNESOTA POWER. SEE E601. 2

ALTERNATES:

BOLLARDS INCLUDING ELECTRICAL CONNECTION, WIRING AND BOLLARD BASE SHALL BE BID SEPARATE UNDER ALTERNATE #9.



INSTALLATION NOTES (DUCTBANK):

1. THIS CONTRACTOR SHALL INSTALL A 200 LB. CAPACITY POLYPROPYLENE PULL ROPE/STRING IN EACH DUCT AND CONDUIT INSTALLED AND PLUG OR CAP THE DUCT. THE ROPE SHALL BE SECURELY ATTACHED TO THE PULL IRON IN EACH MANHOLE, OR A STAKE WHERE THE DUCT TERMINATES UNDERGROUND.
2. INSTALL A DETECTABLE, THREE (3) INCHES WIDE TAPE, EIGHT (8) INCHES BELOW GRADE ABOVE ALL PORTIONS OF DUCT BANKS AND CONDUITS. THE TAPE SHALL HAVE CONTINUOUS MESSAGE PRINTING.
3. THE MAXIMUM DUCT SLOPE SHALL BE THREE (3) INCHES PER ONE HUNDRED (100) FEET.
4. DUCT TERMINATION AT MANHOLE: PROVIDE PLASTIC BELL-ENDS INSIDEE MANHOLE TO FORM A WATER-TITE SEAL.
5. ALL PVC CONDUIT AND FITTINGS SHALL BE SCHEDULE 40 AND CONFORM TO FEDERAL SPEC. W.C.-1094, LATEST EDITION AND SHALL BE U.L. LISTED.
6. ALL REINFORCING STEEL SHALL BE ASTM A615 GRADE 60 AND THE CONCRETE SHALL BE P-610 WITH A 28 DAY STRENGTH OF 4000 PSI. ALL MANHOLES SHALL BE PRECAST.
7. ALL WALL REINFORCEMENT (LOOP AND VERTICAL) AFFECTED BY DUCTWORK SHALL BE RELOCATED ON EITHER SIDE OF THE DUCT, AND DETAILED IN THE SUBMITTAL.
10. CONCRETE ENCASED DUCT BANK SCOPE: THE WORK UNDER THIS SECTION SHALL INCLUDE THE ASSEMBLY OF THE SPACERS, DUCTS AND CONCRETE REQUIRED TO FORM THE DUCT BANK. A. SPACERS: INTERLOCKING PVC SPACERS TO PROVIDE 1-1/2" SPACING BETWEEN DUCTS AND 3" COVER OF CONCRETE FOR THE OUTER DUCTS, SPACED 5 FEET ON CENTERS WILL BE USED. SPACERS SHALL BE ASSEMBLED TO FORM THE DUCT BANK SPECIFIED. CONCRETE BLOCKS SHALL BE UTILIZED.
11. CONTRACTOR TO PROVIDE SUBMITTALS FOR MATERIALS USED.

N

1 ELECTRICAL SITE PLAN
1" = 30'-0"

2 DUCT BANK DETAIL
NTS

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REVISIONS

NO.	DESCRIPTION	DATE
1	ADDENDUM 2	5-31-13
2	ADDENDUM 3	6-7-13

DATE ISSUED: 05/15/2013
REVIEWED BY: BA
DRAWN BY: RJL
DESIGNED BY: RJL/BA

AEP PROJECT NUMBER
213-1882-114

SHEET TITLE
ELECTRICAL SITE PLAN

SHEET NUMBER
E010

ISSUED FOR BID

Drawing: T:\P\2131882.114 Duluth Parking Structure\CAD\E\E010 Electrical SitePlan.dwg Plotted on: 6/4/2013 2:02 PM Plotted by: Lizarn, Rional