

Date: February 21, 2012

RE: City of Duluth Bid #12-4401
New Passenger Terminal Bid Package 2C
Civil Sitework & Apron/Concessions and Furnishings

Addendum No. 1

TO: Prospective Bidders

This Addendum forms a part of the Contract Documents and modifies the original Bidding Documents dated February 10, 2012. 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 Invitation to Bid:

Delete: 8.22C Doors, Frames and Hardware (material only);
8.23C High Speed Overhead Doors shall now read: **8.23C Overhead Fabric Doors;**
13.23C Breach Control shall now read: **13.22C Breach Control;**
Delete: 10.23C Pay Booth. Add: 13.25C Prefabricated Control Booth;
Delete: 10.24C X-Ray Machine. Add 11.21C X-Ray Inspection Equipment;
Delete: 13.22C Computer Controlled Access;
Delete: 13.23C Flight Display.
16.22C Electrical Systems shall now read: **16.22C Electrical, Computer Controlled Access and Flight Display Systems.**

1.2 Bid Form:

Civil Sitework & Apron - Line Item No. 88 shall read: **Type "C" Light with Foundation.**

1.3 Table of Contents:

Part Two-Bid Information and Proposal Forms: Prevailing Wages Rates shall read: **31 pages.**
Part Six-Safety and Security: Advisory Circular 150/5370-2F shall read: **60 pages.**
Part Eleven-Division 1-16 Technical Specifications: Add: **16670 Lighting Protection 13 pages.**

1.4 Technical Specifications:

Include missing Specification Sections listed below in their entirety.

Part Eight-Technical Specifications:

Item P-153 Controlled Low Strength Material (CLSM) P-153-1-3
Item P-501 Portland Cement Concrete..... P-501-1-34
Item D-751 Manholes, Catch Basins, Inlets and Inspection Holes D-751-1-9
Item L-105 Alterations, Removal and Demolition L-105-1-5
Item L-108 Underground Power Cable for Airports..... L-108-1-13

Part 9 – Special Provisions

SP-1 through SP-16 in its entirety.

Part Eleven-Division 1 – 16 Technical Specifications:

16670 Lightning Protection..... 16670-1-13

2.0 DRAWINGS

Replace drawings listed below with sheets included with this Addendum No. 1

2.1 Volume 3 of 3 – Mechanical, Electrical, Plumbing & Fire Protection

M001 MECHANICAL LEGEND
M002 MECHANICAL SYMBOLS
M110 ENLARGED FIRST FLOOR MECHANICAL PLAN AREA A
M111 ENLARGED FIRST FLOOR MECHANICAL PLAN AREA B
M112 PARTIAL SECOND FLOOR MECHANICAL PLAN - CONCESSIONS AREA
M114 PARTIAL THIRD FLOOR MECHANICAL PLAN - CONCESSIONS AREA
M116 PARTIAL ROOF LEVEL MECHANICAL PLAN - CONCESSIONS AREA
M303 TUG TUNNEL RAMP SNOW MELT PLAN, FLOW DIAGRAM AND DETAILS
M401 MECHANICAL SCHEDULES & DETAILS
M401C MECHANICAL EQUIPMENT SCHEDULES
M503 MECHANICAL DETAILS
M506 RAMP SNOW MELT SYSTEM DETAILS
MP111 ENLARGED FIRST FLOOR MECHANICAL PIPING PLAN AREA B
MP112 ENLARGED SECOND FLOOR MECHANICAL PIPING PLAN AREA A
MP113 ENLARGED SECOND FLOOR MECHANICAL PIPING PLAN AREA B
MP114 ENLARGED THIRD FLOOR MECHANICAL PIPING PLAN AREA A
MP115 ENLARGED THIRD FLOOR MECHANICAL PIPING PLAN AREA B
E001C ELECTRICAL SYMBOLS
E112C ENLARGED SECOND FLOOR ELECTRICAL PLAN - AREA A
E116 ELECTRICAL ROOF PLAN
E117 RAMP ELECTRICAL POWER AND LIGHTING PLAN
EL112C ENLARGED SECOND FLOOR LIGHTING PLAN - AREA A
E300C BLDG POWER RISER DIAGRAM
E301 PANEL SCHEDULES
E301C PANEL SCHEDULES
E400 ELECTRICAL ABBREVIATIONS AND TABLES
E401 LIGHTING FIXTURE SCHEDULE
E404 PANEL SCHEDULES
E405 PANEL SCHEDULES
E406 PANEL SCHEDULES
E407 PANEL SCHEDULES
ET001 TECHNOLOGY/ SECURITY SYSTEMS LEGEND AND NOTES
ET401 TECHNOLOGY FIRST FLOOR PLAN
ET402 TECHNOLOGY SECOND FLOOR PLAN
ET403 TECHNOLOGY THIRD FLOOR PLAN
ET410 TECHNOLOGY FIRST FLOOR PLAN AREA A
ET411 TECHNOLOGY FIRST FLOOR PLAN AREA B
ET412 TECHNOLOGY SECOND FLOOR PLAN AREA A
ET413 TECHNOLOGY SECOND FLOOR PLAN AREA B
ET414 TECHNOLOGY THIRD FLOOR PLAN AREA A
ET415 TECHNOLOGY THIRD FLOOR PLAN AREA B
ET501 COMMUNICATIONS EQUIPMENT RACK ELEVATION
ET502 ENLARGED ROOM PLANS
ET503 ACCESS CONTROL DETAILS
ET504 ACCESS CONTROL DETAILS
ET505 ACCESS CONTROL SIGNS
ET600 ACCESS POINT SCHEDULE
ET601 SECURITY RISER
ET602 MUFIDS RISER

2.0 DRAWINGS-continued

ET603 VIDEO SURVEILLANCE RISER
ET604 NETWORK RISER
ET605 CATV & DISPLAY RISERS
ET606 COMMUNICATION RISER
P001 PLUMBING SYMBOL LIST, ABBREVIATIONS AND DRAWING LIST
P110 ENLARGED FIRST FLOOR PLUMBING PLAN AREA A
P111 ENLARGED FIRST FLOOR PLUMBING PLAN AREA B
P112 ENLARGED SECOND FLOOR PLUMBING PLAN AREA A
P114 ENLARGED THIRD FLOOR PLUMBING PLAN AREA A
P122 TUG RAMP ROOF PLUMBING PLAN
P210 FIRST FLOOR FOOD SERVICE PLUMBING PLAN
P212 SECOND FLOOR FOOD SERVICE PLUMBING PLAN
P501 PLUMBING SCHEDULES
F001 FIRE PROTECTION SYMBOL LIST, ABBREVIATIONS AND DRAWING INDEX
F110 ENLARGED FIRST FLOOR FIRE PROTECTION PLAN AREA A
F111 ENLARGED FIRST FLOOR FIRE PROTECTION PLAN AREA B
F112 ENLARGED SECOND FLOOR FIRE PROTECTION PLAN AREA A

2.1 DRAWINGS

Replace drawings list sheet G101 included with this Addendum No. 1 for: Volume 1 Civil, Landscaping, Structural; to include Mechanical, Electrical, Plumbing & Fire Protection; and Volume 2 Architectural, Signage to include Mechanical, Electrical, Plumbing & Fire Protection.
Insert the following additional drawings to Volume 2: Architectural, Signage:

FS101 FOOD SERVICE EQUIPMENT PLAN AND SCHEDULE
FS201 FOOD SERVICE EQUIPMENT ELEVATIONS AND SECTIONS
FS202 FOOD SERVICE EQUIPMENT ELEVATIONS AND SECTIONS
FS301 FOOD SERVICE EQUIPMENT SPECIAL CONDITIONS PLAN AND DETAILS
FS401 FOOD SERVICE EQUIPMENT STANDARD DETAILS
FS402 FOOD SERVICE EQUIPMENT STANDARD DETAILS
FS403 FOOD SERVICE EQUIPMENT STANDARD DETAILS

3.0 OTHER:

There will be no "Request for Substitutions" considered until each Bid Division has been awarded.

END OF ADDENDUM NO. 1



REQUEST FOR BID
DATE 2/10/2012
BID # 12-4401

RETURN BY BID OPENING TIME TO:

PURCHASING DIVISION
100 CITY HALL
Duluth, MN 55802
Buyer: Dennis Sears
PHONE: 218-730-5340
FAX: 218-730-5921

NEW PASSENGER TERMINAL BP-2C SITEWORK & APRON CONCESSIONS AND FURNISHINGS

THIS BID FORM INCORPORATES THREE (3) COMBINED FORMS TO INCLUDE:

- NO. 1 - LINE ITEM BID SCHEDULE FOR CIVIL SITEWORK & APRON**
NO. 2 - ITEMIZED BID FORM SECTION 11400 FOOD SERVICE EQUIPMENT
NO. 3 - WORK SCOPE DIVISIONS 1-16

BID OPENING AT 2:00 PM on THURSDAY, MARCH 8, 2012

Note: all bids must be written, signed and transmitted in a sealed envelope, plainly marked with the bid number, subject matter and opening date. The City of Duluth reserves the right to split award where there is a substantial savings to the City, waive informalities and to reject any and all bids. Bidder should state in proposal if bid price is based on acceptance of total order. Sales tax shall be included in the unit price. Bidder to state freight charges if the proposal F.O.B. is shipping point, freight not allowed. Low bid will not be the only consideration for award of bid. Bid Form shall be signed by authorized bidder's representative as indicated on signature lines and addendums need to be acknowledged with this request for bid form.

RETURN BID IN DUPLICATE WITH DUPLICATE DESCRIPTIVE LITERATURE
FOR BID RESULTS, ENCLOSE A SELF-ADDRESSED, STAMPED ENVELOPE WITH BID

BID DEPOSIT REQUIREMENTS: 5% OF BID AMOUNT

Deposit shall mean cash, cashier's check or corporate surety bond payable to or in favor of the City of Duluth.

A PERFORMANCE BOND AND A PAYMENT BOND shall be required of the successful bidder, BOTH in the full amount of the bid.

INSURANCE CERTIFICATE required per attached requirements.

Designated F.O.B. Point: Jobsite

Tax: Federal Excise Tax Exemption
Account No. 41-74-0056 K

Vendor Email Address: _____ FREIGHT CHARGE \$ N/A

NAME: _____ TOTAL BID PRICE # _____

ADDR1: _____ TO INCLUDE ANY ADDITIONAL PAGES.

ADDR2: _____

ADDR3: _____

BY: _____ PAYMENT TERMS \$ _____

(Print) (Title) F.O.B. POINT Duluth Airport

(Signature) (Tele. #) DELIVERY DATE _____

The City of Duluth is an Equal Opportunity Employer.

DULUTH AIRPORT AUTHORITY
DULUTH INTERNATIONAL AIRPORT
NEW PASSENGER TERMINAL
BP-2C SITEWORK APRON
CONCESSIONS AND FURNISHINGS

Bid Docs.xls
FEBRUARY 10, 2012
ISSUE FOR BID
ADDENDUM NO. 1

BID EXTENSION ATTACHMENT

C I T Y O F D U L U T H

DATE: 2/10/2012

BID #: 12-4401

*******SCHEDULE OF PRICES*******

**NEW PASSENGER TERMINAL BP-2C SITEWORK & APRON
CONCESSIONS AND FURNISHINGS**

Make all extensions and total the bid.

This Bid Form will consist of a Line Item Base Bid for the Civil Sitework & Apron including four (4) Add Alternates; plus Multiple Bid Divisions for the Concessions and Furnishings (Building work)

(Civil Sitework & Apron)--Total Base Bid Line Item \$ _____

(Civil Sitework & Apron)--Total Add Alternate No. 1 \$ _____

(Civil Sitework & Apron)--Total Add Alternate No. 2 \$ _____

(Civil Sitework & Apron)--Total Add Alternate No. 3 \$ _____

(Civil Sitework & Apron)--Total Add Alternate No. 4 \$ _____

(Civil Sitework & Apron) Total Base Bid including Add Alternates \$ _____

SEE ATTACHED BID FORM FOR CONCESSIONS AND FURNISHINGS WORK SCOPE DIVISIONS

The basis of award shall be the lowest bid for either the Line Item Total or Line Item Totals with any combination of Add Alternates No 1, 2, 3 and 4. The basis of the award of the contract shall be at the sole discretion of the City of Duluth/Duluth Airport Authority. The award of the individual Additive Alternates is at the sole discretion of the City of Duluth/DAA, based on available Federal Funding. The City of Duluth/DAA reserves the right to award either the Base Bid or the Base Bid and Alternates No. 1, 2, 3 and/or 4. There will be no additional allowance in the Contract Time if the Additive Alternate is awarded.

A Mandatory pre-bid meeting will be held on Thursday, March 1, 2012 at 2:00 p.m. In the Skyline Room, 2nd Floor, Passenger Terminal Building, Duluth International Airport

DULUTH AIRPORT AUTHORITY
DULUTH INTERNATIONAL AIRPORT
NEW PASSENGER TERMINAL
BP-2C SITEWORK APRON
CONCESSIONS AND FURNISHINGS

C I T Y O F D U L U T H

ADDENDUM RECEIPT ACKNOWLEDGEMENTS:

ADDENDUM NO. _____, DATED _____

ADDENDUM NO. _____, DATED _____

ADDENDUM NO. _____, DATED _____

ADDENDUM NO. _____, DATED _____

ADDENDUM NO. _____, DATED _____

ADDENDUM NO. _____, DATED _____

CONTRACTOR NAME:

THE CONTRACTOR AGREES TO ALL OF THE PROVISIONS CONTAINED IN THE CONTRACT DOCUMENTS. ENCLOSED HERewith FIND A CERTIFIED CHECK OR BID BOND IN THE AMOUNT OF AT LEAST 5% OF THE AMOUNT OF PROPOSAL MADE PAYABLE TO THE CITY OF DULUTH AS A PROPOSAL GUARANTEE WHICH IT (see additional page(s))

IS AGREED BY THE UNDERSIGNED WILL BE FORFEITED IN THE EVENT THE FORM OF CONTRACT AND BOND IS NOT EXECUTED, IF AWARDED TO THE UNDERSIGNED.

SIGNED: _____ FOR

A PARTNERSHIP (OR)_____
A CORPORATION INCORPORATED UNDER THE
LAWS OF THE STATE OF:_____
PRESIDENT_____
VICE-PRES._____
SECRETARY_____
TREASURER_____
ADDRESS (ES)

BEING DULY SWORN, DEPOSES AND SAYS THAT THERE ARE NO OTHER PERSONS COMPRISING ABOVE COMPANY OR FIRM THAN THE ABOVE NAMES, AND THAT THERE ARE NO PERSONS OR

C I T Y O F D U L U T H

2/10/2012

12-4401

CORPORATIONS INTERESTED IN THE FORGOING PROPOSALS, EITHER AS PRINCIPAL OR
SUBCONTRACTOR, OTHER THAN THE ABOVE NAMES; ALSO THAT THE PROPOSALS ARE MADE
WITHOUT ANY CONNECTION WITH ANY PERSON OR PERSONS MAKING ANY PROPOSAL FOR THE
ABOVE WORK; THAT THEY ARE IN ALL RESPECTS FAIR AND WITHOUT COLLUSION OR FRAUD;
AND THAT NO PERSON ACTING IN ANY OFFICIAL CAPACITY FOR THE CITY OF DULUTH IS
IRECTLY OR INDIRECTLY INTERESTED THEREIN, OR IN ANY PORTION OF THE PROFIT THEREOF

SUBSCRIBED AND SWORN TO BEFORE ME THIS

DAY OF

A.D.,

NOTARY PUBLIC

IMPORTANT NOTE BIDDERS:

ALL APPLICABLE SALES AND/OR USE TAXES ARE
TO BE INCLUDED IN BID PRICING. ALSO,
ALL BIDS ARE TO BE F.O.B. JOBSITE.

LOCATION: Duluth International Airport					Reynolds, Smith and Hills, Inc.	
PROJECT DESCRIPTION:					Date Prepared: FEBRUARY 10, 2012	
NEW PASSENGER TERMINAL - SITEWORK/APRON					Prepared By: PTF/AMA/RDRE	
					RS&H Project No. 213-1882-091	
BID ITEM	SPEC. NUMBER	ITEM DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT COST	TOTAL COST
1	P-100.3.1	MOBILIZATION	LS	1		
2	P-102.10.1	SAFETY AND SECURITY	LS	1		
3	P-104.5.1	PROJECT SURVEY AND STAKEOUT	LS	1		
4	P-105.5.1	TEMPORARY CONSTRUCTION ITEMS	LS	1		
5	P-106.5.1	PAVEMENT MARKING REMOVAL	SF	1990		
6	P-107.4.1	REMOVE AND DISPOSE COMPOSITE PAVEMENT FULL DEPTH (INCLUDES CONCRETE AND ASPHALT AIRFIELD PVMT)	SY	12964		
7	P-107.4.2	REMOVE AND DISPOSE CONCRETE SIDEWALK	SY	1810		
8	P-107.4.3	REMOVE AND DISPOSE ASPHALT PAVEMENT FULL DEPTH	SY	18213		
9	P-107.4.4	REMOVE CONCRETE CURB AND GUTTER	LF	2300		
10	P-107.4.5	REMOVE STREET SIGN	EACH	75		
11	P-109.5.1	SAWING CONCRETE PAVEMENT (FULL DEPTH)	LF	1000		
12	P-109.5.2	SAWING BITUMINOUS PAVEMENT (FULL DEPTH)	LF	364		
13	P-152.4.1	UNCLASSIFIED EXCAVATION	CY	59571		
14	P-152.4.2	ROCK EXCAVATION	CY	1000		
15	P-152.4.3	UNSUITABLE EXCAVATION AND SAND BACKFILL	CY	1000		
16	P-152.4.5	EXCAVATION FROM HOLDING PONDS	CY	2013		
17	P-152.4.6	CONTAMINATED SOIL DISPOSAL	CY	2013		
18	P-154.6.1	SAND SUBBASE COURSE	CY	32135		
19	P-156.5.1	EROSION CONTROL - INLET PROTECTION ON PAVEMENT	EACH	39		
20	P-156.5.2	EROSION CONTROL - INLET PROTECTION OFF PAVEMENT	EACH	15		
21	P-156.5.3	EROSION CONTROL - SILT FENCE	LF	2400		
22	P-156.5.4	EROSION CONTROL - RIP RAP, CLASS III	SYD	50		
23	P-209.5.1	CRUSHED AGGREGATE BASE COURSE	CY	6424		
24	MNDOT 2104.501	REMOVE WATER MAIN AND VALVES	LF	70		
25	MNDOT 2104.509/0011	REMOVE HYDRANT	EACH	1		
26	MNDOT 2105.521/0003	GRANULAR BORROW MOD 7% (CV)	CY	2400		
27	MNDOT 2105.604	GEOTEXTILE FABRIC TYPE V	SY	40911		
28	MNDOT 2112.604/0001	SUBGRADE PREPARATION	SY	6755		
29	MNDOT 2211.503	CRUSHED AGGREGATE BASE COURSE	CY	1741		
30	2401.515	CONCRETE SIDEWALK (MIX #3A32) W/ 6" x 6" WWF, AS SPECIFIED	SY	730		
31	P-401.8.1	BITUMINOUS BASE COURSE, 1" MAXIMUM AGGREGATE	TON	6751		
32	P-401.8.2	BITUMINOUS SURFACE COURSE, 3/4" MAXIMUM AGGREGATE	TON	1120		
33	P-501.8.1	12" THICK PORTLAND CEMENT CONCRETE PAVEMENT	SY	26225		
34	P-501.8.2	9" THICK PORTLAND CEMENT CONCRETE PAVEMENT	SY	3400		
35	P-501.8.3	BURIED TRANSITION-CONCRETE	SY	475		
36	P-603.5.1	BITUMINOUS TACK COAT	GAL	4400		
37	P-610.5.1	CONCRETE CURB AND GUTTER D424	LF	389		
38	P-610.5.2	CONCRETE CURB AND GUTTER B624	LF	356		
39	P-610.5.3	6 INCH CONCRETE SLAB W/ 6x6 WWF	SY	34		
40	P-620.5.1	PAVEMENT MARKING (YELLOW) WITH REFLECTIVE BEADS INCLUDING SURFACE PREPARATION	SF	3400		
41	P-620.5.2	PAVEMENT MARKING (BLACK) WITHOUT REFLECTIVE BEADS INCLUDING SURFACE PREPARATION	SF	4300		
42	P-620.5.3	PAVEMENT MARKING (WHITE) WITH REFLECTIVE BEADS INCLUDING SURFACE PREPARATION	SF	7972		
43	P-620.5.4	PAINTED PARKING POSITION SIGN WITH REFLECTIVE BEADS	EACH	4		
44	P-620.5.5	HANDICAP SYMBOL PAVEMENT MARKING WITH REFLECTIVE BEADS	EACH	13		
45	P-620.5.6	PAVEMENT MARKING - TURN ARROW	EACH	2		

LOCATION: Duluth International Airport					Reynolds, Smith and Hills, Inc.	
PROJECT DESCRIPTION:					Date Prepared: FEBRUARY 10, 2012	
NEW PASSENGER TERMINAL - SITEWORK/APRON					Prepared By: PTF/AMA/RDRE	
					RS&H Project No. 213-1882-091	
BID ITEM	SPEC. NUMBER	ITEM DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT COST	TOTAL COST
46	D-701.5.1	STORM SEWER PIPE, 12" CL V, C76	LF	26		
47	D-701.5.2	STORM SEWER PIPE, 18" CL V, C76	LF	80		
48	D-701.5.3	STORM SEWER PIPE, 24" CL V, C76	LF	640		
49	D-701.5.4	STORM SEWER PIPE, 30" CL V, C76	LF	255		
50	D-701.5.5	STORM SEWER PIPE, 36" CL V, C76	LF	1355		
51	D-701.5.6	STORM SEWER PIPE, 42" CL V, C77	LF	25		
52	D-701.5.7	STORM SEWER PIPE, 4" SDR35	LF	1600		
53	D-705.5.1	INSTALL 6" UNDERDRAIN WITH FABRIC PIPE WRAP AND POROUS BACKFILL	LF	9070		
54	D-705.5.3	REMOVE SEWER PIPE (STORM), 12" - 18" DIA.	LF	980		
55	D-705.5.4	REMOVE SEWER PIPE (STORM), 19" AND GREATER	LF	405		
56	D-751.7.1	REMOVE MANHOLES OR CATCH BASINS	EACH	17		
57	D-751.7.2	INSTALL NEW MANHOLE/CATCHBASIN, 4' DIA	EACH	5		
58	D-751.7.3	INSTALL NEW MANHOLE/CATCHBASIN, 5' DIA	EACH	4		
59	D-751.7.4	INSTALL NEW MANHOLE/CATCHBASIN, 6' DIA	EACH	9		
60	D-751.7.5	INSTALL NEW MANHOLE/CATCHBASIN, 7' DIA	EACH	2		
61	D-751.7.6	INSTALL NEW 42" DIA. END SECTION	EACH	1		
62	D-751.7.7	RECONSTRUCT MANHOLES OR CATCH BASINS	EACH	10		
63	D-751.7.8	STORM CHAMBER DETENTION SYSTEM	LSUM	1		
64	D-751.7.9	STORM DRAINAGE FRAME AND COVER, AS SPECIFIED	EACH	26		
65	D-751.7.10	WATER QUALITY UNIT	LSUM	1		
66	D-751.7.11	ADJUST EXISTING STORM OR SANITARY MH CASTING	EACH	8		
67	F-162.5.1	REMOVE FENCE	LF	1750		
68	F-162.5.2	REMOVE GATES	EACH	3		
69	F-162.5.3	6' CHAIN LINK FENCE W/ 3 STRANDS BARBED WIRE	LF	1610		
70	F-162.5.4	TEMPORARY FENCE 6' CHAIN LINK FENCE, NO CONCRETE PULL POSTS, NO TOP RAIL, OR BARBED WIRE	LF	800		
71	F-162.5.5	REINFORCED FENCE SECTION	EACH	1		
72	T-901.5.1	HYDROSEEDING AND WOOD FIBER MULCH WITH FERTILIZER	ACRE	6		
73	T-905.5.1	TOPSOILING (FURNISHED FROM OFF THE SITE)	CY	3000		
74	L-105.7.4	REMOVE LIGHT AND FOUNDATION (STREET)	EACH	9		
75	L-105.7.5	REMOVE LIGHT AND FOUNDATION (SIDEWALK)	EACH	17		
76	L-108-5.1	1/C NO. 8 AWG, 5KV, TYPE L-824 CABLE, SERIES LIGHTING CABLE INSTALLED IN DUCTBANK OR CONDUIT	LF	60		
77	L-108-5.2	1/C NO. 6 AWG, BARE COPPER COUNTERPOISE WIRE INSTALLED IN TRENCH, INCLUDING GROUND RODS AND GROUNDING CONNECTORS	LF	20		
78	L-108-5.3	4/C #8 600V THHN CABLE	LF	532		
79	L-108-5.4	2/C #6 600V THHN CABLE	LF	2355		
80	L-108-5.5	1/C #4 EQUIPMENT GROUND	LF	2889		
81	L-110.5.1	1-WAY, 2" SCHEDULE 80 PVC, DIRECT BURIED	LF	656		
82	L-125-5.1	MEDIUM INTENSITY TAXIWAY EDGE LIGHT, L861, 30" HEIGHT, 6.6A, BASE MOUNT, 360 BLUE LENS, LED LAMP	EACH	1		
83	L-125-5.4	TEMPORARY TAXIWAY EDGE LIGHTING	LS	1		
84	NDOT 2401.521/0003	STRUCTURE EXCAVATION CLASS R	CY	300		
85	NDOT 2504.602/0002	INSTALL HYDRANT & VALVE	EACH	1		
86	NDOT 2504.603/1016	6" WATERMAIN DUCTILE IRON CL 53	LF	35		
87	NDOT 2564.537/0001	HANDICAP PARKING SIGN R7-8M	EACH	13		
88	SP 5.3	TYPE 'C' LIGHT WITH FOUNDATION	EACH	3		

LOCATION: Duluth International Airport
PROJECT DESCRIPTION: NEW PASSENGER TERMINAL - SITEWORK/APRON
Reynolds, Smith and Hills, Inc.
Date Prepared: FEBRUARY 10, 2012
Prepared By: PTF/AMA/RDRE
RS&H Project No. 213-1882-091

BID ITEM	SPEC. NUMBER	ITEM DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT COST	TOTAL COST
89	SP 6.3	PROGRAMMABLE CIRCUIT BREAKER, SQUARE D TYPE NF POWERLINK OR APPROVED EQUAL	EACH	2		
90	SP 7.3	ENTRANCE & EXIT GATES W/ DETECTOR LOOPS W/ FOUNDATION	EACH	4		
91	SP 8.3	PROVIDE AND INSTALL PARKING STOPS	EACH	36		
92	SP 9.3	BUILDING DEMOLITION	LS	1		
93	SP 10.3	REMOVE VALVE AND CAP WATER LINE	EACH	1		
94	SP 11.3	BUILDING UTILITY COORDINATION AND DEMOLITION (UTILITY ALLOWANCE)	AL	1		
95	SP 12.4	TRAFFIC CONTROL ALLOWANCE	AL	1		
96	SP 14.3	COMMERCIAL VEHICLE GATE W/ DETECTOR LOOPS, PROXIMITY ACCESS TAGS, AND FOUNDATION	EACH	1		
97	SP 15.9	EXIT PAY STATION	EACH	1		
98	SP 16.3	PRIVATE UTILITY LOCATING SERVICE	LS	1		
				BASE BID TOTAL		
				CIVIL SITEWORK & APRON		\$

ALTERNATIVE #1 -CONSTRUCT EAST APRON & TAXIWAY 'A' WIDENING AND SHOULDERS						
BID ITEM	SPEC. NUMBER	ITEM DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT COST	TOTAL COST
99	P-109.5.2	SAWING BITUMINOUS PAVEMENT (FULL DEPTH)	LF	636		
100	P-107.4.3	REMOVE AND DISPOSE ASPHALT PAVEMENT FULL DEPTH	SY	2151		
101	P-152.4.1	UNCLASSIFIED EXCAVATION	CY	12579		
102	MNDOT 2105.604	GEOTEXTILE FABRIC TYPE V	SY	7186		
103	P-154.6.1	SAND SUBBASE COURSE	CY	9389		
104	P-209.5.1	CRUSHED AGGREGATE BASE COURSE	CY	1597		
105	P-401.8.1	BITUMINOUS BASE COURSE, 1" MAXIMUM AGGREGATE	TON	1413		
106	P-401.8.2	BITUMINOUS SURFACE COURSE, 3/4" MAXIMUM AGGREGATE	TON	312		
107	P-501.8.1	12" THICK PORTLAND CEMENT CONCRETE PAVEMENT	SY	3722		
108	L-105.7.1	REMOVE GUIDANCE SIGN AND FOUNDATION	EACH	1		
109	L-105.7.2	REMOVE ELECTRICAL HANDHOLE	EACH	13		
110	L-105.7.3	REMOVE BASE MOUNTED AIRFIELD EDGE LIGHT	EACH	11		
111	L-108-5.1	1/C NO. 8 AWG, 5KV, TYPE L-824 CABLE, SERIES LIGHTING CABLE INSTALLED IN DUCTBANK OR CONDUIT	LF	740		
112	L-108-5.2	1/C NO. 6, BARE COPPER COUNTERPOISE WIRE INSTALLED IN TRENCH, INCLUDING GROUND RODS AND GROUNDING CONNECTORS	LF	580		
113	L-110.5.1	1-WAY, 2" SCHEDULE 40 PVC, DIRECT BURIED	LF	65		
114	L-110.5.2	1-WAY, 2" SCHEDULE 40 PVC, IN PAVED AREAS	LF	500		
115	L-125-5.1	MEDIUM INTENSITY TAXIWAY EDGE LIGHT, L861, 30" HEIGHT, 6.6A, BASE MOUNT, 360 BLUE LENS, LED LAMP	EACH	9		
116	L-125-5.2	L-858 GUIDANCE SIGN, SIZE 1, STYLE 3, MODE 2, 2 MODULE	EACH	1		
117	L-125-5.3	JUNCTION BOX, L-867, CLASS 1, SIZE B, 24" DEEP, 12" WIDE	EACH	2		
				ALTERNATE NO. 1 TOTAL		
				CONSTRUCT EAST APRON & TAXIWAY A WIDENING AND SHOULDERS		\$

ALTERNATIVE #2 -CONSTRUCT PERIMETER ROAD EXTENSION & SNOW MELT PAVEMENT

LOCATION: Duluth International Airport Reynolds, Smith and Hills, Inc.
PROJECT DESCRIPTION: Date Prepared: FEBRUARY 10, 2012
 NEW PASSENGER TERMINAL - SITEWORK/APRON Prepared By: PTF/AMA/RDRE
 RS&H Project No. 213-1882-091

BID ITEM	SPEC. NUMBER	ITEM DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT COST	TOTAL COST
BID ITEM	SPEC. NUMBER	ITEM DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT COST	TOTAL COST
118	P-107.4.3	REMOVE AND DISPOSE ASPHALT PAVEMENT FULL DEPTH	SY	5456		
119	P-152.4.1	UNCLASSIFIED EXCAVATION	CY	10912		
120	MNDOT 2105.604	GEOTEXTILE FABRIC TYPE V	SY	5456		
121	P-154.6.1	SAND SUBBASE COURSE	CY	6972		
122	P-209.5.1	CRUSHED AGGREGATE BASE COURSE	CY	1212		
123	P-401.8.1	BITUMINOUS BASE COURSE, 1" MAXIMUM AGGREGATE	TON	818		
124	P-401.8.2	BITUMINOUS SURFACE COURSE, 3/4" MAXIMUM AGGREGATE	TON	491		
				ALTERNATE NO. 2 TOTAL		
				CONSTRUCT PERIMETER ROAD		
				EXTENSION & SNOW MELT PAVEMENT		\$

ALTERNATIVE #3 -APRON DEICING CONTAINMENT SYSTEM						
BID ITEM	SPEC. NUMBER	ITEM DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT COST	TOTAL COST
125	S-101.5.1	GEOSYNTHETIC CLAY LINER AND CUSHION LAYER	SY	40900		
126	D-705.5.2	INSTALL 6" UNDERDRAIN WITH FABRIC PIPE WRAP AND POROUS BACKFILL (ALT	LF	1320		
				SUBTOTAL		
				ALTERNATE NO. 3 TOTAL		
				APRON DEICING CONTAINMENT SYSTEM		\$

ALTERNATIVE #4 -CONSTRUCT WEST APRON PAVEMENT						
BID ITEM	SPEC. NUMBER	ITEM DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT COST	TOTAL COST
127	P-107.4.1	REMOVE AND DISPOSE COMPOSITE PAVEMENT FULL DEPTH (INCLUDES CONCRETE AND ASPHALT AIRFIELD PVMT)	SY	26		
128	P-107.4.3	REMOVE AND DISPOSE ASPHALT PAVEMENT FULL DEPTH	SY	1080		
129	P-152.4.1	UNCLASSIFIED EXCAVATION	CY	1938		
130	MNDOT 2105.604	GEOTEXTILE FABRIC TYPE V	SY	1203		
131	P-154.6.1	SAND SUBBASE COURSE	CY	1604		
132	P-209.5.1	CRUSHED AGGREGATE BASE COURSE	CY	267		
133	P-401.8.1	BITUMINOUS BASE COURSE, 1" MAXIMUM AGGREGATE	TON	288		
134	P-501.8.1	12" THICK PORTLAND CEMENT CONCRETE PAVEMENT	SY	1203		
				ALTERNATE NO. 4 TOTAL		
				CONSTRUCT WEST APRON PAVEMENT		\$

ITEM P-153 CONTROLLED LOW-STRENGTH MATERIAL (CLSM)

DESCRIPTION

153.1.1 This item shall consist of furnishing, transporting, and placing a controlled low-strength material (CLSM) as flowable backfill in trenches or at other locations shown on the plans or as directed by the Engineer.

MATERIALS

153-2.1 MATERIALS

a. Portland Cement. Portland cement shall conform to the requirements of ASTM [150] Type [II]. If for any reason, cement becomes partially set or contains lumps of caked cement, it shall be rejected. Cement salvaged from discarded or used bags shall not be used.

b. Flyash. Flyash shall conform to ASTM C 618, Class C or F.

c. Fine Aggregate (Sand). Fine aggregate shall conform to the requirements of ASTM C 33 except for aggregate gradation. Any aggregate gradation which produces performance characteristics of the CLSM specified herein will be accepted, except as follows.

Sieve Size	Percent Passing by weight
3/4 in (19.0 mm)	100
No. 200 (0.075 mm)	0 - 12

d. Water. Water used in mixing shall be free of oil, salt, acid, alkali, sugar, vegetable matter, or other substances injurious to the finished product.

MIX DESIGN

153-3.1 PROPORTIONS. The contractor shall submit, to the Engineer, a mix design including the proportions and source of materials, admixtures, and dry cubic yard (cubic meter) batch weights. The mix shall contain a minimum of 50 pounds of cement and 250 pounds flyash per cubic yard (30 kg of cement and 148 kg of flyash per cubic meter), with the remainder of the volume composed of sand, water, and any approved admixtures.

a. Compressive Strength. CLSM shall be designed to achieve a 28-day compressive strength of 100 to 200 psi (690 to 3,680 kPa) when tested in accordance with ASTM D 4832.. There should be no significant strength gain after 28 days. Test specimens shall be made in accordance with ASTM D 4832.

b. Consistency. Consistency of the fresh mixture shall be such that the mixture may be placed without segregation. A desired consistency may be approximated by filling an open-ended 3 in (75 mm) diameter cylinder, 6 in (150 mm) high to the top, with the mixture and the cylinder immediately pulled straight up. The correct consistency of the mixture will produce an approximate 8 in (205 mm) diameter circular-type spread without segregation. Adjustments of the proportions of materials should be made to

achieve proper solid suspension and flowable characteristics, however the theoretical yield shall be maintained at one cubic yard (cubic meter) for the given batch weights.

CONSTRUCTION METHODS

153-4.1 PLACEMENT.

a. Placement. CLSM may be placed by any reasonable means from a mixing unit into the space to be filled. Agitation is required during transportation and waiting time. Placement shall be performed in such a manner that structures or pipes are not displaced from their desired final position and intrusion of CLSM into undesirable areas is avoided. The material shall be brought up uniformly to the fill line shown on the plans or as directed to the Engineer. Each placement of CLSM shall be as continuous an operation as possible. If CLSM is placed in more than one layer, the base layer shall be free of surface water and loose of foreign material prior to placement of the next layer.

b. Limitations of Placement. CLSM shall not be placed on frozen ground. Mixing and placing may begin when the air or ground temperature is at least 35 °F (2 °C) and rising. At the time of placement, CLSM shall have a temperature of at least 40 °F (4 °C). Mixing and placement shall stop when the air temperature is 40 °F (4 °C) and falling or when the anticipated air or ground temperature will be 35 °F (2 °C) or less in the 24 hour period following proposed placement.

153-4.2 CURING AND PROTECTION

a. Curing. The air in contact with the CLSM should be maintained at temperatures above freezing for a minimum of 72 hours. If the CLSM is subjected to temperatures below 32 °F (0 °C), the material may be rejected by the Engineer if damage to the material is observed.

b. Protection. The CLSM shall not be subject to loads and shall remain undisturbed by construction activities for a period of 48 hours or until a compressive strength of 15 psi (105 kPa) is obtained. The Contractor shall be responsible for providing evidence to the Engineer that the material has reached the desired strength. Acceptable evidence shall be based upon compressive tests made in accordance with paragraph 153-3.1a.

MATERIAL ACCEPTANCE

153-5.1 Acceptance. Acceptance of CLSM delivered and placed as shown on the plans or as directed by the Engineer shall be based upon mix design approval and batch tickets provided by the Contractor to confirm that the delivered material conforms to the mix design. The Contractor shall verify by additional testing, each 5,000 cubic yards (3,825 cubic meters) of material used. Verification shall include confirmation of material proportions and tests of compressive strength to confirm that the material meets the original mix design and the requirements of CLSM as defined in this specification. Adjustments shall be made as necessary to the proportions and materials prior to further production.

METHOD OF MEASUREMENT

153-6.1 Measurement. Controlled low strength material shall be measured by the number of **[cubic yards (cubic meters)]** as computed from the neatline plan and section, adjusted for the quantities for any embedments, and as specified, completed, and accepted..

BASIS OF PAYMENT

153-7.1 Payment. ~~Accepted quantities of controlled low strength material shall be paid for at the contract unit price per [cubic yard (cubic meter)]. Payment shall be full compensation for all materials, equipment, labor, and incidentals required to complete the work as specified.~~ No direct payment shall be made for the work described in this specification. The work described in this specification is incidental to other items and shall be paid for in the respective bid item SP-9 Building Demolition pay item 9.3.

Payment will be made under:

Item P 153-7.1	Controlled Low Strength Material (CLSM) Per Cubic Yard (Cubic Meter)
---------------------------	---

TESTING REQUIREMENTS

ASTM D 4832	Standard Test Method for Preparation and Testing of Controlled Low Strength Material (CLSM) Test Cylinders
-------------	--

MATERIAL REQUIREMENTS

ASTM C 33	Specification for Concrete Aggregates
ASTM C 150	Specification for Portland Cement
ASTM C 618	Specification for Coal Flyash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete
ASTM C 595	Specification for Blended Hydraulic Cements

END OF ITEM P-153

ITEM P-501 PORTLAND CEMENT CONCRETE PAVEMENT

DESCRIPTION

501-1.1 This work shall consist of pavement composed of Portland cement concrete, **[with reinforcement]** ~~[-without reinforcement-]~~ constructed on a prepared underlying surface in accordance with these specifications and shall conform to the lines, grades, thickness, and typical cross sections shown on the plans.

MATERIALS

501-2.1 AGGREGATES.

a. Reactivity. Aggregates shall be tested for deleterious reactivity with alkalis in the cement, which may cause excessive expansion of the concrete. Tests of coarse and fine aggregate shall be made in accordance with ASTM C 1260. If the expansion of the coarse or fine aggregate test specimens, tested in accordance with ASTM C 1260, does not exceed 0.10 % at 16 days from casting, the coarse or fine aggregates shall be accepted.

If the expansion at 16 days is greater than 0.10%, tests of combined materials shall be made in accordance with ASTM C 1260 or ASTM C 1567 using the aggregates, cementitious materials, and/or specific reactivity reducing chemicals in the proportions proposed for the mixture design. If the expansion of the proposed combined materials test specimens, tested in accordance with ASTM C 1260 or ASTM C 1567, does not exceed 0.10 % at [30] days from casting, the proposed combined materials will be accepted. If the expansion of the proposed combined materials test specimens is greater than 0.10% at 30 days, the aggregates will not be accepted unless adjustments to the combined materials mixture can reduce the expansion to less than 0.10 % at 30 days, or new aggregates shall be evaluated and tested.

b. Fine Aggregate. Fine aggregate shall conform to the requirements of ASTM C 33. Gradation shall meet the requirements of Table 1 when tested in accordance with ASTM C 136, except as may otherwise be qualified under Section 6 of ASTM C 33.

**TABLE 1. GRADATION FOR FINE AGGREGATE
(ASTM C 33)**

Sieve Designation (Square Openings)	Percentage by Weight Passing Sieves
3/8 in. (9.5 mm)	100
No. 4 (4.75 mm)	95-100
No. 8 (2.36 mm)	80-100
No. 16 (1.18 mm)	50-85
No. 30 (600 micro-m)	25-60
No. 50 (300 micro-m)	10-30
No. 100 (150 micro-m)	2-10

c. Coarse Aggregate. Coarse aggregate shall conform to the requirements of ASTM C 33. Gradation, within the separated size groups, shall meet the requirements of Table 2 when tested in accordance with ASTM C 136. When the nominal maximum size of the aggregate is greater than 1 inch, the aggregates shall be furnished in two size groups.

Aggregates delivered to the mixer shall consist of crushed stone, crushed or uncrushed gravel, ~~air-cooled blast furnace slag~~, crushed recycled concrete pavement, or a combination thereof. The aggregate shall be composed of clean, hard, uncoated particles and shall meet the requirements for deleterious substances contained in ASTM C 33, Class [4m]. Dust and other coating shall be removed from the aggregates by washing. The aggregate in any size group shall not contain more than 8 percent by weight of flat or elongated pieces when tested in accordance with ASTM D 4791. A flat or elongated particle is one having a ratio between the maximum and the minimum dimensions of a circumscribing rectangular prism exceeding 5 to 1.

The percentage of wear shall be no more than [40] when tested in accordance with ASTM C 131 or ASTM C 535.

GRADATION FOR COARSE AGGREGATE

Sieve Designations (square openings)		Percentage by Weight Passing Sieves					
		From 2" to No. 4 (50.8 mm - 4.75 mm)		From 1-1/2" to No. 4 (38.1 mm - 4.75 mm)		From 1" to No. 4 (25.0 mm-4.75 mm)	
		#3 2"-1"	#57 1"-No.4	#4 1-1/2"-3/4"	#67 3/4"-No.4	#57 1"-No.4	
2-1/2	63	100	---	---	---	---	
2	50.8	90-100	---	100	---	---	
1-1/2	38.1	35-70	100	90-100	---	100	
1	25.0	0-15	95-100	20-55	100	95-100	
3/4	19.0	---	---	0-15	90-100	---	
1/2	12.5	0-5	25-60	---	---	25-60	
3/8	9.5	---	---	0-5	20-55	---	
No. 4	4.75	---	0-10	---	0-10	0-10	
No. 8	2.36	---	0-5	---	0-5	0-5	

**TABLE 2. GRADATION FOR COARSE AGGREGATE
ASTM C 33**

Sieve Designations (square openings)		Percentage by Weight Passing Sieves	
		From 1 1/2" to No. 4 (38.1 mm - 4.75 mm)	
		#4 1 1/2" - 3/4"	#67 3/4" - No. 4
2-1/2	63	--	--
2	50.8	100	--
1-1/2	38.1	90-100	--
1	25.0	20-55	100
3/4	19.0	0-15	90-100
1/2 1/2	12.5	--	--
3/8	9.5	0.5	20-55
No. 4	4.75	--	0-10
No. 8	2.36	--	0-5

Aggregate susceptibility to Disintegration (D) Cracking. Aggregates that have a history of D-cracking shall not be used. Prior to approval of mixture design and production of Portland cement concrete the Contractor shall submit written certification that the aggregate does not have a history of D-Cracking and that the aggregate meets the specified State requirements.

(1) Other sources of crushed stone aggregate shall be approved if the durability factor as determined by ASTM C 666 is greater than or equal to 95 and all other quality test requirements within these specifications are fulfilled. The FAA will consider and reserves final approval of other State classification procedures.

(2) Crushed gravel and sand-gravel aggregates shall not be required to meet freeze-thaw durability ratings. These aggregates shall be approved for use in concrete by the state highway agency in the state from which the aggregate originates and the state in which they are to be used and shall meet all other criteria within these specifications.

501-2.2 CEMENT. Cement shall conform to the requirements of ASTM [**C150**] Type [**I**].

If for any reason, cement becomes partially set or contains lumps of caked cement, it shall be rejected. Cement salvaged from discarded or used bags shall not be used.

Only cements containing less than 0.6% equivalent alkali or cements that can demonstrate a positive reduction in the expansion created by alkali-silica reactions shall be used.

501-2.3 CEMENTITIOUS MATERIALS.

a. Fly Ash or Natural Pozzolan. Fly ash shall meet the requirements of ASTM C 618, Class C, F, or N with the exception of loss of ignition, where the maximum shall be less than 6 percent for Class F or N. [**The supplementary optional chemical and physical properties of Table 3 contained in ASTM C 618 shall apply.**] Fly ash such as is produced in furnace operations utilizing liming materials or soda ash (sodium carbonate) as an additive shall not be acceptable. The Contractor shall furnish vendor's certified test reports for each shipment of Fly Ash used in the project. The vendor's certified test report can be used for acceptance or the material may be tested independently by the Engineer.

b. Blast Furnace Slag (Slag Cement). Ground Granulated Blast Furnace (GGBF) slag shall conform to ASTM C 989, Grade 100 or 120. GGBF shall be used only at a rate between 25 and 55 percent of the total cementitious material by mass.

501-2.4 PREMOLDED JOINT FILLER. Premolded joint filler for expansion joints shall conform to the requirements of [**ASTM D 1751**] [~~**ASTM D 1752, Type II or III**~~] and shall be punched to admit the dowels where called for on the plans. The filler for each joint shall be furnished in a single piece for the full depth and width required for the joint, unless otherwise specified by the Engineer. When the use of more than one piece is required for a joint, the abutting ends shall be fastened securely and held accurately to shape by stapling or other positive fastening means satisfactory to the Engineer.

501-2.5 JOINT SEALER. The joint sealer for the joints in the concrete pavement shall meet the requirements of Item P-605 and shall be of the type(s) specified in the plans.

The following sealant products or approved equal are known to be acceptable.

<u>Product Name</u>	<u>Manufacturer</u>	<u>Location</u>
Dow Corning 888 (Concrete to Concrete)	Dow Corning Corp.	Midland, MI 48647
Dow Corning 890-SL (Concrete to Asphalt)	Dow Corning Corp.	Midland, MI 48647

Superseal 888	Superior Products Co.	Sparks, NV 89431
SCS-4404N Sealant	General Electric Co.	Waterford, NY 12188
Roadsaver 222	Crafco, Inc.	Chandler, AZ 85226
EpoxySystems 911	Epoxy Systems, Inc.	Orlando, FL 34431

501-2.6 STEEL REINFORCEMENT. Reinforcing shall consist of **[Welded Wire Steel Fabric]** conforming to the requirements of ASTM **[A185]**. If deformed bars are utilized in lieu of the welded wire fabric, the deformed bars shall conform to ASTM A615 Grade 60, and be epoxy coated as specified and detailed on the plans.

501-2.7 DOWEL AND TIE BARS. Tie bars shall be deformed steel bars and conform to the requirements of ASTM A 615 or ASTM A 996, except that rail steel bars, Grade 50 or 60, shall not be used for tie bars that are to be bent or restraightened during construction. Tie bars designated as Grade 40 in ASTM A 615 can be used for construction requiring bent bars.

Dowel bars shall be plain steel bars conforming to ASTM A 615 or ASTM A 966 and shall be free from burring or other deformation restricting slippage in the concrete. High strength dowel bars shall conform to ASTM A 714, Class 2, Type S, Grade I, II or III, Bare Finish. Before delivery to the construction site each dowel bar shall be painted with one coat of paint conforming to MIL-DTL-24441/20A. SSPC Paint 5 or SSPC Paint 25. Metal or plastic collars shall be full circular device supporting the dowel until the epoxy hardens.

The sleeves for dowel bars used in expansion joints shall be metal or other type of an approved design to cover 2 to 3-inches (50 mm to 75 mm) of the dowel, with a closed end and with a suitable stop to hold the end of the bar at least 1-inch (25 mm) from the closed end of the sleeve. Sleeves shall be of such design that they will not collapse during construction.

501-2.8 WATER. Water used in mixing or curing shall be clean and free of oil, salt, acid, alkali, sugar, vegetable, or other substances injurious to the finished product. Water will be tested in accordance with the requirements of AASHTO T 26. Water known to be of potable quality may be used without testing.

501-2.9 COVER MATERIAL FOR CURING. Curing materials shall conform to one of the following specifications:

- a. Liquid membrane-forming compounds for curing concrete shall conform to the requirements of ASTM C 309, Type 2, Class B, or Class A if wax base only.
- b. White polyethylene film for curing concrete shall conform to the requirements of ASTM C 171.
- c. White burlap-polyethylene sheeting for curing concrete shall conform to the requirements of ASTM C 171.
- d. Waterproof paper for curing concrete shall conform to the requirements of ASTM C 171.

501-2.10 ADMIXTURES. The use of any material added to the concrete mix shall be approved by the Engineer. The Contractor shall submit certificates indicating that the material to be furnished meets all of the requirements indicated below. In addition, the Engineer may require the Contractor to submit complete test data from an approved laboratory showing that the material to be furnished meets all of the requirements of the cited specifications. Subsequent tests may be made of samples taken by the Engineer from the supply of the material being furnished or proposed for use on the work to determine whether the admixture is uniform in quality with that approved.

a. Air-Entraining Admixtures. Air-entraining admixtures shall meet the requirements of ASTM C 260 and shall consistently entrain the air content in the specified ranges under field conditions. The air-entrainment agent and any water reducer admixture shall be compatible.

b. Chemical Admixtures. Water-reducing, set retarding, and set-accelerating admixtures shall meet the requirements of ASTM C 494, including the flexural strength test.

501-2.11 EPOXY-RESIN. Epoxy-resin used to anchor dowels and tie bars in pavements shall conform to the requirements of ASTM C 881, Type I, Grade 3, Class C. Class A or B shall be used when the surface temperature of the hardened concrete is below 60 degrees F (16 degrees C).

501-2.12 MATERIAL ACCEPTANCE. Prior to use of materials, the Contractor shall submit certified test reports to the Engineer for those materials proposed for use during construction. The certification shall show the appropriate ASTM test(s) for each material, the test results, and a statement that the material passed or failed.

The Engineer may request samples for testing, prior to and during production, to verify the quality of the materials and to ensure conformance with the applicable specifications.

MIX DESIGN

501-3.1 PROPORTIONS. Concrete shall be designed to achieve a 28-day flexural strength that meets or exceeds the acceptance criteria contained in paragraph 501-5.2 for a flexural strength of [650] psi. The mix shall be designed using the procedures contained in Chapter 9 of the Portland Cement Association's manual, "Design and Control of Concrete Mixtures".

The Contractor shall note that to ensure that the concrete actually produced will meet or exceed the acceptance criteria for the specified strength, the mix design average strength must be higher than the specified strength. The amount of overdesign necessary to meet specification requirements depends on the producer's standard deviation of flexural test results and the accuracy that that value can be estimated from historic data for the same or similar materials.

The minimum cementitious material (cement plus fly ash, or GGBFS) shall be [564] pounds per cubic yard (~~11 kg per cubic meter~~). The ratio of water to cementitious material, including free surface moisture on the aggregates but not including moisture absorbed by the aggregates shall not be more than [0.4] by weight.

Prior to the start of paving operations and after approval of all material to be used in the concrete, the Contractor shall submit a mix design showing the proportions and flexural strength obtained from the concrete at 7 and 28 days. The mix design shall include copies of test reports, including test dates, and a complete list of materials including type, brand, source, and amount of cement, fly ash, ground slag, coarse aggregate, fine aggregate, water, and admixtures. The fineness modulus of the fine aggregate and the air content shall also be shown. The mix design shall be submitted to the Engineer at least [14] days prior to the start of operations. The submitted mix design shall not be more than 90 days old. Production shall not begin until the mix design is approved in writing by the Engineer.

Should a change in sources be made, or admixtures added or deleted from the mix, a new mix design must be submitted to the Engineer for approval. Previously approved mix designs for airfield paving older than 90 days shall not be used without reapproval.

Flexural strength test specimens shall be prepared in accordance with ASTM C 192 and tested in accordance with ASTM C 78. The mix determined shall be workable concrete having a slump (taken at

the site of placement) for side-form concrete between 1 and 2-inches (25 mm and 50 mm) as determined by ASTM C 143. For vibrated slip-form concrete, the slump shall be between 1/2 inch (13 mm) and 1 1/2-inches (38 mm).

501-3.2 CEMENTITIOUS MATERIALS.

a. Fly Ash. Fly ash may be used in the mix design. When fly ash is used as a partial replacement for cement, the minimum cement content may be met by considering Portland cement plus fly ash as the total cementitious material. The replacement rate shall be determined from laboratory trial mixes, but shall be between 20 and 30 percent by weight of the total cementitious material. If fly ash is used in conjunction with ground granular blast furnace slag the maximum replacement rate shall not exceed 10 percent by weight of total cementitious material.

~~**b. Ground Slag.** Ground blast furnace slag may be used in a mix design containing Type I or Type II cement. The slag, or slag plus fly ash if both are used, may constitute between 25 to 55 percent of the total cementitious material by weight. If the concrete is to be used for slipforming operations and the air temperature is expected to be lower than 55 degrees F (13 degrees C) the percent slag shall not exceed 30 percent by weight.~~

501-3.3 ADMIXTURES.

a. Air-Entraining. Air-entraining admixture shall be added in such a manner that will insure uniform distribution of the agent throughout the batch. The air content of freshly mix air-entrained concrete shall be based upon trial mixes with the materials to be used in the work adjusted to produce concrete of the required plasticity and workability. The percentage of air in the mix shall be **[5.5]**. Air content shall be determined by testing in accordance with ASTM C 231 for gravel and stone coarse aggregate and ASTM C 173 for slag and other highly porous coarse aggregate.

b. Chemical. Water-reducing, set-controlling, and other approved admixtures shall be added to the mix in the manner recommended by the manufacturer and in the amount necessary to comply with the specification requirements. Tests shall be conducted on trial mixes, with the materials to be used in the work, in accordance with ASTM C 494.

501-3.4 TESTING LABORATORY. The laboratory used to develop the mix design shall meet the requirements of ASTM C 1077. The laboratory accreditation will include ASTM C 78. A certification that it meets these requirements shall be submitted to the Engineer prior to the start of mix design. The certification shall include evidence that the laboratory is inspected/accredited for the test methods required herein by a nationally recognized laboratory inspection accreditation organization and shall contain as a minimum:

a. Qualifications of personnel; laboratory manager, supervising technician, and testing technicians.

b. A statement that the equipment used in developing the mix design is in calibration.

c. A statement that each test specified in developing the mix design is offered in the scope of the laboratory's services.

d. A copy of the laboratory's quality control system.

CONSTRUCTION METHODS

501-4.1 EQUIPMENT. Equipment necessary for handling materials and performing all parts of the work shall be approved by the engineer as to design, capacity, and mechanical conditions. The equipment shall be at the jobsite sufficiently ahead of the start of paving operations to be examined thoroughly and approved.

a. Batch Plant and Equipment. The batch plant and equipment shall conform to the requirements of ASTM C 94.

b. Mixers and Transportation Equipment.

(1) General. Concrete may be mixed at a central plant, or wholly or in part in truck mixers. Each mixer shall have attached in a prominent place a manufacturer's nameplate showing the capacity of the drum in terms of volume of mixed concrete and the speed of rotation of the mixing drum or blades.

a. Qualifications of personnel; laboratory manager, supervising technician, and testing technicians.

b. A statement that the equipment used in developing the mix design is in calibration.

c. A statement that each test specified in developing the mix design is offered in the scope of the laboratory's services.

d. A copy of the laboratory's quality control system.

(2) Central plant mixer. Central plant mixers shall conform to the requirements of ASTM C 94.

The mixer shall be examined daily for changes in condition due to accumulation of hard concrete or mortar or wear of blades. The pickup and throwover blades shall be replaced when they have worn down 3/4-inch (19 mm) or more. The Contractor shall have a copy of the manufacturer's design on hand showing dimensions and arrangement of blades in reference to original height and depth.

(3) Truck mixers and truck agitators. Truck mixers used for mixing and hauling concrete and truck agitators used for hauling central-mixed concrete shall conform to the requirements of ASTM C 94.

(4) Nonagitator trucks. Nonagitator hauling equipment shall conform to the requirements of ASTM C 94.

c. Finishing Equipment. The standard method of constructing concrete pavements on FAA projects shall be with an approved slip-form paving equipment designed to spread, consolidate, screed, and float-finish the freshly placed concrete in one complete pass of the machine so a dense and homogeneous pavement is achieved with a minimum of hand finishing. The paver-finisher shall be a heavy duty, self-propelled machine designed specifically for paving and finishing high quality concrete pavements. It shall weigh at least 2200 lbs. per foot of paving lane width and powered by an engine having at least 6.0 horsepower per foot of lane width.

On projects requiring less than 500 square yards of cement concrete pavement or requiring individual placement areas of less than 500 square yards, or irregular areas at locations inaccessible to slip-form paving equipment, cement concrete pavement may be placed with approved placement and finishing

equipment utilizing stationary side forms. Hand screeding and float finishing may only be utilized on small irregular areas as allowed by the Engineer.

d. Vibrators. Vibrator shall be the internal type. Operating frequency for internal vibrators shall be between 8,000 and 12,000 vibrations per minute. Average amplitude for internal vibrators shall be 0.025-0.05-inches (0.06-0.13 cm).

The number, spacing, and frequency shall be as necessary to provide a dense and homogeneous pavement and meet the recommendations of ACI 309, Guide for Consolidation of Concrete. Adequate power to operate all vibrators shall be available on the paver. The vibrators shall be automatically controlled so that they shall be stopped as forward motion ceases. The contractor shall provide an electronic or mechanical means to monitor vibrator status. The checks on vibrator status shall occur a minimum of two times per day or when requested by the Engineer.

Hand held vibrators may be used in irregular areas only, but shall meet the recommendations of ACI 309, Guide for Consolidation of Concrete.

e. Concrete Saws. The Contractor shall provide sawing equipment adequate in number of units and power to complete the sawing to the required dimensions. The Contractor shall provide at least one standby saw in good working order and a supply of saw blades at the site of the work at all times during sawing operations.

f. Side Forms. Straight side forms shall be made of steel and shall be furnished in sections not less than 10-feet (3 m) in length. Forms shall have a depth equal to the pavement thickness at the edge, and a base width equal to or greater than the depth. Flexible or curved forms of proper radius shall be used for curves of 100-foot (31 m) radius or less. Forms shall be provided with adequate devices for secure settings so that when in place they will withstand, without visible spring or settlement, the impact and vibration of the consolidating and finishing equipment. Forms with battered top surfaces and bent, twisted or broken forms shall not be used. Built-up forms shall not be used, except as approved by the Engineer. The top face of the form shall not vary from a true plane more than 1/8-inch (3 mm) in 10-feet (3 m), and the upstanding leg shall not vary more than 1/4-inch (6 mm). The forms shall contain provisions for locking the ends of abutting sections together tightly for secure setting. Wood forms may be used under special conditions, when approved by the Engineer.

g. Pavers. The paver shall be fully energized, self-propelled, and designed for the specific purpose of placing, consolidating, and finishing the concrete pavement, true to grade, tolerances, and cross section. It shall be of sufficient weight and power to construct the maximum specified concrete paving lane width as shown in the plans, at adequate forward speed, without transverse, longitudinal or vertical instability or without displacement. The paver shall be equipped with electronic or hydraulic horizontal and vertical control devices.

501-4.2 FORM SETTING. Forms shall be set sufficiently in advance of the concrete placement to insure continuous paving operation. After the forms have been set to correct grade, the underlying surface shall be thoroughly tamped, either mechanically or by hand, at both the inside and outside edges of the base of the forms. Forms shall be staked into place sufficiently to maintain the form in position for the method of placement.

Form sections shall be tightly locked and shall be free from play or movement in any direction. The forms shall not deviate from true line by more than 1/8 inch (3 mm) at any joint. Forms shall be so set that they will withstand, without visible spring or settlement, the impact and vibration of the consolidating and finishing equipment. Forms shall be cleaned and oiled prior to the placing of concrete.

The alignment and grade elevations of the forms shall be checked and corrections made by the Contractor immediately before placing the concrete.

501-4.3 CONDITIONING OF UNDERLYING SURFACE. The compacted underlying surface on which the pavement will be placed shall be widened approximately 3-feet (1 m) to extend beyond the paving machine track to support the paver without any noticeable displacement. After the underlying surface has been placed and compacted to the required density, the areas that will support the paving machine and the area to be paved shall be trimmed or graded to the plan grade elevation and profile by means of a properly designed machine. The grade of the underlying surface shall be controlled by a positive grade control system using lasers, stringlines, or guide wires. If the density of the underlying surface is disturbed by the trimming operations, it shall be corrected by additional compaction and retested at the option of the Engineer before the concrete is placed except when stabilized subbases are being constructed. If damage occurs on a stabilized subbase, it shall be corrected full depth by the Contractor. If traffic is allowed to use the prepared grade, the grade shall be checked and corrected immediately before the placement of concrete. The prepared grade shall be moistened with water, without saturating, immediately ahead of concrete placement to prevent rapid loss of moisture from concrete. The underlying surface shall be protected so that it will be entirely free of frost when concrete is placed.

501-4.4 CONDITIONING OF UNDERLYING SURFACE, SIDE-FORM AND FILL-IN LANE CONSTRUCTION. The prepared underlying surface shall be moistened with water, without saturating, immediately ahead of concrete placement to prevent rapid loss of moisture from the concrete. Damage caused by hauling or usage of other equipment shall be corrected and retested at the option of the Engineers. If damage occurs to a stabilized subbase, it shall be corrected full depth by the Contractor. A template shall be provided and operated on the forms immediately in advance of the placing of all concrete. The template shall be propelled only by hand and not attached to a tractor or other power unit. Templates shall be adjustable so that they may be set and maintained at the correct contour of the underlying surface. The adjustment and operation of the templates shall be such as will provide an accurate retest of the grade before placing the concrete thereon. All excess material shall be removed and wasted. Low areas shall be filled and compacted to a condition similar to that of the surrounding grade. The underlying surface shall be protected so that it will be entirely free from frost when the concrete is placed. The use of chemicals to eliminate frost in the underlying surface shall not be permitted.

The template shall be maintained in accurate adjustment, at all times by the Contractor, and shall be checked daily.

501-4.5 HANDLING, MEASURING, AND BATCHING MATERIAL. The batch plant site, layout, equipment, and provisions for transporting material shall assure a continuous supply of material to the work. Stockpiles shall be constructed in such a manner that prevents segregation and intermixing of deleterious materials.

Aggregates that have become segregated or mixed with earth or foreign material shall not be used. All aggregates produced or handled by hydraulic methods, and washed aggregates, shall be stockpiled or binned for draining at least 12 hours before being batched. Rail shipments requiring more than 12 hours will be accepted as adequate binning only if the car bodies permit free drainage.

Batching plants shall be equipped to proportion aggregates and bulk cement, by weight, automatically using interlocked proportioning devices of an approved type. When bulk cement is used, the Contractor shall use a suitable method of handling the cement from weighing hopper to transporting container or into the batch itself for transportation to the mixer, such as a chute, boot, or other approved device, to prevent loss of cement. The device shall be arranged to provide positive assurance that the cement content specified is present in each batch.

501-4.6 MIXING CONCRETE. The concrete may be mixed at the work site, in a central mix plant or in truck mixers. The mixer shall be of an approved type and capacity. Mixing time shall be measured from the time all materials, except water, are emptied into the drum. All concrete shall be mixed and delivered to the site in accordance with the requirements of ASTM C 94.

Mixed concrete from the central mixing plant shall be transported in truck mixers, truck agitators, or nonagitating trucks. The elapsed time from the addition of cementitious material to the mix until the concrete is deposited in place at the work site shall not exceed 30 minutes when the concrete is hauled in nonagitating trucks, nor 90 minutes when the concrete is hauled in truck mixers or truck agitators. Retempering concrete by adding water or by other means will not be permitted. With transit mixers additional water may be added to the batch materials and additional mixing performed to increase the slump to meet the specified requirements provided the addition of water is performed within 45 minutes after the initial mixing operations and provided the water/cementitious ratio specified in the approved mix design is not exceeded, and approved by the Engineer.

501-4.7 LIMITATIONS ON MIXING AND PLACING. No concrete shall be mixed, placed, or finished when the natural light is insufficient, unless an adequate and approved artificial lighting system is operated.

a. Cold Weather. Unless authorized in writing by the Engineer, mixing and concreting operations shall be discontinued when a descending air temperature in the shade and away from artificial heat reaches 40 degrees F (4 degrees C) and shall not be resumed until an ascending air temperature in the shade and away from artificial heat reaches 35 degrees F (2 degrees C).

The aggregate shall be free of ice, snow, and frozen lumps before entering the mixer. The temperature of the mixed concrete shall not be less than 50 degrees F (10 degrees C) at the time of placement. Concrete shall not be placed on frozen material nor shall frozen aggregates be used in the concrete.

When concreting is authorized during cold weather, water and/or the aggregates may be heated to not more than 150 degrees F (66 degrees C). The apparatus used shall heat the mass uniformly and shall be arranged to preclude the possible occurrence of overheated areas which might be detrimental to the materials.

b. Hot Weather. During periods of hot weather when the maximum daily air temperature exceeds 85 degrees F (30 degrees C), the following precautions shall be taken.

The forms and/or the underlying surface shall be sprinkled with water immediately before placing the concrete. The concrete shall be placed at the coolest temperature practicable, and in no case shall the temperature of the concrete when placed exceed 90 degrees F (35 degrees C). The aggregates and/or mixing water shall be cooled as necessary to maintain the concrete temperature at or not more than the specified maximum.

The finished surfaces of the newly laid pavement shall be kept damp by applying a water-fog or mist with approved spraying equipment until the pavement is covered by the curing medium. If necessary, wind screens shall be provided to protect the concrete from an evaporation rate in excess of 0.2 psf per hour as determined in accordance with Figure 2.1.5 in ACI 305R, Hot Weather Concreting, which takes into consideration relative humidity, wind velocity, and air temperature.

When conditions are such that problems with plastic cracking can be expected, and particularly if any plastic cracking begins to occur, the Contractor shall immediately take such additional measures as necessary to protect the concrete surface. Such measures shall consist of wind screens, more effective

fog sprays, and similar measures commencing immediately behind the paver. If these measures are not effective in preventing plastic cracking, paving operations shall be immediately stopped.

c. Temperature Management Program. Prior to the start of paving operation for each day of paving, the contractor shall provide the engineer with a Temperature Management Program for the concrete to be placed to assure that uncontrolled cracking is avoided. As a minimum the program shall address the following items:

(1) Anticipated tensile strains in the fresh concrete as related to heating and cooling of the concrete material.

(2) Anticipated weather conditions such as ambient temperatures, wind velocity, and relative humidity.

(3) Anticipated timing of initial sawing of joint.

501-4.8 PLACING CONCRETE. The Contractor has the option of placing the concrete with either side (fixed) forms or slip-forms. At any point in concrete conveyance, the free vertical drop of the concrete from one point to another or to the underlying surface shall not exceed 3-feet (1 m). Backhoes and Grading equipment shall not be used to distribute the concrete in front of the paver. Front end loaders will not be used unless the contractor demonstrates that they can be used without contaminating the concrete and base course and it is approved by the Engineer.

Hauling equipment or other mechanical equipment can be permitted on adjoining previously constructed pavement when the concrete strength reaches [**a flexural strength of 550 psi (3-792 kPa) [a compressive strength of 3,500 psi]**], based on the average of four field cured specimens per 2,000 cubic yards (1 530 cubic meters) of concrete placed. Also, subgrade and subbase planers, concrete pavers, and concrete finishing equipment may be permitted to ride upon the edges of previously constructed pavement when the concrete has attained a minimum flexural strength of 400 psi.

a. Slip-Form Construction. The concrete shall be distributed uniformly into final position by a self propelled slip-form paver without delay. The alignment and elevation of the paver shall be regulated from outside reference lines established for this purpose. The paver shall vibrate the concrete for the full width and depth of the strip of pavement being placed and the vibration shall be adequate to provide a consistency of concrete that will stand normal to the surface with sharp well defined edges. The sliding forms shall be rigidly held together laterally to prevent spreading of the forms.

The plastic concrete shall be effectively consolidated by internal vibration with transverse vibrating units for the full width of the pavement and/or a series of equally placed longitudinal vibrating units. The space from the outer edge of the pavement to longitudinal unit shall not exceed 9-inches (23 cm). The spacing of internal units shall be uniform and shall not exceed 18-inches (46 cm).

The term internal vibration means vibrating units located within the specified thickness of pavement section.

The rate of vibration of each vibrating unit shall be within 8000 to 12000 cycles per minute and the amplitude of vibration shall be sufficient to be perceptible on the surface of the concrete along the entire length of the vibrating unit and for a distance of at least one foot. The frequency of vibration or amplitude shall vary proportionately with the rate of travel to result in a uniform density and air content. The paving machine shall be equipped with a tachometer or other suitable device for measuring and indicating the actual frequency of vibrations.

The concrete shall be held at a uniform consistency. The slip-form paver shall be operated with as nearly a continuous forward movement as possible. And all operations of mixing, delivering, and spreading concrete shall be coordinated to provide uniform progress with stopping and starting of the paver held to a minimum. If for any reason, it is necessary to stop the forward movement of the paver, the vibratory and tamping elements shall also be stopped immediately. No tractive force shall be applied to the machine, except that which is controlled from the machine.

When concrete is being placed adjacent to an existing pavement, that part of the equipment which is supported on the existing pavement shall be equipped with protective pads on crawler tracks or rubber-tired wheels on which the bearing surface is offset to run a sufficient distance from the edge of the pavement to avoid breaking the pavement edge.

b. Side-Form Construction. Side form sections shall be straight, free from warps, bends, indentations, or other defects. Defective forms shall be removed from the work. Metal side forms shall be used except at end closures and transverse construction joints where straight forms of other suitable material may be used.

Side forms may be built up by rigidly attaching a section to either top or bottom of forms. If such build-up is attached to the top of metal forms, the build-up shall also be metal.

Width of the base of all forms shall be equal to at least 80 percent of the specified pavement thickness.

Side forms shall be of sufficient rigidity, both in the form and in the interlocking connection with adjoining forms, that springing will not occur under the weight of subgrading and paving equipment or from the pressure of the concrete. The Contractor shall provide sufficient forms so that there will be no delay in placing concrete due to lack of forms.

Before placing side forms, the underlying material shall be at the proper grade. Side forms shall have full bearing upon the foundation throughout their length and width of base and shall be placed to the required grade and alignment of the finished pavement. They shall be firmly supported during the entire operation of placing, compacting, and finishing the pavement.

Forms shall be drilled in advance of being placed to line and grade to accommodate tie bars where these are specified.

Immediately in advance of placing concrete and after all subbase operations are completed, side forms shall be trued and maintained to the required line and grade for a distance sufficient to prevent delay in placing.

Side forms shall remain in place at least 12 hours after the concrete has been placed, and in all cases until the edge of the pavement no longer requires the protection of the forms. Curing compound shall be applied to the concrete immediately after the forms have been removed.

Side forms shall be thoroughly cleaned and oiled each time they are used and before concrete is placed against them.

Concrete shall be spread, screeded, shaped and consolidated by one or more self-propelled machines. These machines shall uniformly distribute and consolidate concrete without segregation so that the completed pavement will conform to the required cross section with a minimum of handwork.

The number and capacity of machines furnished shall be adequate to perform the work required at a rate equal to that of concrete delivery.

Concrete for the full paving width shall be effectively consolidated by internal vibrators without causing segregation. Internal type vibrators' rate of vibration shall be not less than 7,000 cycles per minute. Amplitude of vibration shall be sufficient to be perceptible on the surface of the concrete more than one foot from the vibrating element. The Contractor shall furnish a tachometer or other suitable device for measuring and indicating frequency of vibration.

Power to vibrators shall be connected so that vibration ceases when forward or backward motion of the machine is stopped.

The provisions relating to the frequency and amplitude of internal vibration shall be considered the minimum requirements and are intended to ensure adequate density in the hardened concrete.

c. Consolidation Testing. The provisions relating to the frequency and amplitude of internal vibration shall be considered the minimum requirements and are intended to ensure adequate density in the hardened concrete. If a lack of consolidation of the concrete is suspected by the Engineer, additional referee testing may be required. Referee testing of hardened concrete will be performed by cutting cores from the finished pavement after a minimum of 24 hours curing. Density determinations will be made based on the water content of the core as taken. ASTM C 642 shall be used for the determination of core density in the saturated-surface dry condition. Referee cores will be taken at the minimum rate of one for each 500 cubic yards of pavement, or fraction thereof.

The average density of the cores shall be at least 97 percent of the original mix design density, with no cores having a density of less than 96 percent of the original mix design density.

Failure to meet the above requirements will be considered as evidence that the minimum requirements for vibration are inadequate for the job conditions, and additional vibrating units or other means of increasing the effect of vibration shall be employed so that the density of the hardened concrete as indicated by further referee testing shall conform to the above listed requirements.

501-4.9 STRIKE-OFF OF CONCRETE AND PLACEMENT OF REINFORCEMENT. Following the placing of the concrete, it shall be struck off to conform to the cross section shown on the plans and to an elevation such that when the concrete is properly consolidated and finished, the surface of the pavement shall be at the elevation shown on the plans. When reinforced concrete pavement is placed in two layers, the bottom layer shall be struck off to such length and depth that the sheet of reinforcing steel fabric or bar mat may be laid full length on the concrete in its final position without further manipulation. The reinforcement shall then be placed directly upon the concrete, after which the top layer of the concrete shall be placed, struck off, and screeded. If any portion of the bottom layer of concrete has been placed more than 30 minutes without being covered with the top layer or if initial set has taken place, it shall be removed and replaced with freshly mixed concrete at the Contractor's expense. When reinforced concrete is placed in one layer, the reinforcement may be positioned in advance of concrete placement or it may be placed in plastic concrete by mechanical or vibratory means after spreading.

Reinforcing steel, at the time concrete is placed, shall be free of mud, oil, or other organic matter that may adversely affect or reduce bond. Reinforcing steel with rust, mill scale or a combination of both will be considered satisfactory, provided the minimum dimensions, weight, and tensile properties of a hand wire-brushed test specimen are not less than the applicable ASTM specification requirements.

501-4.10 JOINTS. Joints shall be constructed as shown on the plans and in accordance with these requirements. All joints shall be constructed with their faces perpendicular to the surface of the pavement and finished or edged as shown on the plans. Joints shall not vary more than 1/2-inch (13 mm) from their designated position and shall be true to line with not more than 1/4-inch (6 mm) variation

in 10-feet (3 m). The surface across the joints shall be tested with a 10-foot (3 m) straightedge as the joints are finished and any irregularities in excess of 1/4-inch (6 mm) shall be corrected before the concrete has hardened. All joints shall be so prepared, finished, or cut to provide a groove of uniform width and depth as shown on the plans.

a. Construction. Longitudinal construction joints shall be slip-formed or formed against side forms ~~with or~~ without keyways, as shown in the plans.

Transverse construction joints shall be installed at the end of each day's placing operations and at any other points within a paving lane when concrete placement is interrupted for more than 30 minutes or it appears that the concrete will obtain its initial set before fresh concrete arrives. The installation of the joint shall be located at a planned contraction or expansion joint. If placing of the concrete is stopped, the Contractor shall remove the excess concrete back to the previous planned joint.

b. Contraction. Contraction joints shall be installed at the locations and spacing as shown on the plans. Contraction joints shall be installed to the dimensions required by forming a groove or cleft in the top of the slab while the concrete is still plastic or by sawing a groove into the concrete surface after the concrete has hardened. When the groove is formed in plastic concrete the sides of the grooves shall be finished even and smooth with an edging tool. If an insert material is used, the installation and edge finish shall be according to the manufacturer's instructions. The groove shall be finished or cut clean so that spalling will be avoided at intersections with other joints. Grooving or sawing shall produce a slot at least 1/8-inch (3 mm) wide and to the depth shown on the plans.

c. Expansion. Expansion joints shall be installed as shown on the plans. The premolded filler of the thickness as shown on the plans, shall extend for the full depth and width of the slab at the joint, except for space for sealant at the top of the slab. The filler shall be securely staked or fastened into position perpendicular to the proposed finished surface. A cap shall be provided to protect the top edge of the filler and to permit the concrete to be placed and finished. After the concrete has been placed and struck off, the cap shall be carefully withdrawn leaving the space over the premolded filler. The edges of the joint shall be finished and tooled while the concrete is still plastic. Any concrete bridging the joint space shall be removed for the full width and depth of the joint.

~~**d. Keyways.** Keyways (only female keys permitted) shall be formed in the plastic concrete by means of side forms or the use of keyway liners that are inserted during the slip-form operations. The keyway shall be formed to a tolerance of 1/4-inch (6 mm) in any dimension and shall be of sufficient stiffness to support the upper keyway flange without distortion or slumping of the top of the flange. The dimensions of the keyway forms shall not vary more than plus or minus 1/4-inch (6 mm) from the mid-depth of the pavement. Liners that remain in place permanently and become part of the keyed joint shall be made of galvanized, copper clad, or of similar rust-resistant material compatible with plastic and hardened concrete and shall not interfere with joint reservoir sawing and sealing.~~

e. Tie bars. Tie bars shall consist of deformed bars installed in joints as shown on the plans. Tie bars shall be placed at right angles to the centerline of the concrete slab and shall be spaced at intervals shown on the plans. They shall be held in position parallel to the pavement surface and in the middle of the slab depth. When tie bars extend into an unpaved lane, they may be bent against the form at longitudinal construction joints, unless threaded bolt or other assembled tie bars are specified. These bars shall not be painted, greased, or enclosed in sleeves. When slip-form operations call for tie bars, two-piece hook bolts can be installed in the female side of the keyed joint provided the installation is made without distorting the keyed dimensions or causing edge slump. If a bent tie bar installation is used, the tie bars shall be inserted through the keyway liner only on the female side of the joint. In no case shall a bent tie bar installation for male keyways be permitted.

f. Dowel bars. Dowel bars or other load-transfer units of an approved type shall be placed across joints in the manner as shown on the plans. They shall be of the dimensions and spacings as shown and held rigidly in the middle of the slab depth in the proper horizontal and vertical alignment by an approved assembly device to be left permanently in place. The dowel or load-transfer and joint devices shall be rigid enough to permit complete assembly as a unit ready to be lifted and placed into position. A metal, or other type, dowel expansion cap or sleeve shall be furnished for each dowel bar used with expansion joints. These caps shall be substantial enough to prevent collapse and shall be placed on the ends of the dowels as shown on the plans. The caps or sleeves shall fit the dowel bar tightly and the closed end shall be watertight. The portion of each dowel painted with rust preventative paint, as required under paragraph 501-2.7 and shown on the plans to receive a debonding lubricant, shall be thoroughly coated with asphalt MC-70, or an approved lubricant, to prevent the concrete from bonding to that portion of the dowel. If free-sliding plastic-coated or epoxy-coated steel dowels are used, a lubrication bond breaker shall be used except when approved pullout tests indicate it is not necessary. Where butt-type joints with dowels are designated, the exposed end of the dowel shall be oiled.

Dowel bars at contraction joints may be placed in the full thickness of pavement by a mechanical device approved by the Engineer. The device shall be capable of installing dowel bars within the maximum permissible alignment tolerances. Dowels bars at longitudinal construction joints shall be bonded in drilled holes.

g. Installation. All devices used for the installation of expansion joints shall be approved by the Engineer.

The top of an assembled joint device shall be set at the proper distance below the pavement surface and the elevation shall be checked. Such devices shall be set to the required position and line and shall be securely held in place by stakes or other means to the maximum permissible tolerances during the pouring and finishing of the concrete. The premolded joint material shall be placed and held in a vertical position; if constructed in sections, there shall be no offsets between adjacent units.

Dowel bars and assemblies shall be checked for position and alignment. The maximum permissible tolerances on dowel bar alignment shall be in accordance with paragraph 501-5.2e(6). During the concrete placement operation, it is advisable to place plastic concrete directly on dowel assemblies immediately prior to passage of the paver to help maintain dowel position and alignment within maximum permissible tolerances.

When concrete is placed using slip-form pavers, dowels and tie bars shall be placed in longitudinal construction joints by bonding the dowels or tie bars into holes drilled into the hardened concrete. Holes approximately 1/8-inch to 1/4-inch (3 to 6 mm) greater in diameter than the dowel or tie bar shall be drilled with rotary-type core drills that must be held securely in place to drill perpendicularly into the vertical face of the pavement slab. Rotary-type percussion drills may be used provided that spalling of concrete does not occur. Any damage of the concrete shall be repaired by the Contractor in a method approved by the Engineer. Dowels or tie bars shall be bonded in the drilled holes using an epoxy resin material. Installation procedures shall be adequate to insure that the area around dowels is completely filled with epoxy grout. Epoxy shall be injected into the back of the hole and displaced by the insertion of the dowel bar. Bars shall be completely inserted into the hole and shall not be withdrawn and reinserted creating air pockets in the epoxy around the bar. The Contractor shall furnish a template for checking the position and alignment of the dowels. Dowel bars shall not be less than 10-inches (25 cm) from a transverse joint and shall not interfere with dowels in the transverse direction.

h. Sawing of Joints. Joints shall be cut as shown on the plans. Equipment shall be as described in paragraph 501-4.1. The circular cutter shall be capable of cutting a groove in a straight line and shall produce a slot at least 1/8-inch (3 mm) wide and to the depth shown on the plans. The top portion of the

slot shall be widened by sawing to provide adequate space for joint sealers as shown on the plans. Sawing shall commence as soon as the concrete has hardened sufficiently to permit cutting without chipping, spalling, or tearing and before uncontrolled shrinkage cracking of the pavement occurs. Sawing shall be carried on both during the day and night as required. The joints shall be sawed at the required spacing, consecutively in sequence of the concrete placement. Curing compound, if being used as the cure type, shall be reapplied in the initial sawcut and maintained for the remaining cure period. Curing compound shall not be applied, and used as the cure method, to any final concrete face that is to receive a sealant. All slurry and debris produced in the sawing of joints shall be removed by vacuuming and washing.

501-4.11 FINAL STRIKE-OFF, CONSOLIDATION, AND FINISHING.

a. Sequence. The sequence of operations shall be the strike-off, floating and removal of laitance, straightedging, and final surface finish. The addition of superficial water to the surface of the concrete to assist in finishing operations will not be permitted.

b. Finishing at Joints. The concrete adjacent to joints shall be compacted or firmly placed without voids or segregation against the joint material; it shall be firmly placed without voids or segregation under and around all load-transfer devices, joint assembly units, and other features designed to extend into the pavement. Concrete adjacent to joints shall be mechanically vibrated as required in paragraph 501-4.8.a. After the concrete has been placed and vibrated adjacent to the joints, the finishing machine shall be operated in a manner to avoid damage or misalignment of joints. If uninterrupted operations of the finishing machine, to, over, and beyond the joints, cause segregation of concrete, damage to, or misalignment of the joints, the finishing machine shall be stopped when the screed is approximately 8-inches (20 cm) from the joint. Segregated concrete shall be removed from the front of and off the joint; and the forward motion of the finishing machine shall be resumed. Thereafter, the finishing machine may be run over the joint without lifting the screed, provided there is no segregated concrete immediately between the joint and the screed or on top of the joint.

c. Machine Finishing. The concrete shall be spread as soon as it is placed, and it shall be struck off and screeded by a finishing machine. The machine shall go over each area as many times and at such intervals as necessary to give to proper consolidation and to leave a surface of uniform texture. Excessive operation over a given area shall be avoided. When side forms are used, the tops of the forms shall be kept clean by an effective device attached to the machine, and the travel of the machine on the forms shall be maintained true without lift, wobbling, or other variation tending to affect the precision finish. During the first pass of the finishing machine, a uniform ridge of concrete shall be maintained ahead of the front screed for its entire length. When in operation, the screed shall be moved forward with a combined longitudinal and transverse shearing motion, always moving in the direction in which the work is progressing, and so manipulated that neither end is raised from the side forms during the striking-off process. If necessary, this shall be repeated until the surface is of uniform texture, true to grade and cross section, and free from porous areas.

d. Hand Finishing. Hand finishing methods will not be permitted, except under the following conditions: in the event of breakdown of the mechanical equipment, hand methods may be used to finish the concrete already deposited on the grade; in areas of narrow widths or of irregular dimensions where operation of the mechanical equipment is impractical. Concrete, as soon as placed, shall be struck off and screeded. An approved portable screed shall be used. A second screed shall be provided for striking off the bottom layer of concrete when reinforcement is used.

The screed for the surface shall be at least 2 feet (0.6 m) longer than the maximum width of the slab to be struck off. It shall be of approved design, sufficiently rigid to retain its shape, and shall be constructed

either of metal or of other suitable material covered with metal. Consolidation shall be attained by the use of suitable vibrators.

e. Floating. After the concrete has been struck off and consolidated, it shall be further smoothed and trued by means of a longitudinal float using one of the following methods:

(1) Hand Method. Long-handled floats shall not be less than 12-feet (3.6 m) in length and 6-inches (15 cm) in width, stiffened to prevent flexibility and warping. The float shall be operated from foot bridges spanning but not touching the concrete or from the edge of the pavement. Floating shall pass gradually from one side of the pavement to the other. Forward movement along the centerline of the pavement shall be in successive advances of not more than one-half the length of the float. Any excess water or laitance in excess of 1/8-inch (3 mm) thick shall be removed and wasted.

(2) Mechanical method. The Contractor may use a machine composed of a cutting and smoothing float(s), suspended from and guided by a rigid frame and constantly in contact with, the side forms or underlying surface. If necessary, long-handled floats having blades not less than 5-feet (1.5 m) in length and 6-inches (15 cm) in width may be used to smooth and fill in open-textured areas in the pavement. When the crown of the pavement will not permit the use of the mechanical float, the surface shall be floated transversely by means of a long-handled float. Care shall be taken not to work the crown out of the pavement during the operation. After floating, any excess water and laitance in excess of 1/8-inch (3 mm) thick shall be removed and wasted. Successive drags shall be lapped one-half the length of the blade.

f. Straight-edge Testing and Surface Correction. After the pavement has been struck off and while the concrete is still plastic, it shall be tested for trueness with a Contractor furnished 16-foot (5 m) straightedge swung from handles 3-feet (1 m) longer than one-half the width of the slab. The straightedge shall be held in contact with the surface in successive positions parallel to the centerline and the whole area gone over from one side of the slab to the other, as necessary. Advancing shall be in successive stages of not more than one-half the length of the straightedge. Any excess water and laitance in excess of 1/8-inch (3 mm) thick shall be removed from the surface of the pavement and wasted. Any depressions shall be immediately filled with freshly mixed concrete, struck off, consolidated, and refinished. High areas shall be cut down and refinished. Special attention shall be given to assure that the surface across joints meets the smoothness requirements of paragraph 501-5.2e(3). Straightedge testing and surface corrections shall continue until the entire surface is found to be free from observable departures from the straightedge and until the slab conforms to the required grade and cross section. The use of long-handled wood floats shall be confined to a minimum; they may be used only in emergencies and in areas not accessible to finishing equipment.

501-4.12 SURFACE TEXTURE. The surface of the pavement shall be finished with either a brush or broom, burlap drag, or artificial turf finish for all newly constructed concrete pavements. It is important that the texturing equipment not tear or unduly roughen the pavement surface during the operation. Any imperfections resulting from the texturing operation shall be corrected to the satisfaction of the Engineer.

a. Brush or Broom Finish. If the pavement surface texture is to be a type of brush or broom finish, it shall be applied when the water sheen has practically disappeared. The equipment shall operate transversely across the pavement surface, providing corrugations that are uniform in appearance and approximately 1/16-inch (2 mm) in depth.

b. Burlap Drag Finish. If a burlap drag is used to texture the pavement surface, it shall be at least 15 ounces per square yard (555 grams per square meter). To obtain a textured surface, the transverse threads of the burlap shall be removed approximately 1-foot (0.3 m) from the trailing edge. A heavy buildup of grout on the burlap threads produces the desired wide sweeping longitudinal striations on the

pavement surface. The corrugations shall be uniform in appearance and approximately 1/16-inch (2 mm) in depth.

c. Artificial Turf Finish. If artificial turf is used to texture the surface, it shall be applied by dragging the surface of the pavement in the direction of concrete placement with an approved full-width drag made with artificial turf. The leading transverse edge of the artificial turf drag will be securely fastened to a lightweight pole on a traveling bridge. At least 2-feet of the artificial turf shall be in contact with the concrete surface during dragging operations. A variety of different types of artificial turf are available and approval of any one type will be done only after it has been demonstrated by the Contractor to provide a satisfactory texture. One type that has provided satisfactory texture consists of 7,200 approximately 0.85-inches-long polyethylene turf blades per square foot. The corrugations shall be uniform in appearance and approximately 1/16-inch (2 mm) in depth.

~~The removal of all waste material and slurry generated from the grooving operation shall be continuous. The Contractor shall utilize a vacuum truck to continuously vacuum up all waste material and slurry during the grooving operations. The Contractor shall also maintain a bulk tanker on site to transfer the vacuumed materials into prior to disposal. The Contractor shall not, under any circumstances, deposit the waste materials or slurry generated by the grooving operations on the pavement or surrounding sod or grass areas. All waste material and slurry shall be contained in either the vacuum truck or bulk tanker. All waste material and slurry shall be disposed of off airport at a location approved by the Owner. No waste material or slurry shall be permitted to enter or be deposited into the storm or sanitary sewer system.~~

~~The Contractor shall thoroughly wash all grooves to ensure all grooves are clean and free to transfer runoff from the pavement without obstruction during grooving operations.~~

~~Prior to any grooving, all joints shall be sealed and approved by the Engineer.~~

501-4.14 CURING. Immediately after finishing operations are completed and marring of the concrete will not occur, the entire surface of the newly placed concrete shall be cured for a 7-day cure period in accordance with one of the methods below. Failure to provide sufficient cover material of whatever kind the Contractor may elect to use, or lack of water to adequately take care of both curing and other requirements, shall be cause for immediate suspension of concreting operations. The concrete shall not be left exposed for more than 1/2-hour during the curing period.

a. Impervious Membrane Method. The entire surface of the pavement shall be sprayed uniformly with white pigmented curing compound immediately after the finishing of the surface and before the set of the concrete has taken place. The curing compound shall not be applied during rainfall. Curing compound shall be applied by mechanical sprayers under pressure at the rate of 1-gallon (4 liters) to not more than 150 square feet (14 square meters). The spraying equipment shall be of the fully atomizing type equipped with a tank agitator. At the time of use, the compound shall be in a thoroughly mixed condition with the pigment uniformly dispersed throughout the vehicle. During application the compound shall be stirred continuously by mechanical means. Hand spraying of odd widths or shapes and concrete surfaces exposed by the removal of forms will be permitted. When hand spraying is approved by the Engineer, a double application rate shall be used to insure coverage. The curing compound shall be of such character that the film will harden within 30 minutes after application. Should the film become damaged from any cause, including sawing operations, within the required curing period, the damaged portions shall be repaired immediately with additional compound or other approved means. Upon removal of side forms, the sides of the exposed slabs shall be protected immediately to provide a curing treatment equal to that provided for the surface.

b. Polyethylene Films. The top surface and sides of the pavement shall be entirely covered with polyethylene sheeting. The units shall be lapped at least 18 inches (457 mm). The sheeting shall be placed and weighted to cause it to remain in contact with the surface and sides. The sheeting shall have dimensions that will extend at least twice the thickness of the pavement beyond the edges of the pavement. Unless otherwise specified, the sheeting shall be maintained in place for 7 days after the concrete has been placed. This sheeting will be on site to protect fresh pavement from unanticipated rain events that could mar the surface finish.

~~**c. Waterproof Paper.** The top surface and sides of the pavement shall be entirely covered with waterproofed paper. The units shall be lapped at least 18 inches (457 mm). The paper shall be placed and weighted to cause it to remain in contact with the surface covered. The paper shall have dimensions that will extend at least twice the thickness of the pavement beyond the edges of the slab. The surface of the pavement shall be thoroughly saturated prior to placing of the paper. Unless otherwise specified, the paper shall be maintained in place for 7 days after the concrete has been placed. This sheeting will be on site to protect fresh pavement from unanticipated rain events that could mar the surface finish.~~

~~**d. White Burlap-Polyethylene Sheets.** The surface of the pavement shall be entirely covered with the sheeting. The sheeting used shall be such length (or width) that it will extend at least twice the thickness of the pavement beyond the edges of the slab. The sheeting shall be placed so that the entire surface and both edges of the slab are completely covered. The sheeting shall be placed and weighted to remain in contact with the surface covered, and the covering shall be maintained fully saturated and in position for 7 days after the concrete has been placed.~~

(1) Curing in Cold Weather. The concrete shall be maintained at a temperature of at least 50 degrees F (10 degrees C) for a period of 72 hours after placing and at a temperature above freezing for the remainder of the curing time. The Contractor shall be responsible for the quality and strength of the concrete placed during cold weather, and any concrete injured by frost action shall be removed and replaced at the Contractor's expense.

e. Water Method. The entire area shall be covered with burlap or other water absorbing material. The material shall be of sufficient thickness to retain water for adequate curing without excessive runoff. The material shall be kept wet at all times and maintained for 7 days. When the forms are stripped, the vertical walls shall also be kept moist. It shall be the responsibility of the Contractor to prevent ponding of the curing water on the subbase."

501-4.15 REMOVING FORMS. Unless otherwise specified, forms shall not be removed from freshly placed concrete until it has hardened sufficiently to permit removal without chipping, spalling, or tearing. After the forms have been removed, the sides of the slab shall be cured as outlined in one of the methods indicated in paragraph 501-4.14. Major honeycombed areas shall be considered as defective work and shall be removed and replaced in accordance with paragraph 501-5.2(f).

501-4.16 SEALING JOINTS. The joints in the pavement shall be sealed in accordance with Item [P-605].

501-4.17 PROTECTION OF PAVEMENT. The Contractor shall protect the pavement and its appurtenances against both public traffic and traffic caused by the Contractor's employees and agents. This shall include watchmen to direct traffic and the erection and maintenance of warning signs, lights, pavement bridges, crossovers, and protection of unsealed joints from intrusion of foreign material, etc. Any damage to the pavement occurring prior to final acceptance shall be repaired or the pavement replaced at the Contractor's expense. The Contractor shall have available at all times, materials for the protection of the edges and surface of the unhardened concrete. Such protective materials shall consist of rolled polyethylene sheeting at least 4-mils (0.1 mm) thick of sufficient length and width to cover the

plastic concrete slab and any edges. The sheeting may be mounted on either the paver or a separate movable bridge from which it can be unrolled without dragging over the plastic concrete surface. When rain appears imminent, all paving operations shall stop and all available personnel shall begin covering the surface of the unhardened concrete with the protective covering.

501-4.18 OPENING TO TRAFFIC. The pavement shall not be opened to traffic until test specimens molded and cured in accordance with ASTM C 31 have attained a flexural strength of 550 pounds per square inch (3,792 kPa) when tested in accordance with ASTM C 78. If such tests are not conducted, the pavement shall not be opened to traffic until 14 days after the concrete was placed. Prior to opening the pavement to construction traffic, all joints shall either be sealed or protected from damage to the joint edge and intrusion of foreign materials into the joint. As a minimum, backer rod or tape may be used to protect the joints from foreign matter intrusion. The pavement shall be cleaned before opening for normal operations.

501-4.19 REPAIR, REMOVAL, REPLACEMENT OF SLABS.

a. General. New pavement slabs that are broken or contain cracks shall be removed and replaced or repaired, as specified hereinafter at no cost to the owner. Spalls along joints shall be repaired as specified. Removal of partial slabs is not permitted. Removal and replacement shall be full depth, shall be full width of the slab, and the limit of removal shall be normal to the paving lane and to each original transverse joint. The engineer will determine whether cracks extend full depth of the pavement and may require cores to be drilled on the crack to determine depth of cracking. Such cores shall be 4-inch (100 mm) diameter, shall be drilled by the Contractor and shall be filled by the Contractor with a well consolidated concrete mixture bonded to the walls of the hole with epoxy resin, using approved procedures. Drilling of cores and refilling holes shall be at no expense to the owner. All epoxy resin used in this work shall conform to ASTM C 881, Type V.

b. Shrinkage Cracks. Shrinkage cracks, which do not exceed 4-inches in depth, shall be cleaned and then pressure injected with epoxy resin, Type IV, Grade 1, using procedures as approved. Care shall be taken to assure that the crack is not widened during epoxy resin injection. All epoxy resin injection shall take place in the presence of the Engineer. Shrinkage cracks, which exceed 4-inches (10 cm) in depth, shall be treated as full depth cracks in accordance with paragraphs 4.19b and 4.19c.

c. Slabs With Cracks through Interior Areas. Interior area is defined as that area more than 6-inches (600 mm) from either adjacent original transverse joint. The full slab shall be removed and replaced at no cost to the owner, when there are any full depth cracks, or cracks greater than 4-inches (10 cm) in depth, that extend into the interior area.

d. Cracks Close To and Parallel To Joints. All cracks essentially parallel to original joints, extending full depth of the slab, and lying wholly within 6-inches (600 mm) either side of the joint shall be treated as specified hereinafter. Any crack extending more than 6-inches (600 mm) from the joint shall be treated as specified above in subparagraph "Slabs With Cracks Through Interior Area."

(1) Full Depth Cracks Present, Original Joint Not Opened. When the original uncracked joint has not opened, the crack shall be sawed and sealed, and the original joint filled with epoxy resin as specified below. The crack shall be sawed with equipment specially designed to follow random cracks. The reservoir for joint sealant in the crack shall be formed by sawing to a depth of 3/4-inch (19 mm), plus or minus 1/16-inch (1.6 mm), and to a width of 5/8-inch (16 mm), plus or minus 1/8-inch (3.2 mm). Any equipment or procedure which causes raveling or spalling along the crack shall be modified or replaced to prevent such raveling or spalling. The joint sealant shall be a liquid sealant as specified. Installation of joint seal shall be as specified for sealing joints or as directed. If the joint sealant reservoir has been sawed out, the reservoir and as much of the lower saw cut as possible shall be filled with epoxy resin,

Type IV, Grade 2, thoroughly tooled into the void using approved procedures. If only the original narrow saw cut has been made, it shall be cleaned and pressure injected with epoxy resin, Type IV, Grade 1, using approved procedures. If filler type material has been used to form a weakened plane in the transverse joint, it shall be completely sawed out and the saw cut pressure injected with epoxy resin, Type IV, Grade 1, using approved procedures. Where a parallel crack goes part way across paving lane and then intersects and follows the original joint which is cracked only for the remained of the width, it shall be treated as specified above for a parallel crack, and the cracked original joint shall be prepared and sealed as originally designed.

(2) Full Depth Cracks Present, Original Joint Also Cracked. At a joint, if there is any place in the lane width where a parallel crack and a cracked portion of the original joint overlap, the entire slab containing the crack shall be removed and replaced for the full lane width and length.

e. Removal and Replacement of Full Slabs. Where it is necessary to remove full slabs, unless there are keys or dowels present, all edges of the slab shall be cut full depth with a concrete saw. All saw cuts shall be perpendicular to the slab surface. If keys, dowels, or tie bars are present along any edges, these edges shall be sawed full depth 24-inches (150 mm) from the edge if only keys are present, or just beyond the end of the dowels or tie bars if they are present. These joints shall then be carefully sawed on the joint line to within 1-inch (25 mm) of the depth of the dowel or key.

The main slab shall be further divided by sawing full depth, at appropriate locations, and each piece lifted out and removed. Suitable equipment shall be used to provide a truly vertical lift, and approved safe lifting devices used for attachment to the slabs. The narrow strips along keyed or doweled edges shall be carefully broken up and removed using light, hand-held jackhammers, 30 LB (14 kg) or less, or other approved similar equipment.

Care shall be taken to prevent damage to the dowels, tie bars, or keys or to concrete to remain in place. The joint face below keys or dowels shall be suitably trimmed so that there is not abrupt offset in any direction greater than 1/2-inch (12 mm) and no gradual offset greater than 1-inch (25 mm) when tested in a horizontal direction with a 12-foot (3.6 m) straightedge.

No mechanical impact breakers, other than the above hand-held equipment shall be used for any removal of slabs. If underbreak between 1-1/2 and 4-inches (37 and 100 mm) deep occurs at any point along any edge, the area shall be repaired as directed before replacing the removed slab. Procedures directed will be similar to those specified for surface spalls, modified as necessary.

If underbreak over 4-inches (100 mm) deep occurs, the entire slab containing the underbreak shall be removed and replaced. Where there are no dowels, tie bars, or keys on an edge, or where they have been damaged, dowels of the size and spacing as specified for other joints in similar pavement shall be installed by epoxy grouting them into holes drilled into the existing concrete using procedures as specified. Original damaged dowels or tie bars shall be cut off flush with the joint face. Protruding portions of dowels shall be painted and lightly oiled. All 4 edges of the new slab shall thus contain dowels or original keys or original tie bars.

Placement of concrete shall be as specified for original construction. Prior to placement of new concrete, the underlying material (unless it is stabilized) shall be re-compacted and shaped as specified in the appropriate SECTION of these specifications. The surfaces of all four joint faces shall be cleaned of all loose material and contaminants and coated with a double application of membrane forming curing compound as bond breaker. Care shall be taken to prevent any curing compound from contacting dowels or tie bars. The resulting joints around the new slab shall be prepared and sealed as specified for original construction.

f. Repairing Spalls Along Joints. Where directed, spalls along joints of new slabs, and along parallel cracks used as replacement joints, shall be repaired by first making a vertical saw cut at least 1-inch (25 mm) outside the spalled area and to a depth of at least 2-inches (50 mm). Saw cuts shall be straight lines forming rectangular areas. The concrete between the saw cut and the joint, or crack, shall be chipped out to remove all unsound concrete and at least 1/2-inch (12 mm) of visually sound concrete. The cavity thus formed shall be thoroughly cleaned with high-pressure water jets supplemented with compressed air to remove all loose material. Immediately before filling the cavity, a prime coat of epoxy resin, Type III, Grade I, shall be applied to the dry cleaned surface of all sides and bottom of the cavity, except any joint face. The prime coat shall be applied in a thin coating and scrubbed into the surface with a stiff-bristle brush. Pooling of epoxy resin shall be avoided. The cavity shall be filled with low slump Portland cement concrete or mortar or with epoxy resin concrete or mortar. Concrete shall be used for larger spalls, generally those more than 1/2 cu. ft. (0.014 m³) in size, and mortar SHALL BE USED FOR THE SMALLER ONES. ANY SPALL LESS THAN 0.1 CU. FT. (0.003 m³) shall be repaired only with epoxy resin mortar or a Grade III epoxy resin. Portland cement concrete and mortar mixtures shall be proportioned as directed and shall be mixed, placed, consolidated, and cured as directed. Epoxy resin mortars shall be made with Type III, Grade 1, epoxy resin, using proportions and mixing and placing procedures as recommended by the manufacturer and approved by the Engineer. The epoxy resin materials shall be placed in the cavity in layers not over 2-inches (50 mm) thick. The time interval between placement of additional layers shall be such that the temperature of the epoxy resin material does not exceed 140 degrees F (60 degrees C) at any time during hardening. Mechanical vibrators and hand tampers shall be used to consolidate the concrete or mortar. Any repair material on the surrounding surfaces of the existing concrete shall be removed before it hardens. Where the spalled area abuts a joint, an insert or other bond-breaking medium shall be used to prevent bond at the joint face. A reservoir for the joint sealant shall be sawed to the dimensions required for other joints, or as required to be routed for cracks. The reservoir shall be thoroughly cleaned and sealed with the sealer specified for the joints. If any spall penetrates half the depth of the slab or more, the entire slab shall be removed and replaced as previously specified.

501-4.20 EXISTING CONCRETE PAVEMENT REMOVAL AND REPAIR.

All operations shall be carefully controlled to prevent damage to the concrete pavement and to the underlying material to remain in place. All saw cuts shall be made perpendicular to the slab surface.

a. Removal of Existing Pavement Slab.

When it is necessary to remove existing concrete pavement and leave adjacent concrete in place, [unless there are dowels or keys present,] the joint between the removal area and adjoining pavement to stay in place, [including dowels, tie bars or keys,] shall first be cut full depth with a standard diamond-type concrete saw. [If keys or dowels are present at this joint, the saw cut shall be made full depth 6-inches (150 mm) from the joint if only keys are present, or just beyond the end of dowels if dowels are present. The edge shall then be carefully sawed on the joint line to within 1-inch (25 mm) of the top of the dowel or key.] Next, a full depth saw cut shall be made parallel to the joint at least 24-inches (600 mm) from the joint and at least 12-inches (300 mm) from the end of any dowels. All pavement between this last saw cut and the joint line shall be carefully broken up and removed using hand-held jackhammers, 30 lb. (14 kg) or less, or the approved light-duty equipment which will not cause stress to propagate across the joint saw cut and cause distress in the pavement which is to remain in place. [Where dowels or keys are present, care shall be taken to produce an even, vertical joint face below the dowels or keys. If the Contractor is unable to produce such a joint face, or if underbreak or other distress occurs, the Contractor shall saw the dowels or keys flush with the joint. The Contractor shall then install new dowels, of the size and spacing used for other similar joints, by epoxy resin bonding them in holes drilled in the joint face as specified in paragraph "Placing dowels and Tie-bars. All this shall be at no additional cost to the Owner.] [Dowels of the size and spacing indicated shall be installed as shown on the drawings by epoxy resin

bonding them in holes drilled in the joint face as specified in paragraph "Placing Dowels and Tie Bars".] The joint face shall be sawed or otherwise trimmed so that there is no abrupt offset in any direction greater than 1/2-inch (12 mm) and no gradual offset greater than 1-inch (25 mm) when tested in a horizontal direction with a 12-feet (3.6 m) straightedge.

b. Edge Repair.

The edge of existing concrete pavement against which new pavement abuts shall be protected from damage at all times. Areas that are damaged during construction shall be repaired at not cost to the Owner; repair of previously existing damage areas ~~[will be paid for as listed in the bid schedule]~~ **[will be considered a subsidiary part of concrete pavement construction]**.

(1) Spall Repair. Spalls shall be repaired where indicated and where directed. Repair materials and procedures shall be as previously specified in subparagraph "Repairing Spalls Along Joints."

(2) Underbreak Repair. All underbreak shall be repaired. First, all delaminated and loose material shall be carefully removed. Next, the underlying material shall be recompact, without addition of any new material. Finally, the void shall be completely filled with paving concrete, thoroughly consolidated. Care shall be taken to produce an even joint face from top to bottom. Prior to placing concrete, the underlying material shall be thoroughly moistened. After placement, the exposed surface shall be heavily coated with curing compound.

(3) Underlying Material. The underlying material adjacent to the edge of an under the existing pavement which is to remain in place shall be protected from damage or disturbance during removal operations and until placement of new concrete, and shall be shaped as shown on the drawings or as directed. Sufficient material shall be kept in place outside the joint line to prevent disturbance (or sloughing) of material under the pavement that is to remain in place. Any material under the portion of the concrete pavement to remain in place, which is disturbed or loses its compaction shall be carefully removed and replaced with concrete as specified in paragraph "Underbreak Repair." The underlying material outside the joint line shall be thoroughly compacted and moist when new concrete is placed.

MATERIAL ACCEPTANCE

501-5.1 ACCEPTANCE SAMPLING AND TESTING. All acceptance sampling and testing, with the exception of coring for thickness determination, necessary to determine conformance with the requirements specified in this section will be performed by the Engineer. Concrete shall be accepted for strength and thickness on a lot basis.

A lot shall consist of:

~~[] cubic yards ([] cubic meters).]~~
~~[] square yards ([] square meters).]~~
~~[a day's production not to exceed 2,000 cubic yards (1,530 cubic meters).]~~
[a day's production not to exceed [6,000] square yards ([] square meters).]

Testing organizations performing these tests shall meet the requirements of ASTM C 1077, including accreditation. The accreditation will include ASTM C 78. The Contractor shall bear the cost of providing curing facilities for the strength specimens, per paragraph 501-5.1a(3), and coring and filling operations, per paragraph 501-5.1b(1).

a. Flexural Strength.

(1) Sampling. Each lot shall be divided into four equal sublots. One sample shall be taken for each subplot from the plastic concrete delivered to the job site. Sampling locations shall be determined by the Engineer in accordance with random sampling procedures contained in ASTM D 3665. The concrete shall be sampled in accordance with ASTM C 172.

(2) Testing. Two (2) specimens shall be made from each sample. Specimens shall be made in accordance with ASTM C 31 and the flexural strength of each specimen shall be determined in accordance with ASTM C 78. The flexural strength for each subplot shall be computed by averaging the results of the two test specimens representing that subplot.

Immediately prior to testing for flexural strength, the beam shall be weighed and measured for determination of a sample unit weight. Measurements shall be made for each dimension; height, depth, and length, at the mid-point of the specimen and reported to the nearest tenth of an inch. The weight of the specimen shall be reported to the nearest 0.1 pound. The sample unit weight shall be calculated by dividing the sample weight by the calculated volume of the sample. This information shall be reported as companion information to the measured flexural strength for each specimen.

The samples will be transported while in the molds. The curing, except for the initial cure period, will be accomplished using the immersion in saturated lime water method.

Slump, air content, and temperature tests will also be conducted by the quality assurance laboratory for each set of strength test samples, per ASTM C 31.

(3) Curing. The Contractor shall provide adequate facilities for the initial curing of beams. During the 24 hours after molding, the temperature immediately adjacent to the specimens must be maintained in the range of 60 to 80 degrees F (16 to 27 degrees C), and loss of moisture from the specimens must be prevented. The specimens may be stored in tightly constructed wooden boxes, damp sand pits, temporary buildings at construction sites, under wet burlap in favorable weather, or in heavyweight closed plastic bags, or using other suitable methods, provided the temperature and moisture loss requirements are met.

(4) Acceptance. Acceptance of pavement for flexural strength will be determined by the Engineer in accordance with paragraph 501-5.2b.

b. Pavement Thickness.

(1) Sampling. Each lot shall be divided into four equal sublots and one core shall be taken by the Contractor for each subplot. Sampling locations shall be determined by the Engineer in accordance with random sampling procedures contained in ASTM D 3665. Areas, such as thickened edges, with planned variable thickness, shall be excluded from sample locations.

Cores shall be neatly cut with a core drill. The Contractor shall furnish all tools, labor, and materials for cutting samples and filling the cored hole. Core holes shall be filled by the Contractor with a non-shrink grout approved by the Engineer within one day after sampling.

(2) Testing. The thickness of the cores shall be determined by the Engineer by the average caliper measurement in accordance with ASTM C 174.

(3) Acceptance. Acceptance of pavement for thickness shall be determined by the Engineer in accordance with paragraph 501-5.2c.

c. Partial Lots. When operational conditions cause a lot to be terminated before the specified number of tests have been made for the lot, or when the Contractor and Engineer agree in writing to allow overages or minor placements to be considered as partial lots, the following procedure will be used to adjust the lot size and the number of tests for the lot.

Where three sublots have been produced, they shall constitute a lot. Where one or two sublots have been produced, they shall be incorporated into the next lot or the previous lot and the total number of sublots shall be used in the acceptance criteria calculation, i.e., $n=5$ or $n=6$.

d. Outliers. All individual flexural strength tests within a lot shall be checked for an outlier (test criterion) in accordance with ASTM E 178, at a significance level of 5 percent. Outliers shall be discarded, and the PWL shall be determined using the remaining test values.

501-5.2 ACCEPTANCE CRITERIA.

a. General. Acceptance will be based on the following characteristics of the completed pavement:

- | | |
|-----------------------|-------------------------|
| (1) Flexural strength | (4) Grade |
| (2) Thickness | (5) Edge slump |
| (3) Smoothness | (6) Dowel bar alignment |

Flexural strength and thickness shall be evaluated for acceptance on a lot basis using the method of estimating percentage of material within specification limits (PWL). Acceptance using PWL considers the variability (standard deviation) of the material and the testing procedures, as well as the average (mean) value of the test results to calculate the percentage of material that is above the lower specification tolerance limit (L).

Acceptance for flexural strength will be based on the criteria contained in accordance with paragraph 501-5.2e(1). Acceptance for thickness will be based on the criteria contained in paragraph 501-5.2e(2). Acceptance for smoothness will be based on the criteria contained in paragraph 501-5.2e(3). Acceptance for grade will be based on the criteria contained in paragraph 501-5.2e(4).

The Engineer may at any time, notwithstanding previous plant acceptance, reject and require the Contractor to dispose of any batch of concrete mixture which is rendered unfit for use due to contamination, segregation, or improper slump. Such rejection may be based on only visual inspection. In the event of such rejection, the Contractor may take a representative sample of the rejected material in the presence of the Engineer, and if it can be demonstrated in the laboratory, in the presence of the Engineer, that such material was erroneously rejected, payment will be made for the material at the contract unit price.

b. Flexural Strength. Acceptance of each lot of in-place pavement for flexural strength shall be based on PWL. The Contractor shall target production quality to achieve 90 PWL or higher.

c. Pavement Thickness. Acceptance of each lot of in-place pavement shall be based on PWL. The Contractor shall target production quality to achieve 90 PWL or higher.

d. Percentage of Material Within Limits (PWL). The percentage of material within limits (PWL) shall be determined in accordance with procedures specified in Section 110 of the General Provisions.

The lower specification tolerance limit (L) for flexural strength and thickness shall be:

Lower Specification Tolerance Limit (L)

Flexural Strength	$0.93 \times \text{strength specified in paragraph 501-3.1}$
Thickness	Lot Plan Thickness in inches – 0.50 inches

e. Acceptance Criteria.

(1) Flexural Strength. If the PWL of the lot equals or exceeds 90 percent, the lot shall be acceptable. Acceptance and payment for the lot shall be determined in accordance with paragraph 501-8.1.

(2) Thickness. If the PWL of the lot equals or exceeds 90 percent, the lot shall be acceptable. Acceptance and payment for the lot shall be determined in accordance with paragraph 501-8.1.

(3) Smoothness. As soon as the concrete has hardened sufficiently, the pavement surface shall be tested with a 16-foot (5 m) straightedge or other specified device. Surface smoothness deviations shall not exceed 1/4-inch (6 mm) from a 16-foot (5 m) straightedge placed in any direction, including placement along and spanning any pavement joint edge.

Areas in a slab showing high spots of more than 1/4-inch (6 mm) but not exceeding 1/2-inch (13 mm) in 16-feet (5 m) shall be marked and immediately ground down with an approved grinding machine to an elevation that will fall within the tolerance of 1/4-inch (6 mm) or less. Where the departure from correct cross section exceeds 1/2-inch (13 mm), the pavement shall be removed and replaced at the expense of the Contractor when so directed by the Engineer.

(4) Grade. An evaluation of the surface grade shall be made by the Engineer for compliance to the tolerances contained below. Records shall be maintained showing all grade measurements.

Lateral Deviation. Lateral deviation from established alignment of the pavement edge shall not exceed plus or minus 0.10 foot (30 mm) in any lane.

Vertical Deviation. Vertical deviation from established grade shall not exceed plus or minus 0.04-foot (12 mm) at any point.

(5) Edge Slump. When slip-form paving is used, not more than 15 percent of the total free edge of each 500 foot (150 m) segment of pavement, or fraction thereof, shall have an edge slump exceeding 1/4-inch (6 mm), and none of the free edge of the pavement shall have an edge slump exceeding 3/8-inch (10 mm). (The total free edge of 500-feet (150 m) of pavement will be considered the cumulative total linear measurement of pavement edge originally constructed as nonadjacent to any existing pavement; i.e., 500-feet (150 m) of paving lane originally constructed as a separate lane will have 1,000-feet (300 m) of free edge, 500 feet (150 m) of fill-in lane will have no free edge, etc.). The area affected by the downward movement of the concrete along the pavement edge shall be limited to not more than 18-inches (457 mm) from the edge. When excessive edge slump cannot be corrected before the concrete has hardened, the area with excessive edge slump shall be removed and replaced at the expense of the Contractor when so directed by the Engineer.

(6) Dowel Bar Alignment. Dowel bars and assemblies shall be checked for position and alignment. The maximum permissible tolerance on dowel bar alignment in each plane, horizontal and

vertical, shall not exceed 2 percent or 1/4-inch per foot (20 mm per meter) of a dowel bar. Vertical alignment of dowels shall be measured parallel to the designed top surface of the pavement, except for those across the crown or other grade change joints. Dowels across crowns and other joints at grade changes, shall be measured to a level surface. Horizontal alignment shall be checked perpendicular to the joint edge.

f. Removal and Replacement of Concrete. Any area or section of concrete that is removed and replaced shall be removed and replaced back to planned joints. The Contractor shall replace damaged dowels and the requirements for doweled longitudinal construction joints in paragraph 501-4.10 shall apply to all contraction joints exposed by concrete removal. Removal and replacement shall be in accordance with paragraph 501-4.19 of this specification.

CONTRACTOR QUALITY CONTROL

501-6.1 QUALITY CONTROL PROGRAM. The Contractor shall develop a Quality Control Program in accordance with Section 100 of the General Provisions. The program shall address all elements that affect the quality of the pavement including but not limited to:

- a. Mix Design
- b. Aggregate Gradation
- c. Quality of Materials
- d. Stockpile Management
- e. Proportioning
- f. Mixing and Transportation
- g. Placing and Consolidation
- h. Joints
- i. Dowel Placement and Alignment
- j. Flexural or Compressive Strength
- k. Finishing and Curing
- l. Surface Smoothness

501-6.2 QUALITY CONTROL TESTING. The Contractor shall perform all quality control tests necessary to control the production and construction processes applicable to this specification and as set forth in the Quality Control Program. The testing program shall include, but not necessarily be limited to, tests for aggregate gradation, aggregate moisture content, slump, and air content.

A Quality Control Testing Plan shall be developed as part of the Quality Control Program.

- a. Fine Aggregate.**

(1) Gradation. A sieve analysis shall be made at least twice daily in accordance with ASTM C 136 from randomly sampled material taken from the discharge gate of storage bins or from the conveyor belt.

(2) Moisture Content. If an electric moisture meter is used, at least two direct measurements of moisture content shall be made per week to check the calibration. If direct measurements are made in lieu of using an electric meter, two tests shall be made per day. Tests shall be made in accordance with ASTM C 70 or ASTM C 566.

b. Coarse Aggregate.

(1) Gradation. A sieve analysis shall be made at least twice daily for each size of aggregate. Tests shall be made in accordance with ASTM C 136 from randomly sampled material taken from the discharge gate of storage bins or from the conveyor belt.

(2) Moisture Content. If an electric moisture meter is used, at least two direct measurements of moisture content shall be made per week to check the calibration. If direct measurements are made in lieu of using an electric meter, two tests shall be made per day. Tests shall be made in accordance with ASTM C 566.

c. Slump. Four slump tests shall be performed for each lot of material produced in accordance with the lot size defined in Section 501-5.1. One test shall be made for each subplot. Slump tests shall be performed in accordance with ASTM C 143 from material randomly sampled from material discharged from trucks at the paving site. Material samples shall be taken in accordance with ASTM C 172.

d. Air Content. Four air content tests, shall be performed for each lot of material produced in accordance with the lot size defined in Section 501-5.1. One test shall be made for each subplot. Air content tests shall be performed in accordance with ASTM C 231 for gravel and stone coarse aggregate and ASTM C 173 for slag or other porous coarse aggregate, from material randomly sampled from trucks at the paving site. Material samples shall be taken in accordance with ASTM C 172.

e. Four unit weight and yield tests shall be made in accordance with ASTM C 138. The samples shall be taken in accordance with ASTM C 172 and at the same time as the air content tests.

501-6.3 CONTROL CHARTS. The Contractor shall maintain linear control charts for fine and coarse aggregate gradation, slump, and air content.

Control charts shall be posted in a location satisfactory to the Engineer and shall be kept up to date at all times. As a minimum, the control charts shall identify the project number, the contract item number, the test number, each test parameter, the Action and suspension Limits, or Specification limits, applicable to each test parameter, and the Contractor's test results. The Contractor shall use the control charts as part of a process control system for identifying potential problems and assignable causes before they occur. If the Contractor's projected data during production indicates a potential problem and the Contractor is not taking satisfactory corrective action, the Engineer may halt production or acceptance of the material.

a. Fine and Coarse Aggregate Gradation. The Contractor shall record the running average of the last five gradation tests for each control sieve on linear control charts. Specification limits contained in Tables 1 and 2 shall be superimposed on the Control Chart for job control.

b. Slump and Air Content. The Contractor shall maintain linear control charts both for individual measurements and range (i.e. difference between highest and lowest measurements) for slump and air content in accordance with the following Action and Suspension Limits.

CONTROL CHART LIMITS			
Control Parameter	Individual Measurements		Range Limit Suspension
	Action Limit	Suspension Limit	
Slip Form:			
Slump	+0 to -1 inch (0-25mm)	+0.5 to -1.5 inch (13-38mm)	+/- 1.5 inch (38 mm)
Air Content	+/- 1.2%	+/- 1.8%	+/- 2.5%
Fixed Form			
Slump	+ 0.5 to -1 inch (13-25mm)	+1 to -1.5 inch (25-38mm)	+/- 1.5 inch (38mm)
Air Content	+/- 1.2%	+/- 1.8%	+/- 2.5%

The individual measurement control charts shall use the mix design target values as indicators of central tendency.

501-6.4 CORRECTIVE ACTION. The Contractor Quality Control Program shall indicate that appropriate action shall be taken when the process is believed to be out of control. The Contractor Quality Control Program shall detail what action will be taken to bring the process into control and shall contain sets of rules to gauge when a process is out of control. As a minimum, a process shall be deemed out of control and corrective action taken if any one of the following conditions exists.

a. Fine and Coarse Aggregate Gradation. When two consecutive averages of five tests are outside of the Tables 1 or 2 specification limits, immediate steps, including a halt to production, shall be taken to correct the grading.

b. Fine and Coarse Aggregate Moisture Content. Whenever the moisture content of the fine or coarse aggregate changes by more than 0.5 percent, the scale settings for the aggregate batcher(s) and water batcher shall be adjusted.

c. Slump. The Contractor shall halt production and make appropriate adjustments whenever:

- (1) one point falls outside the Suspension Limit line for individual measurements or range; or
- (2) two points in a row fall outside the Action Limit line for individual measurements.

d. Air Content. The Contractor shall halt production and adjust the amount of air-entraining admixture whenever:

- (1) one point falls outside the Suspension Limit line for individual measurements or range; or
- (2) two points in a row fall outside the Action Limit line for individual measurements.

Whenever a point falls outside the Action Limits line, the air-entraining admixture dispenser shall be calibrated to ensure that it is operating correctly and with good reproducibility.

METHOD OF MEASUREMENT

501-7.1 Portland cement concrete pavement shall be measured by the number of [~~cubic yards (cubic meters)~~] [**square yards (square meters)**] of either plain or reinforced pavement as specified in-place,

completed and accepted. Saw-cut grooving shall be measured by the number of square yards (square meters) of saw-cut grooving as specified in-place, completed and accepted.

BASIS OF PAYMENT

501-8.1 PAYMENT. Payment for accepted concrete pavement shall be made at the contract unit price [~~per cubic yard (cubic meter)~~] [**per square yard (square meter)**] adjusted in accordance with paragraph 501-8.1a, subject to the limitation that:

The total project payment for concrete pavement shall not exceed [**100**] percent of the product of the contract unit price and the total number of [~~cubic yards (cubic meters)~~] [**square yards (square meters)**] of concrete pavement used in the accepted work (See Note 2 under Table 3).

Payment shall be full compensation for all labor, materials, tools, equipment, and incidentals required to complete the work as specified herein and on the drawings, except for saw-cut grooving.

a. Basis of Adjusted Payment. The pay factor for each individual lot shall be calculated in accordance with Table 3. A pay factor shall be calculated for both flexural strength and thickness. The lot pay factor shall be the higher of the two values when calculations for both flexural strength and thickness are 100 percent or higher. The lot pay factor shall be the product of the two values when only one of the calculations for either flexural strength or thickness is 100 percent or higher. The lot pay factor shall be the lower of the two values when calculations for both flexural strength and thickness are less than 100 percent .

TABLE 3. PRICE ADJUSTMENT SCHEDULE ¹

Percentage of Material Within Specification Limits (PWL)	Lot Pay Factor (Percent of Contract Unit Price)
96 – 100	106
90 – 95	PWL + 10
75 – 90	0.5PWL + 55
55 – 74	1.4PWL – 12
Below 55	Reject ²

¹ ALTHOUGH IT IS THEORETICALLY POSSIBLE TO ACHIEVE A PAY FACTOR OF 106 PERCENT FOR EACH LOT, ACTUAL PAYMENT IN EXCESS OF 100 PERCENT SHALL BE SUBJECT TO THE TOTAL PROJECT PAYMENT LIMITATION SPECIFIED IN PARAGRAPH 501-8.1.

² The lot shall be removed and replaced. However, the Engineer may decide to allow the rejected lot to remain. In that case, if the Engineer and Contractor agree in writing that the lot shall not be removed, it shall be paid for at 50 percent of the contract unit price AND THE TOTAL PROJECT PAYMENT LIMITATION SHALL BE REDUCED BY THE AMOUNT WITHHELD FOR THE REJECTED LOT.

For each lot accepted, the adjusted contract unit price shall be the product of the lot pay factor for the lot and the contract unit price. Payment shall be subject to the total project payment limitation specified in paragraph 501-8.1. Payment in excess of 100 percent for accepted lots of concrete pavement shall be used to offset payment for accepted lots of concrete pavement that achieve a lot pay factor less than 100 percent.

b. Payment. Payment shall be made under:

~~Item P-501-8.1a Portland Cement Concrete Pavement -- [per cubic yard (cubic meter)] [per square yard (square meter)]~~

Item P-501-8.1	12-inch Thick Portland Cement Concrete Pavement -- Per Square Yard (Square Meter)
Item P-501-8.2	9-inch Thick Portland Cement Concrete Pavement -- Per Square Yard (Square Meter)
Item P-501-8.3	Buried Transition - Concrete -- Per Square Yard (Square Meter)

c. Basis of adjusted payment for Smoothness. Price adjustment for pavement smoothness will apply to the total area of concrete within a section of pavement and shall be applied in accordance the following equation and schedule:

$$\begin{aligned}
 &(\text{Sq yds in section}) \times (\text{original unit price per sq yds}) \times \text{PFm} = \\
 &= \text{reduction in payment for area within section}
 \end{aligned}$$

Average Profile Index (Inches per mile) pavement strength rating			Contract Unit Price
over 30,000 lb	30,000 lb or less	Short Sections	Adjustment PFm
0 - 7	0 - 10	0 - 15	0.00
7.1 - 9	10.1 - 11	15.1 - 16	0.02
9.1 - 11	11.1 - 12	16.1 - 17	0.04
11.1 - 13	12.1 - 13	17.1 - 18	0.06
13.1 - 14	13.1 - 14	18.1 - 20	0.08
14.1 - 15	14.1 - 15	20.1 - 22	0.10
15.1 & up	15.1 & up	22.1 & up	corrective work required

~~**501-8.2 PAYMENT FOR SAW CUT GROOVING.** Payment for saw cut grooving shall be made at the contract unit price per square yard (square meter) for saw cut grooving. Refer to P-402 Diamond Grooving of Runway Pavement for specification and payment.~~

TESTING REQUIREMENTS

ASTM C 31	Making and Curing Concrete Test Specimens in the Field
ASTM C 39	Compressive Strength of Cylindrical Concrete Specimens
ASTM C 70	Surface Moisture in Fine Aggregate
ASTM C 78	Test for Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading)
ASTM C 88	Test for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate

ASTM C 131	Test for Resistance to Abrasion of Small Size Coarse Aggregate by Use of the Los Angeles Machine
ASTM C 136	Sieve Analysis of Fine and Coarse Aggregates
ASTM C 138 of Concrete	Test for Density (Unit Weight), Yield, and Air Content (Gravimetric)
ASTM C 143	Test for Slump of Hydraulic Cement Concrete
ASTM C 172	Sampling Freshly Mixed Concrete
ASTM C 173 Method	Test for Air Content of Freshly Mixed Concrete by the Volumetric Method
ASTM C 174 Cores	Measuring Thickness of Concrete Elements Using Drilled Concrete Cores
ASTM C 227	Potential Alkali Reactivity of Cement-Aggregate Combinations (Mortar-Bar Method)
ASTM C 231 Method	Test for Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C 289	Potential Alkali-Silica Reactivity of Aggregates (Chemical Method)
ASTM C 295	Petrographic Examination of Aggregates for Concrete
ASTM C 114	Chemical Analysis of Hydraulic Cement
ASTM C 535	Test for Resistance to Degradation of Large-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C 566	Total Evaporable Moisture Content of Aggregates by Drying
ASTM C 642	Test for Density, Absorption, and Voids in Hardened Concrete
ASTM C 666	Resistance of Concrete to Rapid Freezing and Thawing
ASTM C 1077	Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction And Criteria for Laboratory Evaluation
ASTM C 1260	Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)
ASTM D 3665	Random Sampling of Paving Materials
ASTM D 4791	Test Method for Flat or Elongated Particles in Coarse Aggregate
ASTM E 178	Practice for Dealing With Outlying Observations
ASTM E 1274	Test for Measuring Pavement Roughness Using a Profilograph

AASHTO T 26 Quality of Water to be Used in Concrete

MATERIAL REQUIREMENTS

ASTM A 184	Specification for Fabricated Deformed Steel Bar Mats for Concrete Reinforcement
ASTM A 185	Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement
ASTM A 497	Specification for Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement
ASTM A 615	Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
ASTM A 704	Specification for Welded Steel Plain Bar or Rod Mats for Concrete Reinforcement
ASTM A 714	Specification for High-Strength Low-Alloy Welded and Seamless Steel Pipe
ASTM A 996	Specification for Rail-Steel and Axle Steel Deformed Bars for Concrete Reinforcement
ASTM C 33	Specification for Concrete Aggregates
ASTM C 94	Specification for Ready-Mixed Concrete
ASTM C 150	Specification for Portland Cement
ASTM C 171	Specification for Sheet Materials for Curing Concrete
ASTM C 260	Specification for Air-Entraining Admixtures for Concrete
ASTM C 309	Specification for Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C 494	Specification for Chemical Admixtures for Concrete
ASTM C 595	Specification for Blended Hydraulic Cements
ASTM C 618	Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete
ASTM C 881	Specification for Epoxy-Resin Base Bonding System for Concrete
ASTM C 989	Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars

ASTM D 1751	Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
ASTM D 1752	Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving And Structural Construction
ACI 305R	Hot Weather Concreting
ACI 306R	Cold Weather Concreting
ACI 309	Guide for Consolidation of Concrete
MIL-DTL-24441/20a (1999)	Paint, Epoxy-Polyamide, Green Primer, Formula 150, Type III Department of Defense

END ITEM P-501

ITEM D-751 MANHOLES, CATCH BASINS, INLETS AND INSPECTION HOLES

DESCRIPTION

751-1.1 This item shall consist of construction of manholes, catch basins, inlets, and inspection holes, in accordance with these specifications, at the specified locations and conforming to the lines, grades, and dimensions shown on the plans or required by the Engineer. All structures, castings, etc. in the Runway and Taxiway safety areas shall comply with FAA Advisory Circular 150/5320-6, Latest Edition and shall be aircraft rated. All other structures shall conform to these specifications and plans.

751-1.2 SUBMITTALS. Shop drawing of each component shall be submitted to the Engineer for review and approval and shall be approved prior to ordering any materials for this item. This submittal shall include the proposed method of installation for all components. The submittal shall include data on all component parts of this item. The data shall be sufficient, in the opinion of the Engineer, to determine compliance with the contract documents. The Contractor's submittals shall be submitted to the Engineer 30 days prior to start up of construction. The complete submittal shall be reviewed, approved, signed and sealed by a licensed registered Professional Engineer for the state in which the project is located.

751-1.3 QUALIFICATIONS. The Engineer reserves the right to reject any and all equipment, materials, procedures, etc., which, in the Engineer's opinion, does not meet the system design and the standards and codes specified herein.

751-1.4 REFERENCED MATERIALS. Additional details pertaining to specific items covered in this section are contained in Federal Advisory Administration (FAA) Advisory Circulars (AC's), Latest Edition, listed below:

150/5300-13	Airport Design (Latest Edition)
150/5320-6	Airport Pavement Design and Evaluation (Latest Edition)
150/5370-2	Operational Safety on Airports During Construction (Latest Edition)
150/5370-10	Standards for Specifying Construction of Airports (Latest Edition)

The Contractor is responsible for obtaining and using the latest Edition of the referenced FAA Advisory Circulars. This list is not all inclusive but is offered as a convenience to the Contractor.

MATERIALS

751-2.1 BRICK. The brick shall conform to the requirements of ASTM C 32, Grade SM.

751-2.2 MORTAR. Mortar shall consist of one part portland cement and two parts sand. The portland cement shall conform to the requirements of ASTM C 150, Type I. The sand shall conform to the requirements of ASTM C 144.

751-2.3 CONCRETE. Plain and reinforced concrete used in structures, connections of pipes with structures, and the support of structures or frames shall conform to the requirements of Item P-610. Concrete produced by a reputable local supplier of ready-mix or transit-mix concrete designed for a minimum compressive strength of 4,000 psi at 28 days, unless otherwise specified, may be used when approved by the Engineer. The Contractor shall submit the ready-mix or transit-mix design to the Engineer at least 30 days prior to startup of construction.

751-2.4 PRECAST CONCRETE PIPE MANHOLE RINGS. Precast concrete pipe manhole rings shall conform to the requirements of ASTM C 478. Unless otherwise specified, the risers and offset cone sections shall have an inside diameter of not less than 36-inches (90 cm) nor more than 48-inches (120 cm). The precast concrete pipe manhole rings shall be designed to withstand a 250 psi tire pressure when the structure is inside the runway, taxiway or apron safety area and an HS-20 loading when the structure is outside the runway, taxiway or apron safety area.

751-2.5 CORRUGATED METAL. Corrugated metal shall conform to the requirements of AASHTO M 36.

751-2.6 FRAMES, COVERS, AND GRATES. The castings shall conform to one of the following requirements:

- a. Gray iron castings shall meet the requirements of ASTM A 48, Class 30B and 35B.
- b. Malleable iron castings shall meet the requirements of ASTM A 47.
- c. Steel castings shall meet the requirements of ASTM A 27.
- d. Structural steel for grates and frames shall conform to the requirements of ASTM A 283, Grade D.
- e. Ductile iron castings shall conform to the requirements of ASTM A 536.
- f. Austempered ductile iron castings shall conform to the requirements of ASTM A 897.

All castings shall be designed to withstand a 250 psi tire pressure when the structure is inside the runway, taxiway or apron safety area and an HS-20 loading when the structure is outside the runway, taxiway or apron safety area.

All castings or structural steel units shall conform to the dimensions shown on the plans and shall be designed to support the loadings, aircraft gear configuration and/or direct loading, specified.

Each frame and cover or grate unit shall be provided with fastening members to prevent it from being dislodged by traffic but which will allow easy removal for access to the structure.

The frame and cover or grate unit shall be cast flush with the top of the manhole slab. The frame and cover or grate unit manufacturer shall certify that the cover or unit is rated to exceed the requirements of the 250 psi tire pressure or HS-20 loading. Each cover shall have the word "Storm Drainage" or other approved designation cast on one piece.

All castings shall be thoroughly cleaned. After fabrication, structural steel units shall be galvanized to meet the requirements of ASTM A 123.

751-2.7 STEPS. The steps or ladder bars shall be gray or malleable cast iron or galvanized steel. The steps shall be the size, length, and shape shown on the plans and those steps that are not galvanized shall be given a coat of bituminous paint, when directed.

751-2.8 REINFORCING STEEL. All reinforcing steel shall be deformed bars of new billet steel meeting the requirements of ASTM A 615, Grade 60.

751-2.9 PRECAST CONCRETE STRUCTURES. Precast concrete structures shall be constructed on prepared or previously placed slab foundations and shall conform to the dimensions and locations shown on the contract drawings. All precast concrete sections necessary to build a completed structure shall be furnished. The different sections shall fit together readily and all joints shall be sealed with a butyl rubber gasket type sealant. The top of the upper precast concrete member shall be suitably formed and dimensioned to receive the metal frame and cover or grate, or other cap, as required.

751-2.10 SEALANTS. Joints between precast concrete sections shall be sealed with a butyl rubber gasket type sealant that meets all of the requirements of Federal Specification SS-S-210A, Sealing Compound, Preformed Plastic, for Expansion Joints and Pipe Joints.

751-2.11 SUBMITTALS. Submittals of "Shop and Setting Drawings", "Working Drawings", "Catalogue Data" and "Certifications" for review shall be submitted in accordance with appropriate sections of the specifications. Submittals and Certifications required are as follows:

a. Certifications and Concrete Mix Design submittals in accordance with Item P-610, Structural Portland Cement Concrete.

b. Catalogue data and certifications that frames and covers meet the requirements specified.

c. Catalogue data and certification that ladders meet the requirements specified.

d. Certification that reinforcing steel meets the requirements specified.

e. Submittal of Strength Design Calculations, Shop Drawings and Certifications for Pre-cast units.

f. Shop Drawings when structure to be built is at variance with plans or hydraulic assist.

CONSTRUCTION METHODS

751-3.1 UNCLASSIFIED EXCAVATION.

a. The Contractor shall do all excavation for structures and structure footings to the lines and grades or elevations, shown on the plans, or as staked by the Engineer. The excavation shall be of sufficient size to permit the placing of the full width and length of the structure or structure footings shown. The elevations of the bottoms of footings, as shown on the plans, shall be considered as approximate only; and the Engineer may order, in writing, changes in dimensions or elevations of footings necessary to secure a satisfactory foundation.

b. Boulders, logs, or any other objectionable material encountered in excavation shall be removed. All rock or other hard foundation material shall be cleaned of all loose material and cut to a firm surface either level, stepped, or serrated, as directed by the Engineer. All seams or crevices shall be cleaned out and grouted. All loose and disintegrated rock and thin strata shall be removed. When concrete is to rest on a surface other than rock, special care shall be taken not to disturb the bottom of the excavation, and excavation to final grade shall not be made until just before the concrete or reinforcing is to be placed.

c. The Contractor shall do all bracing, sheathing, or shoring necessary to implement and protect the excavation and the structure as required for safety or conformance to governing laws. The cost of bracing, sheathing, or shoring shall be included in the unit price bid for the structure.

d. Unless otherwise provided, bracing, sheathing, or shoring involved in the construction of this item shall be removed by the Contractor after the completion of the structure. Removal shall be effected in a

manner that will not disturb or mar finished masonry. The cost of removal shall be included in the unit price bid for the structure.

e. After each excavation is completed, the Contractor shall notify the Engineer to that effect; and concrete or reinforcing steel shall be placed after the Engineer has approved the depth of the excavation and the character of the foundation material.

751-3.2 BRICK STRUCTURES.

~~— a. Foundations. A prepared foundation shall be placed for all brick structures after the foundation excavation is completed and accepted. Unless otherwise specified, the base shall consist of reinforced concrete mixed, prepared, and placed in accordance with the requirements of Item P-610.~~

~~— b. Laying Brick. All brick shall be clean and thoroughly wet before laying so that they will not absorb any appreciable amount of additional water at the time they are laid. All brick shall be laid in freshly made mortar. Mortar that is not used within 45 minutes after water has been added shall be discarded. Retempering of mortar shall not be permitted. An ample layer of mortar shall be spread on the beds and a shallow furrow shall be made in it that can be readily closed by the laying of the brick. All bed and head joints shall be filled solid with mortar. End joints of stretchers and side or cross joints of headers shall be fully buttered with mortar and a shoved joint made to squeeze out mortar at the top of the joint. Any bricks that may be loosened after the mortar has taken its set, shall be removed, cleaned, and relaid with fresh mortar. No broken or chipped brick shall be used in the face, and no spalls or bats shall be used except where necessary to shape around irregular openings or edges; in which case, full bricks shall be placed at ends or corners where possible, and the bats shall be used in the interior of the course. In making closures, no piece of brick shorter than the width of a whole brick shall be used; and wherever practicable, whole brick shall be used and laid as headers.~~

~~— c. Joints. All joints shall be slushed with mortar at every course, but slushing alone will not be considered adequate for making an acceptable joint. Exterior faces shall be laid up in advance of backing. Exterior faces shall be back plastered or pargeted with a coat of mortar not less than 3/8-inch (9 mm) thick before the backing is laid up. Prior to pargeting, all joints on the back of face courses shall be cut flush. Unless otherwise noted, joints shall be not less than 1/4-inch (6 mm) nor more than 1/2-inch (12 mm) wide and whatever width is adopted shall be maintained uniform throughout the work.~~

~~— d. Pointing. Face joints shall be neatly struck, using the weather joint. All joints shall be finished properly as the laying of the brick progresses. When nails or line pins are used the holes shall be immediately plugged with mortar and pointed when the nail or pin is removed.~~

~~— e. Cleaning. Upon completion of the work all exterior surfaces shall be thoroughly cleaned by scrubbing and washing down with water and, if necessary to produce satisfactory results, cleaning shall be done with a 5% solution of muriatic acid which shall then be rinsed off with liberal quantities of clean fresh water.~~

~~— f. Curing and Cold Weather Protection. In hot or dry weather, or when directed by the Engineer, the brick masonry shall be protected and kept moist for at least 48 hours after laying the brick. Brick masonry work or pointing shall not be done when there is frost in the brick or when the air temperature is below 50 F (10 C) unless the Contractor has on the project ready to use, suitable covering and artificial heating devices necessary to keep the atmosphere surrounding the masonry at a temperature of not less than 60 F (15 C) for the duration of the curing period.~~

No brick products shall be used to adjust the elevation between the precast or cast-in-place concrete structure and the top and rim and cover or inlet. All adjustments shall be cast-in-place concrete meeting the requirements of P-610, Structural Portland Cement Concrete.

751-3.3 CONCRETE STRUCTURES. Concrete structures shall be built on prepared foundations, conforming to the dimensions and form indicated on the plans. The construction shall conform to the requirements specified in Item P-610. Any reinforcement required shall be placed as indicated on the plans and shall be approved by the Engineer before the concrete is poured.

All invert channels shall be constructed and shaped accurately so as to be smooth, uniform, and cause minimum resistance to flowing water. The interior bottom shall be sloped downward toward the outlet.

751-3.4 PRECAST CONCRETE PIPE STRUCTURES. Precast concrete pipe structures shall be constructed on prepared or previously placed slab foundations and shall conform to the dimensions and locations shown on the plans. All precast concrete pipe sections necessary to build a completed structure shall be furnished. The different sections shall fit together readily, and all jointing and connections shall be cemented with mortar. The top of the upper precast concrete pipe member shall be suitably formed and dimensioned to receive the metal frame and cover or grate, or other cap, as required. Provision shall be made for any connections for lateral pipe, including drops and leads that may be installed in the structure. The flow lines shall be smooth, uniform, and cause minimum resistance to flow. The metal steps that are embedded or built into the side walls shall be aligned and placed at vertical intervals of 12-inches (300 mm). When a metal ladder replaces the steps, it shall be securely fastened into position.

~~**751-3.5 CORRUGATED METAL STRUCTURES.** Corrugated metal structures shall be constructed on prepared foundations, conforming to the dimensions and locations as shown on the plans. The structures shall be prefabricated. standard or special fittings shall be furnished to provide pipe connections or branches of correct dimensions. The connections or branches shall be of sufficient length to accommodate connecting bands. The fittings shall be welded in place to the metal structures. When indicated, the structures shall be placed on a reinforced concrete base. The top of the metal structure shall be designed so that either a concrete slab or metal collar may be attached to which can be fastened a standard metal frame and grate or cover. Steps or ladders shall be furnished as shown on the plans.~~

751-3.6 INLET AND OUTLET PIPES. Inlet and outlet pipes shall extend through the walls of the structures for a sufficient distance beyond the outside surface to allow for connections but shall be cut off flush with the wall on the inside surface, unless otherwise directed. For concrete or brick structures, the mortar shall be placed around these pipes so as to form a tight, neat connection.

751-3.7 PLACEMENT AND TREATMENT OF CASTINGS, FRAMES, AND FITTINGS. All castings, frames, and fittings shall be placed in the positions indicated on the plans or as directed by the Engineer, and shall be set true to line and to correct elevation. If frames or fittings are to be set in concrete or cement mortar, all anchors or bolts shall be in place and position before the concrete or mortar is placed. The unit shall not be disturbed until the mortar or concrete has set.

When frames or fittings are to be placed upon previously constructed masonry, the bearing surface or masonry shall be brought true to line and grade and shall present an even bearing surface in order that the entire face or back of the unit will come in contact with the masonry. The unit shall be set in mortar beds and anchored to the masonry as indicated on the plans or as directed and approved by the Engineer. All units shall set firm and secure.

After the frames or fittings have been set in final position and the concrete or mortar has been allowed to harden for 7 days, then the grates or covers shall be placed and fastened down.

751-3.8 INSTALLATION OF STEPS. The steps shall be installed as indicated on the plans or as directed by the Engineer. When the steps are to be set in concrete, they shall be placed and secured in position before the concrete is poured. When the steps are installed in brick masonry, they shall be placed as the masonry is being built. The steps shall not be disturbed or used until the concrete or mortar

has hardened for at least 7 days. After this period has elapsed, the steps shall be cleaned and painted, unless they have been galvanized.

When steps are required with precast concrete pipe structures, they shall be cast into the sides of the pipe at the time the pipe sections are manufactured or set in place after the structure is erected by drilling holes in the concrete and cementing the steps in place.

~~When steps are required with corrugated metal structures, they shall be welded into aligned position at a vertical spacing of 12-inches (300 mm).~~

In lieu of steps, prefabricated ladders may be installed. In the case of brick or concrete structures, the ladder shall be held in place by grouting the supports in drilled holes. ~~In the case of metal structures, the ladder shall be secured by welding the top support and grouting the bottom support into drilled holes in the foundation or as directed.~~

751-3.9 BACKFILLING.

a. After a structure has been completed, the area around it shall be filled with approved material, in horizontal layers not to exceed 8-inches (200 mm) in loose depth, and compacted to the density required in Item P-152. Each layer shall be deposited all around the structure to approximately the same elevation. The top of the fill shall meet the elevation shown on the plans or as directed by the Engineer.

b. Backfilling shall not be placed against any structure until permission is given by the Engineer. In the case of concrete, such permission shall not be given until the concrete has been in place 7 days, or until tests made by the laboratory under supervision of the Engineer establish that the concrete has attained sufficient strength to provide a factor of safety against damage or strain in withstanding any pressure created by the backfill or the methods used in placing it.

c. When required, the Engineer may direct the Contractor to add, at his own expense, sufficient water during compaction to assure a complete consolidation of the backfill. The Contractor shall be responsible for all damage or injury done to ducts, structures, property or persons due to improper placing or compacting of backfill. The cost of all backfill and compaction efforts shall be included in the unit price bid for the manhole, catch basin, inlet or inspection hole.

ed. Backfill shall not be measured for direct payment. Performance of this work shall be considered on obligation of the Contractor covered under the contract unit price for the structure involved.

751-3.10 CLEANING AND RESTORATION OF SITE. After the backfill is completed, the Contractor shall dispose of all surplus material, dirt, and rubbish from the site. Surplus dirt may be deposited in embankments, shoulders, or as ordered by the Engineer. The Contractor shall restore all disturbed areas to their original condition.

After all work is completed, the Contractor shall remove all tools and equipment, leaving the entire site free, clear, and in good condition.

751-3.11 MANHOLE ADJUSTMENTS. The Contractor shall adjust the tops of existing manholes in areas to be paved to the new elevations shown on the contract drawings. The Contractor shall be responsible for determining the exact height adjustment required to raise the top of each inlet or manhole to the new elevation. The existing top elevation of each inlet or manhole to be adjusted shall be determined in the field and added or subtracted from the proposed top elevation. The Contractor shall not use brick products to adjust inlet or manhole tops.

The Contractor shall remove the existing top section or ring and cover from the inlet, manhole structure or manhole access. The Contractor shall then install precast concrete sections or grade rings of the required dimensions to adjust the inlet or manhole top to the new proposed elevation. Finally, the Contractor shall reinstall the inlet or manhole top section or ring and cover on top and check the new top elevation.

The Contractor shall install steps in the new precast concrete sections or grade rings as required to match the spacing of the steps in the existing structure being adjusted. The new steps shall be aligned with the existing steps.

The Contractor shall construct a concrete slab around the top of adjusted structures located in graded areas that are not to be paved. The concrete slab shall conform to the dimensions shown on the contract drawings.

751-3.12 INSPECTION. Prior to final approve of the manholes, catch basins, inlets and inspection holes, the Engineer, accompanied by the Contractor, shall make a through inspection, by an appropriate method, of the entire installation. Any indication of defects in material or workmanship shall be further investigated and corrected. Defects due to the Contractor's negligence shall be corrected by the Contractor without additional compensation and as directed by the Engineer.

751-3.13 REMOVAL OF WATER. If water is encountered in the excavated areas, the Contractor shall dewater the area and obtain optimum moisture content prior to placing concrete, structure or subbase. Performance of the work described in this section is not payable directly, but shall be considered as a subsidiary obligation of the Contractor and included in the contract price for the pay items of work involved.

STORM CHAMBER DETENTION SYSTEM

751-4.1 TRAINING The contractor shall also provide 4.0 hours of Manufacturers' Operation and Maintenance training of the system for the Duluth Airport Authority Staff. The contractor must coordinate the training two weeks prior to the training session.

751-4.2 FINAL ACCEPTANCE The contractor shall clean the system prior to final acceptance.

WATER QUALITY UNIT

751-5.1 SCOPE The contractor shall provide all labor, equipment and materials necessary to construct WATER QUALITY UNIT In place as per plan sheets C513 – C514.

This specification describes 36- through 60-inch (900 to 1500 mm) Storm Water Quality Units for use in on-site point source storm water treatment applications.

751-5.2 REQUIREMENTS Storm Water Quality Units shall have smooth interior and annular exterior corrugations. The unit shall have at least three containment zones, each zone separated from the next by use of a weir or baffle plate. Weir and baffle plates shall be welded at all interfaces between the plate and water quality unit. First weir plate shall incorporate a saw tooth design and shall be reinforced with stiffeners positioned horizontally on the downstream side of the plate to be retained. Storm Water Quality Units shall provide adequate clean-out and inspection access.

751-5.3 JOINT PERFORMANCE Connections for the bypass line and the unit shall utilize the same joint quality as specified for the main storm sewer pipe. Couplers for the bypass line may be either split couplers, in-line bell couplers, snap couplers, bell-bell couplers, or welded bell couplers.

751-5.4 MATERIAL PROPERTIES Virgin material for pipe & fittings used to produce Storm Water Quality Units shall be high density polyethylene conforming with the minimum requirements of cell classification 424420C for 4- through 10-inch (100 to 250 mm) diameters, and 435400C for 12- through 60-inch (300 to 1500mm) diameters as defined and described in the latest version of ASTM D3350. The virgin pipe material shall be evaluated using the notched constant ligament-stress (NCLS) test as specified in Sections 9.5 and 5.1 of AASHTO M294 and ASTM F2306, respectively. All smooth baffle and weir plates shall be high density polyethylene.

751-5.5 INSTALLATION Installation shall be in accordance with the Manufacture's installation guidelines, utilizing a class I (ASTM D2321) structural backfill material or flowable fill (CLSM –Controlled Low Strength Material). Contact your local Manufacture's representative for the latest installation instructions.

751-5.6 PERFORMANCE Water Quality Units shall remove a minimum of 80% of the first flush total suspended solids (TSS) based on flow rates and corresponding sieve sizes. Water Quality units shall be installed "offline" to prevent re-suspension of solids in high flow situations. Offline installation shall be constructed utilizing a by-pass structure. Flow through the unit shall be controlled by an orifice fabricated on the outlet end of the structure.

751-5.7 TRAINING The contractor shall also provide 4.0 hours of Manufacturers' Operation and Maintenance training of the system for the Duluth Airport Authority Staff. The contractor must coordinate the training two weeks prior to the training session.

751-5.8 FINAL ACCEPTANCE The contractor shall clean the system prior to final acceptance.

METHOD OF MEASUREMENT

751-6.1 Manholes, catch basins, inlets, and inspection holes shall be measured by the unit, completed in place and accepted. All required excavation, sheeting and bracing, all required backfilling, restoration of all surfaces, all required connections and dewatering shall be included as part of the unit completed.

BASIS OF PAYMENT

751-7.1 The accepted quantities of manholes, catch basins, inlets, and inspection holes will be paid for at the contract unit price per each in place when completed. This price shall be full compensation for furnishing all materials and for all preparation, excavation, backfilling and placing of the materials; furnishing and installation of such specials and connections to pipes and other structures as may be required to complete the item as shown on the plans; and for all labor equipment, tools and incidentals necessary to complete the structure.

Payment will be made under:

Item D-751-7.1	REMOVE MANHOLES OR CATCH BASINS -- Per Each
Item D-751-7.2	INSTALL NEW MANHOLE/CATCHBASIN, 4' DIA -- Per Each
Item D-751-7.3	INSTALL NEW MANHOLE/CATCHBASIN, 5' DIA -- Per Each
Item D-751-7.4	INSTALL NEW MANHOLE/CATCHBASIN, 6' DIA -- Per Each
Item D-751-7.5	INSTALL NEW MANHOLE/CATCHBASIN, 7' DIA -- Per Each

Item D-751-7.6	INSTALL NEW 42" DIA. END SECTION -- Per Each
Item D-751-7.7	RECONSTRUCT MANHOLES OR CATCH BASINS -- Per Each
Item D-751-7.8	STORM CHAMBER DETENTION SYSTEM -- Per LUMP SUM
Item D-751-7.9	STORM DRAINAGE FRAME AND COVER, AS SPECIFIED -- Per Each
Item D-751-7.10	WATER QUALITY UNIT -- Per LUMP SUM
Item D-751-7.11	ADJUST EXISTING STORM OR SANITARY MH CASTING -- Per Each

MATERIAL REQUIREMENT

ASTM A 27	Steel Castings, Carbon, for General Application
ASTM A 47	Ferritic Malleable Iron Castings
ASTM A 48	Gray Iron Castings
ASTM A 123	Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A 283	Low and Intermediate Tensile Strength Carbon Steel Plates, Shapes, and Bars
ASTM A 536	Ductile Iron Castings
ASTM A 897	Austempered Ductile Iron Castings
ASTM C 32	Sewer and Manhole Brick (Made from Clay or Shale)
ASTM C 144	Aggregate for Masonry Mortar
ASTM C 150	Portland Cement
ASTM C 478	Precast Reinforced Concrete Manhole Sections
AASHTO M 36	Zinc Coated (Galvanized) Corrugated Iron or Steel Culverts and Underdrains

END OF ITEM D-751

ITEM L-105 ALTERATIONS, REMOVAL AND DEMOLITION

GENERAL

105-1.1 DEFINITIONS. Alterations shall mean any change or rearrangement in the component parts, including structural, mechanical, electrical systems, or internal or external arrangements of an existing structure.

Removal shall mean the dismantling of existing materials, components, equipment, and utilities. Removed items shall be handled, prepared for storage, transported to storage areas as specified.

Demolition shall mean the dismantling and disposal of existing materials, components, equipment, and utilities which cannot or will not be reused or which will have no salvage value, or which cannot be reused due to unreparable damage caused by age, non-demolition related reasons, etc. All demolished items not designated to be turned over to the Owner shall be disposed of in a safe manner and at a location acceptable to the Owner.

All items to be turned over to the Owner shall be properly enclosed or boxed to protect the items from damage and transported by the Contractor to a location on the Owner's property, designated by the Engineer and/or the Owner.

The installation and/or removal of lighting equipment may be critical to airport operations; therefore, the Contractor shall follow the work schedule established in the plans and specifications or as directed by the Engineer. The system shall be installed in accordance with the National Electrical Code and/or local code requirements.

The Contractor shall provide temporary wiring as required to reconnect existing circuits to provide guidance for aircraft to pass through the construction areas on those taxiways/runways which must remain open. The Contractor shall check all temporary circuits before dark each day to assure that they are operational. In the event of failure, the Contractor shall immediately take steps to restore operation. The cost of temporary and reconnected lighting shall be absorbed in the various work items.

105-1.2 CONDITION OF EXISTING FACILITIES. The Contractor shall verify the areas, conditions, and features necessary to tie into existing construction. This verification shall be done prior to submittal of shop drawings, fabrication or erection, construction or installation. The Contractor shall be responsible for the accurate tie-in of the new work to existing facilities.

Special attention is called to the fact that there may be piping, fixtures or other items in the existing systems which must be removed or relocated in order to perform the alteration work. All conduit, wiring, boxes, etc., that do not comply with these specifications shall be removed or corrected to comply with these specifications. All unused conduit not removed shall be identified and a pull line shall be installed. The work shall include all removal and relocation required for completion of the alterations and the new construction.

Whenever the scope of work requires connection to an existing circuit, the circuit's insulation resistance shall be tested, in the presence of the Owner and Engineer. The Contractor shall record the results on the forms included in these specifications. When the circuit is returned to its final condition, the circuit's insulation resistance shall be checked again in the presence of the Owner and Engineer. The Contractor shall record the results on the forms included in these specifications. The second reading shall be equal to or greater than the first reading or the Contractor shall make the necessary repairs to the circuit to bring the second reading above the first reading. All repair costs including a complete replacement of the cable, if necessary, shall be borne by the Contractor. All test results shall be submitted in the Operation

and Maintenance Manuals as described in Item L-106, Submittals, Record Documents and Maintenance Manuals.

105-1.3 OCCUPANCY AND USE OF EXISTING FACILITIES. The Owner will occupy and use the facilities within the areas of work during the entire construction period. The Contractor shall be required to plan and coordinate his activities in order to provide all necessary controls for the abatement of dust, noise, and inconvenience to the Owner personnel during all phases of the work.

105-1.4 VACATING OCCUPIED AREAS. The Owner will remove all portable items of furniture, equipment, and fixtures prior to the start of work.

105-1.5 SAFETY REQUIREMENTS. The Contractor shall conduct alterations and removal operations in a manner that will ensure the safety of persons in accordance with the requirements of CFR 29 PART 1926 and 1910.

105-1.6 CLASSIFICATION OF REMOVED/DEMOLISHED ITEMS. Existing materials and equipment indicated to be removed will be classified as "salvageable" and shall remain the property of the Owner or will be classified as "debris" and shall be disposed of legally off the airport.

Reusable salvaged items:

Salvaged materials and equipment shall be reused in the work as described on the contract drawings, unless noted otherwise.

Items classified as debris shall be legally disposed of off the airport property. The cost of such disposal shall be included in the cost of other items of work.

Retained salvaged items:

Salvaged materials and equipment to be retained by the Owner but not reused in the work shall be turned over to the Owner at a site at the facility to be determined by the Owner. Retained salvaged items shall be stored on Owner property where indicated by the Owner.

105-1.7 TEMPORARY PROTECTION. The Contractor shall provide and maintain the following requirements.

Protection of persons and property shall be provided throughout the progress of the work in accordance with these specifications.

Provide temporary enclosures and partitions prior to starting alterations and removal of work. Such items shall protect existing materials, equipment, and other remaining building or system components from damage by weather and construction operations.

Provide temporary enclosures to isolate space utilized by equipment during construction, from dirt, dust, noise, and unauthorized entry.

Provide temporary exits, entrances, and protected passages where work prevents the use of existing facilities.

Provide weathertight temporary enclosures over and around openings to be made in existing exterior construction prior to the start of work. The Contractor shall maintain such temporary enclosures until new construction will protect the interior of existing facilities from the elements.

Provide temporary exterior wall construction which will be designed and fabricated to resist an applied horizontal wind pressure of not less than 130 mph.

Provide temporary exterior roof construction which will be capable of supporting an applied vertical live load of not less than 200 psf, uniformly distributed over the entire roof area.

Design and fabricate temporary enclosures to maintain temperatures inside the existing facilities within a range of plus-or-minus 5 degrees F of normal operating conditions.

Provide temporary jet blast structures which will withstand the jet blast with a safety factor of 2.

EXECUTION

105-2.1 DISCONNECTING UTILITIES. Prior to the start of work, the necessary utilities serving each area of alteration or removal will be shut off by the Owner and shall be disconnected and sealed by the Contractor, as required. Lockout/Tag/Try procedures shall be utilized in accordance with Item L-104, General Electrical Safety Requirements and Temporary Airfield Lighting.

105-2.2 TEMPORARY UTILITY SERVICES. The Contractor shall install temporary utility services in satisfactory operating condition before disconnecting existing utilities. Such temporary services shall be maintained during the period of construction and removed only after new permanent services have been tested and are in operation.

105-2.3 REMOVAL WORK. The Contractor shall not disturb the existing construction beyond that indicated or necessary for installation of new work. Temporary shoring and bracing for support of building components to prevent settlement or other movement shall be as indicated and as required to protect the work.

The Contractor shall provide protective measures to control accumulation and migration of dust and dirt in all areas of work, particularly those adjacent to occupied areas. The Contractor shall remove dust, dirt, and debris from the areas of work daily.

105-2.4 SALVAGEABLE MATERIALS AND EQUIPMENT. The Contractor shall remove all salvageable materials and equipment in a manner that will cause the least possible damage thereto. Removed items which are to be retained by the Owner shall be carefully handled, stored, and protected.

The Contractor shall provide identification tags on all items boxed or placed in containers, indicating the type, size, and quantity of materials.

105-2.5 BUILDINGS AND STRUCTURES. The Contractor shall perform removal operations in existing buildings as indicated and as otherwise required to complete the work.

Existing concrete shall be demolished, removed, and disposed of. Square, straight edges shall be provided where existing concrete adjoins new work and at other locations where indicated. Existing steel reinforcement shall be protected where indicated; otherwise, it shall be cut off flush with face of concrete.

The Contractor shall dismantle steel components at field connections and in a manner that will prevent bending or damage.

The use of flame-cutting torches will be permitted only when other methods of dismantling are not practical, and when approved in writing by the Owner and/or Engineer.

105-2.6 ELECTRICAL EQUIPMENT AND FIXTURES. Wiring systems and components shall be

salvaged. Loose items shall be boxed and tagged for identification.

All unused conduit not removed shall have a pull string installed and shall be noted on the record drawings.

Primary, secondary, control, communication, and signal circuits shall be disconnected at the point of attachment to their distribution system.

The Contractor shall remove and salvage electrical fixtures. Incandescent lamps, mercury-vapor lamps, and fluorescent lamps shall be salvaged, boxed and tagged for identification, and protected from breakage.

The Contractor shall remove and salvage switches, receptacles, fixtures, transformers, constant current regulators, meters, instruments, plates, circuit breakers, panelboards, outlet boxes, and similar items. These items shall be boxed, and tagged for identification according to type and size.

The Contractor shall remove and dispose of conductors and conduits not used in the finished work and shown to be demolished on the plans.

DEMOLITION

105-3.1 DEMOLITION OPERATIONS. Demolition operations shall be conducted to ensure the safe passage of persons to and from facilities occupied and used by the Owner and to prevent damage by falling debris or other cause to adjacent buildings, structures, and other facilities.

The sequence of operations shall be such that maximum protection from inclement weather will be provided for materials and equipment located in partially dismantled structures.

105-3.2 MAINTAINING TRAFFIC. Demolition operations and removal of debris to disposal areas shall be conducted to ensure minimum interference with runways, taxiways, aprons, roads, streets, walks, and other facilities occupied and used by the Owner.

Streets, walks, runways, taxiways and other facilities occupied and used by the Owner shall not be closed or obstructed without written permission from the Owner.

105-3.3 REFERENCE STANDARDS REQUIREMENTS. Demolition operations shall be conducted to ensure the safety of persons in accordance with ANSI A 10.6 Safety Requirements for Demolition.

Demolition shall be conducted in accordance with OSHA, State and local requirements.

DISPOSAL OF DEMOLISHED MATERIALS

105-4.1 GENERAL. The Contractor shall dispose of debris, rubbish, scrap, and other non-salvageable materials resulting from demolition operations. Demolished materials shall not be stored or disposed of on Airport property.

105-4.2 REMOVAL FROM OWNER PROPERTY. Materials classified as debris shall be transported from Owner property and legally disposed of at no additional cost to the Owner. Permits and fees for disposal shall be paid by the Contractor.

ALTERATION WORK

105-5.1 GENERAL. Cutting, patching, repairing, and other alteration work shall be done by tradesman

skilled in the particular trade or work required.

Where required to patch or extend existing construction, or both, such alteration work shall match existing exposed surface materials in finish, color, texture, and pattern.

Salvaged items for reuse shall be as approved by the Engineer and Owner.

METHOD OF MEASUREMENT

105-6.1 This item includes all materials, labor, transportation incidentals and services required for the building demolition as shown on the plans. It is the intent of the demolition pay item that all equipment, devices, fixtures, wiring, materials, systems and appurtenances, etc. which are no longer required as a result of the project to be removed shall be measured by the lump sum.

105-6.2 This item includes all materials, labor, transportation incidentals and services required for the airfield electrical demolition as shown on the plans. It is the intent of the demolition pay item that all equipment, devices, fixtures, wiring, materials, systems and appurtenances, etc. which are no longer required as a result of the project to be removed shall be measured by the lump sum.

BASIS OF PAYMENT

105-7.1 Payment will be made at the contract price for the required building demolition. This price shall be full compensation for furnishing all material, equipment and for all preparation, removal of the salvageable materials or debris and equipment and for all labor, equipment, tools and incidentals necessary to complete this item.

105-7.2 Payment will be made at the contract price for required airfield electrical demolition. This item includes all materials, labor, transportation, incidentals and services required for the demolition as shown on the plans. This item includes any temporary wiring, fixtures, etc. required to maintain the existing airfield lighting systems to the satisfaction of the Owner and Engineer. It is the intent of the demolition pay item that all equipment, devices, fixtures, wiring, materials, systems and appurtenances, etc. which are no longer required as a result of the project be removed.

Payment will be made under:

Item L-105-7.1	Remove Guidance Sign and Foundation – Per Each.
Item L-105-7.2	Remove Electrical Handhole -- Per Each.
Item L-105-7.3	Remove Base Mounted Airfield Edge Light – Per Each.
Item L-105-7.4	Remove Light and Foundation (Street) -- Per Each.
Item L-105-7.5	Remove Light and Foundation (Sidewalk) -- Per Each.

END OF ITEM L-105

ITEM L-108 UNDERGROUND POWER CABLE FOR AIRPORTS

DESCRIPTION

108-1.1 This item shall consist of furnishing and installing power cables direct buried and furnishing and/or installing power cables within conduit or duct banks in accordance with these specifications at the locations shown on the plans. It includes excavation and backfill of trench for direct-buried cables only. Also included are the installation of counterpoise wires, ground wires, ground rods and connections, cable splicing, cable marking, cable testing, and all incidentals necessary to place the cable in operating condition as a completed unit to the satisfaction of the Engineer. This item shall not include the installation of duct banks or conduit, trenching and backfilling for duct banks or conduit, or furnishing or installation of any cable for FAA facilities. Requirements and payment for trenching and backfilling for the installation of underground conduit and duct banks is covered under Item L-110 "Airport Underground Electrical Duct Banks and Conduits."

108-1.2 REFERENCED Additional information pertaining to the items covered in this section are contained in the Federal Aviation Administration (FAA) Advisory Circulars (AC's), latest edition, listed below:

150/5345-7	Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits
150/5345-26	Specification for L-823 Plug and Receptacle, Cable Connectors
150/5345-53	Airport Lighting Equipment Certification Program
150/5370-10	Standard for Specifying Construction of Airports
150/5370-2	Operational Safety on Airports During Construction
150/5370-10	Standard for Specifying Construction of Airports

The contractor is responsible for obtaining and using the latest edition of the referenced FAA Advisory Circulars. This list is not all inclusive but is offered as a convenience to the Contractor.

All new electrical systems should be tested to compare their compatibility to installed equipment. Operational tests shall be performed to ensure no increase in electromagnetic interference (EMI) occurs over the original findings.

EQUIPMENT AND MATERIALS

108-2.1 GENERAL.

a. Airport lighting equipment and materials covered by Federal Aviation Administration (FAA) specifications shall be approved under the Airport Lighting Equipment Certification Program described in Advisory Circular (AC) 150/5345-53, current version.

b. All other equipment and materials covered by other referenced specifications shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification, when

~~requested by the Engineer.~~ The Contractor shall submit the manufacturer's certificate of compliance and the applicable specification sections to the Engineer for approval before the equipment and material are ordered.

c. Manufacturer's certifications shall not relieve the Contractor of the Contractor's responsibility to provide materials in accordance with these specifications and acceptable to the Engineer. Materials supplied and/or installed that do not materially comply with these specifications shall be removed, when directed by the Engineer and replaced with materials, which do comply with these specifications, at the sole cost of the Contractor.

d. All materials and equipment used to construct this item shall be submitted to the Engineer for approval prior to ordering the equipment. Submittals consisting of marked catalog sheets or shop drawings shall be provided. Submittal data shall be presented in a clear, precise and thorough manner. Original catalog sheets are preferred. Photocopies are acceptable provided they are as good a quality as the original. Clearly and boldly mark each copy to identify pertinent products or models applicable to this project. Indicate all optional equipment and delete non-pertinent data. Submittals for components of electrical equipment and systems shall identify the equipment for which they apply on each submittal sheet. Markings shall be boldly and clearly made with arrows or circles (highlighting is not acceptable). Contractor is solely responsible for delays in project accruing directly or indirectly from late submissions or resubmissions of submittals. The Contractor's submittals shall be in accordance with Item L-106, Submittals, Record Documents and Maintenance Manuals.

e. The data submitted shall be sufficient, in the opinion of the Engineer, to determine compliance with the plans and specifications. [The Contractor's submittals shall be neatly bound in a properly sized 3-ring binder, tabbed by specification section.] The Contractor's submittals shall be submitted to the Engineer within fifteen (15) days of the notice to proceed. Submittals shall comply with Section L-106. The Engineer reserves the right to reject any and all equipment, materials or procedures, which, in the Engineer's opinion, does not meet the system design and the standards and codes, specified herein.

f. All equipment and materials furnished and installed under this section shall be guaranteed against defects in materials and workmanship for a period of at least [twelve (12) months] from final acceptance by the Owner. The defective materials and/or equipment shall be repaired or replaced, at the Owner's discretion, with no additional cost to the Owner. The Contractor shall be responsible to maintain an insulation resistance of 50 megohms minima, (1000 V megger) with isolation transformers connected in new circuits and new segments of existing circuits through the end of the contract warranty period.

108-2.2 CABLE. Underground cable for airfield lighting facilities (runway and taxiway lights and signs) shall conform to the requirements of AC 150/5345-7, Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits. Conductor sizes noted above shall not apply to leads furnished by manufacturers on airfield lighting transformers and fixtures.

Wire for electrical circuits up to 600 volts shall comply with Specification L-824 and/or Federal Specification J-C-30 and shall be type THWN-2.

Cable type, size, number of conductors, strand and service voltage shall be as specified on the plans.

108-2.3 BARE COPPER WIRE FOR (COUNTERPOISE, BARE COPPER WIRE GROUND AND GROUND RODS). Wire for counterpoise or ground installations for airfield lighting systems shall be bare No. 6 AWG solid, single conductor for counterpoise wire and ~~or~~ 600V insulated, XHHW insulation, No. 6 AWG stranded single conductor for ground wire conforming to ASTM B 3 and ASTM B 8, and shall be ~~[bare copper wire] [tinned copper]~~ conforming to the requirements of ASTM D 33.

Ground rods shall be ~~[solid stainless steel]~~ ~~[copper]~~ or **[copper-clad steel]**. The ground rods shall be of the length and diameter specified on the plans, but in no case shall they be less than ~~8-10-feet (240305 cm)~~ long nor less than ~~5/8 3/4-in (45 19 mm)~~ in diameter.

108-2.4 CABLE CONNECTIONS. In-line connections of underground primary cables shall be of the type called for on the plans, and shall be one of the types listed below. No separate payment will be made for cable connections.

a. The Cast Splice. A cast splice, employing a plastic mold and using epoxy resin equivalent to that manufactured by Minnesota Mining and Manufacturing Company, "Scotchcast" Kit No. 82--B, or as manufactured by Hysol® Corporation, "Hyseal Epoxy Splice" Kit No. E1135, or equivalent, is used for potting the splice is acceptable.

b. The Field-attached Plug-in Splice. Figure 3 of AC 150/5345-26, Specification for L-823 Plug and Receptacle, Cable Connectors, employing connector kits, is acceptable for field attachment to single conductor cable. It shall be the Contractor's responsibility to determine the outside diameter of the cable to be spliced and to furnish appropriately sized connector kits and/or adapters and heat shrink tubing with integral sealant.

c. The Factory-Molded Plug-in Splice. Specification for L-823 Connectors, Factory-Molded to Individual Conductors, is acceptable.

d. The Taped or Heat-Shrunk Splice. Taped splices employing field-applied rubber, or synthetic rubber tape covered with plastic tape is acceptable. The rubber tape should meet the requirements of ASTM D 4388 and the plastic tape should comply with Mil Spec. MIL-I-24391 or Fed. Spec. A-A-55809. Heat shrinkable tubing shall be heavy-wall, self-sealing tubing rated for the voltage of the wire being spliced and suitable for direct-buried installations. The tubing shall be factory coated with a thermoplastic adhesive-sealant that will adhere to the insulation of the wire being spliced forming a moisture- and dirt-proof seal. Additionally, heat shrinkable tubing for multi-conductor cables, shielded cables, and armored cables shall be factory kits designed for the application. Heat shrinkable tubing and tubing kits shall be manufactured by Tyco Electronics/ Raychem Corporation, Energy Division, or approved equivalent.

In all the above cases, connections of cable conductors shall be made using crimp connectors using a crimping tool designed to make a complete crimp before the tool can be removed. All L-823/L-824 splices and terminations shall be made in accordance with the manufacturer's recommendations and listings.

All connections of counterpoise, grounding conductors and ground rods shall be made by the exothermic process or approved equivalent, except the base can ground clamp connector shall be used for attachment to the base can. All exothermic connections shall be made in accordance with the manufacturer's recommendations and listings.

108-2.5 SPLICER QUALIFICATIONS. Every airfield lighting cable splicer shall be qualified in making cable splices and terminations on cables rated above 5,000 volts AC. The Contractor shall submit to the Engineer proof of the qualifications of each proposed cable splicer for the cable type and voltage level to be worked on. Cable splicing/terminating personnel shall have a minimum of three (3) years continuous experience in terminating/splicing medium voltage cable.

108-2.6 CONCRETE. Concrete for cable markers shall conform to Specification Item P-610, "Structural Portland Cement Concrete."

108-2.7 FLOWABLE BACKFILL. Flowable material used to backfill trenches for power cable trenches shall conform to the requirements of Item P-153 "Controlled Low Strength Material".

108-2.8 CABLE IDENTIFICATION TAGS. Cable identification tags shall be made from a non-corrosive material with the circuit identification stamped or etched onto the tag. The tags shall be of the type as detailed on the plans.

108-2.9 TAPE. Electrical tapes shall be Scotch Electrical Tapes – number Scotch 88 (1-1/2" wide) and Scotch 130C linerless rubber splicing tape (2" wide), as manufactured by the Minnesota Mining and Manufacturing Company, or approved equivalent.

108-2.10 ELECTRICAL COATING. Scotchkote™ shall be as manufactured by Minnesota Mining and Manufacturing Company, or approved equivalent.

108-2.11 EXISTING CIRCUITS. Whenever the scope of work requires, connection to an existing circuit, the circuit's insulation resistance shall be tested, in the presence of the Engineer. The test shall be performed in accordance with this item and prior to any activity affecting the respective circuit. The Contractor shall record the results on forms acceptable to the engineer. When the work affecting the circuit is complete, the circuit's insulation resistance shall be checked again, in the presence of the Engineer. The Contractor shall record the results on forms acceptable to the engineer. The second reading shall be equal to or greater than the first reading or the Contractor shall make the necessary repairs to the circuit to bring the second reading above the first reading. All repair costs including a complete replacement of the L-823 connectors, L-830 transformers and L-824 cable, if necessary, shall be borne by the Contractor. All test results shall be submitted in the Operation and Maintenance (O&M) Manual.

108-2.12 TEMPORARY CIRCUITING. Refer to Item L-104 General Electrical Safety Requirements and Temporary Airfield Lighting for requirements. Basis for payment shall be as included in this section.

CONSTRUCTION METHODS

108-3.1 GENERAL. The Contractor shall install the specified cable at the approximate locations indicated on the plans. Unless otherwise shown on the plans, all cable required to cross under pavements expected to carry aircraft loads shall be installed in concrete encased duct banks. Wherever possible, cable shall be run without splices, from connection to connection.

Cable connections between lights will be permitted only at the light locations for connecting the underground cable to the primary leads of the individual isolation transformers. The Contractor shall be responsible for providing cable in continuous lengths for home runs or other long cable runs without connections, unless otherwise authorized in writing by the Engineer or shown on the plans.

In addition to connectors being installed at individual isolation transformers, L-823 cable connectors for maintenance and test points shall be installed at locations shown on the plans. Cable circuit identification markers shall be installed on both sides of the L-823 connectors installed or at least once in each access point where L-823 connectors are not installed.

Provide not less than 3 feet of cable slack on each side of all connections, isolation transformers, light units, and at points where cable is connected to field equipment. Where provisions must be made for testing or for future above grade connections, provide enough slack to allow the cable to be extended at least 1 ft vertically above the top of the access structure. This requirement also applies where primary cable passes through empty base cans, junction and access structures to allow for future connections, or as designated by the Engineer.

108-3.2 INSTALLATION IN DUCT BANKS OR CONDUITS. This item includes the installation of the cable in duct banks or conduit as described below. The maximum number and voltage ratings of cables

installed in each single duct or conduit, and the current-carrying capacity of each cable shall be in accordance with the latest National Electric Code, or the code of the local agency or authority having jurisdiction.

The Contractor shall make no connections or splices of any kind in cables installed in conduits or duct banks.

Unless otherwise designated in the plans, where ducts are in tiers, use the lowest ducts to receive the cable first, with spare ducts left in the upper levels. Check duct routes prior to construction to obtain assurance that the shortest routes are selected and interferences are avoided.

Duct banks or conduits shall be installed as a separate item in accordance with Item L-110, "Airport Underground Electrical Duct Banks and Conduit." The Contractor shall run a flexible mandrel, 1/4-inch less than the conduit size, 2 wire brushes, and a rag through duct banks or conduit prior to installation of cable to insure that the duct bank or conduit is open, continuous and clear of debris. ~~Mandrel size shall be compatible with conduit size.~~ The Contractor shall swab out all conduits/ducts and clean base can, manhole, etc. interiors IMMEDIATELY prior to pulling cable. Once cleaned and swabbed the base cans and all accessible points of entry to the duct/conduit system shall be kept closed except when installing cables. Cleaning of ducts, base cans, manholes, etc. is incidental to the pay item of the item being cleaned. All raceway systems left open, after initial cleaning, for any reason shall be recleaned at the Contractor's expense. All accessible points shall be kept closed when not installing cable. The Contractor shall verify existing ducts proposed for use in this project as clear and open. The Contractor shall notify the Engineer of any blockage in the existing ducts. The cable shall be installed in a manner to prevent harmful stretching of the conductor, injury to the insulation, or damage to the outer protective covering. The ends of all cables shall be sealed with moisture-seal tape providing moisture-tight mechanical protection with minimum bulk, or alternately, heat shrinkable tubing before pulling into the conduit and it shall be left sealed until connections are made. Where more than one cable is to be installed in a conduit, all cable shall be pulled in the conduit at the same time. The pulling of a cable through duct banks or conduits may be accomplished by hand winch or power winch with the use of cable grips or pulling eyes. Maximum pulling tensions shall be governed by cable manufacturer's recommendations. A non-hardening lubricant ~~recommended for~~ approved for use with the type of cable being installed shall be used where pulling lubricant is required.

The Contractor shall submit to the engineer, a cable installation plan for all cable pulls. Cable installation plan shall include:

- a. Site layout drawing with cable pulls identified in numeric order of expected pulling sequence and direction of cable pull.
- b. List of cable installation equipment.
- c. Lubricant manufacturer's application instructions.
- d. Procedure for resealing cable ends to prevent moisture from entering cable.
- e. Cable pulling tension calculations of all cable pulls.
- f. Cable percentage conduit fill.
- g. Cable sidewall thrust pressure.
- h. Cable minimum bend radius and minimum diameter of pulling wheels used.

- i. Cable jam ratio.
- j. Maximum allowable pulling tension on each different type and size of conductor.
- k. Maximum allowable pulling tension on pulling device.

Contractor shall submit pulling tension values to the Engineer prior to any cable installation. ~~If required by the Engineer,~~ pulling tension values for cable pulls shall be monitored by a dynamometer in the presence of the Engineer. Cable pull tensions shall be recorded by the Contractor and reviewed by the Engineer. Cables exceeding the maximum allowable pulling tension values shall be removed and replaced by the Contractor at the Contractor's expense.

The manufacturer's minimum bend radius or the NEC requirements whichever is more restrictive shall apply. Cable installation, handling and storage shall be per manufacturer's recommendations. During cold weather, particular attention shall be paid to the manufacturer's minimum installation temperature. Cable shall not be installed when the temperature is at or below the manufacturer's minimum installation temperature. At the Contractor's option, the Contractor may submit a plan, for review by the Engineer, for heated storage of the cable and maintenance of an acceptable cable temperature during installation when temperatures are below the manufacturer's minimum cable installation temperature.

Cable shall not be dragged across base can or manhole edges, pavement or earth. When cable must be coiled, lay cable out on a canvas tarp or use other appropriate means to prevent abrasion to the cable jacket.

108-3.3 INSTALLATION OF DIRECT-BURIED CABLE IN TRENCHES. Unless otherwise specified, the Contractor shall not use a cable plow for installing the cable. Cable shall be unreeled uniformly in place alongside or in the trench and shall be carefully placed along the bottom of the trench. The cable shall not be unreeled and pulled into the trench from one end. Slack cable sufficient to provide strain relief shall be placed in the trench in a series of S curves. Sharp bends or kinks in the cable shall not be permitted. Where cables must cross over each other, a minimum of 3 in vertical displacement shall be provided with the topmost cable depth at or below the minimum required depth below finished grade.

Primary airfield lighting cables installed shall have cable circuit identification markers attached on both sides of each L-823 connector and on each airport lighting cable entering or leaving cable access points, such as manholes, handholes, pull boxes, junction boxes, etc. Markers shall be of sufficient length for imprinting the cable circuit identification legend on one line, using letters not less than ¼ in in size. The cable circuit identification shall match the circuits noted on the construction plans.

a. Trenching. Where turf is well established and the sod can be removed, it shall be carefully stripped and properly stored. Trenches for cables may be excavated manually or with mechanical trenching equipment. Walls of trenches shall be essentially vertical so that a minimum of surface is disturbed. Graders shall not be used to excavate the trench with their blades. The bottom surface of trenches shall be essentially smooth and free from coarse aggregate. Unless otherwise specified, cable trenches shall be excavated to a minimum depth of 18 in below finished grade, except as follows:

(1) When off the airport or crossing under a roadway or driveway, the minimum depth shall be 36 in unless otherwise specified.

(2) Minimum cable depth when crossing under a railroad track, shall be 42 in unless otherwise specified.

Dewatering necessary for cable installation, erosion and turbidity control, in accordance with Federal, State, and Local requirements is incidental to its respective pay items as part of Item L-108. The cost of

all excavation regardless of type of material encountered, shall be included in the unit price bid for the L-108 Item.

The Contractor shall excavate all cable trenches to a width not less than 6 in. Unless otherwise specified on the plans, all cables in the same location and running in the same general direction shall be installed in the same trench.

When rock is encountered, the rock shall be removed to a depth of at least 3 in below the required cable depth and it shall be replaced with bedding material of earth or sand containing no mineral aggregate particles that would be retained on a 1/4 in sieve. Flowable backfill material may alternatively be used. The Contractor shall ascertain the type of soil or rock to be excavated before bidding. All such rock removal shall be performed and paid for under Item P-152.

Duct bank or conduit markers temporarily removed for trench excavations shall be replaced as required.

It is the Contractor's responsibility to locate existing utilities within the work area prior to excavation. Where existing active cables cross proposed installations, the Contractor shall insure that these cables are adequately protected. Where crossings are unavoidable, no splices will be allowed in the existing cables, except as specified on the plans. Installation of new cable where such crossings must occur shall proceed as follows:

(1) Existing cables shall be located manually. Unearthed cables shall be inspected to assure absolutely no damage has occurred.

(2) Trenching, etc., in cable areas shall then proceed, with approval of the Engineer, with care taken to minimize possible damage or disruption of existing cable, including careful backfilling in area of cable.

In the event that any previously identified cable is damaged during the course of construction, the Contractor shall be responsible for the complete repair or replacement.

b. Backfilling. After the cable has been installed, the trench shall be backfilled. The first layer of backfill in the trench shall be 3 in deep, loose measurement, and shall be either earth or sand containing no mineral aggregate particles that would be retained on a 1/4 in sieve. This layer shall not be compacted. The second layer shall be 5 in deep, loose measurement, and shall contain no particles that would be retained on a 1 in sieve. The remaining 3rd and subsequent layers of backfill shall not exceed 8 in of loose measurement and be excavated or imported material and shall not contain stone or aggregate larger than 4 in maximum diameter.

The second and subsequent layers shall be thoroughly tamped and compacted to at least the density of the adjacent undisturbed soil, and to the satisfaction of the Engineer. If necessary to obtain the desired compaction, the backfill material shall be moistened or aerated as required.

Trenches shall not contain pools of water during backfilling operations. The trench shall be completely backfilled and tamped level with the adjacent surface, except that when turf is to be established over the trench, the backfilling shall be stopped at an appropriate depth consistent with the type of turfing operation to be accommodated. A proper allowance for settlement shall also be provided. Any excess excavated material shall be removed and disposed of in accordance with the plans and specifications.

Underground electrical warning (caution) tape shall be installed in the trench above all direct-buried cable. Contractor shall submit a sample of the proposed warning tape for acceptance by the Engineer. If not shown on the plans, the warning tape shall be located 6 in above the direct-buried cable or the

counterpoise wire if present. A 4-6 in wide polyethylene film detectable tape, with a metalized foil core, shall be installed above all direct buried cable or counterpoise. The tape shall be of the color and have a continuous legend as indicated on the plans. The tape shall be installed 8 in minimum below finished grade.

c. Restoration. Where soil and sod has been removed, it shall be replaced as soon as possible after the backfilling is completed. All areas disturbed by work shall be restored to its original condition. The restoration shall include the **[sodding] [topsoiling] [fertilizing] [liming] [seeding] [sprigging]** and **[mulching]** as shown on the plans. Refer to specifications T-901 Seeding, T-904 Sodding and T-908 Mulching. The Contractor shall be held responsible for maintaining all disturbed surfaces and replacements until final acceptance. When trenching is through paved areas, restoration shall be equal to existing conditions and compaction shall meet the requirements of Item P-152 Excavation and Embankment. Restoration shall be considered incidental to the pay item of which it is a component part.

108-3.4 CABLE MARKERS FOR DIRECT-BURIED CABLE. The location of direct buried circuits shall be marked by a concrete slab marker, 2 feet (60 cm) square and 4-6 in (100 - 150 mm) thick, extending approximately 1 in (25 mm) above the surface. Each cable run from a line of lights and signs to the equipment vault shall be marked at approximately every 200 feet (60 m) along the cable run, with an additional marker at each change of direction of cable run. All other direct-buried cable shall be marked in the same manner. Cable markers shall be installed directly above the cable. The Contractor shall impress the word "CABLE" and directional arrows on each cable marking slab. The letters shall be approximately 4 in (100 mm) high and 3 in (75 mm) wide, with width of stroke 1/2 in (12 mm) and 1/4 in (6 mm) deep.

The location of each underground cable connection, except at lighting units, or isolation transformers, or power adapters shall be marked by a concrete marker slab placed above the connection. The Contractor shall impress the word "SPlice" on each slab. The Contractor also shall impress additional circuit identification symbols on each slab as directed by the Engineer. All cable markers and splice markers shall be painted international orange. Paint shall be specifically manufactured for uncured exterior concrete. Furnishing and installation of cable markers is incidental to the respective cable pay item.

108-3.5 SPLICING. Connections of the type shown on the plans shall be made by experienced personnel regularly engaged in this type of work and shall be made as follows:

a. Cast Splices. These shall be made by using crimp connectors for jointing conductors. Molds shall be assembled, and the compound shall be mixed and poured in accordance with manufacturer's instructions and to the satisfaction of the Engineer.

b. Field-attached Plug-in Splices. These shall be assembled in accordance with manufacturer's instructions. These splices shall be made by plugging directly into mating connectors. In all cases the joint where the connectors come together shall be wrapped with at least one layer of rubber or synthetic rubber tape and one layer of plastic tape, one-half lapped, extending at least 1-1/2 in (37 mm) on each side of the joint.

c. Factory-Molded Plug-in Splices. These shall be made by plugging directly into mating connectors. In all cases, the joint where the connectors come together shall be wrapped with at least one layer of rubber or synthetic rubber tape and one layer of plastic tape, one-half lapped, extending at least 1-1/2 in (37 mm) on each side of the joint.

d. Taped or Heat-Shrunk Splices. A taped splice shall be made in the following manner: Bring the cables to their final position and cut so that the conductors will butt. Remove insulation and jacket allowing for bare conductor of proper length to fit compression sleeve connector with 1/4 in (6 mm) of bare conductor on each side of the connector. Prior to splicing, the two ends of the cable insulation shall be penciled using a tool designed specifically for this purpose and for cable size and type. Do not use emery paper on splicing operation since it contains metallic particles. The copper conductors shall be

thoroughly cleaned. Join the conductors by inserting them equidistant into the compression connection sleeve. Crimp conductors firmly in place with crimping tool that requires a complete crimp before tool can be removed. Test the crimped connection by pulling on the cable. Scrape the insulation to assure that the entire surface over which the tape will be applied (plus 3 in (75 mm) on each end) is clean. After scraping wipe the entire area with a clean lint-free cloth. Do not use solvents.

Apply high-voltage rubber tape one-half lapped over bare conductor. This tape should be tensioned as recommended by the manufacturer. Voids in the connector area may be eliminated by highly elongating the tape, stretching it just short of its breaking point. Throughout the rest of the splice less tension should be used. Always attempt to exactly half-lap to produce a uniform buildup. Continue buildup to 1-1/2 times cable diameter over the body of the splice with ends tapered a distance of approximately 1 in (25 mm) over the original jacket. Cover rubber tape with two layers of vinyl pressure-sensitive tape one-half lapped. Do not use glyptol or lacquer over vinyl tape as they react as solvents to the tape. No further cable covering or splice boxes are required.

Heat shrinkable tubing shall be installed following manufacturer's instructions. Direct flame heating shall not be permitted unless recommended by the manufacturer. Cable surfaces within the limits of the heat-shrink application shall be clean and free of contaminants prior to application.

108-3.6 BARE COUNTERPOISE WIRE INSTALLATION FOR LIGHTNING PROTECTION AND GROUNDING. If shown on the plans or included in the job specifications, bare counterpoise copper wire shall be installed for lightning protection of the underground cables. Counterpoise wire shall be installed in the same trench for the entire length of buried cable, conduits and duct banks that are installed to contain airfield cables. Where the cable or duct/conduit trench runs parallel to the edge of pavement, the counterpoise shall be installed in a separate trench located half the distance between the pavement edge and the cable or duct/conduit trench. In trenches not parallel to pavement edges, counterpoise wire shall be installed continuously a minimum of 4 in above the cable, conduit or duct bank, or as shown on the plans if greater. Additionally, counterpoise wire shall be installed at least 8 in below the top of subgrade in paved areas or 10 in below finished grade in un-paved areas. This dimension may be less than 4 in where conduit is to be embedded in existing pavement. Counterpoise wire shall not be installed in conduit.

The counterpoise wire shall be routed around to each light fixture base, mounting stake, or junction/access structures. The counterpoise wire shall also be exothermically welded to ground rods installed as shown on the plans but not more than 500 ft (150 m) apart around the entire circuit.

The counterpoise system shall be continuous and terminate ~~at~~ outside the transformer vault or ~~at separate from~~ the power source. It shall be securely attached to the vault or equipment external ground ring or other made electrode grounding system. The connections shall be made as shown on the plans and in the specifications.

If shown on the plans or in the specifications, a separate equipment (safety) ground system shall be provided in addition to the counterpoise wire using one of the following methods:

(1) A ground rod installed at and securely attached to each light fixture base, mounting stake if painted, and to all metal surfaces at junction/access structures.

(2) Install an insulated equipment ground conductor internal to the conduit system and securely attached it to each light fixture base and to all metal surfaces at junction/access structures. This equipment ground conductor shall also be exothermically welded to ground rods installed not more than 500 feet (150 m) apart around the circuit.

a. Counterpoise Wire Installation Above Multiple Conduits and Duct Banks. Counterpoise wires shall be installed above multiple conduits/duct banks for airfield lighting cables, with the intent being to provide a complete cone of protection over the airfield lighting cables. When multiple conduits and/or duct banks for airfield cable are installed in the same trench, the number and location of counterpoise wires above the conduits shall be adequate to provide a complete cone of protection measured 22 ½ degrees each side of vertical.

Where duct banks pass under pavement to be constructed in the project, the counterpoise shall be placed above the duct bank. Reference details on the construction plans.

b. Counterpoise Wire Installation at Existing Duct Banks. When airfield lighting cables are indicated on the plans to be routed through existing duct banks, the new counterpoise wiring shall be terminated at ground rods at each end of the existing duct bank where the cables being protected enter and exit the duct bank. The new counterpoise conductor shall be bonded to the existing counterpoise system.

108-3.7 EXOTHERMIC BONDING. Bonding of ground and counterpoise wire shall be by the exothermic welding process. Only personnel experienced in and regularly engaged in this type of work shall make these connections.

Contractor shall demonstrate to the satisfaction of the Engineer, the welding kits, materials and procedures to be used for welded connections prior to any installations in the field. The installations shall comply with the manufacturer's recommendations and the following:

a. All slag shall be removed from welds.

b. For welds at light fixture base cans, all galvanized coated surface areas and "melt" areas, both inside and outside of base cans, damaged by exothermic bond process shall be restored by coating with a liquid cold-galvanizing compound conforming to U.S. Navy galvanized repair coating meeting Mil. Spec. MIL-P-21035. Surfaces to be coated shall be prepared and compound applied in accordance with manufacturer's recommendations.

c. All buried copper and weld material at weld connections shall be thoroughly coated 6 mil of 3M "Scotchkote," or approved equivalent, or coated with coal tar Bitumastic® material to prevent surface exposure to corrosive soil or moisture.

108-3.8 TESTING. The Contractor shall furnish all necessary equipment and appliances for testing the airport electrical systems and underground cable circuits before and after installation. The Contractor shall perform all tests in the presence of the Engineer. The Contractor shall demonstrate the electrical characteristics to the satisfaction of the Engineer. All costs for testing are incidental to the respective item being tested. For phased projects, the tests must be completed by phase and results meeting the specifications below must be maintained by the Contractor throughout the entire project as well as during the ensuing warranty period.

Earth resistance testing methods shall be submitted to the Engineer for approval. Earth resistance testing results shall be recorded on an approved form and testing shall be performed in the presence of the Engineer. All such testing shall be at the sole expense of the Contractor.

Should the counterpoise or ground grid conductors be damaged or suspected of being damaged by construction activities the Contractor shall test the conductors for continuity with a low resistance ohmmeter. The conductors shall be isolated such that no parallel path exists and tested for continuity.

The Engineer shall approve of the test method selected. All such testing shall be at the sole expense of the Contractor.

After installation, the Contractor shall test and demonstrate to the satisfaction of the Engineer the following:

- a. That all affected lighting power and control circuits (existing and new) are continuous and free from short circuits.
- b. That all affected circuits (existing and new) are free from unspecified grounds.
- c. That the insulation resistance to ground of all new non-grounded series circuits or cable segments is not less than 50 megohms.
- d. That the insulation resistance to ground of all non-grounded conductors of new multiple circuits or circuit segments is not less than 50 megohms.
- e. That all affected circuits (existing and new) are properly connected in accordance with applicable wiring diagrams.
- f. That all affected circuits (existing and new) are operable. Tests shall be conducted that include operating each control not less than 10 times and the continuous operation of each lighting and power circuit for not less than 1/2 hour.
- g. That the impedance to ground of each ground rod does not exceed 25 ohms prior to establishing connections to other ground electrodes. The fall-of-potential ground impedance test shall be used, as described by ANSI/IEEE Standard 81, to verify this requirement.

Two copies of tabulated results of all cable tests performed shall be supplied by the Contractor to the Engineer. Where connecting new cable to existing cable, ground resistance tests shall be performed on the new cable prior to connection to the existing circuit.

There are no approved "repair" procedures for items that have failed testing other than complete replacement.

Refer to Item L-131 for additional testing requirements.

108-3.9 CABLE INSTALLATION REPORTS. Submit copies of the information described below in 8-1/2-inch by 11-inch binders having a minimum of 5 rings from which material may readily be removed and replaced, including a separate section for each cable pull. Sections shall be separated by heavy plastic dividers with tabs, with all data sheets signed and dated by the person supervising the pull.

- a. Site layout drawing with all cable pulls numerically identified.
- b. A list of all equipment used, with calibration certifications.
- c. The manufacturer of and quantity of lubricant used on pull.
- d. The cable manufacturer and type of cable. The dates of cable pulls, time of day, and ambient temperature.
- e. The length of cable pulls and calculated cable pulling tensions.
- f. The actual cable pulling tensions encountered during pull.

METHOD OF MEASUREMENT

108-4.1 Trenching shall be measured by the linear feet (meters) of trench, including the excavation, backfill, and restoration, completed, measured as excavated, and accepted as satisfactory.

When specified, separate measurement shall be made for trenches of various specified widths.

The cost of all excavation, backfill, dewatering and restoration regardless of the type of material encountered shall be included in the unit price bid for the work.

108-4.2 Cable or counterpoise wire installed in trench, duct bank or conduit shall be measured by the number of linear feet (meters) of cable or counterpoise wire installed in trenches, duct bank or conduit, including ground rods and grounding connectors, and trench marking tape ready for operation, and accepted as satisfactory by the Engineer. Separate measurement shall be made for each cable or counterpoise wire installed in trench, duct bank or conduit. The measurement for this item ~~[shall]~~ **[shall not]** include additional quantities required for slack.

BASIS OF PAYMENT

108-5.1 Payment will be made at the contract unit price for trenching, cable and bare counterpoise wire installed in trench (direct-buried), or cable and equipment ground installed in duct bank or conduit, in place by the Contractor and accepted by the Engineer. This price shall be full compensation for furnishing all materials and for all preparation and installation of these materials, and for all labor, equipment, tools, and incidentals, including ground rods and ground connectors and trench marking tape, necessary to complete this item.

Payment will be made under:

- Item L-108-5.1 ~~Trenching for direct-buried cable per linear foot (meter)~~
- Item L-108-5.2 ~~[No. 8 AWG] [No. 6 AWG] L-824C Cable, installed in trench, duct bank or conduit per liner foot (meter)~~
- Item L-108-5.3 ~~Bare Counterpoise Wire, installed in trench, duct bank or conduit, including ground rods and ground connectors per linear foot (meter)~~
- Item L-108-5.4 ~~Bare or insulated equipment ground, installed in duct bank or conduit including ground rods and ground conductors per linear foot (meter)~~

Item L-108-5.1	1/C No. 8 AWG, 5kV, L-824C Cable, Series Lighting Cable Installed in Duct Bank or Conduit -- Per Linear Foot (meter)
Item L-108-5.2	1/C No. 6 AWG, Bare Copper Counterpoise Wire Installed In Trench, Including Ground Rods And Grounding Connectors -- Per Linear Foot (meter).
Item L-108-5.3	1/C #8 600V THHN Cable -- Per Linear Foot (meter)
Item L-108-5.4	1/C #6 600V THHN Cable -- Per Linear Foot (meter)

Item L-108-5.5 1/C #4 Equipment Ground -- Per Linear Foot (meter)

MATERIAL REQUIREMENTS

AC 150/5345-7	Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits
AC 150/5345-26	Specification for L-823 Plug and Receptacle Cable Connectors
FED SPEC J-C-30	Cable and Wire, Electrical Power, Fixed Installation (cancelled; replaced by A-A-59544 Cable and Wire, Electrical (Power, Fixed Installation))
FED SPEC A-A-55809 ASTM B 3	Insulation Tape, Electrical, Pressure-Sensitive Adhesive, Plastic Soft or Annealed Copper Wire
ASTM D 4388	Rubber tapes, Nonmetallic Semiconducting and Electrically Insulating

REFERENCE DOCUMENTS

NFPA No. 70	National Electrical Code (NEC)
MIL-S-23586C	Sealing Compound, Electrical, Silicone Rubber
NN	Building Industry Consulting Service International (BICSI)
ANSI/IEEE Std 81	IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System

END OF ITEM L-108

**SPECIAL PROVISIONS
Job Number: 12-4401
(Duluth International Airport)
(February 10, 2012)**

**CITY of DULUTH
PROJECT SPECIFICATIONS**

**Duluth International Airport-New Passenger Terminal
Bid Package 2C-Sitework & Apron
Concessions and Furnishings
Issue for Bid**

**City of Duluth, MN
411 West 1st St.
Duluth, MN 55802**

Bid # 12-4401

Opening Date: 02/8/12

Time: 2:00 pm

Place: City Hall, Room 400, Duluth MN

SPECIAL PROVISIONS
Job Number: 12-4401
(Duluth International Airport)
(February 10, 2012)

SP-1

SPECIFICATIONS SIGNATURE PAGE

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 or Printed Name

Date

License No.

SPECIAL PROVISIONS
Job Number: 12-4401
(Duluth International Airport)
(February 10, 2012)

SP-2

Table of Contents

SP-1	Certification Page	2
SP-2	Table of Contents	3
SP-3	Forms and Regulations.....	4
SP-4	Scope of Work	5
SP-5	Install Type "C" Light With Foundation.....	5
SP-6	Programmable Circuit Breaker, Square D Type NF Powerlink or Approved Equal.....	5
SP-7	Entrance and Exit Gates w/ Detector Loops w/ Foundations.....	5
SP-8	Provide and Install Parking Stops.....	6
SP-9	Building Demolition	6
SP-10	Remove Valve and Cap Water line.....	6
SP-11	Building Utility Coordination and Demolition (Utility Allowance).....	6
SP-12	Traffic Control Allowance.....	6
SP-13	Increase or Decrease of Quantities	7
SP-14	Commercial Vehicle Gate w/ Detector Loops w/ Foundation.....	7
SP-15	Exit Pay Station	8
SP-16	Private Utility Locating Service	12

Certified Payroll Checklist CDBG Funding Only rev 4/5/11
Data for Labor Cost Bidding
Instructions to Bidders – Engineering 6/02/10
Prevailing Wage Rate(s) Heavy/Highway/Building
Project Insurance Requirements 7/13/09
Request for Bids form

SPECIAL PROVISIONS
Job Number: 12-4401
(Duluth International Airport)
(February 10, 2012)

SP-3

The following forms and regulations/rules/statutes and interpretations, which are incorporated by reference in this contract, are available on the World Wide Web at the sites listed below. The City of Duluth will use its best efforts to ensure that the most recent, applicable forms and regulations/rules/statutes and interpretations are included on the web sites provided; however, if you are the successful bidder, prior to signing the contract, you are responsible for comparing the versions of the forms and regulations/rules/statutes and interpretations attached to the contract which you are signing with the versions on the web to ensure conformity.

THE VERSIONS OF THE FORMS AND REGULATIONS/RULES/STATUTES and INTERPRETATION ATTACHED TO THE CONTRACT WILL BE CONTROLLING. HARD COPIES OF ALL FORMS ARE AVAILABLE AT THE ENGINEERING DIVISION, EXCEPT THE NON-COLLUSION AND AFFIRMATIVE ACTION POLICY STATEMENT, WHICH ARE AVAILABLE AT THE CITY OF DULUTH PURCHASING DEPARTMENT.

Item listing from web:

FORM	WEB SITE
Affidavit of Non-Collusion (required by awarded contractor only)	www.duluthmn.gov/engineering/construction_documents.cfm
Affirmative Action Policy Statement/Certificate - EEO (required by awarded contractor only)	www.duluthmn.gov/engineering/construction_documents.cfm
Bidder's Label for submitting project bids	www.duluthmn.gov/engineering/construction_documents.cfm
Certified Payroll Report form WH347 (front side only)	www.dol.gov/whd/forms/WH347.pdf
Contractor's Haul Route	www.duluthmn.gov/engineering/construction_documents.cfm
Debarment/Suspension Notice 12-13-2011	www.dot.state.mn.us/pre-letting/prov/order/suspension.pdf
HUD 4010	www.hud.gov/offices/adm/hudclips/forms/files/4010.pdf
IC-134 form	www.taxes.state.mn.us/Forms_and_Instructions/ic134.pdf
IC-134 on-line submittal (click: Submit Contractor Affidavit; r-side of screen)	www.mndor.state.mn.us/
MN Rules 5200.1105 & .1106	www.duluthmn.gov/engineering/construction_documents.cfm
MN Statutes 177.41 to 177.44	www.revisor.mn.gov/statutes/?id=177
Notice to Bidders Prompt Payment to Subs	www.duluthmn.gov/engineering/construction_documents.cfm
One-Call Instructions	www.duluthmn.gov/engineering/construction_documents.cfm
Purchasing Division General Specifications	www.duluthmn.gov/engineering/construction_documents.cfm
Request to Sublet TP-21834 (5-12-09)	www.duluthmn.gov/engineering/construction_documents.cfm
Statement of Compliance Form (12-10)	www.dot.state.mn.us/const/labor/forms.html
Statement of Compliance Form - 2 nd page WH347	www.dol.gov/whd/wh347.pdf
Supplemental General Conditions Part II 4/15/11	www.duluthmn.gov/engineering/construction_documents.cfm

SPECIAL PROVISIONS
Job Number: 12-4401
(Duluth International Airport)
(February 10, 2012)

NOTICE TO ALL BIDDERS:

The City of Duluth Public Works & Utilities Department – Engineering Division 2011 Edition Standard Construction Specifications book and any addendums or supplements is incorporated by reference and is deemed to be a part hereof as if fully incorporated and set forth herein. The Standard Construction Specification is available on the City website at www.duluthmn.gov/engineering/index.cfm.

SP-4 **SCOPE OF WORK** The project scope consists of: Bid Package 2C, which includes building demolition, grading, concrete paving, bituminous paving, and lighting; building concessions and furnishings.

SP 5 **TYPE 'C' LIGHT WITH FOUNDATION**

SP-5.1 Lighting pole shall be a Kim Lighting Model No. KSS30-5180/SA, or approved equal, with a standard color finish to be confirmed before placing order. Pole shall come complete with breakaway banner arm and all necessary adapters, and arms to connect the proposed Phillips Master Elite 210 watt 277 volt -Clear fixture, or approved equal.

Busman HEBAF fuseholders/fuses, or approved equal, shall be provided and installed in the base of each light pole.

SP-5.2 Measurement will be made by each unit of entrance lighting unit Type 'C' installed with foundation provided and installed.

SP 5.3 Payment for TYPE 'C' LIGHT WITH FOUNDATION shall be made under Item SP 5.3.

SP-6 **PROGRAMMABLE CIRCUIT BREAKER, SQUARE D TYPE NF POWERLINK OR APPROVED EQUAL**

SP-6.1 Lighting circuits 23 and 24 shall have breakers installed in the existing panel as indicated on the plan sheets. Breakers shall be bolt-on programmable circuit breakers and compatible with the existing NF Power link Panel. The contractor shall be responsible for sizing the breaker to be adequate for the circuit as shown on the plan sheets.

SP-6.2 Measurement will be made by lump sum for all breakers to be provided and installed in existing electrical panel to complete the Lighting Circuits 23 and 24.

SP 6.3 Payment for PROGRAMMABLE CIRCUIT BREAKER, SQUARE D TYPE NF POWERLINK OR APPROVED EQUAL shall be made under Item SP 6.3.

SP-7 **ENTRANCE AND EXIT GATES W/ DETECTOR LOOPS W/FOUNDATIONS**

SP-7.1 The contractor shall provide all labor, equipment and materials necessary to supply, and install AMANO McGANN AMG-1700 SERIES with AL-12 GATES and two XML-PVC-2 Detector Loops. The gate operator shall be equipped with an AL-12 gate arm and an illumination kit. The PARKING GATE shall have a minimum 6" foundation that extends 2' on each side of the operator (or until foundation is adjacent to curb and gutter whichever is less) and anchor bolt system as recommended by the manufacturer. An expansion joint shall be installed per Detail 7 on Sheet C207 if the foundation is adjacent to concrete curb and gutter.

The contractor shall also install a bollard on each side of the gate operator to protect the operator from damage. For bollard details see Sheet C211, Detail 7 (Two bollards per operator).

SP-7.2 Measurement will be made by each unit of entrance and exit gate w/detector loop, foundation, and bollards provided and installed.

SPECIAL PROVISIONS
Job Number: 12-4401
(Duluth International Airport)
(February 10, 2012)

SP 7.3 Payment for ENTRANCE AND EXIT GATES W/ DETECTOR LOOPS W/FOUNDATIONS shall be made under Item SP 7.3.

SP-8 **PROVIDE AND INSTALL PARKING STOPS**

SP-8.1 The contractor shall provide all labor, equipment and materials necessary to provide and install rubber wheel stops. The wheels stops shall be Barco Products Part Number: 06FY1770(YL), or approved equal. The contractor shall provide shop drawings and confirm color of parking stops before ordering.

SP-8.2 Measurement will be made by each unit of parking stops provided and installed.

SP 8.3 Payment for PROVIDE AND INSTALL PARKING STOPS shall be made under Item SP 8.3.

SP-9 **BUILDING DEMOLITION**

SP-9.1 The contractor shall provide all labor, equipment and materials necessary to complete all work associated with the following specifications:

02221 – Building Demolition; 01732 – Selective Demolition

The contractor shall provide review the specifications thoroughly and provide the required signed submittals.

SP-9.2 Measurement will be made by lump sum.

SP-9.3 Payment for BUILDING DEMOLITION shall be made under Item 9.3.

SP-10 **REMOVE VALVE AND CAP WATER LINE**

SP-10.1 The contractor shall provide all labor, equipment and materials necessary to remove the existing 8" valve, cap the 8" ductile iron pipe, and provide concrete blocking to meet the City of Duluth Standard Detail W-2.

SP-10.2 Measurement will be made by each unit of valve and water line capped provided and installed.

SP 10.3 Payment for REMOVE VALVE AND CAP WATER LINE shall be made under Item SP 10.3.

SP-11 **BUILDING UTILITY COORDINATION AND DEMOLITION (UTILITY ALLOWANCE)**

SP-11.1 The contractor shall include a \$35,000.00 allowance to be used to pay for work done by Minnesota Power, Qwest or any other utility company that will be required to transition from the existing terminal to the new terminal building or as directed by the engineer.

SP-11.2 Measurement will be made by the actual amount of the invoice from the utility company. Any portion of the allowance amount not needed for reimbursement for work done by the utility company will not be paid to the Contractor.

SP-11.3 Payment for **BUILDING UTILITY COORDINATION AND DEMOLITION (UTILITY ALLOWANCE)** shall be made under Item SP 11.3.

SP-12 **TRAFFIC CONTROL ALLOWANCE**

SP-12.1 The contractor shall include a \$50,000.00 allowance to be used to pay for traffic control measures.

SPECIAL PROVISIONS
Job Number: 12-4401
(Duluth International Airport)
(February 10, 2012)

SP-12.2 The contractor shall submit a detailed traffic control plan for each phase of construction. The contractor shall furnish, install, and maintain all traffic control devices required in their submitted and approved traffic control plan.

SP-12.3 Measurement will be made by each unit of traffic control device provided and installed.

SP-12.4 Payment for TRAFFIC CONTROL ALLOWANCE shall be made under Item 12.4.

SP-13 **(1903) INCREASED OR DECREASED QUANTITIES**

The provisions of Mn/DOT 1903 regarding overruns and underruns shall not apply to any of the items of work under this Contract.

SP-14 **COMMERCIAL VEHICLE GATE W/ DETECTOR LOOPS, PROXIMITY ACCESS TAGS, AND FOUNDATION**

SP-14.1 The contractor shall provide all labor, equipment and materials necessary to supply, and install AMANO McGANN AMG-1700 SERIES with AL-12 GATES, and two XML-PVC-2 Detector Loops. The gate operator shall be equipped with an AL-12 gate arm and an illumination kit. The PARKING GATE shall have a minimum 6" foundation that extends 2' on each side of the operator (or until foundation is adjacent to curb and gutter whichever is less) and anchor bolt system as recommended by the manufacturer. An expansion joint shall be installed per Detail 7 on Sheet C207 if the foundation is adjacent to concrete curb and gutter.

The contractor shall also install a bollard on each side of the gate operator to protect the operator from damage. For bollard details see Sheet C211, Detail 7 (Two bollards per operator).

The gate operator shall be equipped to be initiated by an internally mounted tag that operates on the FCC 915 MHZ frequency band.

1. Fixed RFID Reader:

The fixed reader should be a fully integrated, self-contained 915 MHz wireless RFID reader specifically targeted at high performance applications in parking, security access, electronic vehicle registration (EVR) and traffic management.

It should be capable of reading any two of the following standard protocols:

- Super eGo®
- eGo® (ISO 18000 6B)
- American Trucking Associations (ATA)
- Interagency Group (IAG)

The fixed reader must be capable of reading read half-frame and full-frame ATA tags and Wiegand formatted tags and identification cards. The unit shall operate with beam or battery powered tags. Unit parameters shall include the following:

Fixed Reader requirements:

- Read range up to 17 feet
- Capable of buffering up to 500 tag reads
- Frequency Range – 911.75 to 919.75 MHz FCC-authorized in Canada and United States
- Communications Interface – RS-232 or RS422 with Wiegand-compatible host interface
- RF Control – By sense input or host command
- I/O Control – Input: Two independent dry contact closures for sense circuits. Outputs: Two independent form C contacts
- Approximate Size – 39.4 cm x 39.4 cm x 8.25 cm (15.5 x 15.5 x 3.25 in)
- Approximate Weight – 4.3 kg (9.5 lb.)

SPECIAL PROVISIONS
Job Number: 12-4401
(Duluth International Airport)
(February 10, 2012)

- Enclosure – The reader shall be a self contained device environmentally sealed in a tamper-proof housing
- Operating Temperature: -40 to +55 ° C (-40°F to +131°F)
- Humidity – 100% condensing
- Vibration – 0.5Grms, 10 to 500 Hz
- Standards – Shall comply with the requirements of Underwriters Laboratories UL-1950 Standard for Safety of Information Technology Equipment
- Verified to Part 15 of the FCC rules for a Class A digital device and comply with the requirements of Underwriters Laboratories UL-1950, Standard for Safety of Information Technology Equipment.
- Capable of being mounted indoors or outdoors on pole or wall mount

2. Internally Mounted Tags:

The contractor shall supply 250 of the internally mounted tags that meet the following requirements:

- Internally Mounted Tag One operates on the FCC approved 915 MHz frequency band and supports eGo protocol.
- Packaged in the form of a flexible sticker.
- The tag should be suited for transportation, trucking and port operations, parking, mCommerce, security-access, vehicle registration and other wireless identification applications
- Read distance of up to 17 feet with licensed eGo readers.
- Non-battery
- Fully compliant with ANSI INCITS 256-2001 and ISO 18000-6B.
- Contains 1024-bits of total memory. This includes a 64-bit ID, 880-bits of user memory formatted and locked as required by application and includes 128 bits of user memory that are factory programmable.
- Attached by a semi-permanent adhesive to the interior of a non-metallic windshield 0.190 to 0.230in in thickness (standard windshields).
- Tag is not damaged when exposed to water washing of the backside of the sticker.
- Tag is not damaged when exposed to commonly spilled beverages, mild cleaning solutions or vinyl plasticizers.
- Capable of unlimited reads and 100,000 write transactions.
- Linear, horizontal polarization.
- The tag's lamination layers are not significantly damaged by extreme exposure to sunlight.
- Operating Temperature range of -40 to +85 degrees Celsius (-40 to +185F).
- Storage Temperature range of -50 to +95 Celsius (-58 to +203F)
- Dimensions should be approximately 2 x 3 inches; and thickness approximately .05 inch.

SP-14.2 Measurement will be made by each unit of commercial vehicle gate w/ detector loops, proximity access tags, foundation and 700 linear feet of Belden 9842 Multi-conductor – Low Capacitance Computer Cable communication cable (or approved equal) provided and installed.

SP 14.3 Payment for COMMERCIAL VEHICLE GATE W/ DETECTOR LOOPS, PROXIMITY ACCESS TAGS, AND FOUNDATION shall be made under Item SP 14.3.

SP-15 **EXIT PAY STATION**

SP-15.1 The contractor shall provide all labor, equipment and materials necessary to supply, and install the Exit Pay Station.

SP-15.2 The Exit Pay Station shall be installed to collect payment for parking in unattended exits of the parking facility. The features shall allow the processing of transient parkers to exit the parking facility using bank notes, coins, and credit card; calculate variable rate or flat fees; process lost tickets, print receipts, and void and vault validated tickets. The exit pay station shall operate as a stand-alone system or on-line to the system Server for

SPECIAL PROVISIONS
Job Number: 12-4401
(Duluth International Airport)
(February 10, 2012)

collection of revenue transactions. It shall read the Airport's existing magnetic stripe access tickets and interface with the existing Amano McGann credit card processing and report generating system.

SP-15.3 The exit pay station shall be located in the exit lanes of the facility for easy access by parking patrons from their vehicle. The patron shall insert the entry ticket into the exit pay station, guided by instructions displayed on the touch screen color monitor and guidance lights on the front panel of the exit pay station. The exit pay station shall automatically calculate the patron's parking fee based on date and time encoded on the ticket, accept payment, tender any change due, issue a customer receipt, validate and vault the ticket, and vend the gate.

SP-15.4 Accepted at a minimum:

1. Entry Ticket dispensed by existing ticket dispensers
2. Entry Ticket validated with magnetic encoder
3. Credit Card
4. Lost Ticket

SP-15.5 Features:

1. Grace Time Control:
 - a. Grace time is the amount of time allocated to the patron to exit the facility without having to pay. Free exit shall be granted via programming to patrons who are compelled to leave within a short period of time
 - b. When the entry ticket time falls within the grace time period, the exit pay station shall accept the patron's ticket, void and vault the ticket and vend the gate.
 - c. The parking fee will calculate from actual time of entry once the Grace period has been exceeded.
2. Complementary Time Control:
 - a. Complementary time is additional free time allocated to the patron for exit lane processing for long wait times due to high volume mass-exiting of a facility.
 - b. Programmed Complementary time period shall be a programmable time subtracted from the duration of the patron's stay, or a minimum fee.
3. Daylight Savings Time: Exit pay station shall automatically adjust its clock upon the beginning and end of daylight savings time.
4. Off-line Credit Card Control:
 - a. Off-line with the system server, the exit pay station shall continue to accept payment in note and coin.
 - b. Credit card transactions shall be denied until communications with the system server are re-established.
5. Ticket/Card Reader Unit:
 - a. Shall read all accepted tickets, management cards and credit cards,
 - b. Erase encoding from all vaulted tickets;
 - c. Print and vault all paid tickets with transaction data including at a minimum month, day, year, time of payment, fee and calculated rate.
6. Coin Acceptor shall accept and sort U.S.\$.05, .10, .25 and 1.00 coins and recycle coins for change.
7. Bank Note Acceptor shall allow 4-way note insertion and accept U.S.\$1.00, \$5.00, \$10.00, \$20.00 notes.
8. Credit Card: Exit pay station shall read all major credit cards (consult financial processor for availability), and process credit cards real time via the system server.
9. Bank note vault shall store all notes collected by the bank note acceptor.

SPECIAL PROVISIONS
Job Number: 12-4401
(Duluth International Airport)
(February 10, 2012)

10. Coin vault shall store overflow coins.
11. Receipt/Report Printer shall have the capacity to print approximately 500 receipts per roll.
12. Front Panel shall include a touch screen graphic monitor to display all user information and include operational buttons to select and respond to program prompts. User operation shall include at a minimum:
 - a. Cancel
 - b. Lost Ticket
 - c. Receipt
 - d. Help (intercom)
13. Patron guidance lights shall light when appropriate and indicate to the patron where to insert tickets, credit card, notes and coin.
14. Invalid Operation Indication: If an unreadable, invalid or expired ticket or credit card is inserted, it shall be returned to the patron accompanied by a voice announcement and display message informing the patron of the reason for the denial. If applicable, ticket or credit card shall be returned to patron.
15. Ticket Box shall have the capacity to store a minimum of 1500 vaulted tickets.
16. Voice Guide shall deliver verbal instructions to the patron and include at a minimum instruction for payment, fee, alarm and receipt.
17. Validation Accounts:
 - a. Store ID's (validation accounts) shall be assignable to participating merchants that will be validating parking patron's valid entry tickets with a magnetic encoder.
 - b. Each Store ID shall be programmable in the exit pay station with its own unique ID.
 - c. Validations at a minimum shall be by time, fee, percent, flat fee, and surcharge.
 - d. Exit pay station shall read the Store ID encoded on the ticket and automatically apply the discount or surcharge to the parking fee.
18. Taxes:
 - a. Only one tax rate shall apply.
 - b. Tax shall be programmable to apply before or after validation is applied.
 - c. Each calculation mode shall have the capability to apply a programmable tax (0.00% – 99.99%).
 - d. Unit shall be programmable to include or exclude tax.
 - e. The tax total shall be reported in each total of T/GT.
 - f. The amount of tax can be split into up to four separate taxes when sent to the facility management PC.
19. Cancellation of a Transaction:
 - a. A transaction may be cancelled at any time prior to completed payment of the parking fee.
 - b. Partial amount tendered shall be refunded in coins (if applicable).
 - c. Once full parking fee payment is completed or credit card approval process has started, transaction cancellation cannot be performed and refunds shall not be available.
20. Out of Change:
 - a. The unit shall be programmable to stop operation.
 - b. Display a closed message to the patron.
 - c. Issue a claim check for the amount of change due the patron.
21. Bank Note Full Operation: the unit can be programmed as "Out of Service" or to continue to accept coins.

SPECIAL PROVISIONS
Job Number: 12-4401
(Duluth International Airport)
(February 10, 2012)

22. Reports shall include at a minimum:

- a. T-Total/subtotal
- b. GT-Total/subtotal
- c. Hopper Total/subtotal
- d. Coin Vault Total/subtotal
- e. Note Vault Total/subtotal
- f. System Parameters
- g. Journal Record
- h. Error Log
- i. Alarm record

23. Security: Exit Pay Station should contain at a minimum:

- a. Concealed hinges.
- b. Multiple locks to access the front cabinet door.
- c. Lock to access the drawer of bank note vault.
- d. Lock to access the coin hoppers door.
- e. Each coin hopper's security box.
- f. Lock to access the coin vault.
- g. Lock to access the bank note vault.
- h. Password protection via Management Cards.

24. Events and alarms shall include but not be limited to the following:

- a. Receipt paper out
- b. Coin empty
- c. Door alarm
- d. Coin vault full
- e. Bank Note vault full
- f. Door open
- g. Out of Change – Operation stopped
- h. Note reader error
- i. Bank note vault error
- j. Shutter error
- k. Magnetic reader error
- l. CPU error
- m. Coin validator error
- n. Credit card server error
- o. Credit card processing error
- p. Time out error

25. Management cards shall be user-programmable and each programmable with varying levels of security management. Varying security level functions include at a minimum money management, inventory, subtotal and fill.

26. Exit pay station shall include an electronic shutter system activated by the start of a transaction that shall reduce damage to the unit that may be caused by weather (rain, dust, snow) or vandalism.

SP-15.6 Rate Structures:

- 1. The exit pay station shall have at a minimum three calculation modes:
 - a. Day-Night Zone mode
 - b. Regressive Zone mode
 - c. Block Pattern mode

SPECIAL PROVISIONS
Job Number: 12-4401
(Duluth International Airport)
(February 10, 2012)

1. Day-Night Zone calculation mode:
 - a. Fee shall depend on the actual time a time zone is entered.
 - b. A minimum of 3 systems of time zone structures.
 - c. A minimum of 12 rates shall be programmable.
3. Regressive Zone calculation mode:
 - a. Fee shall depend on the length of time parked.
 - b. A minimum of 3 systems of time zone structures.
 - c. Each system can have up to 12 patterns for parking time.
 - d. A minimum of 12 rates shall be programmable.
2. Block Pattern calculation mode:
 - a. Combining the Day-Night Zone mode and the Regressive Zone mode can set the fee.
 - b. A minimum of 5 systems of time zone structures.
 - c. Each system can be separated into up to 6 time zones.
 - d. Each zone can have up to 10 patterns for parking time.
 - e. A minimum of 8 rates shall be programmable.

SP-15.7 Construction: The cabinet shall be constructed of heavy-gauge, all-weather steel welded construction and a powder-coated paint finish for maximum protection against corrosion. The color shall match the existing equipment installed on-site.

The exit pay station shall have a minimum 6" foundation that extends 2' on each side of the operator (or until foundation is adjacent to curb and gutter whichever is less) and anchor bolt system as recommended by the manufacturer. An expansion joint shall be installed per Detail 7 on Sheet C207 if the foundation is adjacent to concrete curb and gutter.

The contractor shall also install a bollard on each side of the gate operator to protect the operator from damage. For bollard details see Sheet C211, Detail 7 (Two bollards per operator).

SP-15.8 Measurement will be made by each unit of exit pay station provided and installed. Power and communications cable conduit all materials, equipment and labor necessary to connect the exit pay station to the Revenue Control Booth to create a working system shall be included in the unit price of the item.

SP 15.9 Payment for EXIT PAY STATION shall be made under Item SP 15.9.

SP-16 **PRIVATE UTILITY LOCATING SERVICE**

SP-16.1 The contractor shall retain a certified utility locating service to locate all private (DAA owned) utilities within the project limits.

SP-16.2 Measurement of the item PRIVATE UTILITY LOCATING SERVICE will be on a lump sum basis.

SP-16.3 Payment for PRIVATE UTILITY LOCATING SERVICE shall be made under Item SP 16.3.

**NEW PASSENGER TERMINAL
DULUTH INTERNATIONAL AIRPORT
DULUTH, MINNESOTA**

SECTION 16670 - LIGHTNING PROTECTION

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. This Section includes lightning protection for buildings and associated structures and requirements for lightning protection system components.

1.3 SYSTEM DESCRIPTION

- A. Protect entire building and outlying electro/mechanical equipment.

1.4 SUBMITTALS

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Product Data for each component specified.
- C. Shop Drawings detailing lightning protection system. Include air terminal locations, conductor routing and connections, and bonding and grounding provisions. Include indications for use of raceway and data on how concealment requirements will be met.
- D. Qualification data for firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include data on listing or certification by Nationally Recognized Testing Laboratory (NRTL) or trade association. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- E. Certification, signed by Contractor, that roof adhesive for air terminals is approved by manufacturers of both the terminal assembly and the single-ply membrane roofing material.
- F. Field inspection reports indicating compliance with specified requirements.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer who is Underwriters Laboratories listed.

- B. Listing and Labeling: Provide products specified in this Section that are Underwriters Laboratories listed and labeled.
 - 1. The Terms "Listed" and "Labeled": As defined in the National Electrical Code, Article 100.
- C. Comply with NFPA 70, as amended by state and local codes.
- D. Comply with NFPA 780.
- E. Comply with UL 96 and UL 96A.
- F. Provide UL Master Label to owner.

1.6 SEQUENCING AND SCHEDULING

- A. Coordinate installation of lightning protection with installation of other building systems and components, including electrical wiring, supporting structures and building materials, metal bodies requiring bonding to lightning protection components, and building finishes.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:
 - 1. Approved Lightning Protection Co., Inc.
 - 2. Harger Lightning Protection, Inc.
 - 3. Heary Bros. Lightning Protection Co.
 - 4. Thompson Lightning Protection Co.

2.2 LIGHTNING PROTECTION SYSTEM COMPONENTS

- A. System Materials: Copper, with solid air terminals, except as otherwise indicated.
- B. Air Terminals for Single-Ply Membrane Roof Mounting: Units with bases especially designed for single-ply membrane roof materials.
- C. Ground Rods: Copper-clad steel with a minimum of 27 percent of rod weight in copper cladding.
 - 1. Diameter: 3/4 inch (19 mm).
 - 2. Length: 10 feet (3 m).
- D. Arresters, Protectors and Antenna-Discharge Units: Comply with UL 1449.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces, areas, and conditions, with Installer present, for compliance with installation tolerances and other conditions affecting performance of lightning protection. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install lightning protection as indicated, according to manufacturer's written instructions.
- B. Comply with UL 96A, and NFPA 780.
- C. Conform to the most stringent requirements when more than one standard is specified.
- D. Install conductors with direct paths from air terminals to ground connections. Avoid sharp bends and narrow loops. Where concealed, run conductors in nonmetallic raceway - Schedule 40 minimum.
- E. Conceal system conductors.
- F. Conceal conductors from normal view from exterior locations at grade within 200 feet (60 m) of building.
- G. Provide notification at least 48 hours before concealing lightning protection components.
- H. Cable Connections: Use approved exothermic-welded connections for all conductor splices and connections between conductors and other components, except those above single-ply membrane roofing.
- I. Air Terminals on Single-Ply Membrane Roofing: Comply with adhesive manufacturer's installation instructions.
- J. Bond extremities of vertical metal bodies exceeding 60 feet (18 m) in length to lightning protection components.
- K. Bond ground terminals to counterpoise conductor.
- L. Bond grounded metal bodies on building within 12 feet (4 m) of ground to counterpoise conductor.
- M. Bond grounded metal bodies on building within 12 feet (4 m) of roof to counterpoise conductor.
- N. Bond grounded metal bodies on building within 12 feet (4 m) of roof to interconnecting loop at eave level or above.

- O. Bond lightning protection components to grounded metal bodies on building at every 60 feet (18 m) with intermediate-level interconnection loop conductors.
- P. Install lightning arresters, protectors and antenna discharge units on all incoming electrical and telecommunication services and antenna lead-ins.

3.3 CORROSION PROTECTION

- A. Do not combine materials that can form an electrolytic couple that will accelerate corrosion in the presence of moisture, unless moisture is permanently excluded from the junction of such materials.
- B. Use conductors with protective coatings where conditions would cause deterioration or corrosion of conductors.

3.4 FIELD QUALITY CONTROL

- A. UL Inspection: Apply for inspection by UL as required for UL master labeling of system. Provide additional components as required to obtain UL Master Label at no additional cost to owner.

END OF SECTION 16670



DULUTH INTERNATIONAL AIRPORT

Director of Airports: Brian Ryks
4701 GRINDEN DRIVE - DULUTH INTERNATIONAL AIRPORT
DULUTH, MINNESOTA 55811

FAA AIP No. - 3-27-0024-48-10
RS&H PROJ. No. - 213.1882.091
CITY OF DULUTH BID No. - 11-4403

DULUTH AIRPORT AUTHORITY BOARD OF DIRECTORS

- President: John Eagleton
- Vice President: Robert Pearson
- Secretary: Michael Lundstrom
- Conrad Firling
- Roy Niemi
- Sue Ross
- Roger Wedin



**NEW PASSENGER TERMINAL
BID PACKAGE 2C - ISSUE FOR BID
VOLUME 3 OF 3
MECHANICAL, ELECTRICAL, PLUMBING,
FIRE PROTECTION
FEBRUARY 10, 2012**



Construction Managers:
KRAUS-ANDERSON.
3716 Oneota Street
Duluth MN 55807
TEL: (218) 722-3775 / FAX: (218) 722-3778



Architects and Civil Engineers:
REYNOLDS, SMITH & HILLS, INC.
4525 Airport Approach Road,
Duluth MN 55811
TEL: (218) 722-1227 / FAX: (218) 722-1052

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) 722-9306

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

Public Address Consultants:
SHEN, MILSOM & WILKE, LLC
2 N. Riverside Plaza #1460
Chicago IL 60606
TEL: (312) 559-4585 / FAX (312) 559-5393

DRAWING LIST – VOLUME 1

G101 DRAWING LIST
<u>CIVIL</u>
C001 SUMMARY OF QUANTITIES
C002 SAFETY AND SECURITY NOTES & DETAILS
C003 GENERAL CONSTRUCTION NOTES, LEGEND AND ABBREVIATIONS
C004 ULTIMATE DEVELOPMENT SITE PLAN
C005 CONTRACT LAYOUT PLAN AND CONTRACT NOTES
C006 SAFETY PHASING PLAN PHASE 1
C007 SAFETY PHASING PLAN PHASE 2
C008 SAFETY PHASING PLAN PHASE 3
C009 HORIZONTAL AND VERTICAL CONTROL PLANS AND NOTES
C020 GEOTECHNICAL BORING LAYOUT AND INFORMATION
C021 GEOTECHNICAL BORING LOGS
C022 GEOTECHNICAL BORING LOGS
C100 OVERALL DEMOLITION PLANS AND NOTES
C101 DEMOLITION PIERAL PLAN
C102 DEMOLITION PLAN
C103 DEMOLITION PLAN
C104 DEMOLITION PLAN
C104A DEMOLITION PLAN
C120 DEMOLITION DETAILS
C121 DEMOLITION DETAILS
C200 OVERALL GEOMETRY PLAN
C201 GEOMETRY PLAN
C202 GEOMETRY PLAN
C203 GEOMETRY PLAN
C204 GEOMETRY PLAN
C204A GEOMETRY PLAN
C205 TYPICAL PAVEMENT SECTIONS
C206 TYPICAL PAVEMENT JOINT DETAILS
C207 TYPICAL PAVEMENT JOINT DETAILS
C208 CURB, GUTTER AND STRUCTURE JOINT DETAILS
C209 FENCING LAYOUT SITE PLAN AND NOTES
C210 FENCING AND GATE DETAILS
C211 FENCING AND GATE DETAILS
C400 OVERALL GRADING AND EROSION CONTROL PLAN & NOTES
C401 GRADING AND EROSION CONTROL PLAN
C402 GRADING AND EROSION CONTROL PLAN
C403 GRADING AND EROSION CONTROL PLAN
C404 GRADING AND EROSION CONTROL PLAN
C404A GRADING AND EROSION CONTROL PLAN
C407 EROSION & SEDIMENTATION CONTROL NOTES & DETAILS
C408 EROSION & SEDIMENTATION CONTROL NOTES & DETAILS
C409 EROSION & SEDIMENTATION CONTROL NOTES & DETAILS
C410 EROSION & SEDIMENTATION CONTROL NOTES & DETAILS
C500 OVERALL SITE UTILITY PLAN AND NOTES
C501 SITE UTILITY PLAN
C502 SITE UTILITY PLAN
C503 SITE UTILITY PLAN
C504 SITE UTILITY PLAN
C504A SITE UTILITY PLAN
C510 SITE UTILITY TABLE
C511 SITE UNDERDRAIN TABLE
C512 STORM CHAMBER SYSTEM
C513 WATER QUALITY UNIT
C514 WATER QUALITY UNIT DETAILS
C520 SITE UTILITY PROFILES
C521 SITE UTILITY PROFILES
C530 CITY OF DULUTH UTILITY DETAILS
C531 CITY OF DULUTH UTILITY DETAILS
C532 DRAINAGE DETAILS
C533 DRAINAGE DETAILS
C534 DRAINAGE DETAILS
C535 DRAINAGE DETAILS
C536 DRAINAGE DETAILS
C601 CONCRETE JOINT LAYOUT PLAN
C602 CONCRETE JOINT LAYOUT PLAN
C610 CONCRETE JOINT SPOT ELEVATION PLAN
C611 CONCRETE JOINT SPOT ELEVATION PLAN
C612 CONCRETE JOINT SPOT ELEVATION PLAN
C613 CONCRETE JOINT SPOT ELEVATION PLAN
C700 PAVEMENT MARKING REMOVAL PLAN
C701 PAVEMENT MARKING PLAN
C702 LANDSIDE PAVEMENT MARKING PLAN AND DETAILS
C710 PAVEMENT MARKING DETAILS
<u>CIVIL – ELECTRICAL</u>
E000 ELECTRICAL NOTES
E101 PROPOSED LIGHTING AND SIGNAGE PLAN
E102 PROPOSED LIGHTING AND SIGNAGE PLAN
E103 PROPOSED LIGHTING AND SIGNAGE PLAN
E104 PROPOSED LIGHTING AND SIGNAGE PLAN
E104A PROPOSED LIGHTING AND SIGNAGE PLAN
E300 AIRFIELD SIGNAGE PLAN
E400 TAXIWAY GUIDANCE SIGN DETAILS
E401 ELECTRICAL DETAILS
E402 ELECTRICAL DETAILS
<u>CIVIL – CROSS SECTIONS</u>
X100 CROSS SECTION SUMMARY PLAN
X110 CROSS SECTIONS STA. 0+00 TO STA. 0+50
X111 CROSS SECTIONS STA. 1+00 TO STA. 1+50
X112 CROSS SECTIONS STA. 2+00 TO STA. 2+50
X113 CROSS SECTIONS STA. 3+00 TO STA. 3+50
X114 CROSS SECTIONS STA. 4+00 TO STA. 4+50
X115 CROSS SECTIONS STA. 5+00 TO STA. 5+50
X116 CROSS SECTIONS STA. 6+00 TO STA. 6+50
X117 CROSS SECTIONS STA. 7+00 TO STA. 7+50
X118 CROSS SECTIONS STA. 8+00 TO STA. 8+50
X119 CROSS SECTIONS STA. 9+00 TO STA. 9+50
X120 CROSS SECTIONS STA. 10+00 TO STA. 10+50
X121 CROSS SECTIONS STA. 11+00 TO STA. 11+50
X122 CROSS SECTIONS STA. 12+00 TO STA. 12+50
X123 CROSS SECTIONS STA. 13+00 TO STA. 13+50
X124 CROSS SECTIONS STA. 14+00 TO STA. 14+50
X125 CROSS SECTIONS STA. 15+00 TO STA. 15+50
X126 CROSS SECTIONS STA. 16+00 TO STA. 16+50
X127 CROSS SECTIONS STA. 17+00 TO STA. 17+50
X128 CROSS SECTIONS STA. 18+00
X129 CROSS SECTIONS STA. 18+50
X130 CROSS SECTIONS STA. 19+00
X131 CROSS SECTIONS STA. 19+50
X132 CROSS SECTIONS STA. 20+00
X133 CROSS SECTIONS STA. 20+50
X134 CROSS SECTIONS STA. 21+00
X135 CROSS SECTIONS STA. 21+40

DRAWING LIST – VOLUME 2

G101 DRAWING LIST
<u>ARCHITECTURAL</u>
A5100 OVERALL SITE PLAN
A5101 ARCHITECTURAL SITE PLAN
A5102 PASSENGER BOARDING BRIDGES
A5103 PASSENGER BOARDING BRIDGES
A001 ABBREVIATIONS AND GENERAL NOTES
A002 SYMBOLS AND ADA
A003 PARTITION TYPES
A101 OVERALL FIRST FLOOR PLAN
A102 OVERALL SECOND FLOOR PLAN
A103 OVERALL THIRD FLOOR PLAN
A104 OVERALL ROOF PLAN
A110 FIRST FLOOR AREA A
A111 FIRST FLOOR AREA B
A112 SECOND FLOOR AREA A
A113 SECOND FLOOR AREA B
A114 THIRD FLOOR AREA A
A115 THIRD FLOOR AREA B
A201 OVERALL FIRST FLOOR RCP
A202 OVERALL SECOND FLOOR RCP
A203 OVERALL THIRD FLOOR RCP
A210 ENLARGED FIRST FLOOR RCP AREA A
A211 ENLARGED FIRST FLOOR RCP AREA B
A212 ENLARGED SECOND FLOOR RCP AREA A
A213 ENLARGED SECOND FLOOR RCP AREA B
A214 ENLARGED THIRD FLOOR RCP AREA A
A215 ENLARGED THIRD FLOOR RCP AREA B
A301 EXTERIOR ELEVATIONS
A302 EXTERIOR ELEVATIONS
A310 BUILDING SECTIONS
A311 BUILDING SECTIONS
A401 WALL SECTIONS
A402 WALL SECTIONS
A403 WALL SECTIONS
A404 WALL SECTIONS
A405 WALL SECTIONS
A510 PLAN DETAILS
A511 PLAN DETAILS
A512 PLAN DETAILS
A513 PLAN DETAILS
A514 PLAN DETAILS – EXIT CORRIDOR
A520 SECTION DETAILS
A521 SECTION DETAILS
A522 SECTION DETAILS
A530 EXTERIOR SYSTEMS – VERTICAL CIRCULATION
A530A EXTERIOR SYSTEMS – VERTICAL CIRCULATION
A530B EXTERIOR SYSTEMS – VERTICAL CIRCULATION
A531 INTERIOR SYSTEMS – VERTICAL CIRCULATION
A532 INTERIOR SYSTEMS – VERTICAL CIRCULATION
A533 INTERIOR SYSTEMS – VERTICAL CIRCULATION
A534 INTERIOR SYSTEM SHEET – MAIN ELEVATOR
A535 INTERIOR SYSTEM SHEET – MAIN STAIR AND ESCALATOR
A536 EXTERIOR SYSTEM SHEET – APRON RAMPS
A537 EXTERIOR SYSTEM SHEET – APRON RAMP CANOPY
A538 EXTERIOR SYSTEM SHEET – APRON RAMP CANOPY DETAILS
A560 MILLWORK ELEVATIONS
A561 MILLWORK ELEVATIONS
A562 MILLWORK ELEVATIONS AND DETAILS
A563 MILLWORK DETAILS
A564 MILLWORK ELEVATIONS AND DETAILS – TICKETING
A565 MILLWORK ELEVATIONS AND DETAILS – RENT–A–CAR
A566 MILLWORK ELEVATIONS AND DETAILS – CBP
A567 MISC. MILLWORK DETAILS
A601 INTERIOR ELEVATIONS
A602 INTERIOR ELEVATIONS
A603 INTERIOR ELEVATIONS
A604 INTERIOR ELEVATIONS
A605 INTERIOR ELEVATIONS
A606 INTERIOR ELEVATIONS
A607 INTERIOR ELEVATIONS
A608 INTERIOR ELEVATIONS
A610 INTERIOR SYSTEM SHEET – RESTROOMS
A611 INTERIOR SYSTEM SHEET – RESTROOMS
A612 INTERIOR SYSTEM SHEET – RESTROOMS
A620 INTERIOR SYSTEM SHEET – WOOD CEILING
A621 INTERIOR SYSTEM SHEET – METAL CEILING
A622 CEILING SECTION DETAILS
A623 CEILING PLAN DETAILS
A630 FEATURE WALL SYSTEM DETAILS
A631 FEATURE WALL SYSTEM DETAILS
A632 FEATURE WALL SYSTEM DETAILS
A701 DOOR SCHEDULES
A702 DOOR DETAILS
A703 DOOR DETAILS
A704 DOOR DETAILS
A710 EXTERIOR SYSTEM SHEET – LANDSIDE CURTAIN WALL
A711 EXTERIOR SYSTEM SHEET – LANDSIDE CURTAIN WALL
A712 EXTERIOR SYSTEM SHEET – AIRSIDE CURTAIN WALL
A713 EXTERIOR SYSTEM SHEET – AIRSIDE CURTAIN WALL
A714 EXTERIOR SYSTEM SHEET – ENTRY VESTIBULE
A715 EXTERIOR SYSTEM SHEET – CORE WALL
A720 EXTERIOR SYSTEM SHEET – TUG TUNNEL
A721 EXTERIOR SYSTEM SHEET – TUG TUNNEL
A722 EXTERIOR SYSTEM SHEET – TUG TUNNEL
A723 EXTERIOR SYSTEM SHEET – CANOPY
A724 EXTERIOR SYSTEM SHEET – REVENUE CONTROL BOOTH
A725 EXTERIOR SYSTEM SHEET – REVENUE CONTROL BOOTH
A801 INTERIOR FINISH SCHEDULES
A802 INTERIOR MATERIALS SCHEDULE
A811 FIRST FLOOR FURNITURE PLAN
A812 FIRST FLOOR FURNITURE PLAN – AREA A
A813 FIRST FLOOR FURNITURE PLAN – AREA B
A814 SECOND FLOOR FURNITURE PLAN
A815 SECOND FLOOR FURNITURE PLAN – AREA A
A816 SECOND FLOOR FURNITURE PLAN – AREA B
A817 THIRD FLOOR FURNITURE PLAN
A818 THIRD FLOOR FURNITURE PLAN – ADMIN.
A901 CONCESSIONS PLAN
A902 CONCESSIONS REFLECTED CEILING PLAN
A903 CONCESSIONS ELEVATIONS AND DETAILS
<u>FOOD SERVICE</u>
FS101 FOOD SERVICE EQUIPMENT PLAN AND SCHEDULE
FS201 FOOD SERVICE EQUIPMENT ELEVATIONS AND SECTIONS
FS202 FOOD SERVICE EQUIPMENT ELEVATIONS AND SECTIONS
FS301 FOOD SERVICE EQUIPMENT SPECIAL CONDITIONS PLAN AND DETAILS
FS401 FOOD SERVICE EQUIPMENT STANDARD DETAILS
FS402 FOOD SERVICE EQUIPMENT STANDARD DETAILS
FS403 FOOD SERVICE EQUIPMENT STANDARD DETAILS

DRAWING LIST – VOLUME 3

G101 DRAWING LIST
<u>MECHANICAL</u>
M001 MECHANICAL LEGEND
M002 MECHANICAL SYMBOLS
M110 ENLARGED FIRST FLOOR MECHANICAL PLAN AREA A
M111 ENLARGED FIRST FLOOR MECHANICAL PLAN AREA B
M112 PARTIAL SECOND FLOOR MECHANICAL PLAN – CONCESSIONS AREA
M114 PARTIAL THIRD FLOOR MECHANICAL PLAN – CONCESSIONS AREA
M116 PARTIAL ROOF LEVEL MECHANICAL PLAN – CONCESSIONS AREA
M303 TUG TUNNEL RAMP SNOW MELT PLAN, FLOW DIAGRAM AND DETAILS
M401 MECHANICAL SCHEDULES & DETAILS
M401C MECHANICAL EQUIPMENT SCHEDULES
M503 MECHANICAL DETAILS
M506 RAMP SNOW MELT SYSTEM DETAILS
MP111 ENLARGED FIRST FLOOR MECHANICAL PIPING PLAN AREA B
MP112 ENLARGED SECOND FLOOR MECHANICAL PIPING PLAN AREA A
MP113 ENLARGED SECOND FLOOR MECHANICAL PIPING PLAN AREA B
MP114 ENLARGED THIRD FLOOR MECHANICAL PIPING PLAN AREA A
MP115 ENLARGED THIRD FLOOR MECHANICAL PIPING PLAN AREA B
<u>ELECTRICAL</u>
E001C ELECTRICAL SYMBOLS
E112C ENLARGED SECOND FLOOR ELECTRICAL PLAN – AREA A
E116 ELECTRICAL ROOF PLAN
E117 RAMP ELECTRICAL POWER AND LIGHTING PLAN
EL112C ENLARGED SECOND FLOOR LIGHTING PLAN – AREA A
E300C BLDG POWER RISER DIAGRAM
E301 PANEL SCHEDULES
E301C PANEL SCHEDULES
E400 ELECTRICAL ABBREVIATIONS AND TABLES
E401 LIGHTING FIXTURE SCHEDULE
E404 PANEL SCHEDULES
E405 PANEL SCHEDULES
E406 PANEL SCHEDULES
E407 PANEL SCHEDULES
ET001 TECHNOLOGY/ SECURITY SYSTEMS LEGEND AND NOTES
ET401 TECHNOLOGY FIRST FLOOR PLAN
ET402 TECHNOLOGY SECOND FLOOR PLAN
ET403 TECHNOLOGY THIRD FLOOR PLAN
ET410 TECHNOLOGY FIRST FLOOR PLAN AREA A
ET411 TECHNOLOGY FIRST FLOOR PLAN AREA B
ET412 TECHNOLOGY SECOND FLOOR PLAN AREA A
ET413 TECHNOLOGY SECOND FLOOR PLAN AREA B
ET414 TECHNOLOGY THIRD FLOOR PLAN AREA A
ET415 TECHNOLOGY THIRD FLOOR PLAN AREA B
ET501 COMMUNICATIONS EQUIPMENT RACK ELEVATION
ET502 ENLARGED ROOM PLANS
ET503 ACCESS CONTROL DETAILS
ET504 ACCESS CONTROL DETAILS
ET505 ACCESS CONTROL SIGNS
ET600 ACCESS POINT SCHEDULE
ET601 SECURITY RISER
ET602 MUFIDS RISER
ET603 VIDEO SURVEILLANCE RISER
ET604 NETWORK RISER
ET605 CATV & DISPLAY RISERS
ET606 COMMUNICATION RISER

<u>PLUMBING</u>
P001 PLUMBING SYMBOL LIST, ABBREVIATIONS AND DRAWING LIST
P110 ENLARGED FIRST FLOOR PLUMBING PLAN AREA A
P111 ENLARGED FIRST FLOOR PLUMBING PLAN AREA B
P112 ENLARGED SECOND FLOOR PLUMBING PLAN AREA A
P114 ENLARGED THIRD FLOOR PLUMBING PLAN AREA A
P122 TUG RAMP ROOF PLUMBING PLAN
P210 FIRST FLOOR FOOD SERVICE PLUMBING PLAN
P212 SECOND FLOOR FOOD SERVICE PLUMBING PLAN
P501 PLUMBING SCHEDULES
<u>FIRE PROTECTION</u>
F001 FIRE PROTECTION SYMBOL LIST, ABBREVIATIONS AND DRAWING INDEX



Reynolds, Smith and Hills, Inc.
4525 Airport Approach Rd, Ste A
Duluth, Minnesota 55811
218-722-1227 Fax: 218-722-1052
www.rsandh.com



DULUTH
INTERNATIONAL
AIRPORT
DULUTH, MN

NEW PASSENGER
TERMINAL

<u>CONSULTANTS</u>
Interior Architects:
SJA ARCHITECTS
11 E Superior Street Suite 340, Duluth MN 55802 TEL: (218) 724-6578 / FAX: (218) 724-8717
Structural Engineers:
MBJ CONSULTING ENG.
501 Lake Avenue South, Suite 300, Duluth MN 55802 TEL: (218) 722-1056 / FAX: (218) 722-9306
M/E/P/F 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
Landscape Consultants:
APPOLO DESIGN
2432 East First Street, Duluth MN 55812 TEL: (218) 591-5079

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: 06-03-10 Reg. No.: 46001

REVISIONS		
NO.	BID DESCRIPTION	DATE
	FOUNDATION PERMIT	6.11.10
1,2,3	NOT CHANGED	
	CONFIRMANCE SET	7.12.10
	BUILDING PERMIT	8.16.10
4	BUILDING PERMIT REVISIONS	11.12.10
	BID PACKAGE 2A	1.24.11
	BP2A CONFIRMANCE SET	5.2.11
	BID PACKAGE 2B REVIEW	7.6.11
	BP2B CONFIRMANCE	10.21.11
	BID PACKAGE 2C	2.10.12

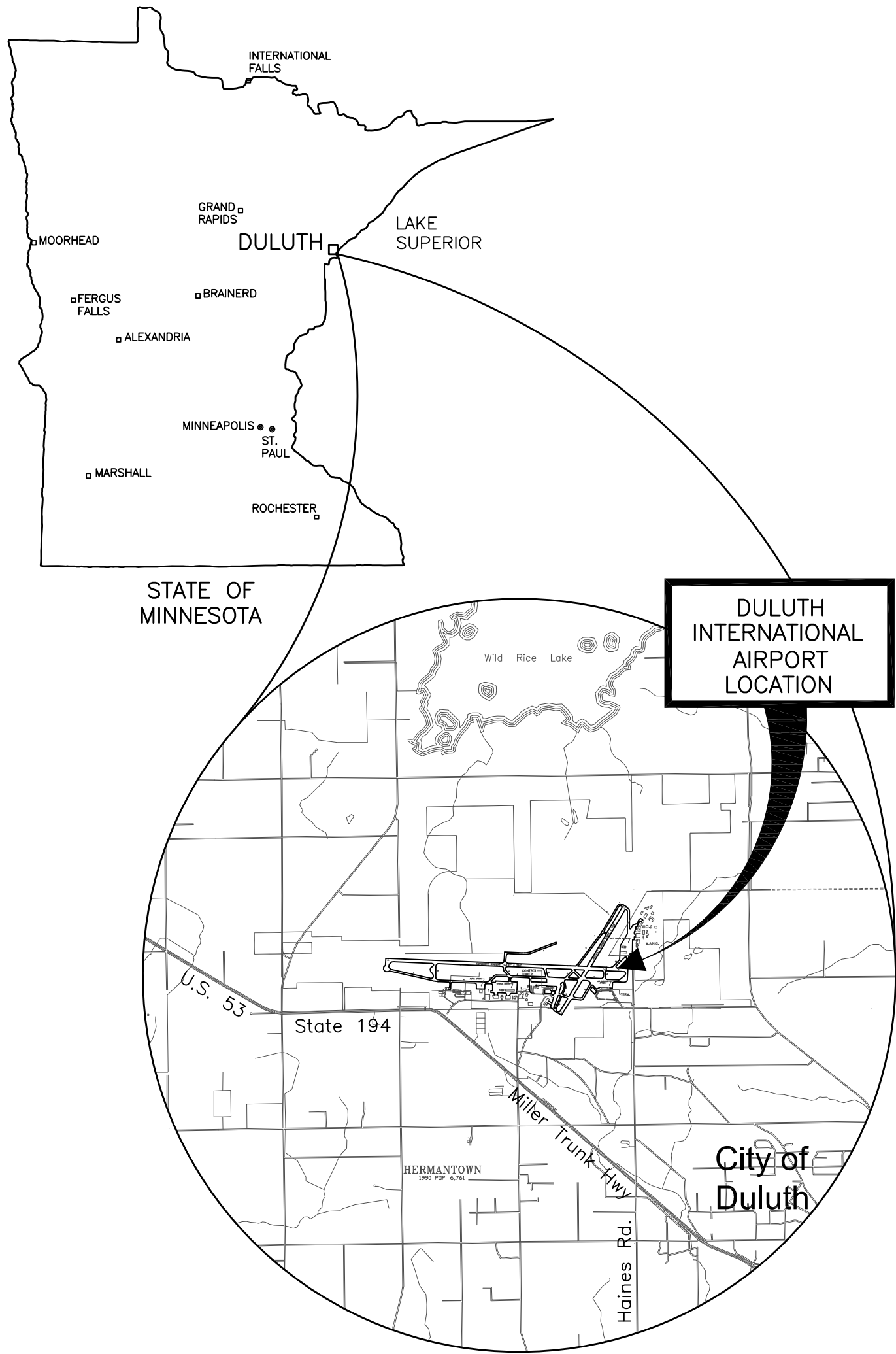
DATE ISSUED: 02-10-12
REVIEWED BY: TC
DRAWN BY: MKG/MI
DESIGNED BY: TC

AEP PROJECT NUMBER
213-1882-091
© 2010 REYNOLDS, SMITH AND HILLS, INC.

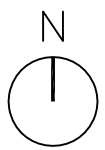
SHEET TITLE
DRAWING
LIST

SHEET NUMBER

G101
BID PACKAGE 2C



GENERAL NOTE:
FOR ADA STANDARDS, PLUMBING FIXTURES' MOUNTING
HEIGHTS AND CLEARANCES, SEE A002



1 LOCATION MAP
N.T.S.

DUCTWORK SYMBOLS & STANDARDS

WHERE DUCTWORK IS SHOWN SINGLE LINE, FOLLOWING SHALL APPLY FOR ACTUAL DUCT CONSTR.

SINGLE LINE	ACTUAL CONSTRUCTION

PIPE HANGER & SUPPORT SCHEDULE

LESS THAN 1/4" MOVEMENT EXCEPT AS NOTED

FIG. NO.	NON. INSUL.	CH.W. LINES	HOT LINES
1			
2		*	
3			*
4			*
5			*
6			*
7			*
8			*
9			*
10	*		
11		*	
12		*	

MORE THAN 1/4" MOVEMENT EXCEPT AS NOTED

FIG. NO.	NON. INSUL.	CH.W. LINES	HOT LINES
1			
2		*	
3			*
4			*
5			*
6			*
7			*
8			*
9			*
10	*		
11		*	
12		*	

OVERHEAD SUPPORTS (HORIZONTAL PIPING)

1					
2		*			
3			*		
4			*		
5			*		*
6			*		*
7			*		*
8			*		*
9			*		*
10	*				*
11		*			*
12		*			*

WALL SUPPORTS (HORIZONTAL PIPING)

13	*				
14		*			
15			*		
16			*		*
17			*		*
18			*		*
19	*	*	*	*	*

FLOOR SUPPORTS (HORIZONTAL PIPING)

20			*		
21			*		*
22	*				*
23	*				*
24		*			*
25		*			*

FLOOR SUPPORTS (VERTICAL PIPING)

26	*	*	*		
27	*	*	*		
28			*	*	*

OVERHEAD SUPPORTS (VERTICAL & HORIZ. PIPING)

29			*	*	*
30			*	*	*
31			*	*	*

WALL SUPPORTS (VERTICAL PIPING)

32	*	*	*		
33			*	*	*

ANCHORS (VERTICAL & HORIZONTAL PIPING)

34	APPLIES TO ALL PIPES TO STOP MOVEMENT				
35					

GANG HANGERS (VERTICAL PIPING)

36	*	*	*		
----	---	---	---	--	--

GANG HANGERS (HORIZONTAL PIPING)

37	*	*	*	TO BE INDIVIDUALLY SUPPORTED	
----	---	---	---	------------------------------	--

GUIDES (VERTICAL & HORIZONTAL PIPING)

38				*	
39				*	*
40				*	
41				*	
42				*	*

#34 SINGLE BOLT RISER CLAMP

#35 STRUCT. STEEL FRAME TO SUIT

#36 MULTI- J HOOK PLATE GANG HANGER

#37 MULTI TWO ROD RIGID HANGER GANG HANGER

#38 OPEN BAY-NO SLEEVE IN FLOOR. STEEL FRAME

#39 4 SADDLES

#40 SINGLE BOLT RISER CLAMS

#41 360° SHIELD

#42 360° SHIELD

MECHANICAL DRAWING LIST		DATE							
		2/17/2011							
SHEET NO.	DESCRIPTION	ISSUED FOR	BID PACKAGE 2C						
M001	MECHANICAL LEGEND	●							
M002	MECHANICAL SYMBOLS & ABBREVIATIONS	●							
M110	ENLARGED FIRST FLOOR MECHANICAL PLAN - AREA A	●							
M111	ENLARGED FIRST FLOOR MECHANICAL PLAN - AREA B	●							
M112	PARTIAL SECOND FLOOR MECHANICAL PLAN - CONCESSIONS AREA	●							
M114	PARTIAL THIRD FLOOR MECHANICAL PLAN - CONCESSIONS AREA	●							
M116	PARTIAL ROOF LEVEL MECHANICAL PLAN - CONCESSIONS AREA	●							
MP110	ENLARGED FIRST FLOOR MECHANICAL PIPING PLAN - AREA A	●							
MP111	ENLARGED FIRST FLOOR MECHANICAL PIPING PLAN - AREA B	●							
MP112	ENLARGED SECOND FLOOR MECHANICAL PIPING PLAN - AREA A	●							
MP113	ENLARGED SECOND FLOOR MECHANICAL PIPING PLAN - AREA B	●							
MP114	ENLARGED THIRD FLOOR MECHANICAL PIPING PLAN - AREA A	●							
MP115	ENLARGED THIRD FLOOR MECHANICAL PIPING PLAN - AREA B	●							
M303	TUG TUNNEL RAMP SNOW MELT PLAN, FLOW DIAGRAM & DETAILS	●							
M401	MECHANICAL SCHEDULES & DETAILS	●							
M401C	MECHANICAL EQUIPMENT SCHEDULES	●							
M503	MECHANICAL DETAILS	●							
M506	RAMP SNOW MELT SYSTEM DETAILS	●							

GENERAL NOTES:

- ALL WORK SHALL CONFORM TO THE FOLLOWING CODES AND STANDARDS AT A MINIMUM:
 - 2007 MINNESOTA STATE BUILDING CODE
 - 2007 MINNESOATE STATE MECHANICAL AND FUEL GAS CODES
 - 2007 COMMERCIAL ENERGY CODE
 - MINNESOTA SUSTAINABLE BUILDING GUIDELINES (REQUIRED SECTIONS ONLY)
 - ASHRAE STANDARD 90.1-2007
 - ASHRAE STANDARD 62.1-2007
 - ASHRAE STANDARD 55-2004
- ACCESS PANELS ARE REQUIRED FOR ALL AIR TERMINAL DEVICES, VALVES, AND DAMPERS LOCATED ABOVE CEILINGS. MECHANICAL CONTRACTOR IS RESPONSIBLE FOR COORDINATION OF ALL PANEL SIZES AND LOCATIONS WITH GENERAL CONTRACTOR AND ARCHITECT. ACCESS PANELS TO BE CONSTRUCTED PER ARCHITECTURAL SPECIFICATIONS AND DETAILS.
- FINAL LOCATION OF ALL DIFFUSERS & SENSORS INSTALLED IN FINISHED SPACES SHALL BE REVIEWED AND APPROVED BY ARCHITECT.

RS&H

IMPROVING YOUR WORLD

Reynolds, Smith and Hills, Inc.
4525 Airport Approach Rd, Ste A
Duluth, Minnesota 55811
218-722-1227 Fax: 218-722-1052
www.rsandh.com

DULUTH AIRPORT
AUTHORITY

DULUTH
INTERNATIONAL
AIRPORT
DULUTH, MN

NEW PASSENGER
TERMINAL

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: (312) 722-1056 / FAX: (218) 722-9306

M/E/P/F/P Engineers:
COSENTINI ASSOCIATES INC.
1 South Wacker Drive, 37th Floor, Chicago IL 60606
TEL: (312) 201-7400 / 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) 591-5079

REVISIONS

NO.	DESCRIPTION	DATE

DATE ISSUED: 02-17-12
REVIEWED BY: **MXB**
DRAWN BY: **JEH**
DESIGNED BY: **MXB**
AEP PROJECT NUMBER
213-1882-091
© 2010 REYNOLDS, SMITH AND HILLS INC.
SHEET TITLE

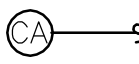
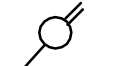
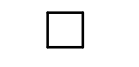
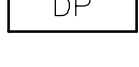
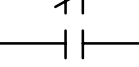

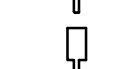
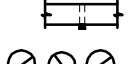

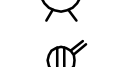
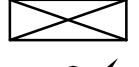


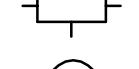
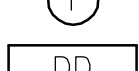

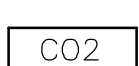






MECHANICAL
LEGEND

SHEET NUMBER

M001

BID PACKAGE 2C

CONTROL SYMBOLS

	COMMON
CCP	CENTRAL CONTROL PANEL
DPT	DIFFERENTIAL PRESSURE TRANSMITTER
FS	FLOW SWITCH
LLR	LOW LIMIT RELAY
LP	LOCAL PANEL
OPER	OPERATION
PI	PRESSURE INDICATOR
RC	RECEIVER CONTROLLER
SAV	SOLENOID AIR VALVE
SPT	STATIC PRESSURE TRANSMITTER
TC	TIME CLOCK
TI	TEMPERATURE INDICATOR
TT	TEMPERATURE TRANSMITTER
VIB	VIBRATION
VPT	VELOCITY PRESSURE TRANSMITTER
	COMPRESSED AIR PIPING
	DAMPER END SWITCH
	DEVICE WITH AVERAGING SENSING DEVICE
	DIFFERENTIAL PRESSURE SWITCH CONTROLLER
	ELECTRIC CONTACT (N.C.)
	ELECTRIC CONTACT (N.O.)
	ELECTRIC PNEUMATIC VALVE (EP)
	IMMERSION OR INSERTION STATUS
	INDICATION POINT
	MOTOR OPERATOR FOR DAMPER OR VALVE
	OPPOSED DAMPER BLADE
	PARALLEL DAMPER BLADE
	PLOT UNIT RUN STATUS
	PRESSURE ELECTRIC SWITCH (PE)
	RECEIVER CONTROLLER
	ROOM THERMOSTAT
	PNEUMATIC ELECTRIC SWITCH
	3 POSITION SWITCH & HAND OFF AUTO
	3-WAY AIR VALVE
	THERMOSTAT
	DUCT SMOKE DETECTOR
	HUMIDISTAT
	CARBON DIOXIDE SPACE SENSOR

ACCU	AIR COOLED CONDENSING UNIT
AC	AIR CONDITIONING
AD	ACCESS DOOR
AH	AIR HANDLING SYSTEM
AL	ACOUSTICAL LINING
APPROX.	APPROXIMATE
AVG	AVERAGE
ABV	ABOVE
AS	AIR SEPARATOR
B	BOILER
BDD	BACKDRAFT DAMPER
BHP	BRAKE HORSEPOWER
BI	BLACK IRON
BOD	BOTTOM OF DUCT
BSMT	BASEMENT
BTU	BRITISH THERMAL UNIT
BTUH	BRITISH THERMAL UNIT PER HOUR
CA	COMPRESSOR AIR
CC	COOLING COIL
CCW	COUNTER CLOCKWISE
CD	CONDENSATE DRAIN
CF	CUBIC FEET
CFM	CUBIC FEET PER MINUTE
CG	CEILING GRILLE
CH	CHEMICAL TREATMENT TANK
CI	CAST IRON
CL	CENTER LINE
CLG	CEILING
C.O.	CLEAN OUT
CO	CARBON MONOXIDE
CO2	CARBON DIOXIDE
COT	COMPRESSION TANK
CONC	CONCRETE
COND. DR.	CONDENSATE DRAIN (COIL. PAN D
CONN.	CONNECTION
CR	CEILING REGISTER
CT	COOLING TOWER
CW	CLOCKWISE
CY	CYCLE
DB	DRY BULB TEMPERATURE
DD	DUCT SMOKE DETECTOR
DFN	DEFLECTION
DG	DOOR GRILLE

DI	DIAMETER
DIFF	DIFFUSER
DX	DIRECT EXPANSION
DN	DOWN
DWG.	DRAWING
EF	EXHAUST FAN
EA	EACH
EAT	ENTERING AIR TEMPERATURE
EC	ELECTRICAL CONTRACTOR
ED	EXHAUST DISCHARGE
EE	ELECTRICAL ROOM EXHAUST
EFF	EFFICIENCY
EH	EXHAUST HEAD
EJ	EXPANSION JOINT
EL	ELEVATION
ELEC.	ELECTRIC
ELEV.	ELEVATOR
EOAT	ENTERING OUTSIDE AIR TEMPERATURE
ET	EXPANSION TANK
EW	ENTERING WATER TEMPERATURE
EXH	EXHAUST
EXP	EXPANSION
F	FILTER
FA	FREE AREA
FD	FIRE DAMPER
F/SD	FIRE SMOKE DAMPER
FHE	FUME HOOD EXHAUST
FL	FLOOR
FLEX.	FLEXIBLE
FMD	FLOW MEASURING DEVICE
FO	FILTER ON OUTSIDE AIR
FP	FAN POWER
FPM	FEET PER MINUTE
FPS	FEET PER SECOND
FR	FILTER ON RETURN AIR
FRP	FIBERGLASS REINFORCED PLASTIC
FT	FOOT
FTR	FINNED TUBE RADIATOR
FLGD	FLANGED
GA	GAGE OR GAUGE
GC	GENERAL CONTRACTOR
GD	GRAVITY DAMPER
GE	GENERAL EXHAUST
GR	GRILLE
GALV	GALVANIZED
H	HORIZONTAL
HC	HEATING COIL
HP	HORSEPOWER
HTC	HEATING
HU	HUMIDIFIER
HYAC	HEATING VENTILATION & AIR CONDITIONING
HX	HEAT EXCHANGER
HZ	HERTZ
ID	INSIDE DIAMETER
IAC	INSTRUMENTS AIR COMPRESSOR
IN	INCH
INSUL	INSULATION
KW	KILOWATT
LAT	LEAVING AIR TEMPERATURE
KWH	KILOWATT HOUR
LD	LINED DUCT
LN	LINEAR
LOV	INTAKE OR EXHAUST LOUVER
LWT	LEAVING WATER TEMPERATURE
MACH	MACHINE
MAT	MIXED AIR TEMPERATURE
MBH	THOUSAND BRITISH THERMAL UNITS PER HOUR
MD	MOTORIZED DAMPER
MIN	MINIMUM
MAX	MAXIMUM
MC	MECHANICAL CONTRACTOR
MCC	MOTOR CONTROL CENTER
NC	NOISE CRITERIA
N.C.	NORMALLY CLOSED
N.I.C.	NOT IN CONTRACT
NK	NECK
N.O.	NORMALLY OPEN
NR	NO REQUIREMENT
NRO	NET ROOF OPENING
NTS	NOT TO SCALE
OA	OUTSIDE AIR
OAI	OUTSIDE AIR INTAKE
OBD	OPPOSED BLADE DAMPER
OD	OUTSIDE DAMPER
OSD	OPEN SITE DRAIN
OV	OUTLET VELOCITY
PFR	PREFILTER ON RETURN AIR
1 PH	SINGLE PHASE
3 PH	THREE PHASE
PRESS	PRESSURE
PRV	PRESSURE REDUCING VALVE
PS	PIPE SUPPORT
PSIG	POUND PER SQUARE INCH
PNEU.	PNEUMATIC
R	REFRIGERATION
RA	RETURN AIR
REF	RECIRCULATION/EXHAUST FAN
REG	REGISTER
REQ'D	REQUIRED
RET	RETURN
RM	ROOM

P	REFRIGERANT PUMPOUT UNIT
RPM	REVOLUTIONS PER MINUTE
RV	PRESSURE RELIEF VALVE
S	SUPPLY FAN
SA	SUPPLY AIR
SD	SMOKE DAMPER
SF	SQUARE FEET
SHT	SHEET
SM	SHEET METAL
SMS/R	SNOW MELT SUPPLY & RETURN
SP	STATIC PRESSURE
SPD	SPLITTER DAMPER
SPEC	SPECIFICATION
ST	SOUND ATTENUATOR
STD	STANDARD
SUP	SUPPLY
SOL	SOLENOID
SCRD	SCREWED
SS	STAINLESS STEEL
T	TANK
TD	TEMPERATURE DIFFERENCE
TE	TOILET EXHAUST
TEMP	TEMPERATURE
TR	TON OF REFRIGERATION
TS	TOP SPEED
T.S.P.	TOTAL STATIC PRESSURE
TYP	TYPICAL
TCP	TEMPERATURE CONTROL PANEL
TH	TOP HORIZONTAL
UG	UNDERGROUND
UB	UP BLAST
V	VENTILATION FAN
VA	VALVE
VAV	VARIABLE AIR VOLUME
VD	VOLUME DAMPER
VEL	VELOCITY
VOL	VOLUME
VTR	VENT THRU ROOF
W	WATT
W/	WITH
WB	WET BULB TEMPERATURE
WE	WALL EXHAUST
WC	WATER COLUMN
WM	WATER METER
WMS	WIRE MESH SCREEN
Z	ZONE

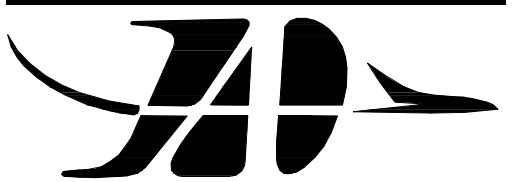
[illegible]

SHEET TITLE

BID PACKAGE 2C



Reynolds, Smith and Hills, Inc.
4525 Airport Approach Rd, Ste A
Duluth, Minnesota 55811
218-722-1227 Fax: 218-722-1052
www.rsandh.com



**DULUTH AIRPORT
AUTHORITY**

DULUTH
INTERNATIONAL
AIRPORT
DULUTH, MN

NEW PASSENGER
TERMINAL

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) 722-9306

M/E/P/FP Engineers:
COSENTINI ASSOCIATES INC.
 1 South Wacker Drive, 37th Floor, Chicago IL 60606
 TEL: (312) 201-7400 / FAX: (312) 201-0031

Baggage Handling Systems Consultants:
BNP ASSOCIATES INC.
 1 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) 591-5079

REVISIONS

[illegible]

DATE ISSUED:	02-17-12
REVIEWED BY:	MXB
DRAWN BY:	JEH
DESIGNED BY:	MXB

AEP PROJECT NUMBER
213-1882-091
© 2010 REYNOLDS, SMITH AND HILLS INC.

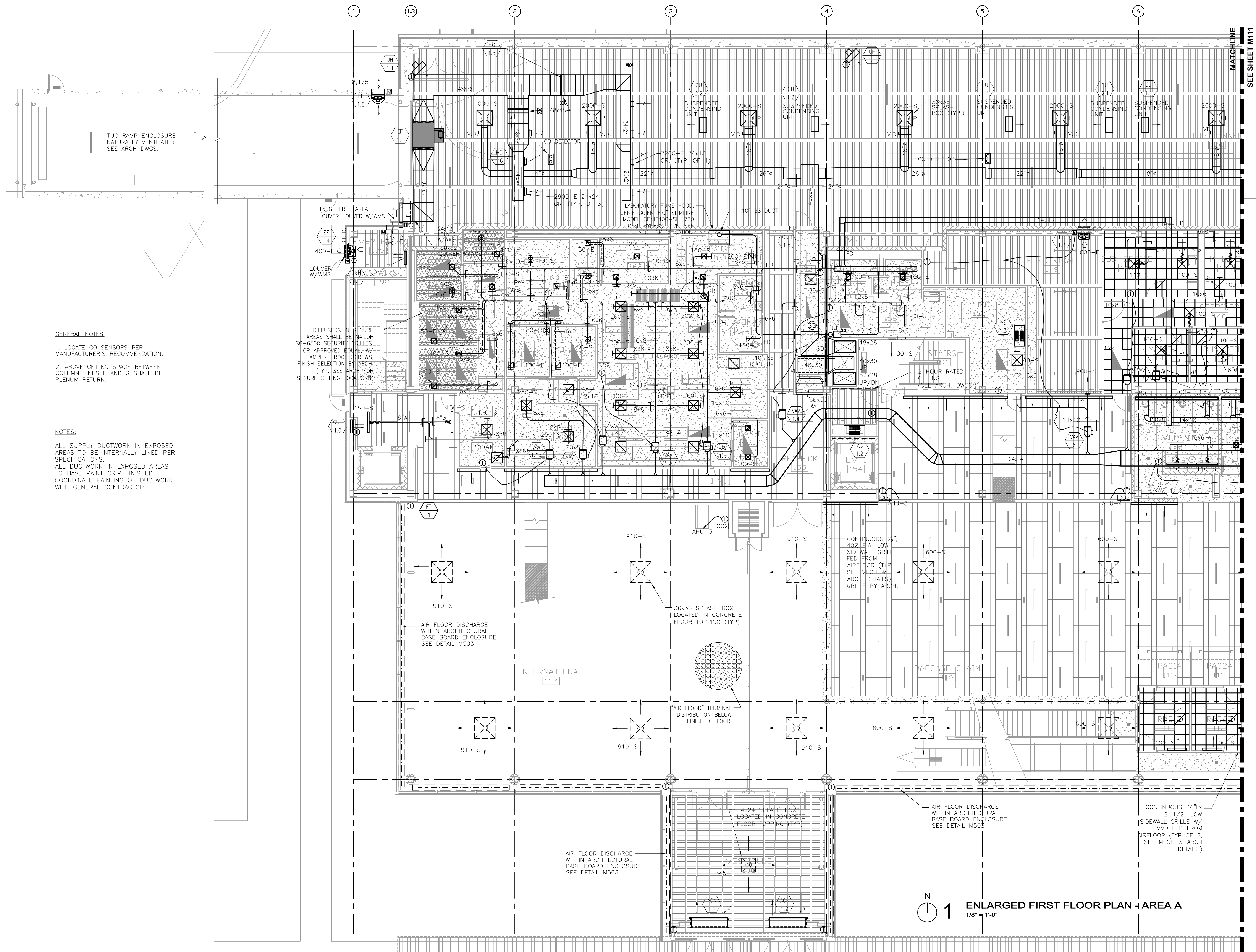
SHEET TITLE

ENLARGED
FIRST FLOOR
MECHANICAL
PLAN AREA A

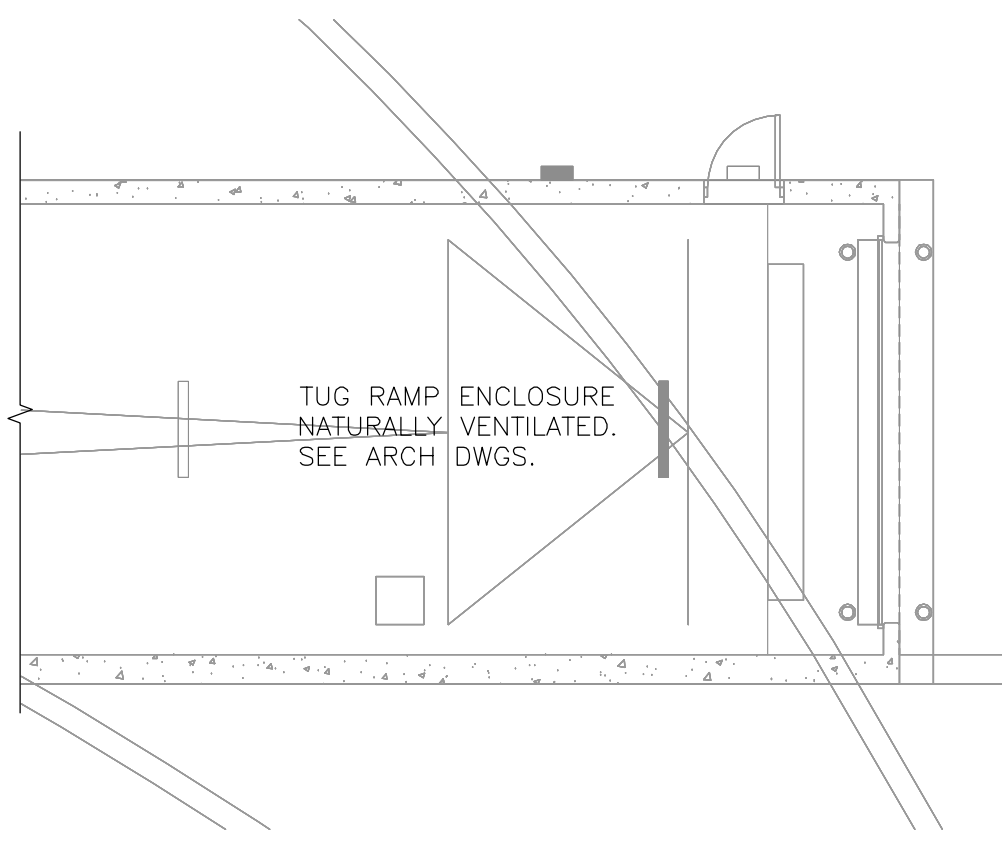
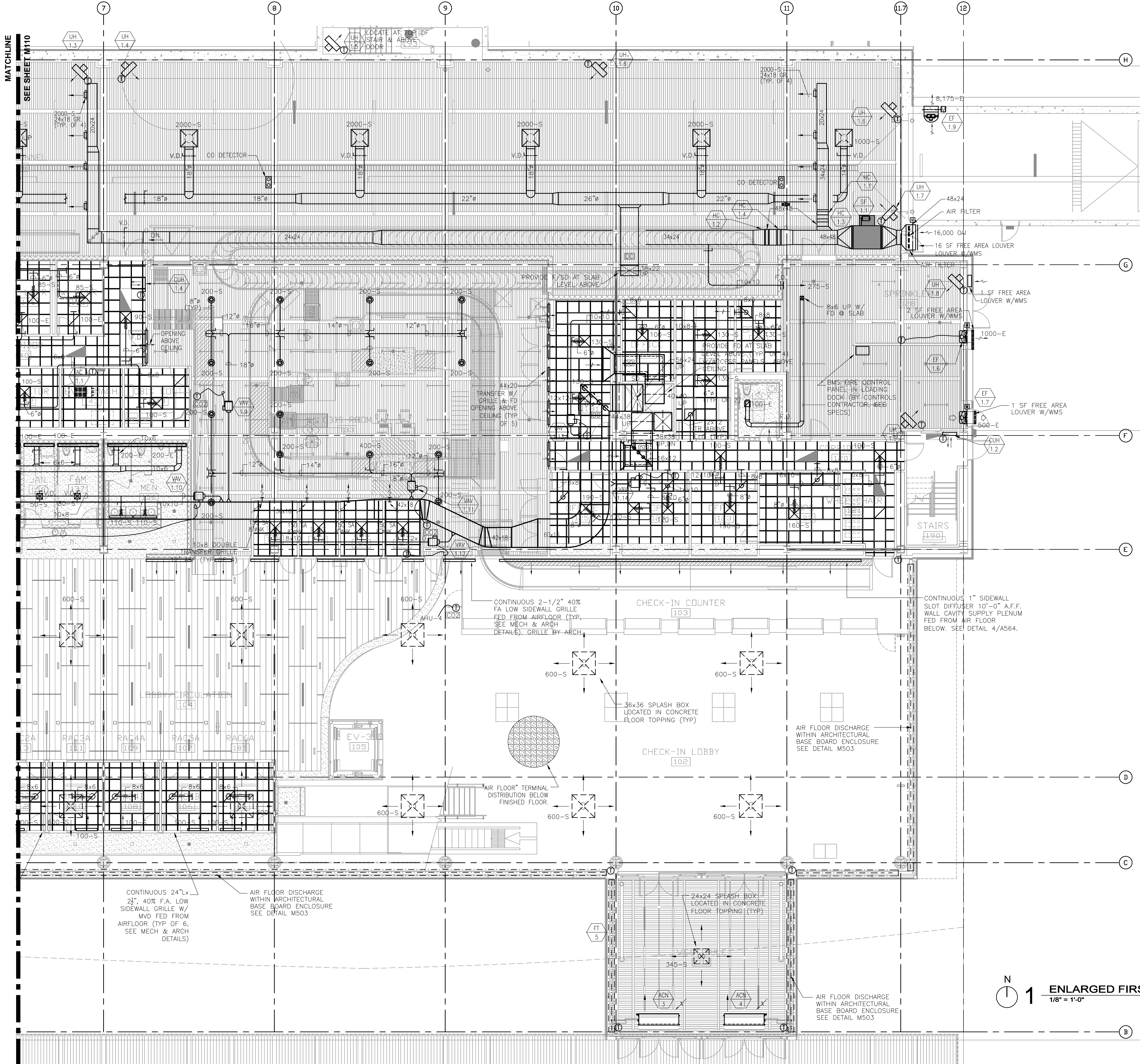
SHEET NUMBER

M110

BID PACKAGE 2C



Drawing: I:\5528.00 Dabith Airport\5.0 CADD\5.0 HVAC\CONCESSIONS\Depts\5528_M110.dwg Plotted on: 2/20/2012 11:16 AM Plotted by: Brandi, Mor



GENERAL NOTES:

- LOCATE CO SENSORS PER MANUFACTURER'S RECOMMENDATION.
- ABOVE CEILING SPACE BETWEEN COLUMN LINES E AND G SHALL BE PLENUM RETURN.
- ALL EXPOSED DUCTWORK IN CBIS ROOM 133 TO BE 1" LINED, SPIRAL ROUND DUCT W/ PAINT GRIP FINISH. BOTTOM OF DIFFUSER FACE TO BE MOUNTED AT 10'-0" AFF (VERIFY W/ ARCH). DIFFUSER TYPE TO BE NAILOR "RNR" W/8" NECK

NOTES:

ALL SUPPLY DUCTWORK IN EXPOSED AREAS TO BE INTERNALLY LINED PER SPECIFICATIONS.

ALL DUCTWORK IN EXPOSED AREAS TO HAVE PAINT GRIP FINISH. COORDINATE PAINTING OF DUCTWORK WITH GENERAL CONTRACTOR.



Reynolds, Smith and Hills, Inc.
4525 Airport Approach Rd, Ste A
Duluth, Minnesota 55811
218-722-1227 Fax: 218-722-1052
www.rsandh.com



DULUTH INTERNATIONAL AIRPORT
DULUTH, MN

NEW PASSENGER TERMINAL

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) 722-9306

M/E/P/F Engineers:
COSENTINI ASSOCIATES INC.
1 South Wacker Drive, 37th Floor, Chicago IL 60606
TEL: (312) 201-7400 / 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) 591-5079

REVISIONS

NO.	DESCRIPTION	DATE

DATE ISSUED: 02-17-12
REVIEWED BY: XXX
DRAWN BY: JEH
DESIGNED BY: MXB

AEP PROJECT NUMBER
213-1882-091
© 2010 REYNOLDS, SMITH AND HILLS INC.

SHEET TITLE
ENLARGED FIRST FLOOR MECHANICAL PLAN AREA B

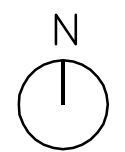
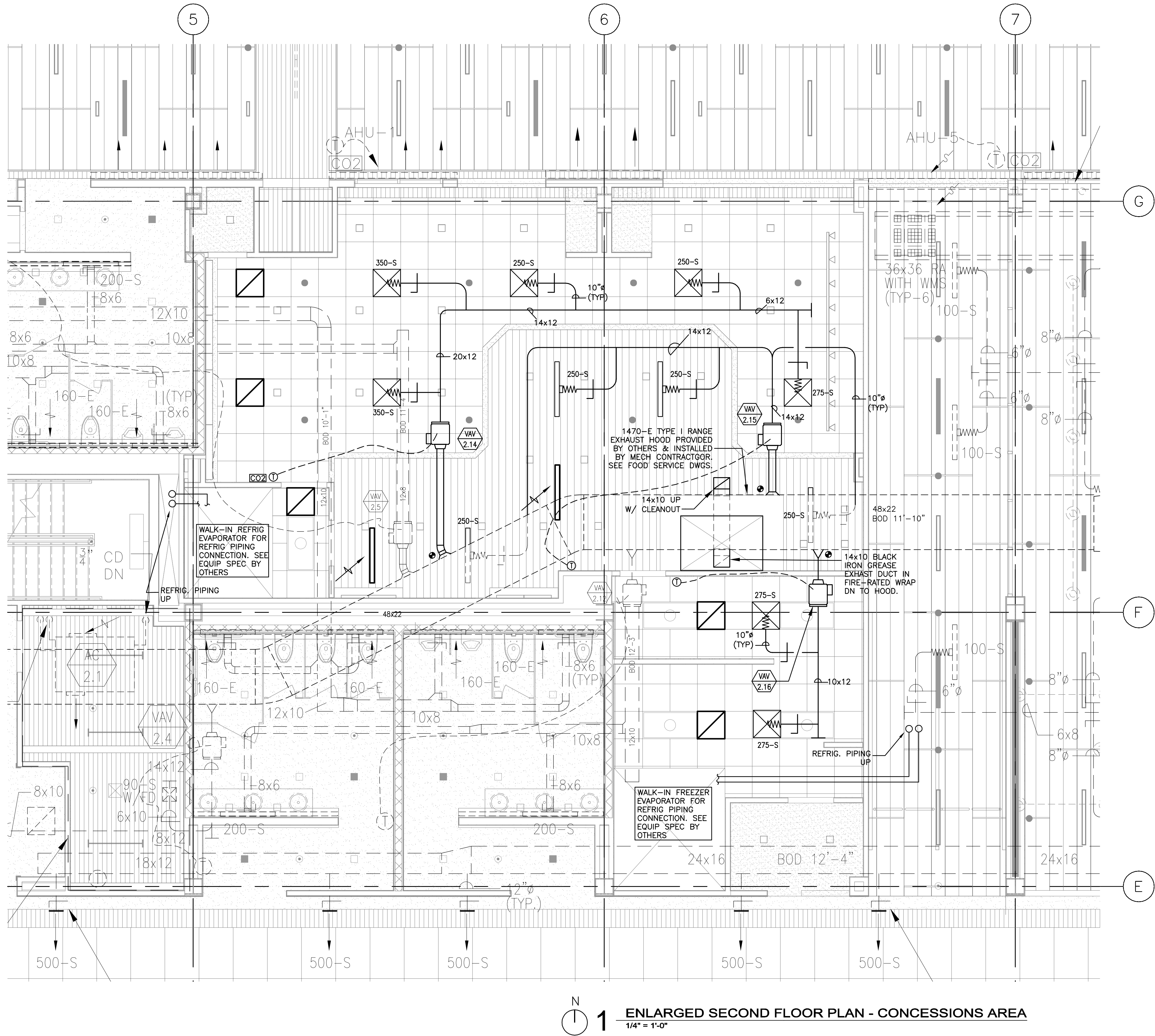
SHEET NUMBER

M111

BID PACKAGE 2C

GENERAL NOTES:

1. LOCATIONS OF ALL WALL-MOUNTED DEVICES SHALL BE VERIFIED WITH ARCHITECT PRIOR TO INSTALLATION.
2. ABOVE CEILING SPACE SHALL BE PLENUM RETURN.
3. PROVIDE INSULATED CONDENSATE DRAIN LINE FROM WALK-IN REFRIG & FREEZER EVAPORATOR TO FLOOR DRAIN. SEE EQUIP SPEC PROVIDED BY OTHERS.



1 ENLARGED SECOND FLOOR PLAN - CONCESSIONS AREA
1/4" = 1'-0"



Reynolds, Smith and Hills, Inc.
4525 Airport Approach Rd, Ste A
Duluth, Minnesota 55811
218-722-1227 Fax: 218-722-1052
www.rsandh.com



DULUTH AIRPORT
AUTHORITY

DULUTH
INTERNATIONAL
AIRPORT
DULUTH, MN

NEW PASSENGER
TERMINAL

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) 722-9306

M/E/P/F Engineers:
COSENTINI ASSOCIATES INC.
1 South Wacker Drive, 37th Floor, Chicago IL 60606
TEL: (312) 201-7400 / 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) 591-5079

REVISIONS

NO.	DESCRIPTION	DATE

DATE ISSUED: 02-17-12
REVIEWED BY: **MXB**
DRAWN BY: **JEH**
DESIGNED BY: **MXB**

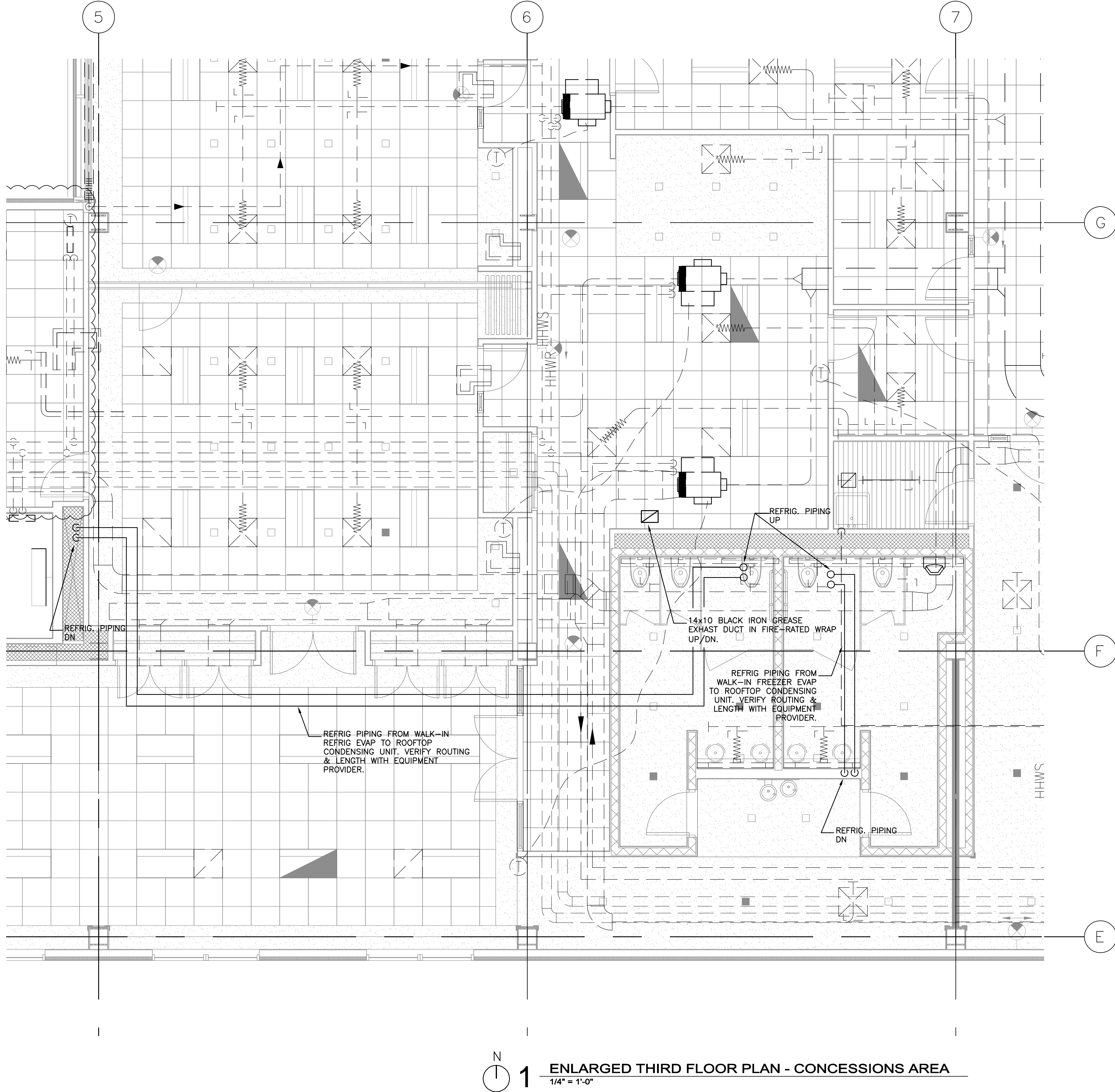
AEP PROJECT NUMBER
213-1882-091
© 2010 REYNOLDS, SMITH AND HILLS INC.

SHEET TITLE
**PARTIAL
SECOND FLOOR
MECHANICAL PLAN
- CONCESSIONS**

SHEET NUMBER

M112

BID PACKAGE 2C



Reynolds, Smith and Hills, Inc.
4525 Airport Approach Rd., Ste A
Duluth, Minnesota 55811
218-722-1227 Fax: 218-722-1052
www.rsandh.com



DULUTH
INTERNATIONAL
AIRPORT
DULUTH, MN

NEW PASSENGER
TERMINAL

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) 722-9306

M/E/P/F/P Engineers:
COSENTINI ASSOCIATES INC.
1 South Wacker Drive, 37th Floor, Chicago IL 60606
TEL: (312) 201-7400 / 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) 591-5079

REVISIONS		
NO.	DESCRIPTION	DATE

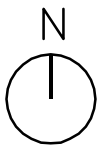
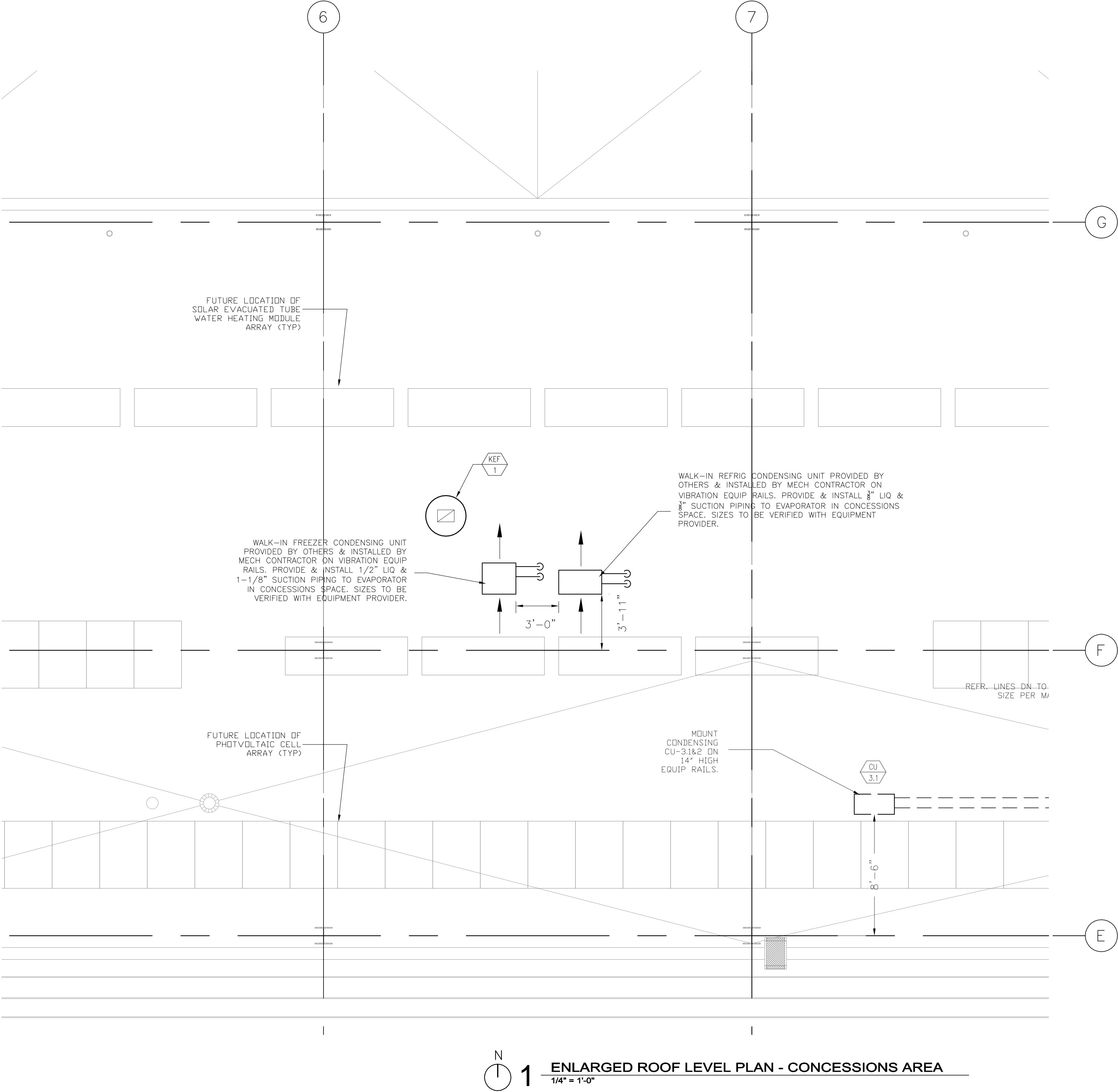
DATE ISSUED: 02-17-12
REVIEWED BY: **MXB**
DRAWN BY: **MB/JEH**
DESIGNED BY: **MXB**

AEP PROJECT NUMBER
213-1882-091
© 2010 REYNOLDS, SMITH AND HILLS, INC.

SHEET TITLE
**PARTIAL
THIRD FLOOR
MECHANICAL PLAN
- CONCESSIONS**

SHEET NUMBER
M114

BID PACKAGE 2C



1 ENLARGED ROOF LEVEL PLAN - CONCESSIONS AREA
1/4" = 1'-0"



Reynolds, Smith and Hills, Inc.
4525 Airport Approach Rd, Ste A
Duluth, Minnesota 55811
218-722-1227 Fax: 218-722-1052
www.rsandh.com



DULUTH
INTERNATIONAL
AIRPORT
DULUTH, MN

NEW PASSENGER
TERMINAL

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) 722-9306

M/E/P/F/P Engineers:
COSENTINI ASSOCIATES INC.
1 South Wacker Drive, 37th Floor, Chicago IL 60606
TEL: (312) 201-7400 / 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) 591-5079

REVISIONS		
NO.	DESCRIPTION	DATE

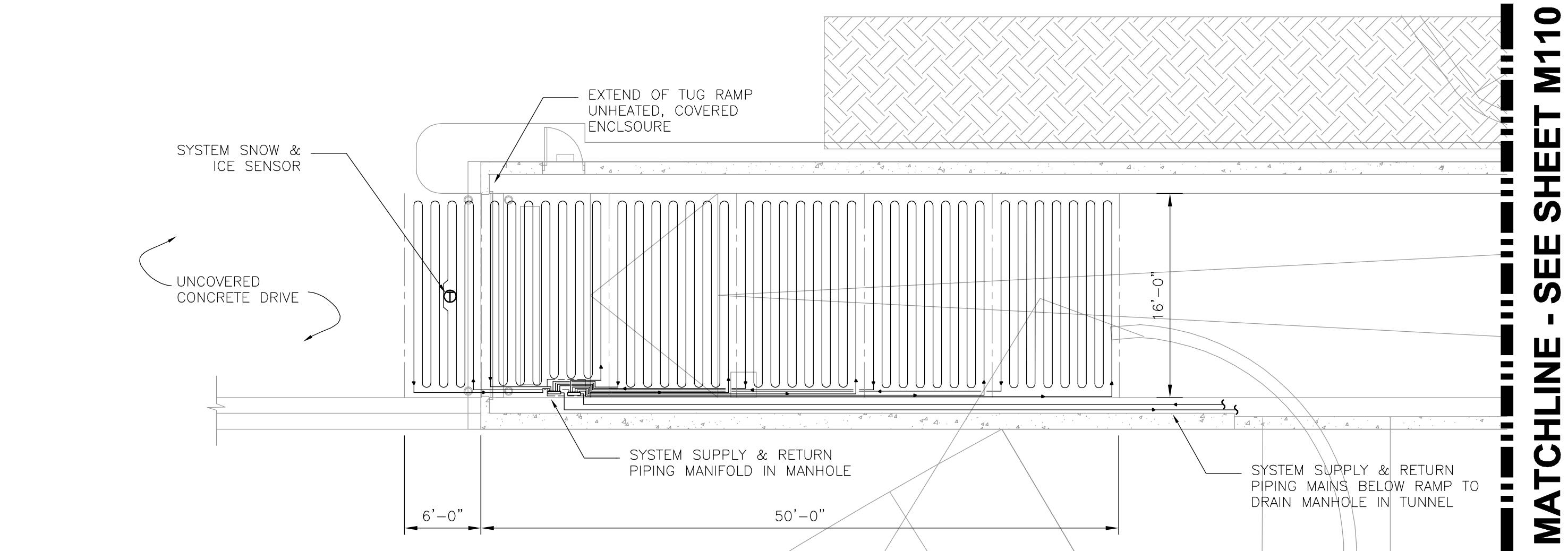
DATE ISSUED: 02-17-12
REVIEWED BY: **MXB**
DRAWN BY: **MB/JH**
DESIGNED BY: **MXB**

AEP PROJECT NUMBER
213-1882-091
© 2010 REYNOLDS, SMITH AND HILLS INC.

SHEET TITLE
**PARTIAL
ROOF LEVEL
MECHANICAL PLAN
- CONCESSIONS**

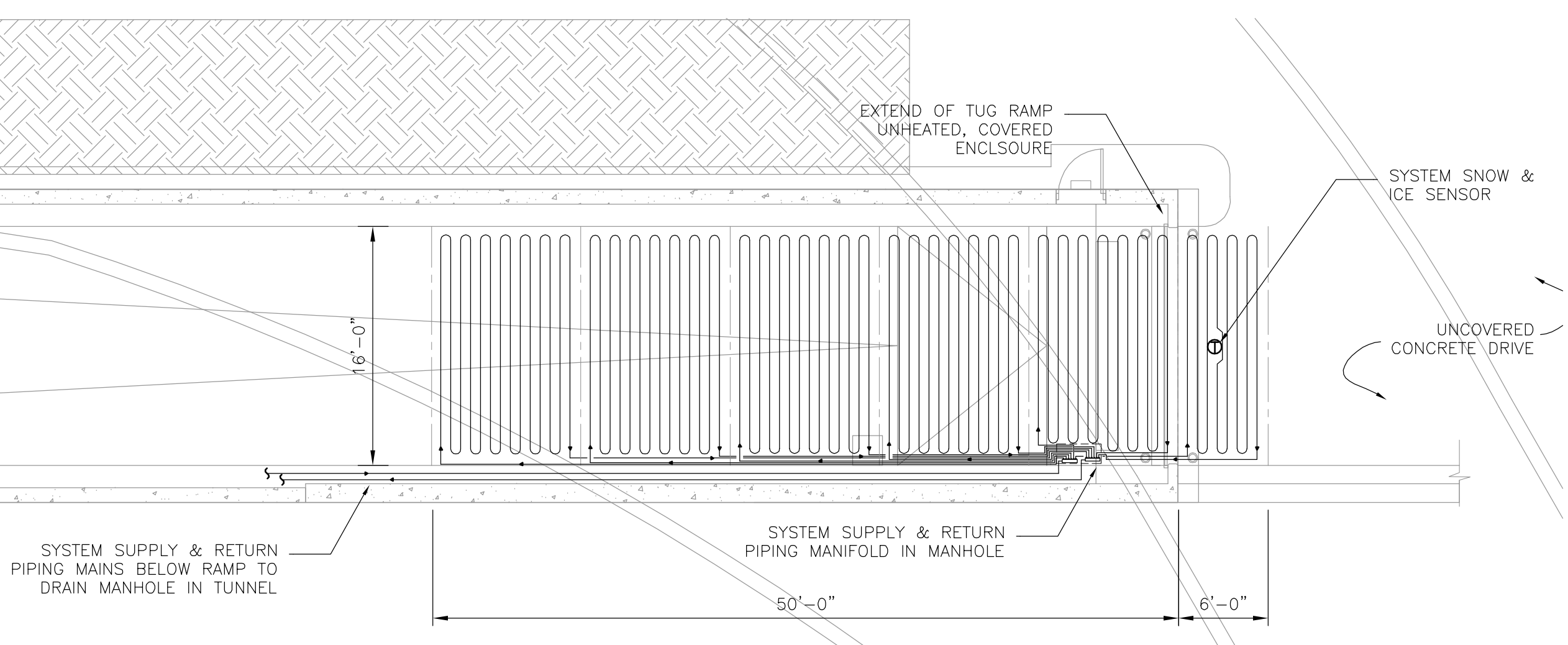
SHEET NUMBER
M116

BID PACKAGE 2C



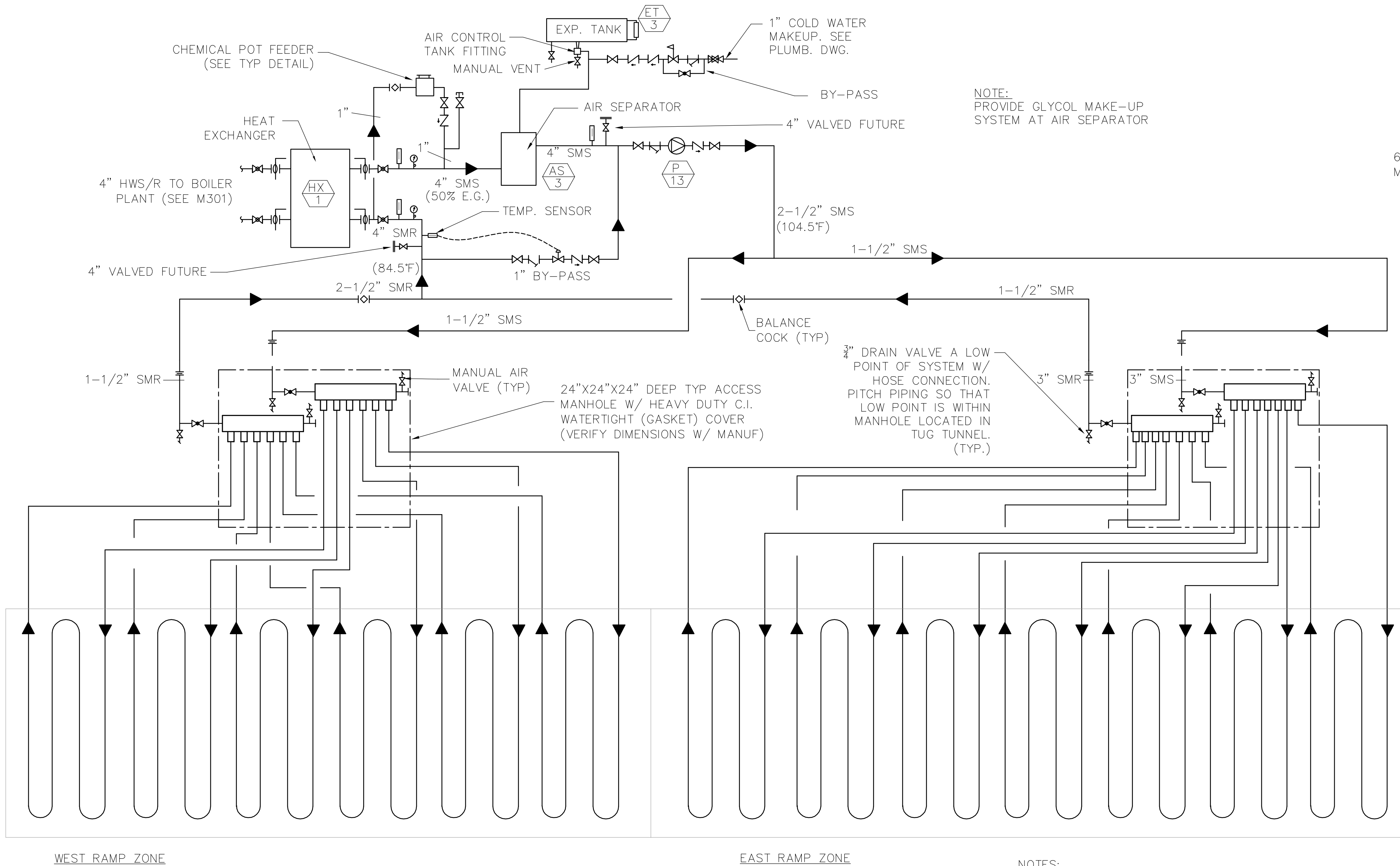
1 ENLARGED FIRST LEVEL TUG TUNNEL WEST
1/8" = 1'-0"

MATCHLINE - SEE SHEET M110



2 ENLARGED FIRST LEVEL TUG TUNNEL EAST
1/8" = 1'-0"

MATCHLINE - SEE SHEET M111



SNOW MELTING FLOW DIAGRAM
NOT TO SCALE

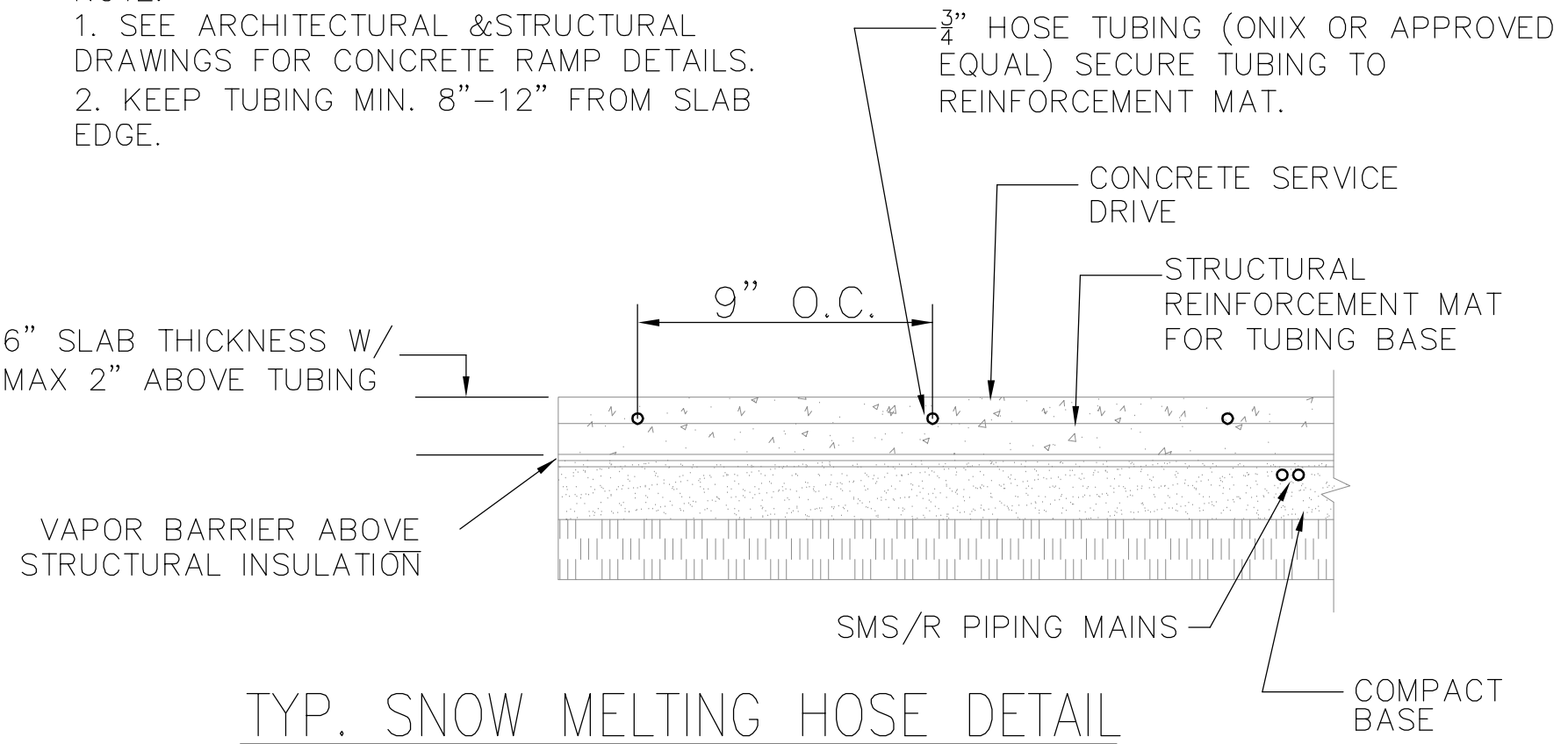
3 SNOW MELT SYSTEM DIAGRAM, NOTES & DETAILS
NO SCALE

NOTE:
PROVIDE GLYCOL MAKE-UP SYSTEM AT AIR SEPARATOR

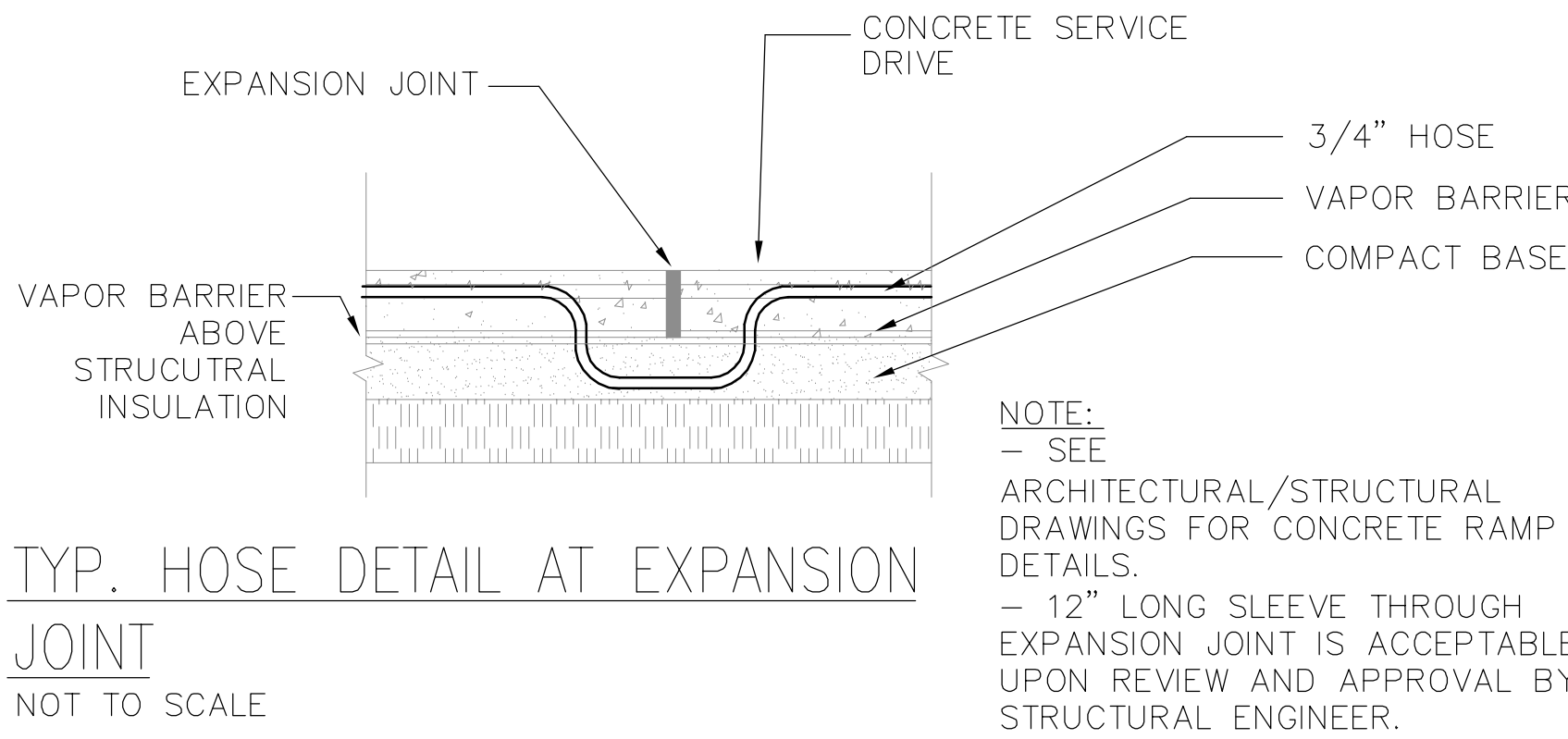
NOTES:

1. PROVIDE COMPLETE SNOW MELTING SYSTEM INCLUDING THREE ZONES, EIGHT CIRCUITS MAXIMUM PER ZONE (SEE PLANS), 9" O.C. SPACING PER CIRCUIT. PROVIDE 3/4" ONIX TUBING FOR CIRCUITS EMBEDDED IN CONCRETE SERVICE DRIVE RAMP.
2. TUBING WILL BE AS MANUFACTURED BY WATTS RADIANT, OR APPROVED EQUAL.
3. DISTRIBUTING MANIFOLDS SHALL BE REVERSE RETURN CONFIGURATION AND SHALL INCLUDE BRANCHES AND FITTINGS, MINI-BALL VALVES AT SUPPLY AND RETURN SIDE OF EACH TUBE, VENT/PURGE VALVES & TENSION CLAMPS.

- NOTE:
1. SEE ARCHITECTURAL & STRUCTURAL DRAWINGS FOR CONCRETE RAMP DETAILS.
2. KEEP TUBING MIN. 8"-12" FROM SLAB EDGE.



TYP. SNOW MELTING HOSE DETAIL
NOT TO SCALE



TYP. HOSE DETAIL AT EXPANSION JOINT
NOT TO SCALE

4. PROVIDE 40% ETHYLENE GLYCOL BY VOLUME IN SNOW MELTING HEATING WATER SYSTEM.

5. PROVIDE VENT/PURGE ASSEMBLY W/ HOSE CONNECTIONS ON RETURN SIDE MANIFOLDS. RETURN MANIFOLDS SHALL BE MOUNTED HIGHER THAN SUPPLY MANIFOLD FOR SAME ZONE.

6. THE SYSTEM SHALL BE DESIGNED AND TESTED FOR LEAKS, AT 100 PSIG MINIMUM PRESSURE.

7. SECURE & SUPPORT PIPING, 6'-0" ON CENTERS, & PITCH FOR DRAINAGE.

8. SLAB TEMPERATURE SENSORS SHALL BE PROVIDED FOR EACH ZONE. SENSOR & CONTROLLER TO BE PROVIDED BY TEKMAR OR APPROVED EQUAL. CONTROLS SHAL INTEGRATE BOILER & PUMP PACKAGES. ROUTE 3/4" PVC CONDUIT IN TOPPING SLAB FOR EACH SENSOR TO CONTROL PANEL IN BOILER ROOM. CONDUIT SHALL BE ROUTED FROM SENORS TO MANIFOLD MANHOLE FOR EACH ZONE. ROUTE CONDUIT TRUNK IN TOPPING SLAB AT SIDE OF RAMP TO MAIN CONTROLLER. LOCATE SENSOR APPROXIMATELY 2 FT. OFF WEST CURB OR PER MANUFACTURERS RECOMMENDATION.

9. BURIED SMS/R MAIN PIPING BELOW RAMP SHALL BE PRE-INSULATED, FLEXIBLE PEX PIPING (WATTS RADIANT R-FLEX OR APPROVED EQUAL). INSULATION SHALL BE CELLULAR FOAM MINIMUM 1" THICK, U=0.025 BTU/HR SQ.FT °F. JACKET SHALL BE CORRUGATED, DOUBLEWALL HOPE. PIPING SHALL HAVE OXYGEN BARRIER COATING. PROVIDE ALL FITTINGS BY SAME MANUFACTURER.

RS&H
IMPROVING YOUR WORLD

Reynolds, Smith and Hills, Inc.
4525 Airport Approach Rd, Ste A
Duluth, Minnesota 55811
218-722-1227 Fax: 218-722-1052
www.rsandh.com

**DULUTH AIRPORT
AUTHORITY**

DULUTH
INTERNATIONAL
AIRPORT
DULUTH, MN

NEW PASSENGER
TERMINAL

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) 722-9306

M/E/P/F Engineers:
COSENTINI ASSOCIATES INC.
1 South Wacker Drive, 37th Floor, Chicago IL 60606
TEL: (312) 201-7400 / 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) 591-5079

REVISIONS

NO.	DESCRIPTION	DATE

DATE ISSUED: 02-17-12

REVIEWED BY: **MXB**

DRAWN BY: **JEH**

DESIGNED BY: **MXB**

AEP PROJECT NUMBER

213-1882-091

© 2010 REYNOLDS, SMITH AND HILLS INC.

SHEET TITLE

**TUG TUNNEL RAMP
SNOW MELT
PLAN, FLOW DIAGRAM
& DETAILS**

SHEET NUMBER

M303

BID PACKAGE 2C



Diagram illustrating the components and dimensions of a rooftop exhaust fan installation:

- ALUMINUM BIRDSCREEN
- UP-BLAST, ROOFTOP EXHAUST FAN W/FACORY-WIRED INTERNAL DISCONNECT SWITCH. SEE SPECIFICATION & DRAWINGS FOR TYPES, SIZES ETC.
- 40" MIN
- NEOPRENE GASKET
- CAP FLASHING BY HVAC CONTRACTOR
- GREASE DRAIN & PAN
- 14" MIN CURB
- WIRING BY OTHERS
- PACK & SEAL ANNULAR SPACE
- DUCT SIZE
- ROOF FLASHING BY GENERAL CONTRACTOR
- ROOF DECK
- ROOF OPENING

NOTES:

1. DUCT SHALL BE 2" SMALLER THAN ROOF OPENING.
2. ROOF OPENING SHALL CONFORM TO MANUFACTURERS CURB SIZE.
3. DUCT FIRE-RATED ENCLOSURE SHALL EXTEND TO THROUGH ROOF DECK.
4. FASTEN FAN TO CURB WITH S.S. LEG SCREW & WASHERS, MINIMUM (2) PER SIDE



1. LENGTH OF FLEXIBLE DUCTS SHALL NOT EXCEED 5'-0", INCLUDING ELBOWS.

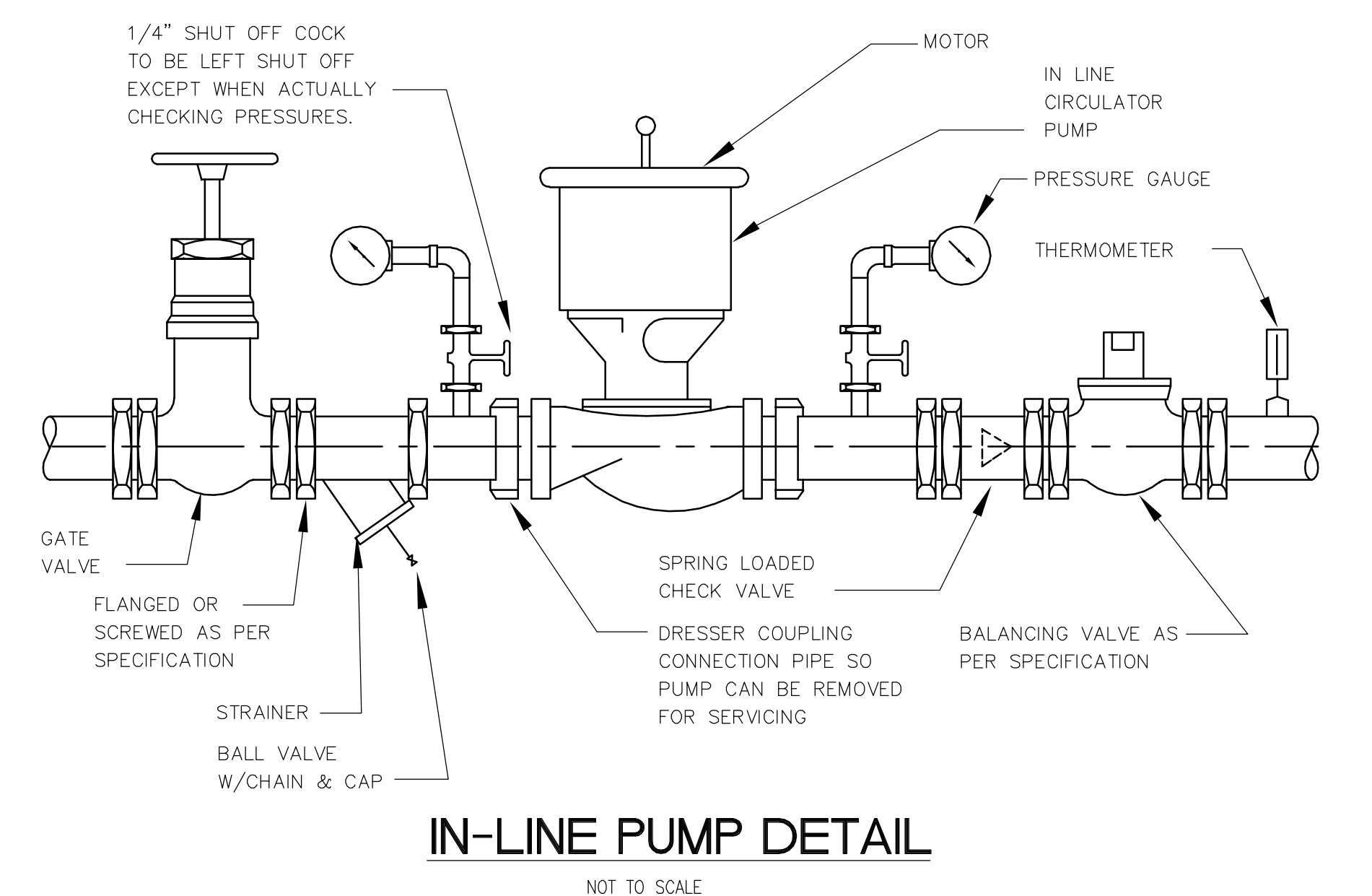
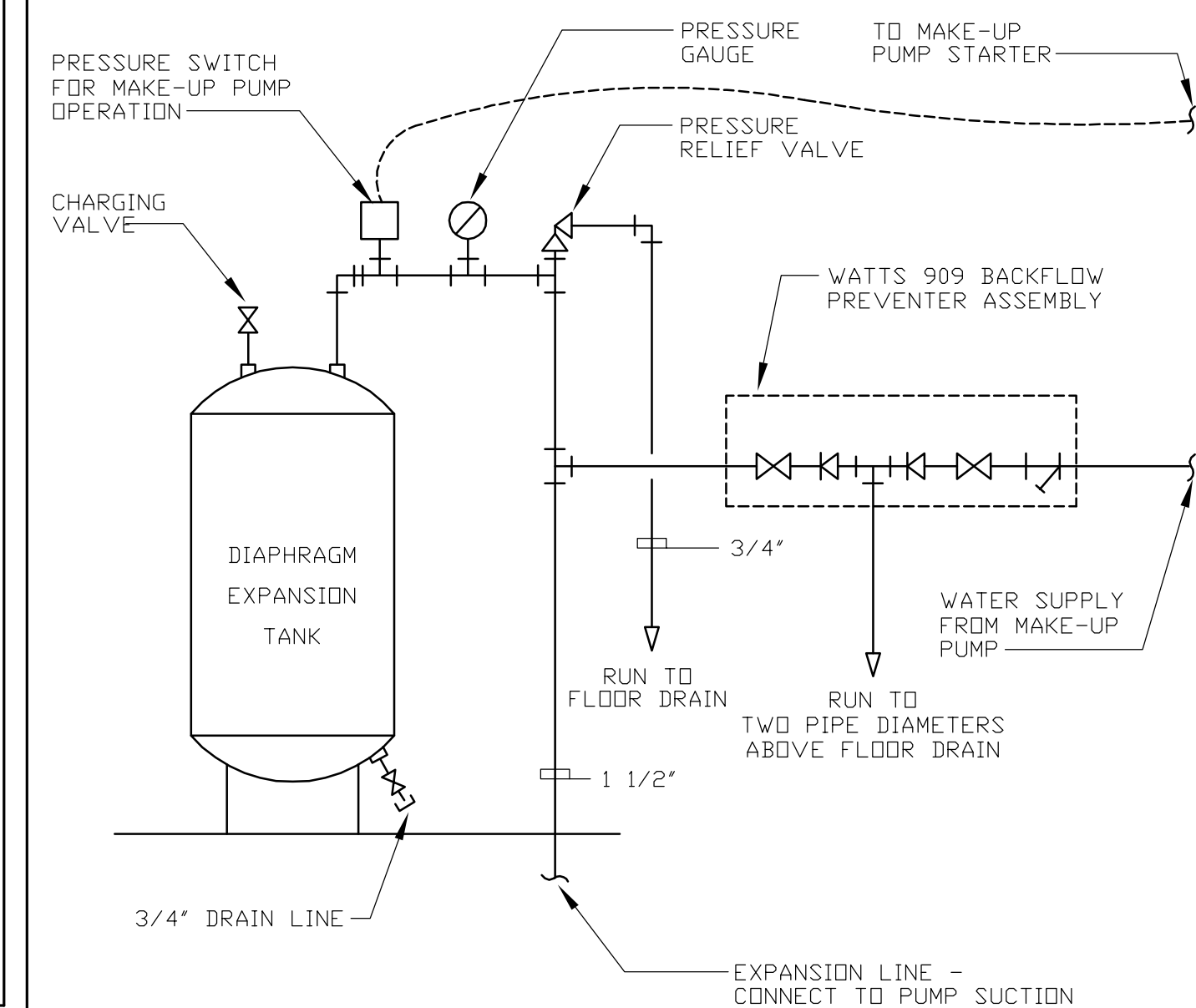
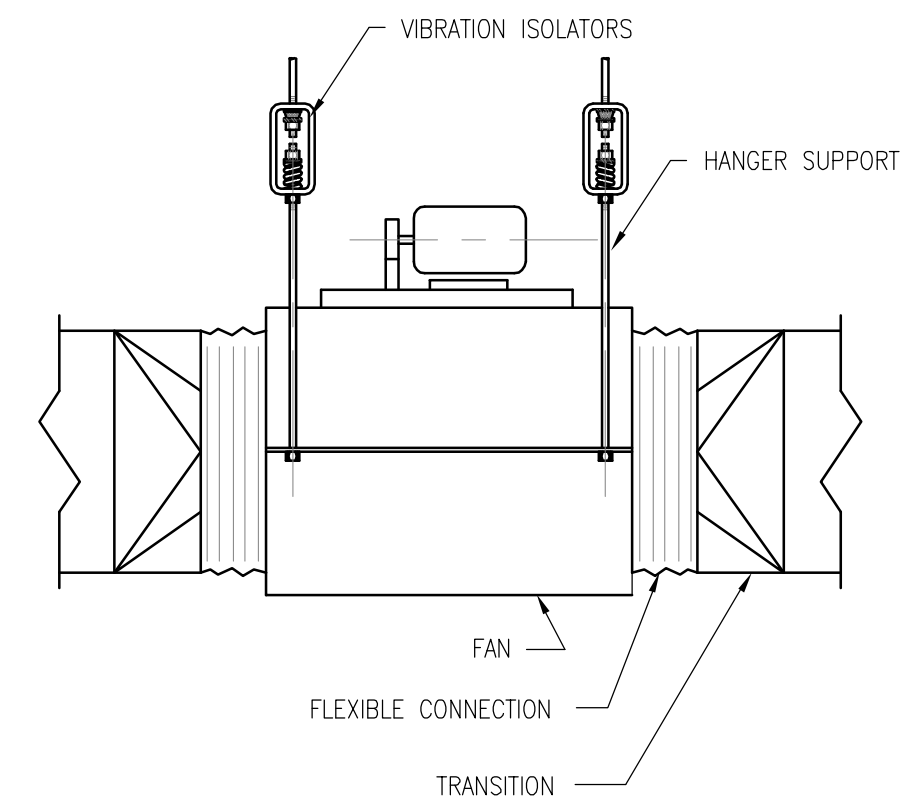
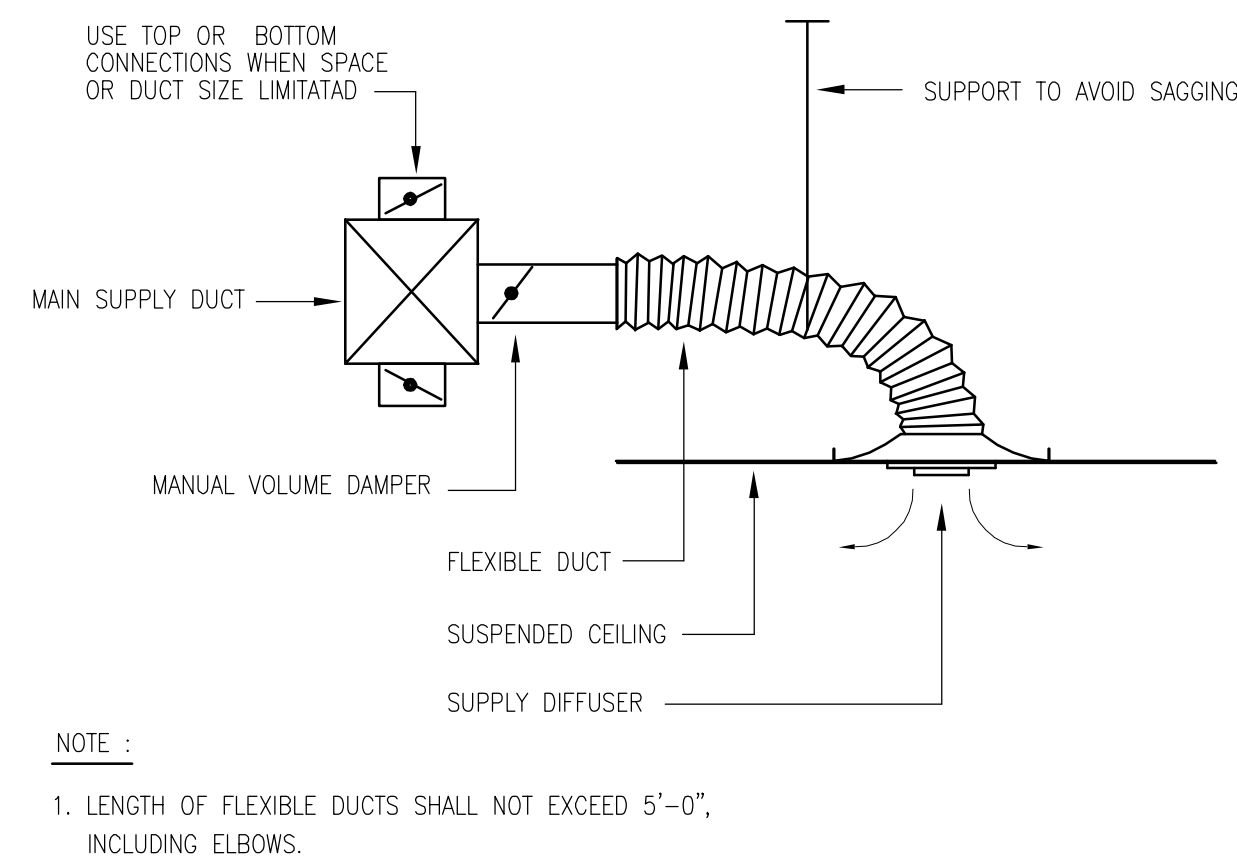
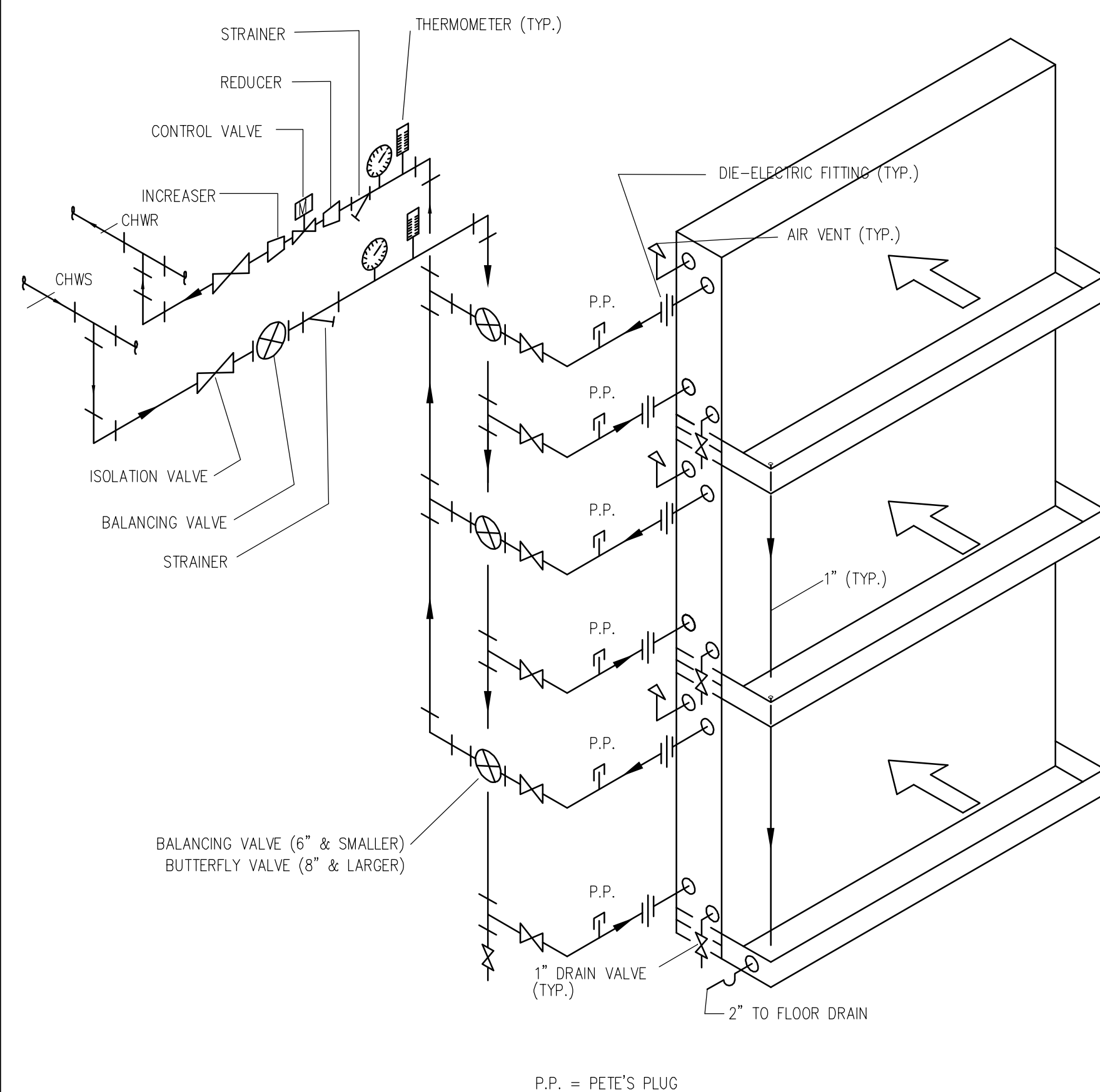
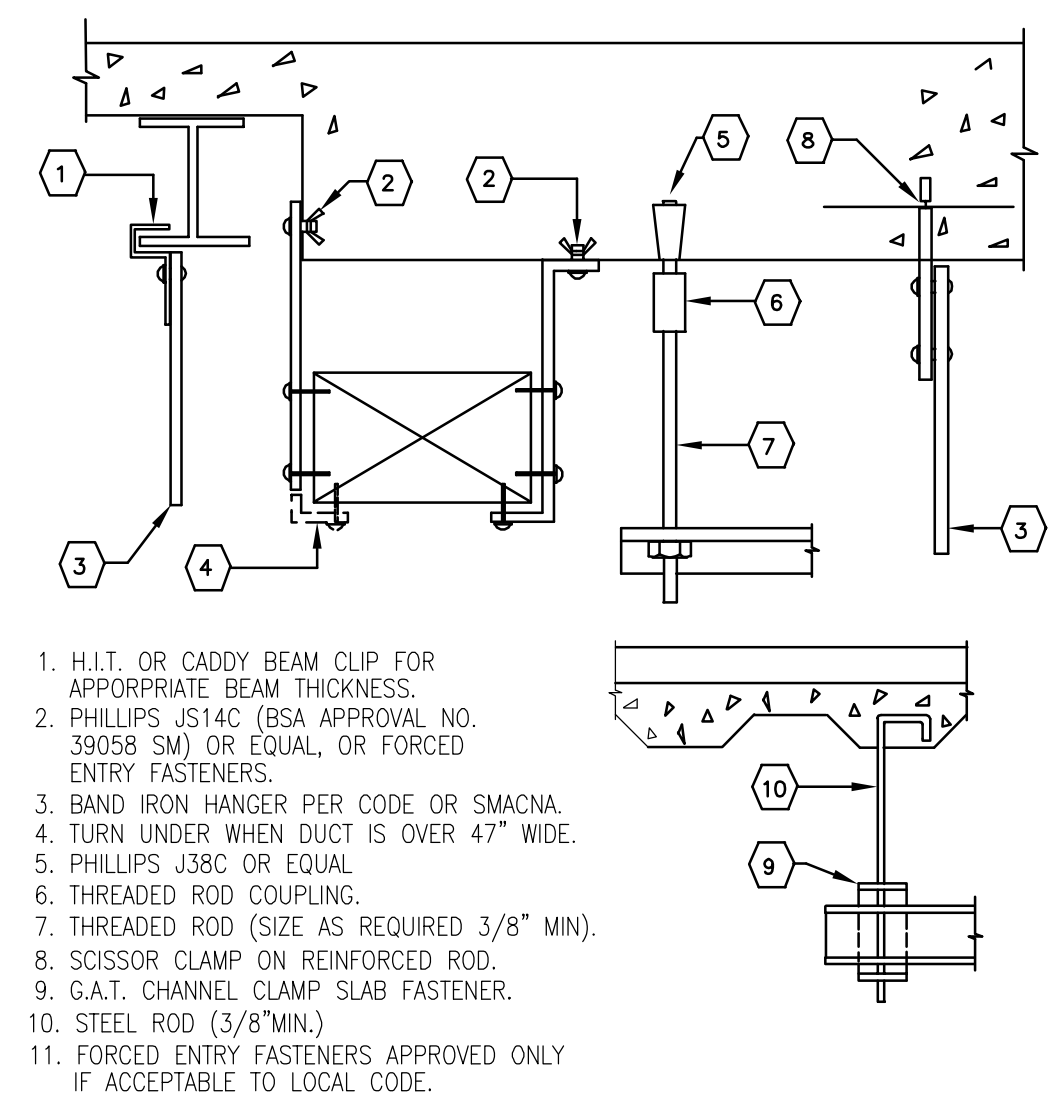
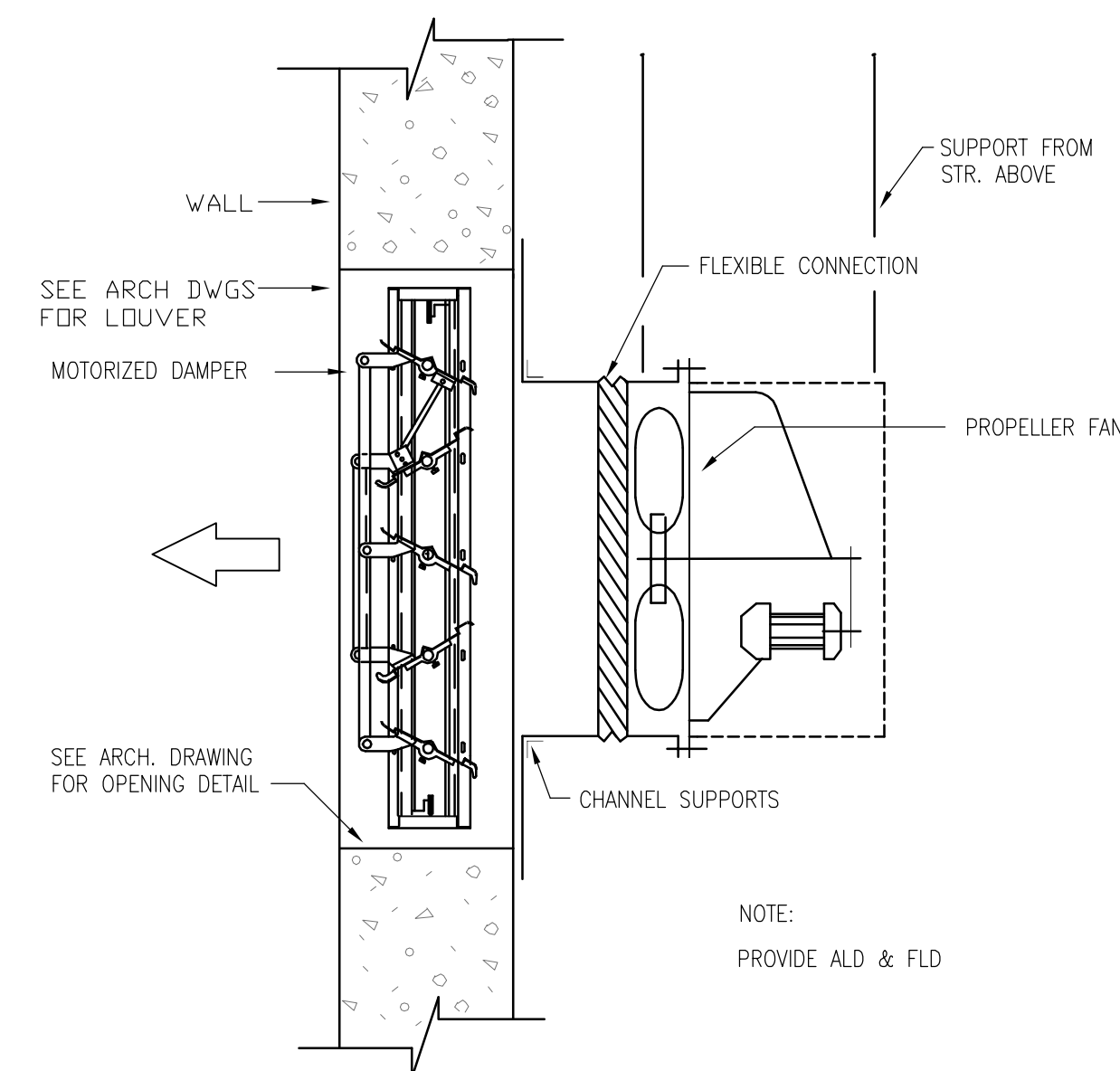
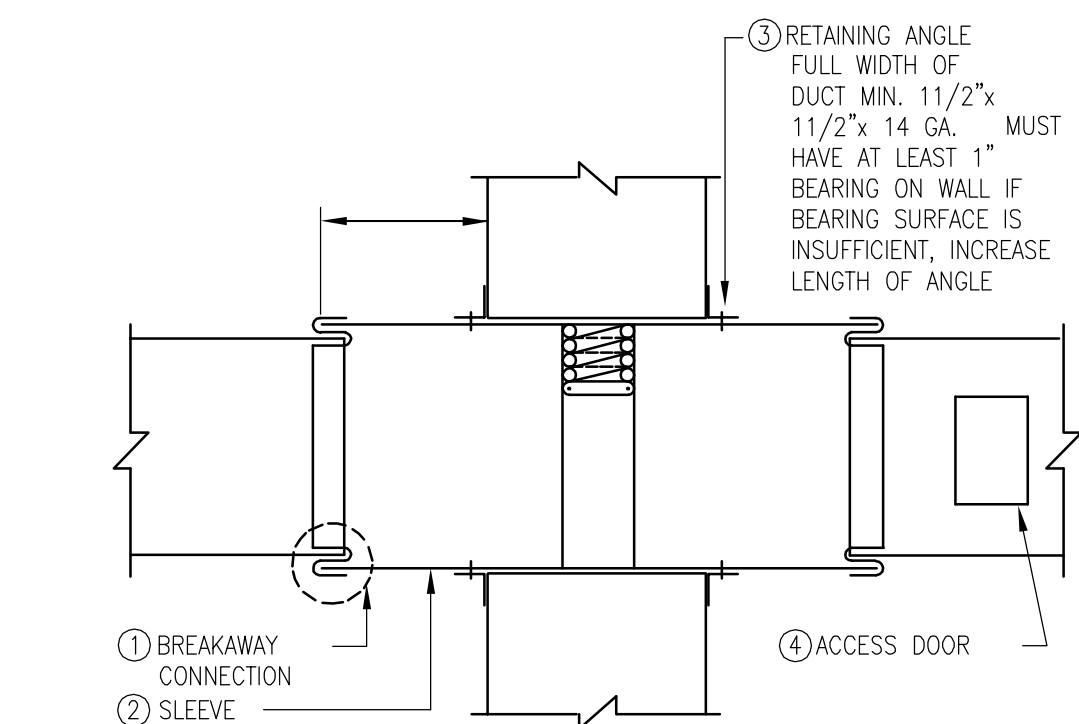
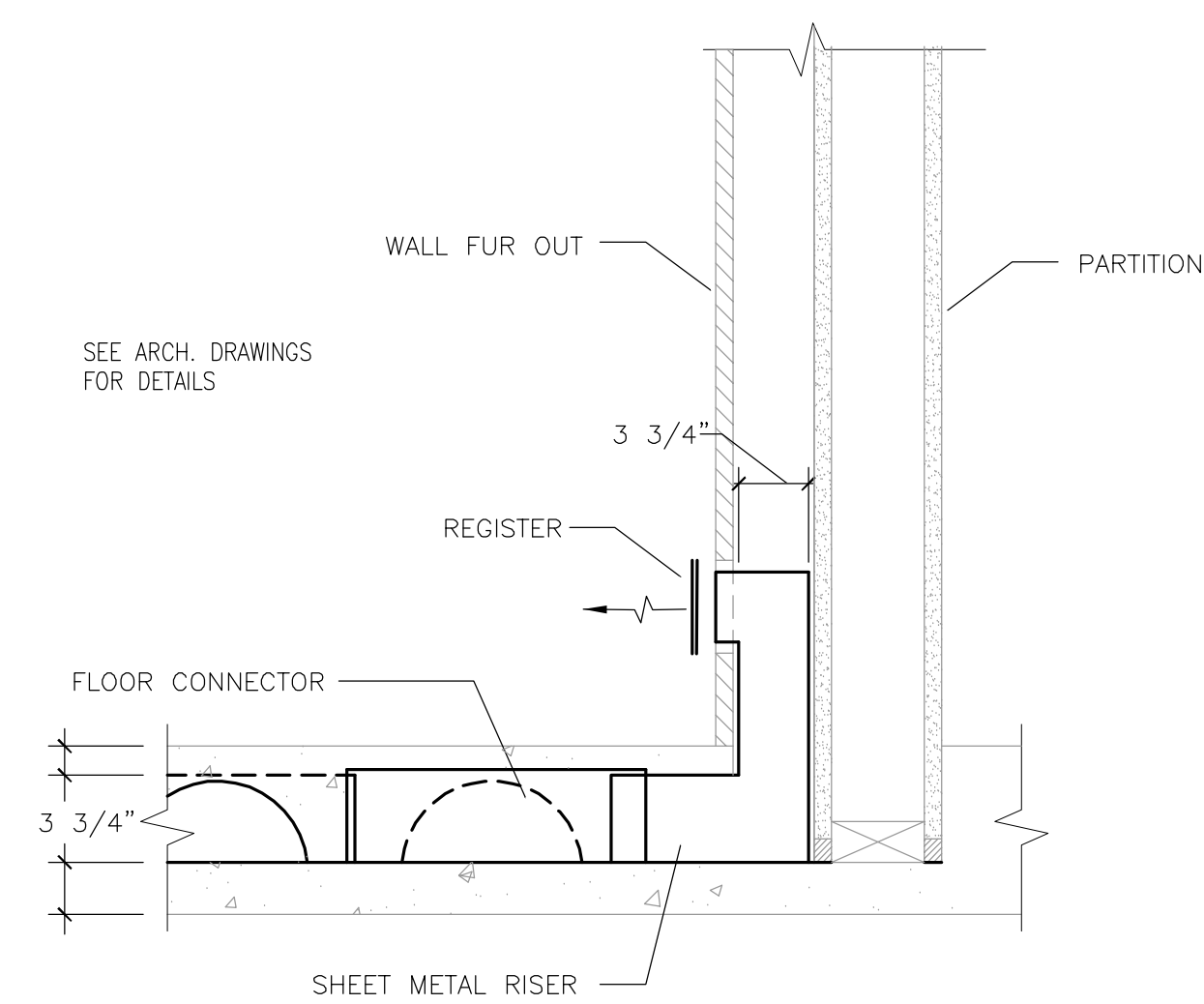
NOT TO SCALE

1. PROVIDE EXTERNAL NEMA 3R ELECTRICAL DISCONNECT & STARTER.
2. FAN SHALL HAVE AL HOUSING & SHALL BE PROVIDED W/ DRAIN TRAP, VENTED CURB EXTENSION, EXTERNAL WIRING IN FLEXIBLE CONDUIT & BE UL 762 RATED FOR GREASE LADEN VAPORS. INTERLOCK CONTROL W/ LOCAL MANUAL USER SWITCH IN KITCHEN.

NOTES:

1. ALL UNIT SHALL BE DDC CONTROLLED AND INTEGRATED IN EXISTING BMS.
2. MINIMUM CFM SETTING SHALL BE SCHEDULED VALUE OR VAV BOX MINIMUM CAPACITY, WHICHEVER IS GREATER.

Drawing: I:\5528.00 Duluth Airport\5.0 CADD\5.4 HARC\CONCRECTIONS\Draws\552808_M401.dwg Plotted on: 2/16/2012 3:34 PM Plotted by: Brandi, M



Reynolds, Smith and Hills, Inc.
4525 Airport Approach Rd, Ste A
Duluth, Minnesota 55811
218-722-1227 Fax: 218-722-1052
www.rsandh.com



DULUTH
INTERNATIONAL
AIRPORT
DULUTH, MN

NEW PASSENGER
TERMINAL

CONSULTANTS

Interior Architects:

SJA ARCHITECTS
Superior Street Suite 340, Duluth MN 55802
(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) 722-9306

M/E/P/FP Engineers:

COSENTINI ASSOCIATES INC.
1 South Wacker Drive, 37th Floor, Chicago IL 60606
TEL: (312) 201-7400 / 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) 591-5079

REVISIONS

[illegible]

DATE ISSUED:	02-17-12
REVIEWED BY:	MXB
DRAWN BY:	MXB
DESIGNED BY:	MXB

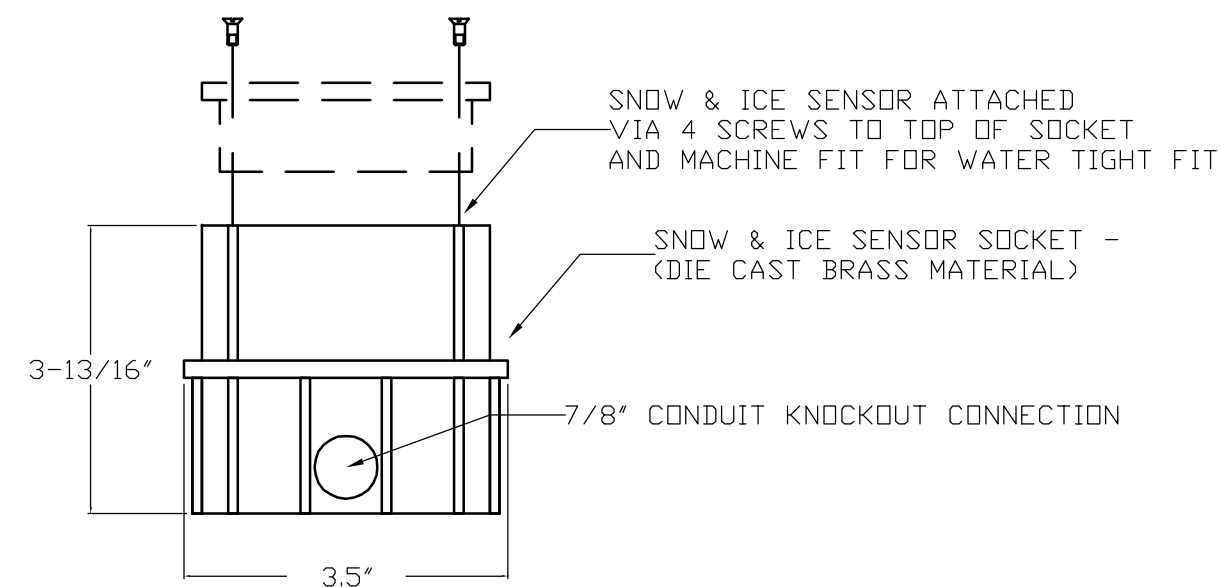
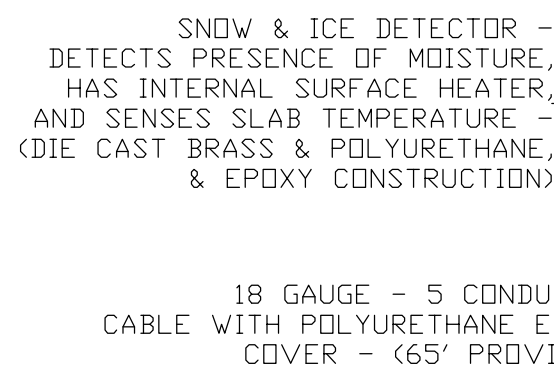
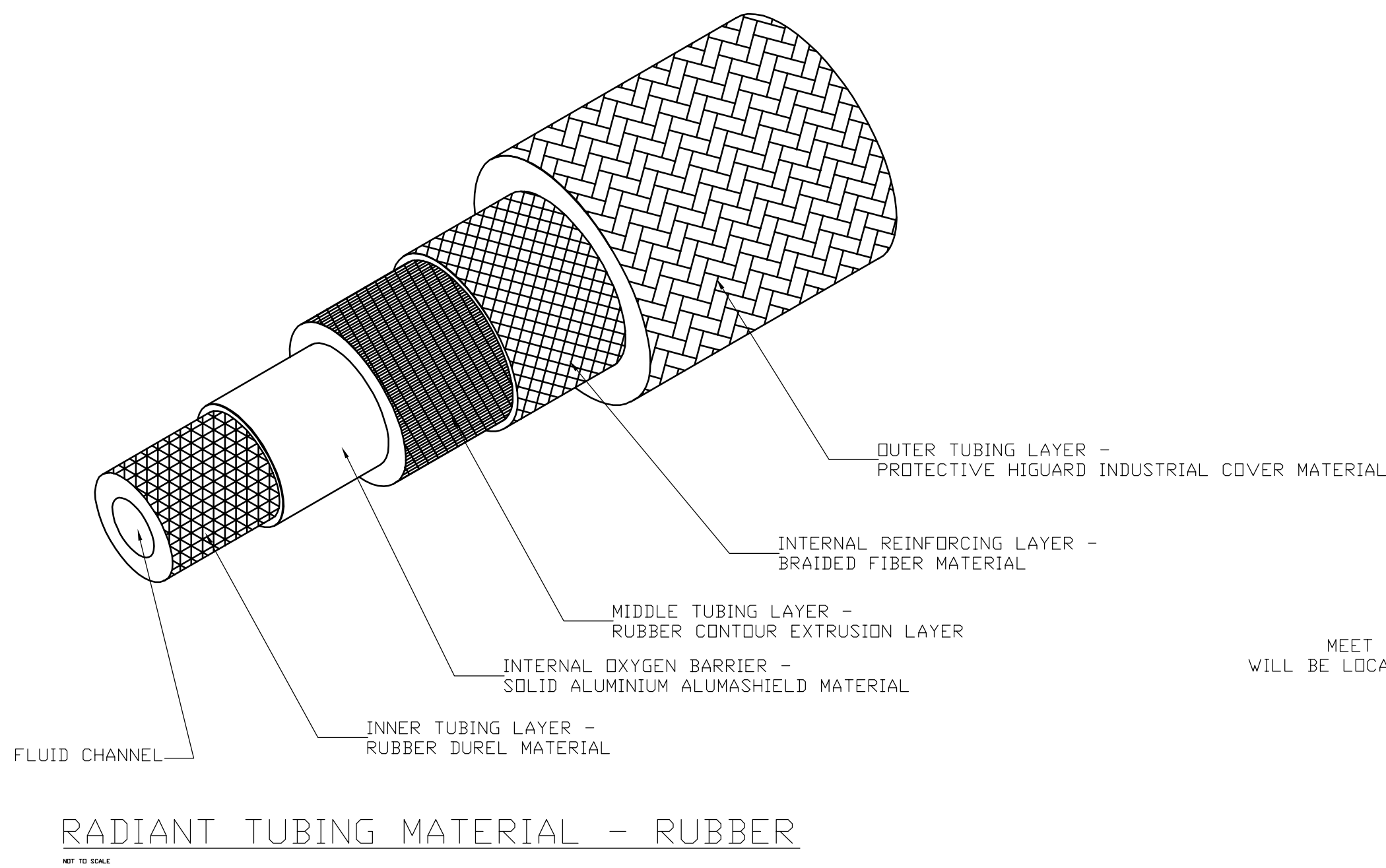
AEP PROJECT NUMBER
213-1882-091
© 2010 REYNOLDS, SMITH AND HILLS INC.
SHEET TITLE

MECHANICAL DETAILS

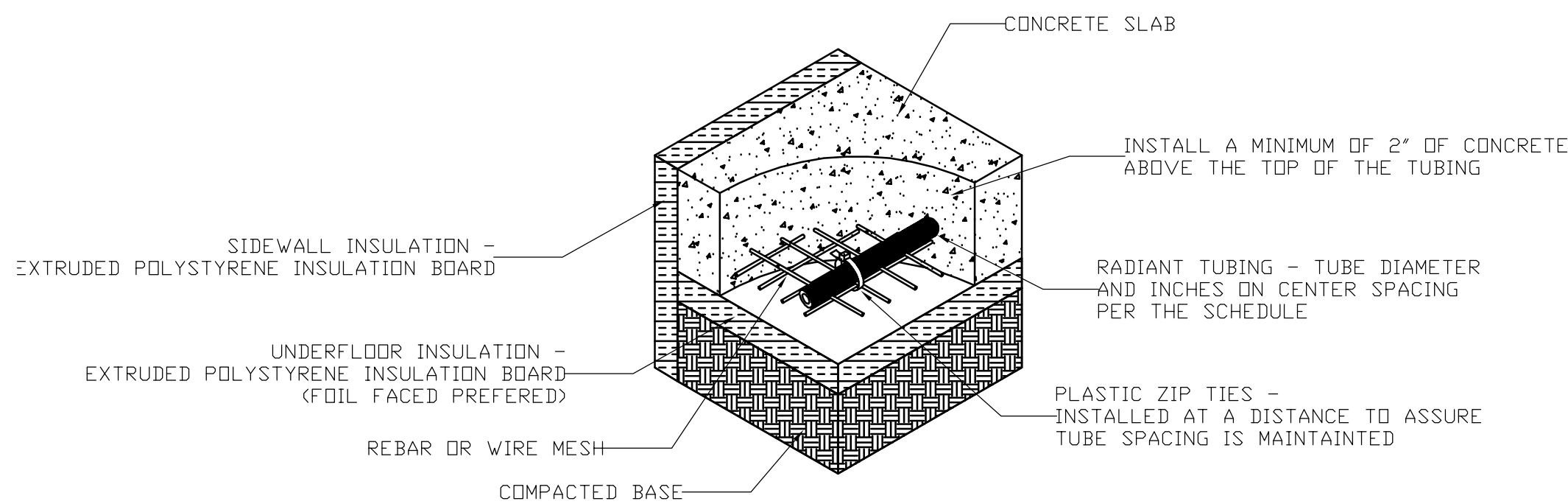
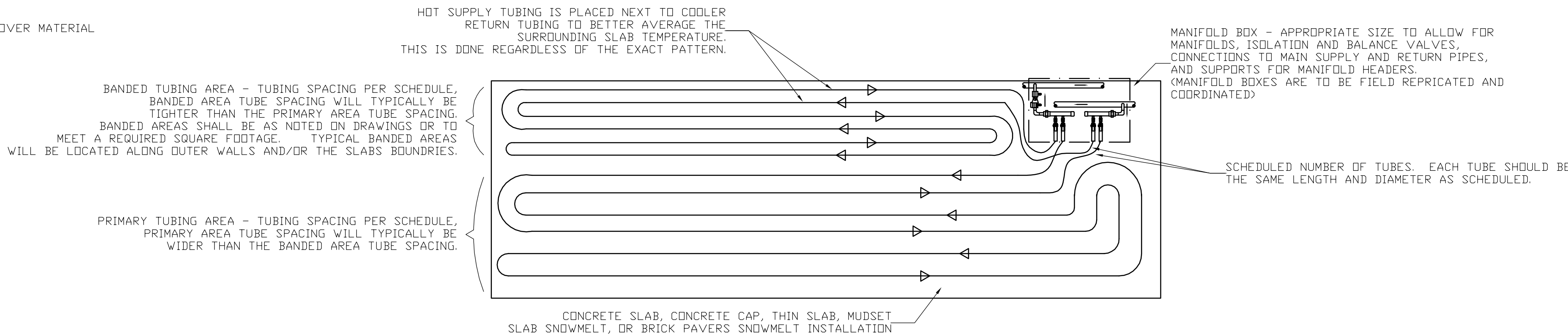
SHEET NUMBER

M503

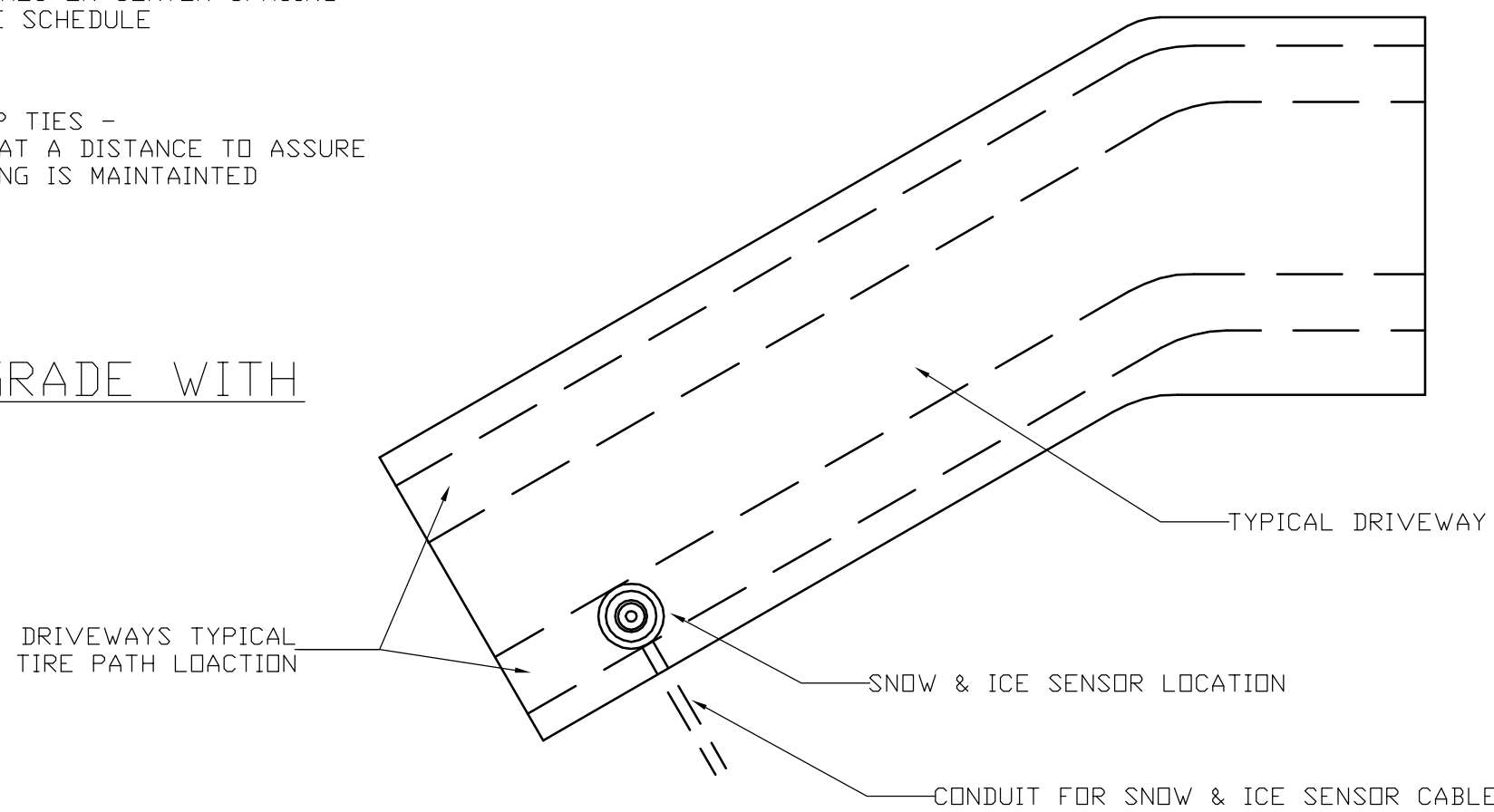
BID PACKAGE 2C



RADIANT SNOWMELT SYSTEM - SNOW & ICE SENSOR WITH SOCKET DETAIL



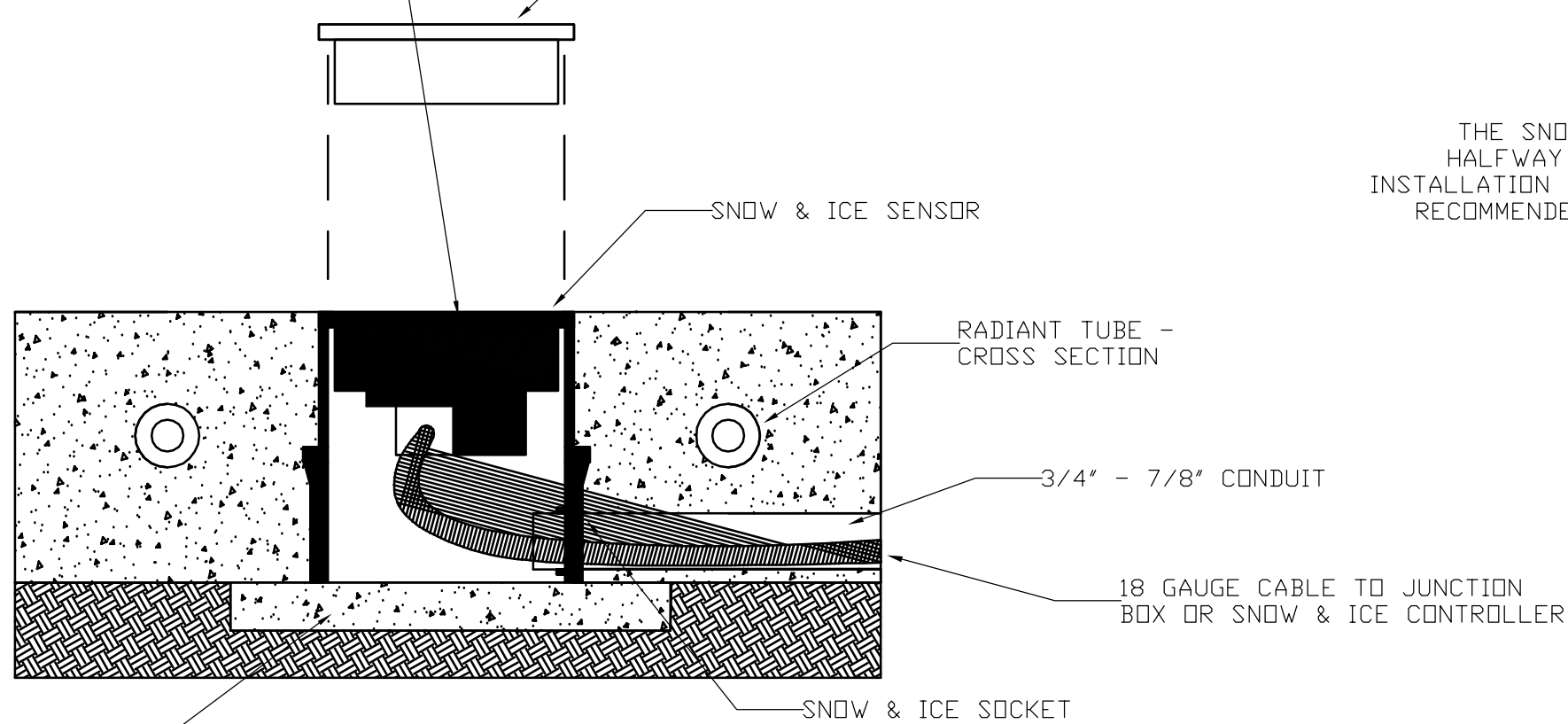
RADIANT SNOWMELT - SLAB ON GRADE WITH FOAM INSULATION



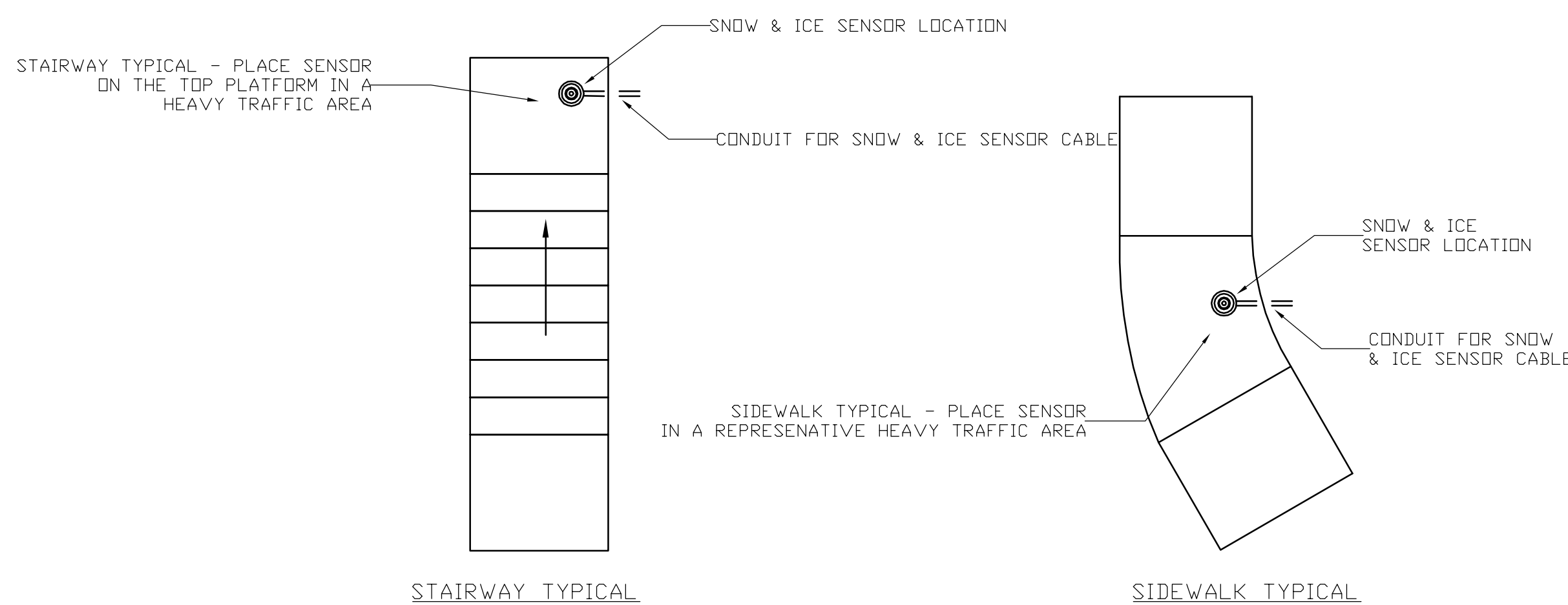
RECOMMENDED SENSOR INSTALLATION - DRIVEWAY INSTALLATIONS

THE SNOW & ICE SENSOR IS INSTALLED HALFWAY BETWEEN TWO RADIANT TUBES. INSTALLATION SHALL BE PER MANUFACTURER'S RECOMMENDED INSTALLATION INSTRUCTIONS.

A WOOD PLUG CAN BE USED TO PLUG THE SENSOR SOCKET DURING CONSTRUCTION AND THE CONCRETE POURING TO ELIMINATE POSSIBLE DAMAGE TO THE SENSOR.



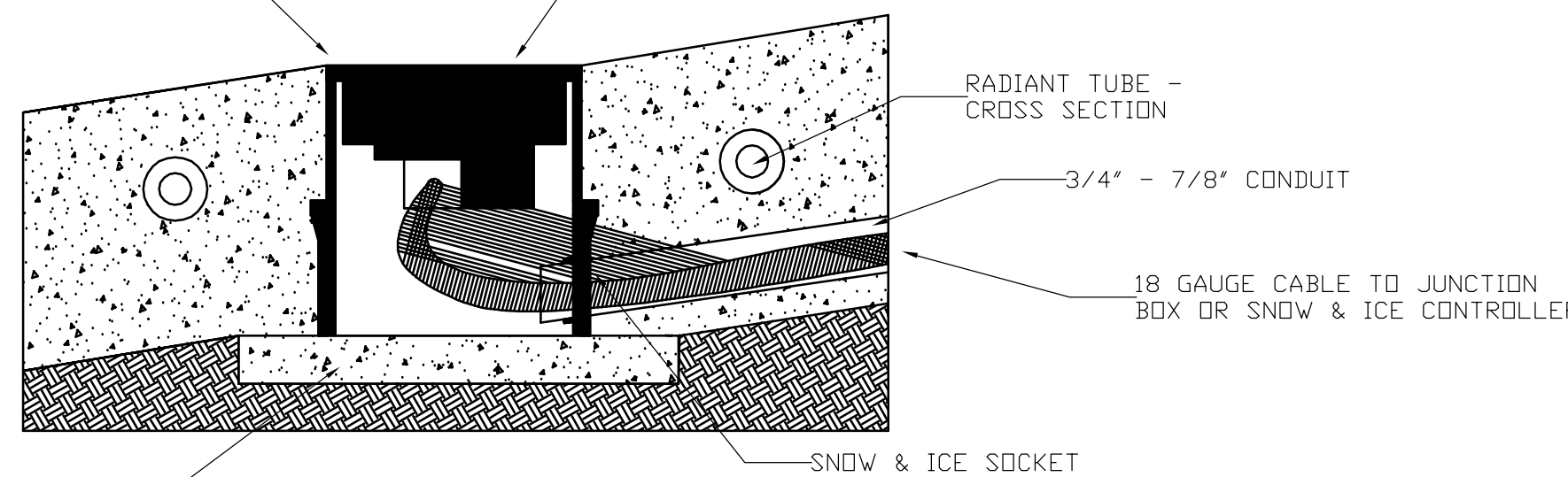
INSTALLATION OF SENSOR IN LEVEL SURFACE



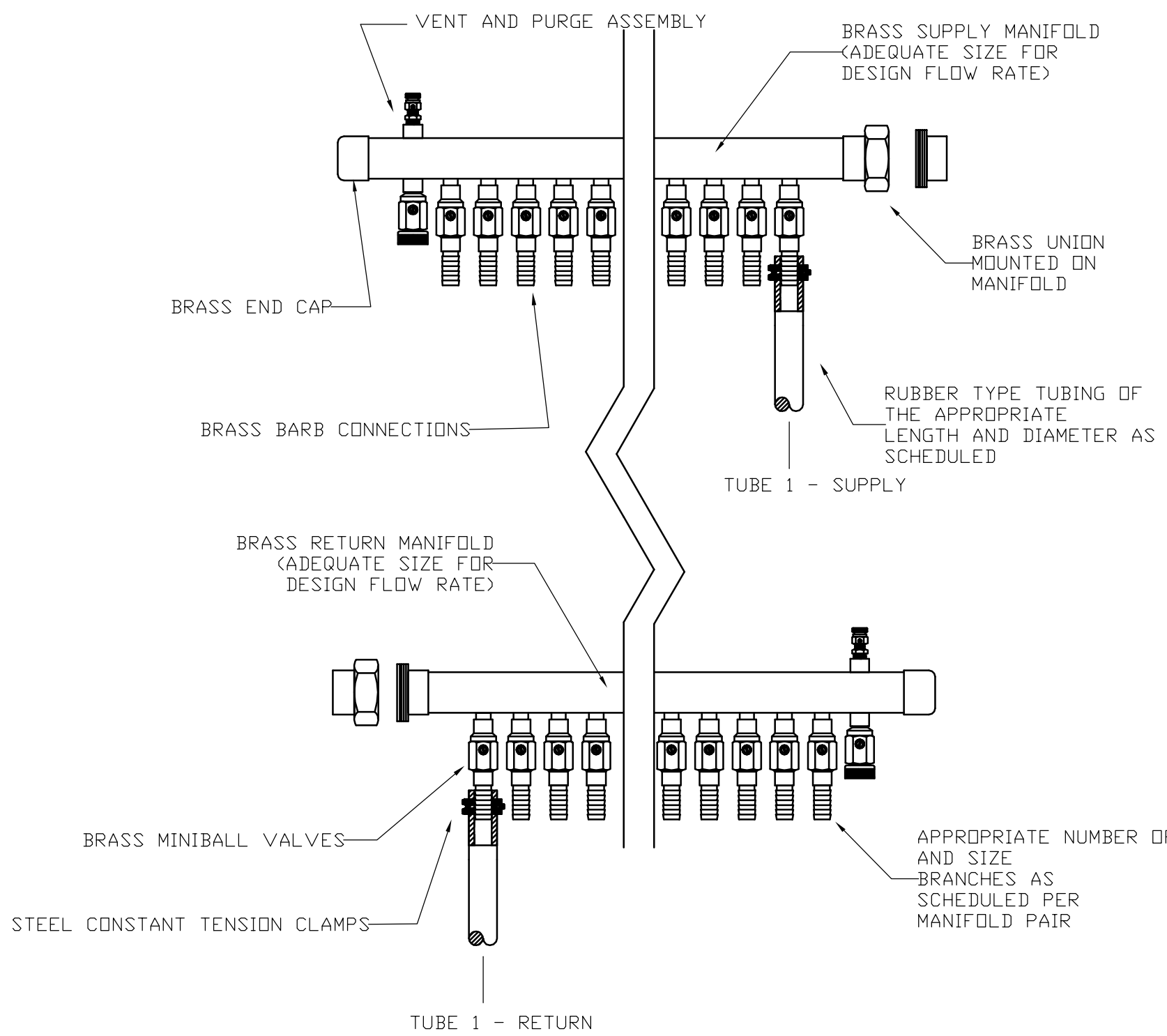
RECOMMENDED SENSOR INSTALLATION - STAIRS AND SIDEWALKS INSTALLATIONS

THE SNOW & ICE SENSOR IS INSTALLED HALFWAY BETWEEN TWO RADIANT TUBES. INSTALLATION SHALL BE PER MANUFACTURER'S RECOMMENDED INSTALLATION INSTRUCTIONS.

SNOW & ICE SENSOR - INSTALLED LEVEL TO HOLD WATER FOR MORE ACCURATE MOISTURE DETECTION



INSTALLATION OF SENSOR IN SLOPPED SURFACE



RADIANT TUBING MANIFOLD - RUBBER TUBING

RADIANT SNOWMELT SYSTEM - SNOW & ICE SENSOR (WITH SOCKET) INSTALLATION

RS&H
IMPROVING YOUR WORLD

Reynolds, Smith and Hills, Inc.
4525 Airport Approach Rd, Ste A
Duluth, Minnesota 55811
218-722-1227 Fax: 218-722-1052
www.rsandh.com

**DULUTH AIRPORT
AUTHORITY**

DULUTH
INTERNATIONAL
AIRPORT
DULUTH, MN

NEW PASSENGER
TERMINAL

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) 722-9306

M/E/P/F Engineers:

COSENTINI ASSOCIATES INC.
1 South Wacker Drive, 37th Floor, Chicago IL 60606
TEL: (312) 201-7400 / 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) 591-5079

REVISIONS

NO.	DESCRIPTION	DATE

DATE ISSUED: 02-17-12

REVIEWED BY: **MXB**

DRAWN BY: **MXB**

DESIGNED BY: **MXB**

AEP PROJECT NUMBER

213-1882-091

© 2010 REYNOLDS, SMITH AND HILLS INC.

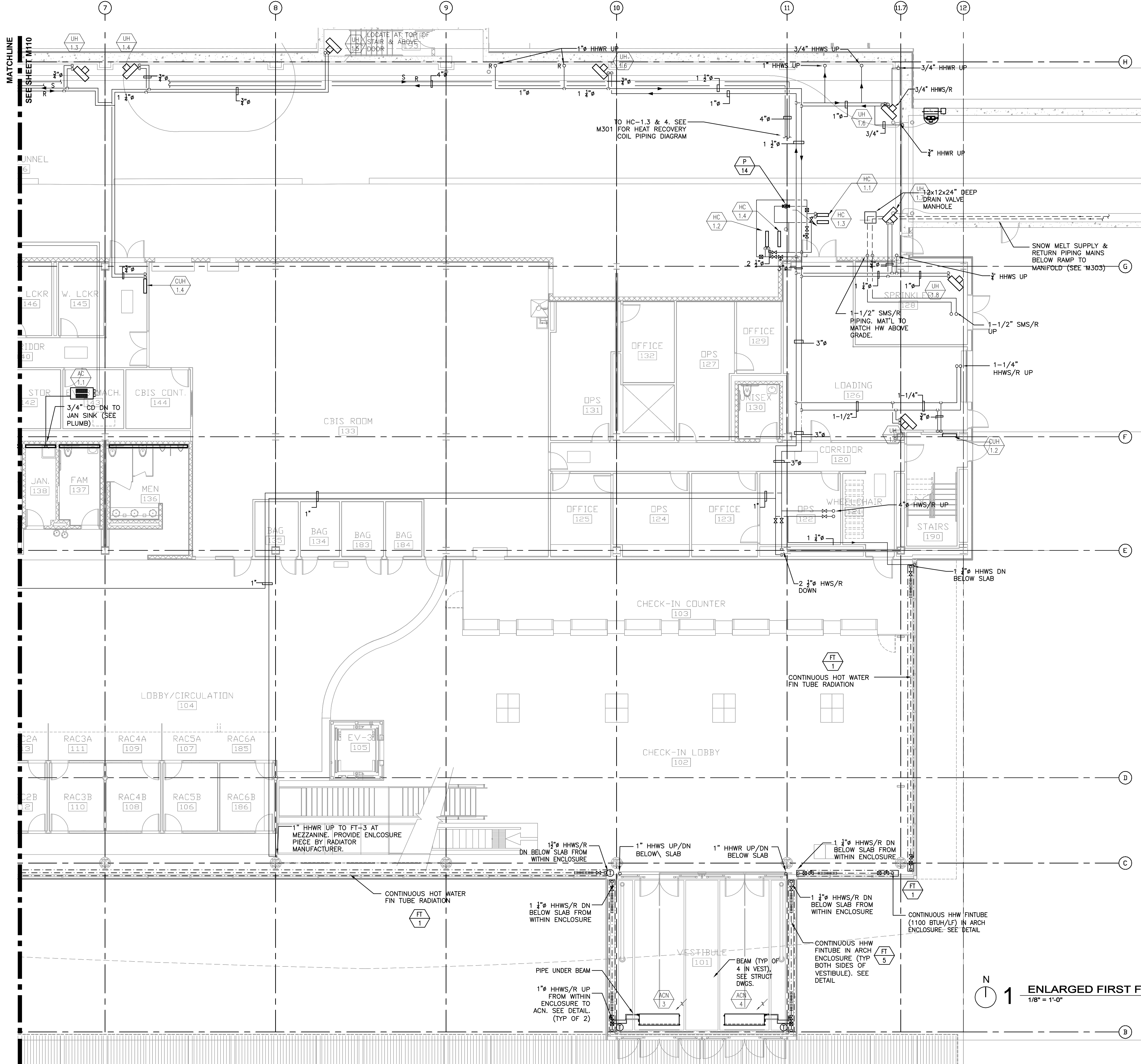
SHEET TITLE

**RAMP SNOW MELT
SYSTEM DETAILS**

SHEET NUMBER

M506

BID PACKAGE 2C



- GENERAL NOTES:
- SEE M109 FOR BELOW GRADE PIPING IN THIS AREA.
 - EXPOSED PIPING IN MAIN ENTRANCE VESTIBULES TO HAVE 0.04" ALUMINUM JACKET WITH POLISHED FINISH & PRE-FORMED ELBOWS.
 - EXPOSED PIPING IN MAIN ENTRANCE VESTIBULES TO HAVE 0.04" ALUMINUM JACKET WITH POLISHED FINISH & PRE-FORMED ELBOWS.

RS&H
IMPROVING YOUR WORLD

Reynolds, Smith and Hills, Inc.
4525 Airport Approach Rd, Ste A
Duluth, Minnesota 55811
218-722-1227 Fax: 218-722-1052
www.rsandh.com

DULUTH AIRPORT AUTHORITY

DULUTH INTERNATIONAL AIRPORT
DULUTH, MN

NEW PASSENGER TERMINAL

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) 722-9306

M/E/P/F Engineers:
COSENTINI ASSOCIATES INC.
1 South Wacker Drive, 37th Floor, Chicago IL 60606
TEL: (312) 201-7400 / 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) 591-5079

REVISIONS		
NO.	DESCRIPTION	DATE

DATE ISSUED: 02-17-12
REVIEWED BY: **MXB**
DRAWN BY: **JEH**
DESIGNED BY: **MXB**

AEP PROJECT NUMBER
213-1882-091
© 2010 REYNOLDS, SMITH AND HILLS INC.

SHEET TITLE
ENLARGED FIRST FLOOR MECHANICAL PIPING PLAN AREA B

SHEET NUMBER
MP111
BID PACKAGE 2C

NEW PASSENGER
TERMINAL

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 55812
TEL: (218) 722-1056 / FAX: (218) 722-9306

M/E/P/FP Engineer

COSENTINI ASSOCIATES INC
1 South Wacker Drive, 37th Floor, Chicago IL 60606
TEL: (312) 201-7400 / FAX: (312) 201-0031

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

Landscape Consulting

APPOLD DESIGN
East First Street, Duluth MN 558
TEL: (218) 591-5079

REVISIONS

[illegible]

DATE ISSUED: 02-17-12

REVIEWED BY: MXB

DRAWN BY: JEH

DESIGNED BY: MXP

AEP PROJECT NUMBER

213-1882-091

© 2010 REYNOLDS, SMITH AND HILLS INC.

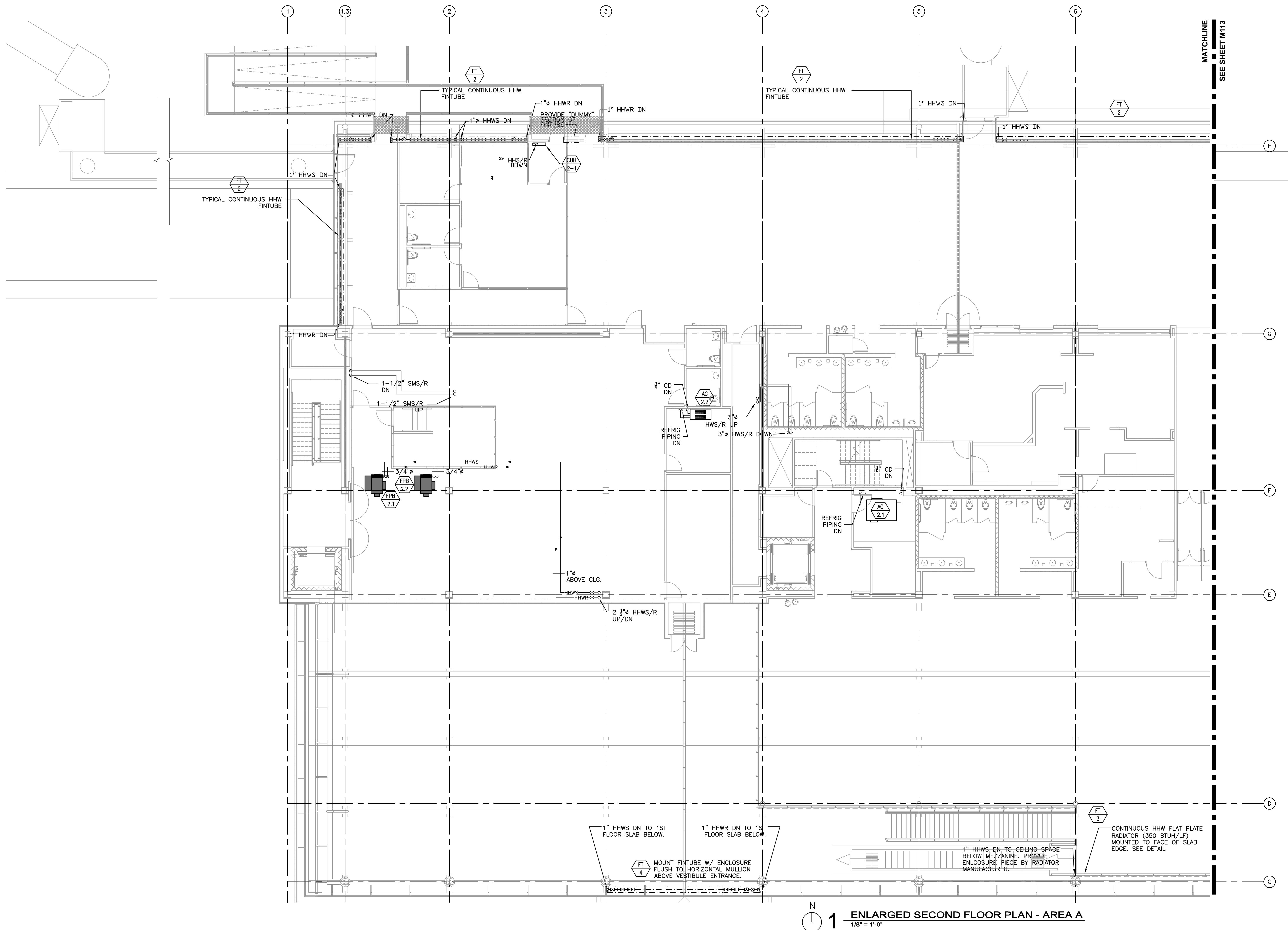
SHEET TITLE

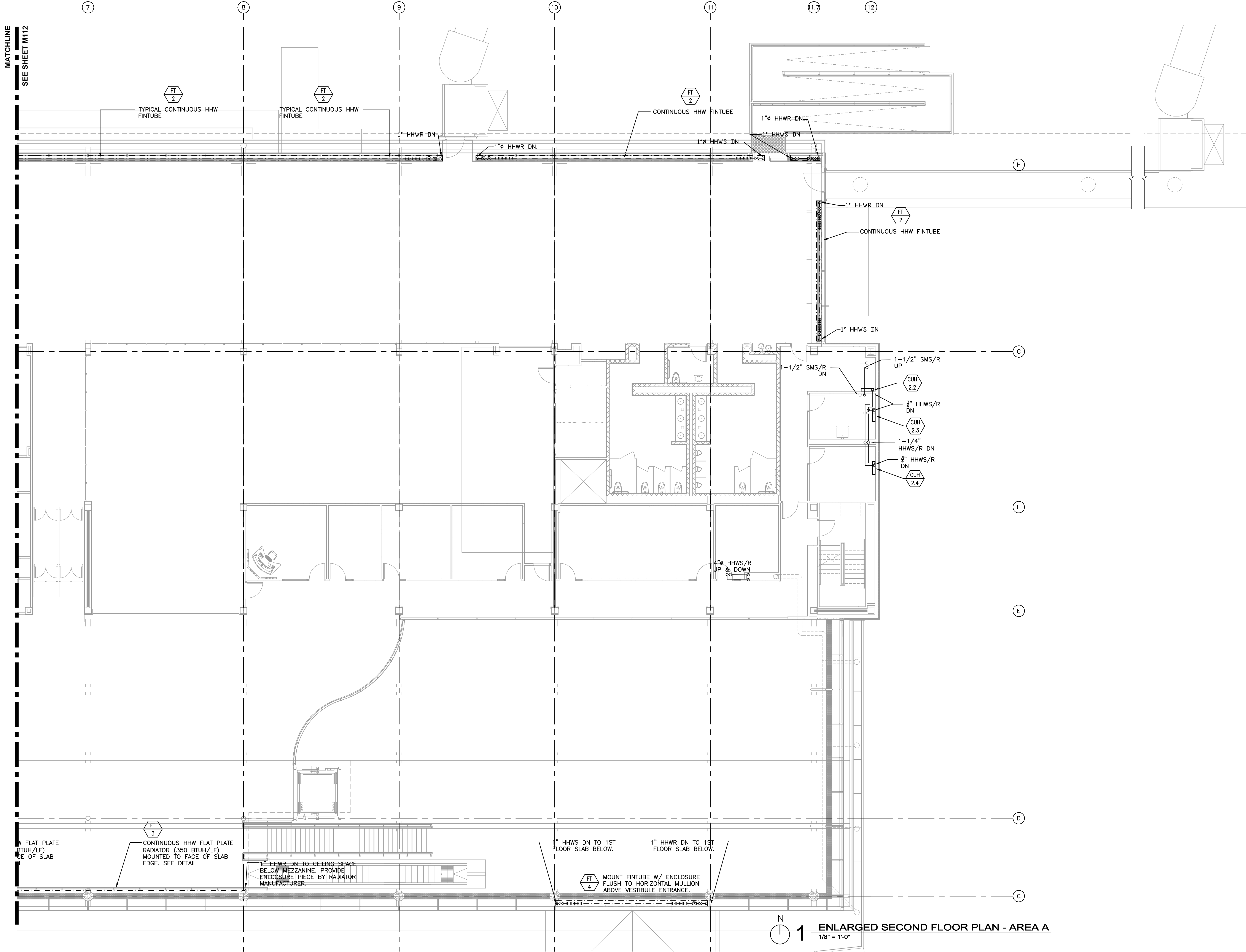
ENLARGED
SECOND FLOOR
MECHANICAL PIPING
PLAN AREA A

SHEET NUMBER

MP112

BID PACKAGE 20





Reynolds, Smith and Hills, Inc.
4525 Airport Approach Rd, Ste A
Duluth, Minnesota 55811
218-722-1227 Fax: 218-722-1052
www.rsandh.com



DULUTH
INTERNATIONAL
AIRPORT
DULUTH, MN

NEW PASSENGER
TERMINAL

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) 722-9306

M/E/P/F Engineers:
COSENTINI ASSOCIATES INC.
1 South Wacker Drive, 37th Floor, Chicago IL 60606
TEL: (312) 201-7400 / 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) 591-5079

REVISIONS

NO.	DESCRIPTION	DATE

DATE ISSUED: 02-17-12
REVIEWED BY: **MXB**
DRAWN BY: **JEH**
DESIGNED BY: **MXB**

AEP PROJECT NUMBER
213-1882-091
© 2010 REYNOLDS, SMITH AND HILLS INC.

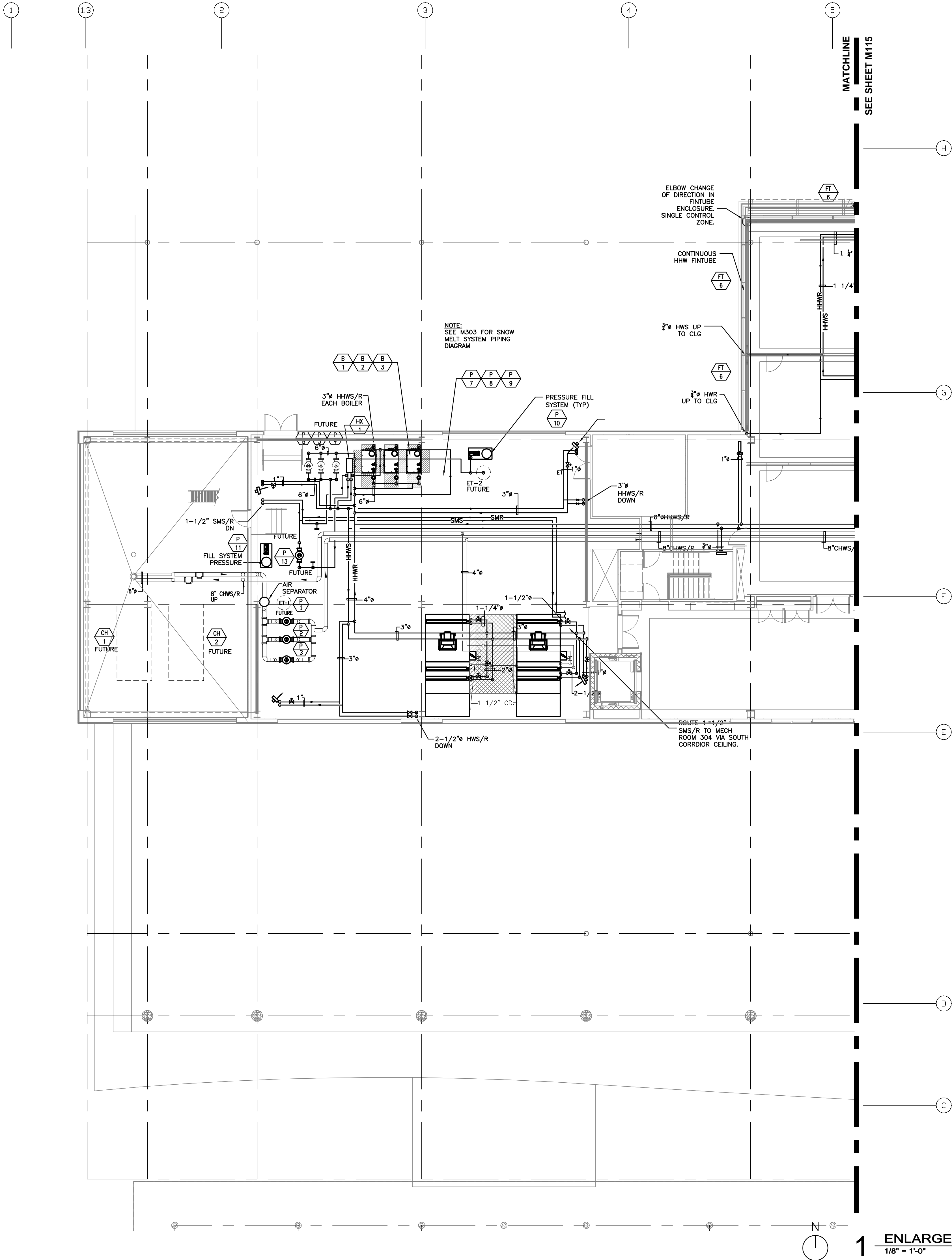
SHEET TITLE
**ENLARGED
SECOND FLOOR
MECHANICAL PIPING
PLAN AREA B**

SHEET NUMBER
MP113

BID PACKAGE 2C

GENERAL NOTES:

1. PERIMETER FINTUBE SHALL BE CONTROLLED AS FIRST STAGE OF HEATING THROUGH DDC INTERLOCK WITH RESPECTIVE ZONE FPB.



MATCHLINE
SEE SHEET M115

H

G

F

E

D

C

1

ENLARGED THIRD LEVEL FLOOR PLAN - ADMIN.

1/8" = 1'-0"

RS&H
IMPROVING YOUR WORLD

Reynolds, Smith and Hills, Inc.
4525 Airport Approach Rd, Ste A
Duluth, Minnesota 55811
218-722-1227 Fax: 218-722-1052
www.rsandh.com

**DULUTH AIRPORT
AUTHORITY**

DULUTH
INTERNATIONAL
AIRPORT
DULUTH, MN

NEW PASSENGER
TERMINAL

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) 722-9306

M/E/P/F Engineers:
COSENTINI ASSOCIATES INC.
1 South Wacker Drive, 37th Floor, Chicago IL 60606
TEL: (312) 201-7400 / 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) 591-5079

REVISIONS

NO.	DESCRIPTION	DATE

DATE ISSUED: 02-17-12
REVIEWED BY: **MXB**
DRAWN BY: **MB/JH**
DESIGNED BY: **MXB**

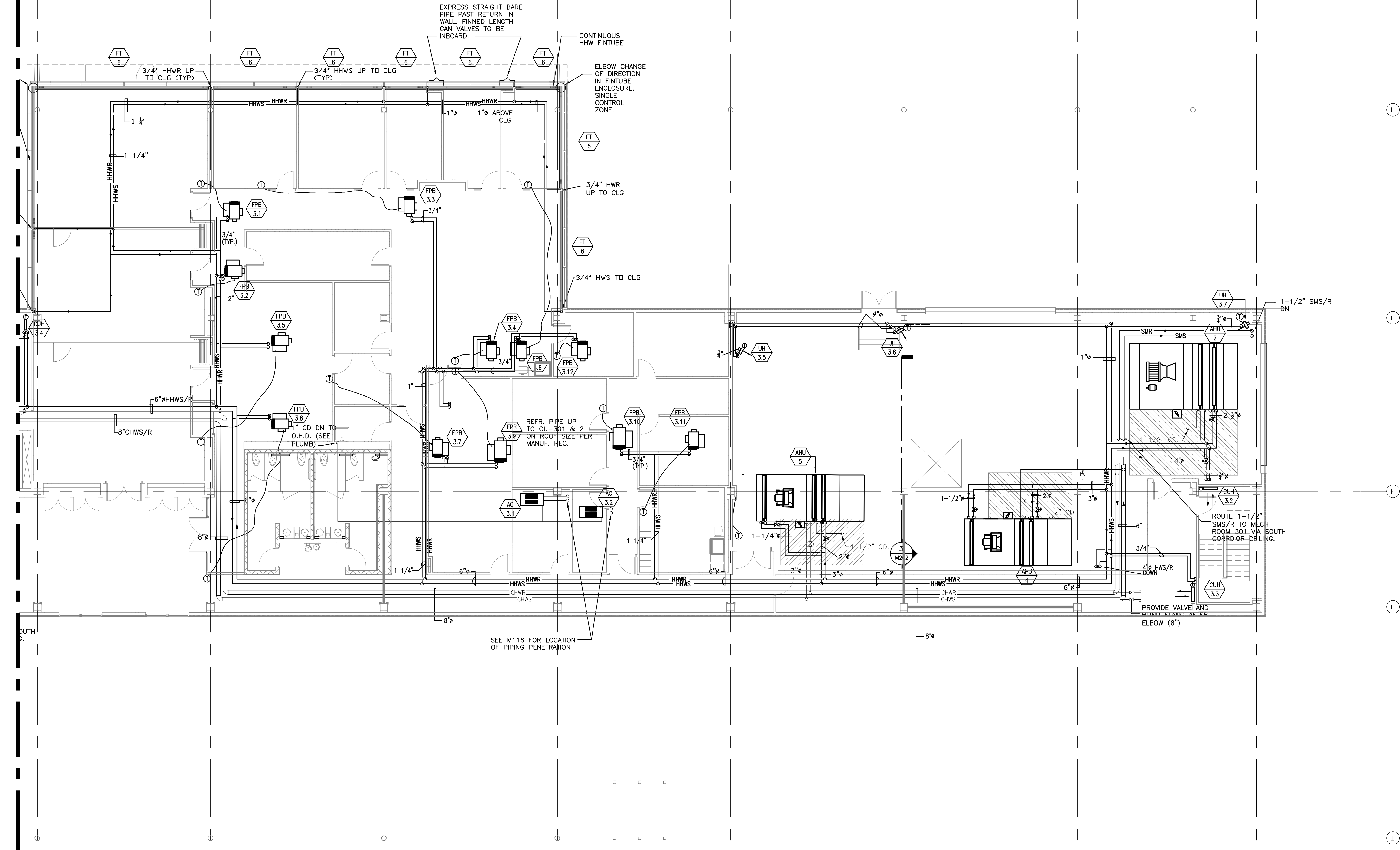
AEP PROJECT NUMBER
213-1882-091
© 2010 REYNOLDS, SMITH AND HILLS INC.

SHEET TITLE
**ENLARGED
THIRD FLOOR
MECHANICAL PIPING
PLAN AREA A**

SHEET NUMBER
MP114

BID PACKAGE 2C

MATCHLINE
SEE SHEET M112



GENERAL NOTES:

1. PERIMETER FINTUBE SHALL BE CONTROLLED AS FIRST STAGE OF HEATING THROUGH DDC INTERLOCK WITH RESPECTIVE ZONE FPB.

RS&H
IMPROVING YOUR WORLD

Reynolds, Smith and Hills, Inc.
4525 Airport Approach Rd, Ste A
Duluth, Minnesota 55811
218-722-1227 Fax: 218-722-1052
www.rsandh.com



DULUTH AIRPORT
AUTHORITY

DULUTH
INTERNATIONAL
AIRPORT
DULUTH, MN

NEW PASSENGER
TERMINAL

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) 722-9306

M/E/P&F Engineers:
COSENTINI ASSOCIATES INC.
1 South Wacker Drive, 37th Floor, Chicago IL 60606
TEL: (312) 201-7400 / 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) 591-5079

REVISIONS		
NO.	DESCRIPTION	DATE

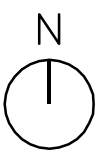
DATE ISSUED: 02-17-12
REVIEWED BY: **MXB**
DRAWN BY: **MB/JEH**
DESIGNED BY: **MXB**

AEP PROJECT NUMBER
213-1882-091
© 2010 REYNOLDS, SMITH AND HILLS INC.

SHEET TITLE
**ENLARGED
THIRD FLOOR
MECHANICAL PIPING
PLAN AREA B**

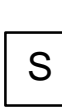
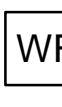




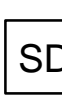
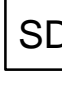

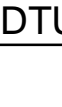
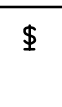
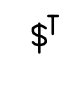
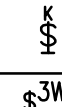


SHEET NUMBER
MP115






















BID PACKAGE 2C










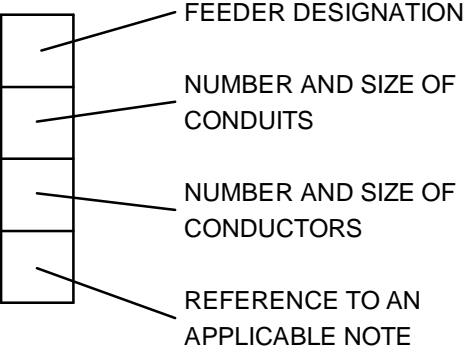

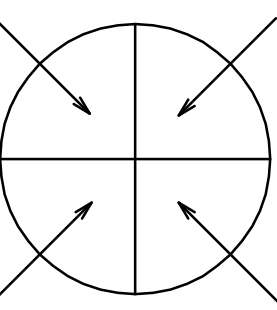
1 ENLARGED THIRD LEVEL MECHANICAL PLAN - AREA B
1/8" = 1'-0"

SYMBOL	DESCRIPTION	NOTES
LIGHTING FIXTURES		
<div><div>F1</div><div><div></div><div>d</div></div></div> <div><div>F2</div><div><div></div><div>c</div></div></div> <div><div>F3</div><div><div></div><div>b</div></div></div> <div><div>F4</div><div><div></div><div>d</div></div></div>	CEILING MOUNTED LIGHTING FIXTURES	UPPER CASE LETTERS INSCRIBED IN SYMBOL INDICATE FIXTURE TYPE REFERENCES TO FIXTURE LIST SUBSCRIPT LOWER CASE LETTERS INDICATE SWITCH CONTROL ASSOCIATIONS INDICATES EMERGENCY LIGHTING:
<div><div>F1</div><div><div></div><div>a</div></div></div> <div><div>F1</div><div><div></div><div>d</div></div></div>	WALL MOUNTED LIGHTING FIXTURES	<div><div>F1</div><div><div></div><div>0</div></div></div> , <div><div>F3</div><div><div></div><div>b</div></div></div> , <div><div>F1</div><div><div></div><div>a</div></div></div> CIRCUITRY FOR EMERGENCY LIGHTING AND EXIT SIGNS ARE DESIGNATED WITH "E" BEFORE THE CIRCUIT NUMBER.
<div><div></div><div></div></div>	FLOOR MOUNTED LIGHTING FIXTURE	
EXIT SIGNS		
<div><div></div><div></div></div>	WALL MOUNTED EXIT SIGN	APPLICATION OF SHADED QUADRANTS AND ARROWS THUS: <div><div></div><div></div></div>
<div><div></div><div></div></div>	CEILING MOUNTED EXIT SIGN	INDICATE LETTERED FACE AND DIRECTIONAL ARROWS AT SYMBOLS FOR SIGNS FOR WHICH SELECTION OF SUCH FEATURES IS REQUIRED.
		SUBSCRIPT DESIGNATIONS XA, XB, XC, ETC. INDICATE EXIT SIGN TYPE REFERENCES TO LIGHTING FIXTURE LIST.
JUNCTION AND PULL BOXES -- SECONDARY LIGHT AND POWER WIRING		
<div><div></div><div></div></div>	PULL BOX OR JUNCTION BOX--OUTLET BOX TYPE WALL MOUNTED	
<div><div></div><div></div></div>	PULL BOX OR JUNCTION BOX--OUTLET BOX TYPE MOUNTED AT CEILING	
<div><div></div><div></div></div>	JUNCTION BOX	
SECONDARY FEEDERS		
<div><div></div><div></div></div>	FEEDER RUN CONCEALED ABOVE AS PER BASIC REQUIREMENTS FOR THE INSTALLATION OF CIRCUITRY.	
<div><div></div><div></div></div>	FEEDER RUN CONCEALED BELOW AS PER BASIC REQUIREMENTS FOR THE INSTALLATION OF CIRCUITRY.	
<div><div></div><div></div></div>	FEEDER RUN EXPOSED AS PER BASIC REQUIREMENTS FOR THE INSTALLATION OF	
FIRE PROTECTIVE ALARM SYSTEMS SOUNDING AND VISUAL DEVICES		
<div><div></div><div></div></div>	SPEAKER	SUBSCRIPT -P- DENOTES PRESIGNAL SUBSCRIPT -T- DENOTES TROUBLE SIGNAL
<div><div></div><div></div></div>	SPEAKER w/ VISUAL ALARM DEVICE	SYMBOLS AS SHOWN REPRESENT CLG MOUNTED DEVICES--CIRCUMSCRIBED CIRCLES THUS:-
<div><div></div><div></div></div>	VISUAL ALARM DEVICE	<div><div></div><div></div></div>
		DENOTE WALL MOUNTING SYMBOLS WITH LOWER PORTION LEFT UNSHADED DENOTE THAT THE ITEMS ARE PART OF AN OVERALL FIRE PROTECTIVE ALARM SYSTEM INSCRIBED SHADING IN LOWER PORTION DENOTES THAT THE ITEMS ARE PART OF A SEPARATE SYSTEM WHICH INCORPORATES ACTUATING DEVICES REPRESENTED BY SIMILARLY SHADED SYMBOLS SUBSCRIPT LOWER CASE LETTERS IN QUOTES DENOTE EXCEPTIONS TO SPECIFIED MOUNTING AS FOLLOWS: "f" - flush "s" - surface
FIRE PROTECTIVE ALARM SYSTEMS BASIC ITEMS		
<div><div></div><div></div></div>	CENTRAL EQUIPMENT OF SYSTEM	
<div><div></div><div></div></div>	OUTLYING ANNUNCIATOR	

SYMBOL	DESCRIPTION	NOTES	
FIRE PROTECTIVE ALARM SYSTEM ACTUATING DEVICES			
	MANUAL FIRE ALARM ACTUATING DEVICE OR STATION	SUBSCRIPT -K- DENOTES STRAP KEY STATION	SUBSCRIPT NUM- BERS INDICATE ZONE OR CIRCUIT
	SPRINKLER ALARM ACTUATING DEVICE	SUBSCRIPT UPPER CASE LETTERS DE- NOTE THE FOLLOW- ING:-	SUBSCRIPT LOWER CASE LETTERS IN QUOTES DENOTE EXCEPTIONS TO SPECIFIED STAND- ARD MOUNTING AS FOLLOWS:-
	VALVE SUPERVISOR SWITCH	a--main alarm valve waterflow detector W--WATERFLOW DE- TECTOR T--TAMPER SWITCH F--FLOAT SWITCH FR-FIRE PUMP RUN- NING ALARM RELAY CONTACTS fp-fire pump pow- er available alarm relay con- tacts P--AIR PRESSURE SWITCH DF-DRY PIPE AIR COMP. power failure DP-DRY PIPE air comp. low air comp	
	AUTOMATIC FIRE DETECTION ALARM ACTUATING DEVICES SMOKE DETECTOR	SUBSCRIPT UPPER CASE LETTERS DE- NOTE THE FOLLOW- ING:-	SUBSCRIPT UPPER CASE LETTERS IN PARENTHESIS DE- NOTE DEVICE FUNCTION THUS:-
	DUCT SMOKE DETECTOR	-RT-FIRESTAT-- RATE OF RISE PLUS FIXED TEM- PERATURE TYPE	(TE)-TOCCC EVACUATION (FE)-FLOOR EVACUATION
	HEAT DETECTOR	-FT-FIRESTAT-- FIXED TEM- PERATURE TYPE	
	BEAM TYPE SMOKE DETECTOR SUBSCRIPT "T" INDICATES TRANSMITTER	-PM--PNEUMATIC TUBE DIA- PHRAGM SWITCH	
	SUBSCRIPT "R" INDICATES RECEIVER		
	ELECTRIC DOOR LOCK	SUBSCRIPT NUM- BERS IN PAREN- THESIS AT SYM- BOLS REPRESENT- ING FIRESTATS DENOTE EXCEP- TIONS TO SPECI- FIED STANDARD TEMPERATURE SETTINGS SUBSCRIPT NUM- BERS IN PAREN- THESIS AT SYM- BOLS REPRESENT- ING PNEUMATIC TUBE DIAPHRAGM SWITCHES DENOTE LENGTH OF ASSO- CIATED TUBING	
	DATA TRANSMISSION UNIT		
SYMBOL	DESCRIPTION	NOTES	
WIRING DEVICES			
	WIRING DEVICE TYPE SWITCH	WITHOUT SUB- SCRIPT NUMBER SYMBOL DENOTES "SINGLE POLE"	WITHOUT SUBSCRIPT UPPER CASE LETTERS SYMBOLS DENOTE WIRING DEVICE STANDARD AS SPECI- FIED.
	SWITCH WITH THERMAL OVERLOAD PROTECTION FOR 120V FRACTIONAL HP MOTORS	SUBSCRIPT UPPER CASE LETTERS DE- NOTE NON STAND- ARD TYPE REFER- ENCE TO SCHEDULE OF NON STANDARD WIRING DEVICES.	SUBSCRIPT LOWER CASE LETTERS IN- DICATE SWITCH CONTROL ASSOCCIA- TIONS.
	KEY OPERATED SWITCH		
	3 WAY TYPE SWITCH		
	AREA OF RESCUE ASSISTANCE INTERCOM STATION	INDICATE SEPARATE PILOT LIGHT.	

SYMBOL	DESCRIPTION	NOTES			
WIRING DEVICES (CONT)					
	WALL DUPLEX CONVENIENCE RECEPTACLE	SHADING OF SYMBOL THUS:-  INDICATES RECEPTACLE WITH EACH HALF SEPARATELY WIRED (HALF CONSTANT, HALF SWITCH CONTROLLED)	*D* INDICATES DEDICATED RECEPTACLE		
	WALL DOUBLE DUPLEX (QUAD) CONV. RECEPT.				
	GFI (GROUND FAULT INTERRUPTING) WALL DUPLEX CONVENIENCE RECEPTACLE				
	WALL SINGLE CONVENIENCE RECEPTACLE				
	POWER SUPPLY FOR ACCESS CONTROL				
	QUAD RECEPTACLE IN FLUSH FLOOR BOX			SEE TELECOM PLANS ("ET" SERIES) FOR INDICATION WHETHER BOX CONTAINS DATA	
	DUPLEX RECEPTACLE IN FLUSH FLOOR BOX				
	QUAD RECEPTACLE PENDANT MOUNTED FROM CEILING				
	CEILING DUPLEX RECEPTACLE				
	WALL SPECIAL PURPOSE POWER SUPPLY RECEPTACLE				
	FLOOR SPECIAL PURPOSE POWER SUPPLY RECEPTACLE				
	CEILING SPECIAL PURPOSE POWER SUPPLY RECEPTACLE	GANGING SYMBOL SHOWN IN CIRCUITRY RUN IN COMBINATION WITH ANY WIRING DEVICE SYMBOLS THUS:- DENOTES WIRING DEVICES WHICH ARE			
	FLOOR BOX FOR ILLUMINATED SIGNS - COORDINATE WITH MANUFACTURER REQUIREMENTS FOR COMPONENTS.	TO BE GANGED IN A SINGLE COMMON PLATE OUTLET.			
	WIRING DEVICE GANGING SYMBOL				
MOTORS, PANELS, AND INDIVIDUALLY MOUNTED DEVICES AND EQUIPMENT - SECONDARY LIGHT AND POWER WIRING					
	MOTORS IN MECHANICAL SYSTEM EQUIPMENT.	COMPLETE INFORMATION FOR MOTORS IS INDICATED BY APPLICATION OF TAG SYMBOL REFERENCE TO MOTOR LIST			
	INDIVIDUALLY MOUNTED SECONDARY OVERCURRENT AND SWITCHING DEVICES (CIRCUIT BREAKERS, FUSIBLE SWITCHES, UNFUSED SWITCHES, ETC.) APPLIED AS SPECIFIED.	PROVIDE VOLTAGE TO MATCH EQUIPMENT VOLTAGE. AMPERAGE AND POLES ARE INDICATED ON PLANS - SOME SIZES SHOULD BE VERIFIED WITH EQUIPMENT MANUFACTURER (WHERE NOTED).			
	MOTOR STARTER FOR MOTORS IN MECHANICAL SYSTEM EQUIPMENT.	SUBSCRIPT NUMBERS INDICATE FUSING WHERE REQUIRED (3 POLE FUSING UNLESS NOTED).	COMPLETE INFORMATION FOR MOTOR CONTROL ITEMS IS INDICATED BY THE TAG SYMBOL REFERENCE APPLIED TO ASSOCIATED MOTORS--WHERE RELATION OF MOTORS TO CONTROL ITEMS IS NOT EVIDENT, MOTOR TAG SYMBOLS ARE REPEATED AT SYMBOLS REPRESENTING THESE ITEMS TO CLARIFY THESE ASSOCIATIONS.		
	POWER OR DISTRIBUTION PANEL.	ARROW OF NOTE INDICATING PANEL DESIGNATION ALSO DENOTES FRONT FACE OF PANEL.			
	LIGHTING OR APPLIANCE PANEL.				
	INDIVIDUALLY MOUNTED DRY TYPE TRANSFORMER PRIMARY VOLTAGE TO SECONDARY VOLTAGE	SUBSCRIPT NUMBERS INDICATE KVA RATING.			

SYMBOL	DESCRIPTION	NOTES
LIGHTING CONTROL - ALL LIGHTING CONTROL TO ACCOMODATE 277V U.N.O.		
	DESCRIPTION	MANUFACTURER/CAT. #
	LINE VOLTAGE, DUAL TECHNOLOGY WALL SWITCH SENSOR WALL--MOUNTED AT STANDARD SWITCH HEIGHT NEAR DOORS. SET FOR MANUAL--ON, AUTOMATIC--OFF OPERATION. PROVIDE THREE--WAY VERSION WHERE REQUIRED. 180° COVERAGE PATTERN REQUIRED.	WATTSTOPPER DT-200 LEVITON DSSMT HUBBELL H-MOSS ADI277W1
	LINE VOLTAGE, DUAL RELAY WALL SWITCH SENSOR WALL--MOUNTED AT STANDARD SWITCH HEIGHT NEAR DOORS. SET FOR MANUAL--ON, AUTOMATIC--OFF OPERATION. 180° COVERAGE PATTERN REQUIRED.	WATTSTOPPER DW-200 LEVITON DSSMD HUBBELL WSJ277W2
	LOW VOLTAGE MAGNETIC DIMMING SWITCH WITH 1000VA LOAD CAPACITY. CONFIRM SWITCH IS COMPATIBLE WITH SPECIFIED LIGHTING FIXTURE.	
	DIMMING SWITCH FOR FLUORESCENT LOAD WITH 400VA LOAD CAPACITY. CONFIRM SWITCH IS COMPATIBLE WITH SPECIFIED LIGHTING FIXTURE.	
	DIMMING SWITCH FOR FLUORESCENT LOAD WITH 1000VA LOAD CAPACITY. CONFIRM SWITCH IS COMPATIBLE WITH SPECIFIED LIGHTING FIXTURE.	
	LINE VOLTAGE, DUAL TECHNOLOGY MOTION SENSOR. MINIMUM 1,000 SQUARE FOOT COVERAGE. RECEIVES LOW VOLTAGE POWER FROM SWITCHPACK, AND RETURNS A LOW--VOLTAGE SIGNAL TO SWITCHPACK WHEN MOTION IS DETECTED. CEILING MOUNTED.	WATTSTOPPER DT-300 LEVITON DSCI0-MDW HUBBELL DMNI-DT-2000

SYMBOL	DESCRIPTION	NOTES
TAG SYMBOLS		
	SECONDARY FEEDER TAG SYMBOL	INFORMATION IS LISTED IN THE TAG SYMBOL THUS:-  CONDUIT SIZE INDICATED ALONE DENOTES A SINGLE CONDUIT.
	SECONDARY INDIVIDUALLY MOUNTED OVER-CURRENT AND/OR SWITCHING DEVICE TAG SYMBOL	INFORMATION IS LISTED IN THE TAG SYMBOL THUS:- <div> <div>"600" OR "250" INDICATES VOLTAGE RANGE AT WHICH DEVICE IS TO OPERATE.</div> <div>"2", "3", "3-N", ETC. INDICATES "2" POLE "3 POLE PLUS NEUTRAL," ETC.</div> </div>  <div> <div>DEVICE SIZE IN AMPERES.</div> <div>"U" INDICATES THAT NO OVER-CURRENT PROTECTION IS REQUIRED--NUMBER INDICATES SIZE OF OVERCURRENT PROTECTION REQUIRED.</div> </div> INDIVIDUALLY MOUNTED OVERCURRENT AND SWITCHING DEVICES ARE FOR SURFACE MOUNTING UNLESS THE TAG SYMBOL CARRIES AN EXTERNAL SUBSCRIPT "F" INDICATING FLUSH MOUNTING.



REYNOLDS, SMITH AND HILLS, INC.

4525 Airport Approach Rd, Ste A
Duluth, Minnesota 55811
218--722--1227 Fax: 218--722--1052
www.rsandh.com



DULUTH AIRPORT AUTHORITY

DULUTH INTERNATIONAL AIRPORT
DULUTH, MN

NEW PASSENGER TERMINAL

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) 722-9306

M/E/P/F Engineers:
COSENTINI ASSOCIATES INC.
1 South Wacker Drive, 37th Floor, Chicago IL 60606
TEL: (312) 201-7400 / 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) 591-5079

REVISIONS

NO.	DESCRIPTION	DATE

DATE ISSUED: 02--17--12
REVIEWED BY: **MXB**
DRAWN BY: **JK**
DESIGNED BY: **JK**

AEP PROJECT NUMBER
213--1882--091
© 2010 REYNOLDS, SMITH AND HILLS, INC.

SHEET TITLE
ELECTRICAL SYMBOLS

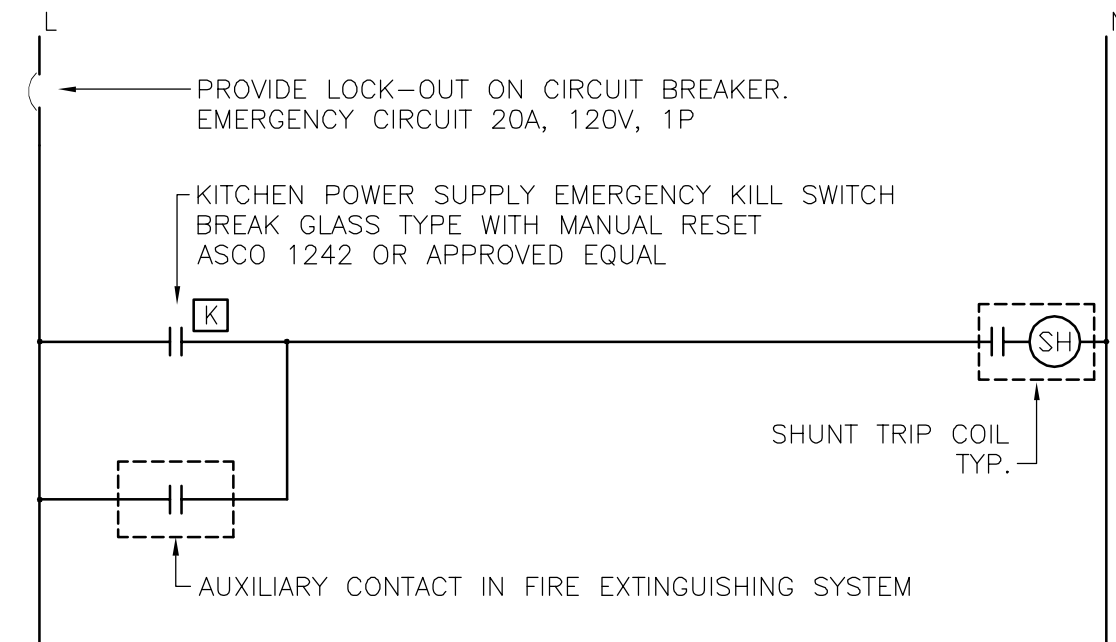
SHEET NUMBER
E001C

BID PACKAGE 20

ELECTRICAL CONNECTION SCHEDULE									
ITEM#	DESCRIPTION	VOLT/PH	LOAD	HP	CONN	PANEL (CKT #/S)			
3	SELF SERVICE ORDER INTERFACE	VFY.	VFY.		RECEPT.	LP-2B (6) (VERIFY POWER REQUIREMENTS WITH OWNER)			
4	MENU BOARD	VFY.	VFY.		RECEPT.	LP-2B (7) (VERIFY POWER REQUIREMENTS WITH OWNER)			
10	ICE MAKER	120/1	13.6 A		DIRECT	LP-2B (11)			
12	WALK-IN FREEZER	120/1	20 A		DIRECT	LP-2B (13)			
13	A FREEZER SYSTEM COIL	208/1	8.7 A		DIRECT	LP-2B (15/17)			
18	B FREEZER SYSTEM CONDENSER	208/3	11.7 A	2.5 HP	DIRECT	LP-2B (19/21/23)			
22	REACH-IN REFRIGERATOR, 2-SEC.	120/1	10.0 A	1/2 HP	RECEPT.	LP-2B (25)			
24	DISPOSER W/SPRAY RINSE	208/3	6.6 A	2 HP	DIRECT	LP-2B (27/29/31)			
28	MICROWAVE OVEN	120/1	1.8 kW		RECEPT.	RB-2D (1)			
29	EXHAUST HOOD	120/1	0.1 kW		DIRECT	RB-2D (3)			
32	FIRE PROTECTION SYSTEM				DIRECT	LP-2B (12)			
34	HALF-SIZE CONVECTION OVEN	120/1	5.0 A	1/3 HP	RECEPT.	RP-2D (5)			
42	REFRIGERATED PREP TABLE	120/1	7.9 A	1/3 HP	RECEPT.	RP-2D (7)			
44	CONVEYOR TOASTER	120/1	15.0 A		RECEPT.	RP-2D (9)			
46	SANDWICH GRILL	208/1	3.45 kW		RECEPT.	RP-2D (11/13)			
47	SOUP WELL	120/1	1.0 kW		RECEPT.	RP-2D (24)			
48	ICE MAKER, UNDERCOUNTER	120/1	6.0 A		RECEPT.	RP-2D (6)			
49	BLENDER	120/1	11.5 A	2 HP	RECEPT.	RP-2D (8)			
52	COFFEE GRINDER	120/1	9.0 A	3/4 HP	RECEPT.	RP-2D (10)			
53	AIRPOT BREWER	120/208/1	4.6 kW		DIRECT	RP-2D (12/14)			
57	SERVING COUNTER	120/1	(7)20.0 A		DIRECT	RP-2D (24,26,28,30,32), RPC-1A (11,13)-NOTE PROVIDE SEPARATE JUNCTION BOX FOR LOADS COMING FROM DIFFERENT PANELS			
		A							
		B	208/1	4.5 kW	DIRECT	RP-2D (20/22)			
58	P.O.S. KEYBOARD	120/1	5.0 A			SERVICE BY ITEM #57A (PANEL RPC-1A, CKTS 11,13)			
58	P.O.S. PRINTER	120/1	5.0 A			SERVICE BY ITEM #57A (PANEL RPC-1A, CKTS 11,13)			
60	BAKERY DISPLAY	120/1	0.61 A			SERVICE BY ITEM #57A (PANEL RP-2D, CKT 24)			
64	ESPRESSO GRINDER	120/1	3.0 A			SERVICE BY ITEM #57A (PANEL RP-2D, CKT 26)			
66	UNDERCOUNTER REFRIGERATOR, 1-SEC.	120/1	3.9 A	1/6 HP		SERVICE BY ITEM #57A (PANEL RP-2D, CKT 28)			
67	ESPRESSO MACHINE	208/1	4.5 kW			SERVICE BY ITEM #57B (PANEL RP-2D, CKT 20/22)			
68	REFRIGERATED DISPLAY	120/1	7.2 A	1/2 HP	RECEPT.	RP-2D (17)			
76	WALK-IN REFRIGERATOR	120/1	20.0 A		DIRECT	LP-2B (33)			
77	A REFRIGERATION SYSTEM COIL	120/1	1.8 A		DIRECT	LP-2B (35)			
8	B REFRIGERATION SYSTEM CONDENSER	208/3	5.3 A	1 HP	DIRECT	LP-2B (37/39/41)			
82	B SODA CARBONATOR	120/1	7.0 A	1/3 HP	RECEPT.	RP-2D (19)			
83	A BEER SYSTEM	120/1	14.0 A	1/3 HP	RECEPT.	RP-2D (21)			
84	BACK BAR REFRIGERATOR, 2-SEC	120/1	6.5 A	1/4 HP	RECEPT.	RP-2D (23)			
92	BACK BAR REFRIGERATOR, 3-SEC	120/1	6.5 A	1/4 HP	RECEPT.	RP-2D (25)			
97	BLENDER	120/1	15.0 A	3 HP	RECEPT.	RP-2D (27)			
106	GLASS WASHER	120/208/1	18.0 A		DIRECT	RP-2D (29/31)			

GENERAL KITCHEN EQUIPMENT NOTES:

- JUNCTION BOXES, LIGHTING FIXTURES, LIGHTING SWITCHES, THE CLOCKS, ETC. FOR WALK-IN REFRIGERATOR EQUIPMENT ARE FURNISHED BY EQUIPMENT SUPPLIER. ELECTRICAL CONTRACTOR SHALL INSTALL THEM AND WIRE PER MANUFACTURER'S RECOMMENDATIONS. VERIFY EXACT LOCATION IN FIELD.
- ELECTRICAL CONTRACTOR SHALL PROVIDE ALL JUNCTION BOXES, PULL BOXES, ELECTRICAL OUTLETS, COVER PLATES AND SWITCHES NOT BUILT INTO FIXTURES OR EQUIPMENT. CONDUITS AND WIRING FOR REMOTE REFRIGERATION AND WALK-IN REFRIGERATION AND FREEZER EQUIPMENT.
- ELECTRICAL CONTRACTOR SHALL PROVIDE LOCK-OUT DEVICES ON CIRCUIT BREAKERS CONTROLLING EXHAUST, REFRIGERATION AND FIRE PROTECTION SYSTEMS CONTROLS.
- ELECTRICAL CONTRACTOR SHALL PROVIDE REMOTE START-STOP PUSH-BUTTON SWITCHES TO OPERATE HOOD EXHAUST FANS, INTERLOCK WITH HOOD FIRE SUPPRESSION SYSTEMS AND MAKE-UP AIR HANDLING UNITS.
- KITCHEN EQUIPMENT CONTRACTOR SHALL FURNISH ALL ELECTRICAL CONTROLS, SWITCHES OR ANY OTHER COMPONENTS FOR KITCHEN EQUIPMENT SUCH AS SOLENOID VALVES, ETC., EACH MOTOR DRIVEN APPLIANCE OR ELECTRICAL HEATING UNIT SHALL HAVE SUITABLE HEAVY DUTY CONTROL SWITCH, MAGNETIC CONTRACTORATOR STARTER WITH ALL APPROVED UL LABEL FINAL CONNECTIONS TO CONTROLS, SWITCHES, ETC. SHALL BE PROVIDED BY ELECTRICAL CONTRACTOR.
- ELECTRICAL CONTRACTOR SHALL PROVIDE ALL REQUIRED PLUGS AND CORDS. ALL CORDS MUST BE UL APPROVED FOR MANUFACTURED APPLIANCES OR FABRICATED EQUIPMENT. ELECTRICAL CONTRACTOR SHALL PROVIDE MATCHING RECEPTACLES.
- ALL FLEXIBLE CONDUIT CONNECTORS SHALL BE SEAL TIGHT WITH GROUNDING WIRE.
- ELECTRICAL CONTRACTOR SHALL VERIFY ALL REQUIREMENTS, CONNECTIONS, MOUNTING HEIGHT AND LOCATIONS WITH KITCHEN EQUIPMENT CONTRACTOR PRIOR TO INSTALLATION OR ROUGH-IN.
- OPERATION OF HOOD FIRE EXTINGUISHING SYSTEM SHALL AUTOMATICALLY SIGNAL FIRE ALARM SYSTEM SERVING THE BUILDING AS REQUIRED PER NFPA 92.
- ELECTRICAL PLAN IS INTENDED TO SHOW OUTLETS LOCATIONS AND LOAD REQUIREMENTS. FOR FINAL ROUGH-IN LOCATION REFER TO DIMENSIONED PLANS FURNISHED BY KITCHEN EQUIPMENT CONTRACTOR.
- ALL ELECTRICAL WORK FOR PREFABRICATED EQUIPMENT SHALL BE COMPLETELY WIRED BY KITCHEN EQUIPMENT CONTRACTOR TO A JUNCTION BOX (OR DISCONNECT) AND ALL ELECTRICAL WORK FROM PANELBOARD SHALL BE THE RESPONSIBILITY OF THE ELECTRICAL CONTRACTOR.
- MOUNT RECEPTACLES HORIZONTALLY, CENTERED ON HEIGHT ABOVE FINISHED FLOORS AS INDICATED ON KITCHEN CONSULTANT'S PLANS. VERIFY AND COORDINATE WITH KITCHEN CONTRACTOR IN FIELD.



3 EMERGENCY SHUT DOWN SYSTEM DETAIL

NOT TO SCALE

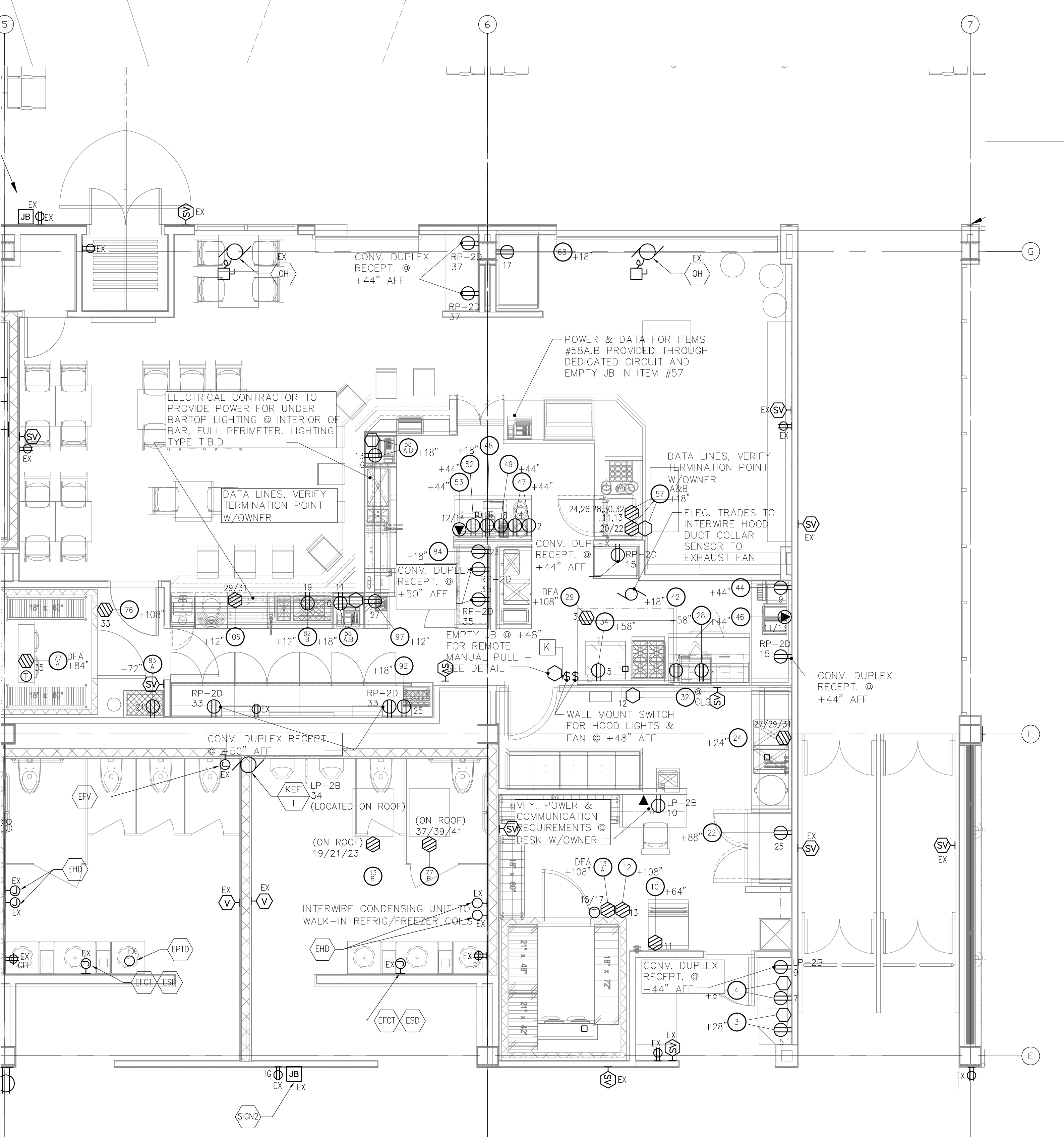
PLAN NOTES:

- ELECTRICAL DEVICES AND WORK IS NEW U.N.O. EXISTING DEVICES ARE DENOTED WITH AN "EX" NEXT TO SYMBOL.
- ALL POWER CIRCUITRY SHOWN ON THIS PLAN EMANATES FROM PANELS AS INDICATED ON CONNECTION SCHEDULE (SHOWN ON THIS DRAWING) U.N.O.
- ALL 125-VOLT, SINGLE PHASE, 15- AND 20- AMPERE RECEPTACLES INSTALLED IN KITCHEN AREA SHALL HAVE A GROUND-FAULT CIRCUIT INTERRUPTER PROTECTION FOR PERSONNEL.
- VERIFY EXACT LOCATION OF SWITCH FOR HOOD LIGHTS WITH ARCHITECT.
- PROVIDE CONDUIT AND WIRING BETWEEN THE SHUNT TRIP BREAKERS, FIRE EXTINGUISHING SYSTEM AND EMERGENCY KILL SWITCHES.
- REFER TO DETAIL 3 ON THIS DRAWING. VERIFY IN FIELD EXACT LOCATION OF EMERGENCY KILL SWITCHES.
- SEE KITCHEN CONSULTANT DRAWINGS FOR SIZE AND LOCATION OF CONDUIT FOR BEVERAGE SYSTEM LINES.
- REFER TO KITCHEN CONSULTANT DRAWINGS FOR WIRING REQUIREMENTS BETWEEN FIRE EXTINGUISHING SYSTEM AND VARIOUS BUILDING SYSTEMS.
- REFER TO KITCHEN CONSULTANT DRAWINGS FOR KITCHEN EQUIPMENT ELECTRICAL CONNECTION SCHEDULE AND ADDITIONAL ELECTRICAL WORK.
- STROBES THAT ARE LOCATED WITHIN THE SAME FIELD OF VIEW SHALL FLASH IN SYNCHRONIZATION.
- PROVIDE RACEWAYS, JUNCTION BOXES AND POWER, WHERE REQUIRED, FOR TELECOM, SECURITY, AV DEVICES AND SIGNAGE. REFER TO RESPECTIVE PLANS AND SPECIFICATIONS FOR ADDITIONAL INFORMATION.
- CONFIRM NEMA CONFIGURATIONS FOR RECEPTACLES WITH KITCHEN EQUIPMENT MANUFACTURER REQUIREMENTS.

KEYED NOTES:

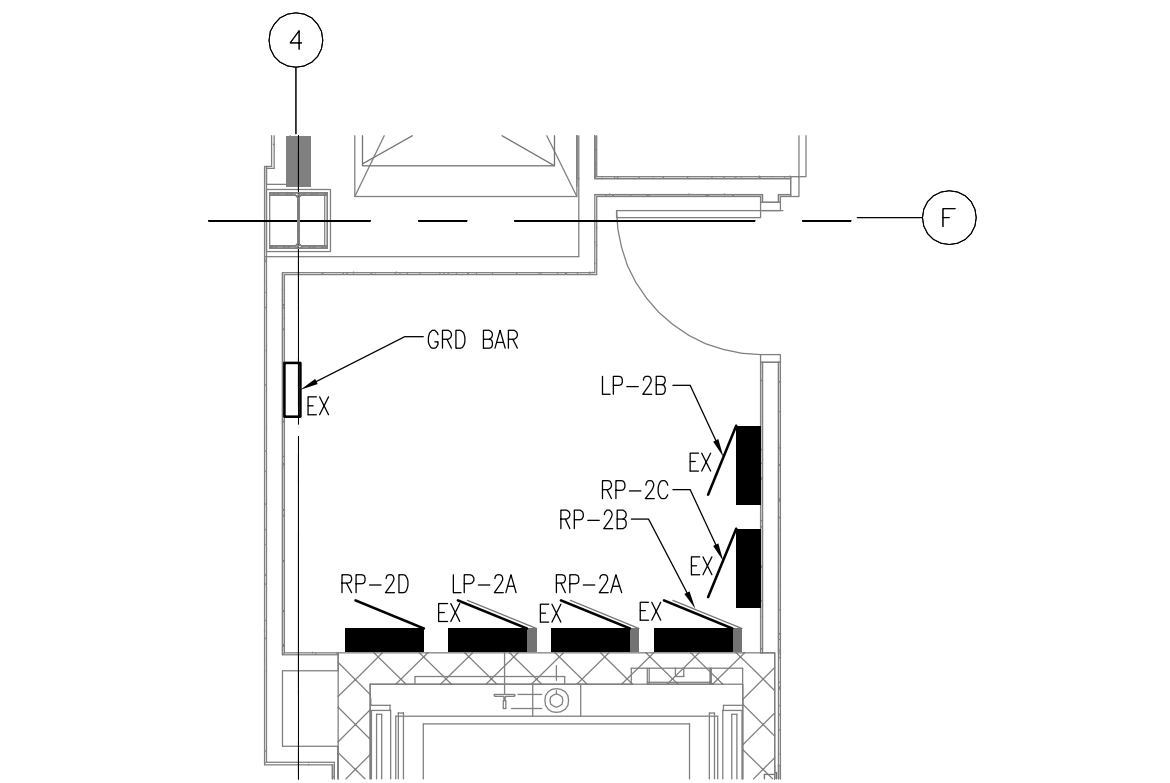
- FOR EXACT LOCATION OF NEW ELECTRIC WATER HEATER AND RECIRCULATION PUMP, SEE PLUMBING PLANS.

ELECTRICAL LEGEND	
	DR DUPLEX RECEPTACLE
	SR SPECIAL RECEPTACLE
	EC ELECTRICAL CONNECTION
	SW SWITCH
	V VOLTS
	AMP AMPERES
	PH PHASE
	W WATTS
	KW KILOWATT
	HP HORSEPOWER
	JB JUNCTION BOX
	+ DISTANCE ABOVE FINISHED FLOOR
	DFA BRING SERVICE DOWN FROM ABOVE CEILING TO A DISTANCE ABOVE FINISHED FLOOR
	COMP COMPRESSOR MOTOR
	SOLENOID
	TIME CLOCK (BY FSEC)
	DATA OUTLET
	VOICE OUTLET
	KITCHEN POWER SUPPLY EMERGENCY KILL SWITCH



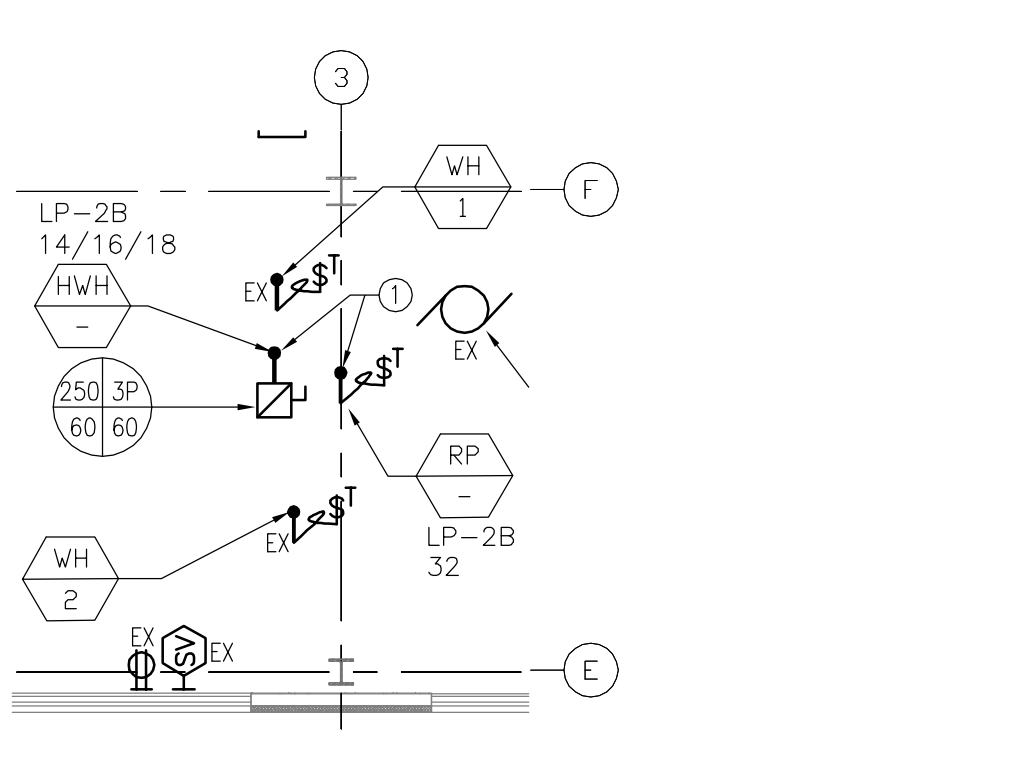
1 ENLARGED SECOND FLOOR PLAN - CONCESSIONS AREA

1/4" = 1'-0"



2 ENLARGED ELEC. RM PLAN-2ND FLR

1/4" = 1'-0"



3 PARTIAL 3RD FLR POWER PLAN

1/8" = 1'-0"

RS&H
IMPROVING YOUR WORLD

Reynolds, Smith and Hills, Inc.

4525 Airport Approach Rd, Ste A
Duluth, Minnesota 55811
218-722-1227 Fax: 218-722-1052
www.rsandh.com

DULUTH AIRPORT AUTHORITY

DULUTH
INTERNATIONAL
AIRPORT
DULUTH, MN

NEW PASSENGER
TERMINAL

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) 722-9306

M/E/P/F Engineers:

COSENTINI ASSOCIATES INC.

1 South Wacker Drive, 37th Floor, Chicago IL 60606
TEL: (312) 201-7400 / 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) 591-5079

REVISIONS

NO.	DESCRIPTION	DATE

DATE ISSUED: 02-17-12

REVIEWED BY: **MXB**

DRAWN BY: **JK**

DESIGNED BY: **JK**

AEP PROJECT NUMBER

213-1882-091

© 2010 REYNOLDS, SMITH AND HILLS, INC.

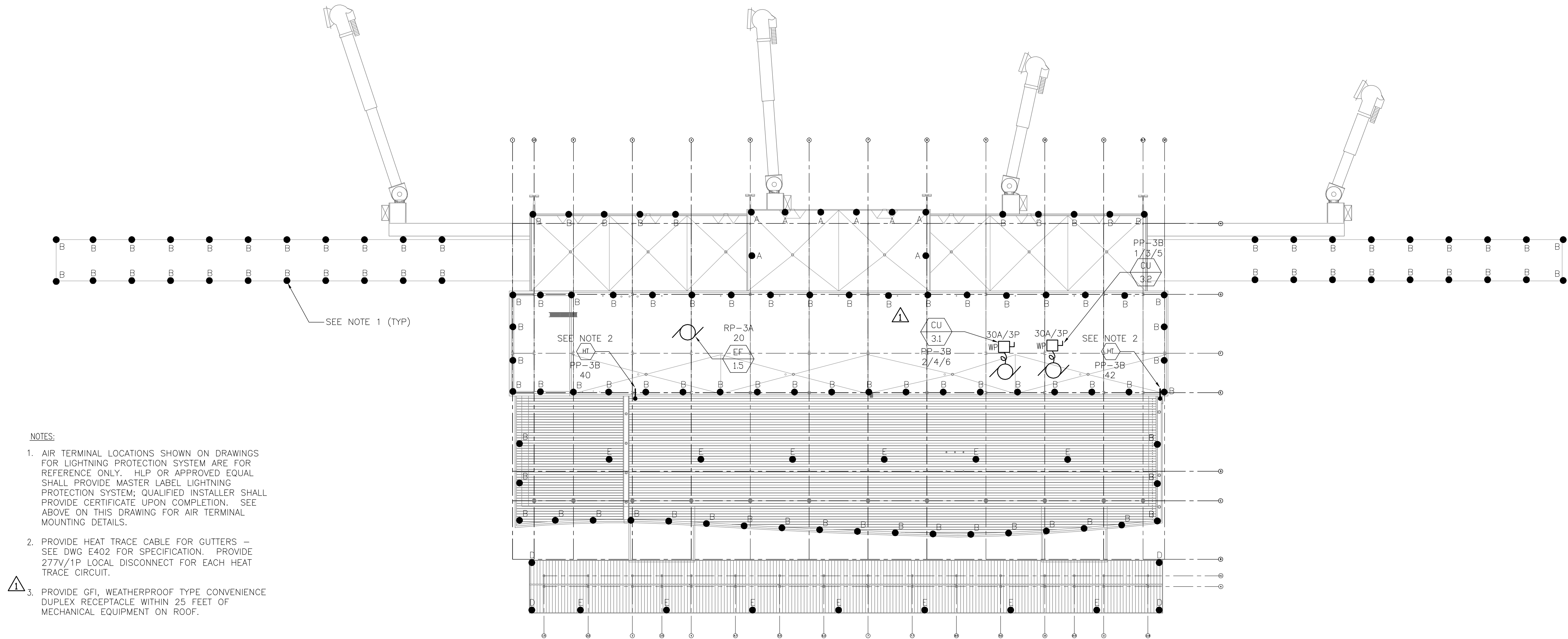
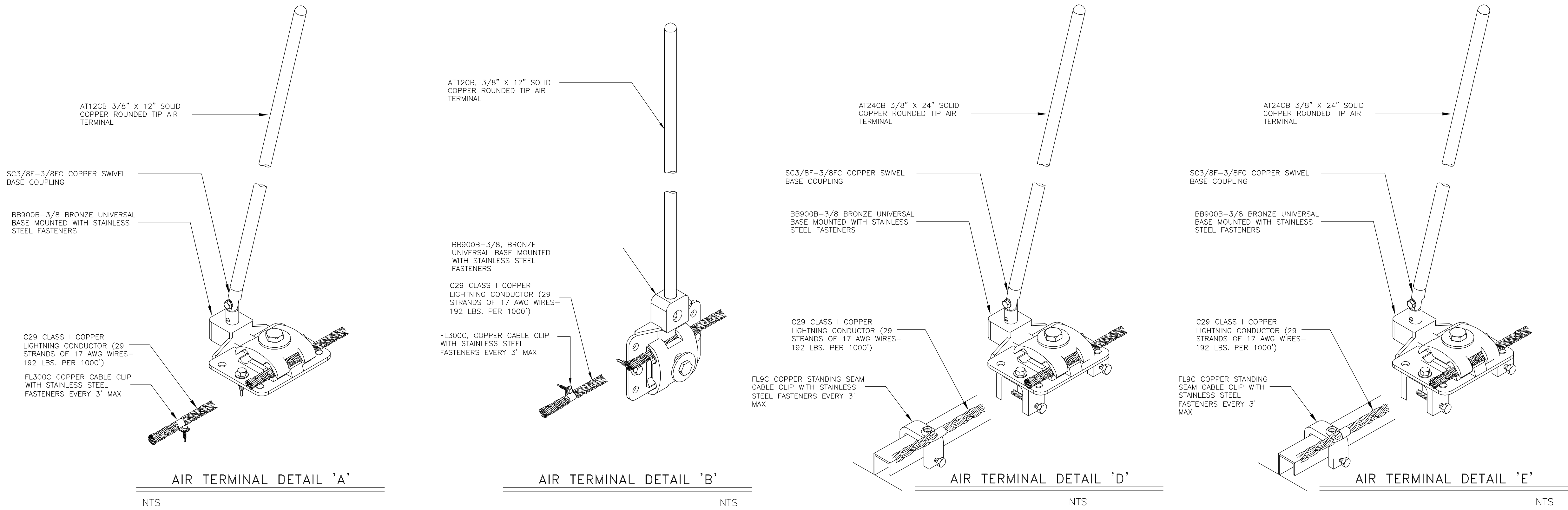
SHEET TITLE

**ENLARGED
SECOND FLOOR
ELECTRICAL
PLAN AREA A**

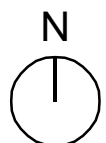
SHEET NUMBER

E112C

BID PACKAGE 2C



- NOTES:
- AIR TERMINAL LOCATIONS SHOWN ON DRAWINGS FOR LIGHTNING PROTECTION SYSTEM ARE FOR REFERENCE ONLY. HLP OR APPROVED EQUAL SHALL PROVIDE MASTER LABEL LIGHTNING PROTECTION SYSTEM; QUALIFIED INSTALLER SHALL PROVIDE CERTIFICATE UPON COMPLETION. SEE ABOVE ON THIS DRAWING FOR AIR TERMINAL MOUNTING DETAILS.
 - PROVIDE HEAT TRACE CABLE FOR GUTTERS - SEE DWG E402 FOR SPECIFICATION. PROVIDE 277V/1P LOCAL DISCONNECT FOR EACH HEAT TRACE CIRCUIT.
 - PROVIDE GFI WEATHERPROOF TYPE CONVENIENCE DUPLEX RECEPTACLE WITHIN 25 FEET OF MECHANICAL EQUIPMENT ON ROOF.



1 ROOF PLAN
1/32" = 1'-0"

RS&H
IMPROVING YOUR WORLD

Reynolds, Smith and Hills, Inc.
4525 Airport Approach Rd, Ste A
Duluth, Minnesota 55811
218-722-1227 Fax: 218-722-1052
www.rsandh.com

**DULUTH AIRPORT
AUTHORITY**

DULUTH
INTERNATIONAL
AIRPORT
DULUTH, MN

NEW PASSENGER
TERMINAL

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) 722-9306

M/E/P/F Engineers:
COSENTINI ASSOCIATES INC.
1 South Wacker Drive, 37th Floor, Chicago IL 60606
TEL: (312) 201-7400 / 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) 591-5079

REVISIONS

NO.	DESCRIPTION	DATE

DATE ISSUED: 02-17-12
REVIEWED BY: XXX
DRAWN BY: JK
DESIGNED BY: JK

AEP PROJECT NUMBER
213-1882-091
© 2010 REYNOLDS, SMITH AND HILLS, INC.

SHEET TITLE
**ELECTRICAL
ROOF PLAN**

SHEET NUMBER

E116

BID PACKAGE 2C



CONSULTANTS

Structural Engineers:
MBJ CONSULTING ENG.
501 Lake Avenue South, Suite 300, Duluth MN 55802
TEL: (218) 722-1056 / FAX: (218) 722-9306

Baggage Handling Systems Consultants:
BNP ASSOCIATES INC.
 1 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) 591-5079

[illegible]

DATE ISSUED: 02-17-12

REVIEWED BY: XXX

DRAWN BY: JK

DESIGNED BY: JK

AEP PROJECT NUMBER

213-1882-091

© 2010 REYNOLDS, SMITH AND HILLS INC.

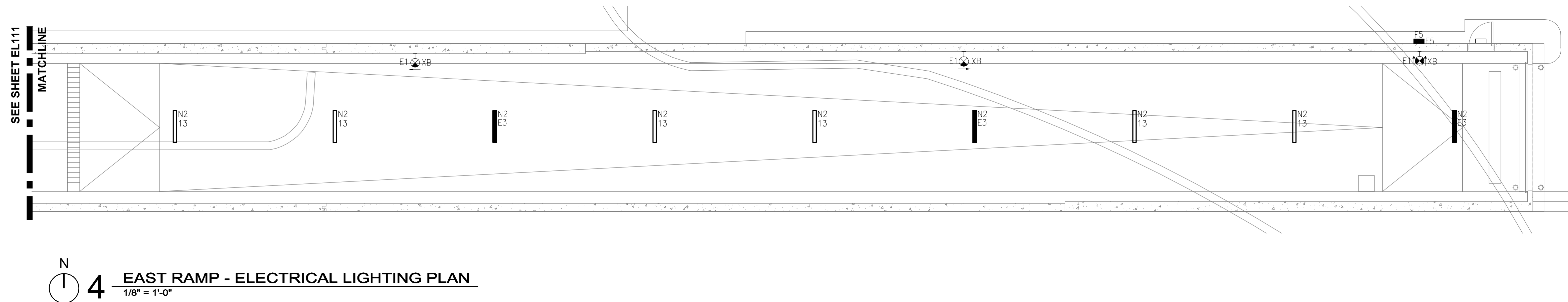
SHEET TITLE

**RAMP
ELECTRICAL POWER
AND LIGHTING PLAN**

SHEET NUMBER

E117

BID PACKAGE 2C








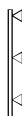

1. STROBES THAT ARE LOCATED WITHIN THE SAME FIELD OF VIEW SHALL FLASH IN SYNCHRONIZATION.
2. PROVIDE RACEWAYS, JUNCTION BOXES AND POWER, WHERE REQUIRED, FOR TELECOM, SECURITY AND /AV DEVICES. REFER TO RESPECTIVE PLANS AND SPECIFICATIONS FOR ADDITIONAL INFORMATION.
3. POWER PROVISIONS FOR MOTORIZED ROLLING DOORS AND SHUTTERS SHALL BE BASED ON MANUFACTURER'S REQUIREMENTS (INCLUDING LOCAL DISCONNECT).
4. LIGHT FIXTURES ON NORMAL POWER ARE CONNECTED TO PANEL "LP-1A". EMERGENCY LIGHTING FIXTURES AND EXIT SIGNS ARE CONNECTED TO PANEL "EMLP-1A".

NOTES:

1. LIGHTING FIXTURES, ASSOCIATED CONTROLS AND EXIT SIGNS ARE NEW U.N.O. EXISTING FIXTURES, CONTROLS AND SIGNS HAVE AN "EX" ADJACENT TO SYMBOL. MAINTAIN WIRING FOR ALL EXISTING TO REMAIN ITEMS.
2. EXIT SIGNS SHALL BE CONNECTED TO PANEL "EMLP-1A".
3. EMERGENCY LIGHTING FIXTURES SHALL BE CONNECTED TO PANEL "EPP-1D".
4. LIGHTING FIXTURES ON NORMAL POWER SHALL BE CONNECTED TO PANEL "LP-2B" U.N.O. COORDINATE PROGRAMMING FOR AUTOMATIC ON/OFF LIGHTING CONTROL WITH OWNER (CIRCUIT BREAKERS FOR LIGHTING ARE CONTROLLABLE).
5. SEE FOOD SERVICE DRAWINGS FOR ADDITIONAL SCOPE; ADDITIONAL UNDERCABINET LIGHTING IS REQUIRED.
6. SEE ELECTRICAL SYMBOL SHEET E001C FOR DESCRIPTION OF DIMMER SWITCHES.

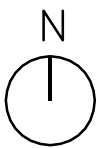
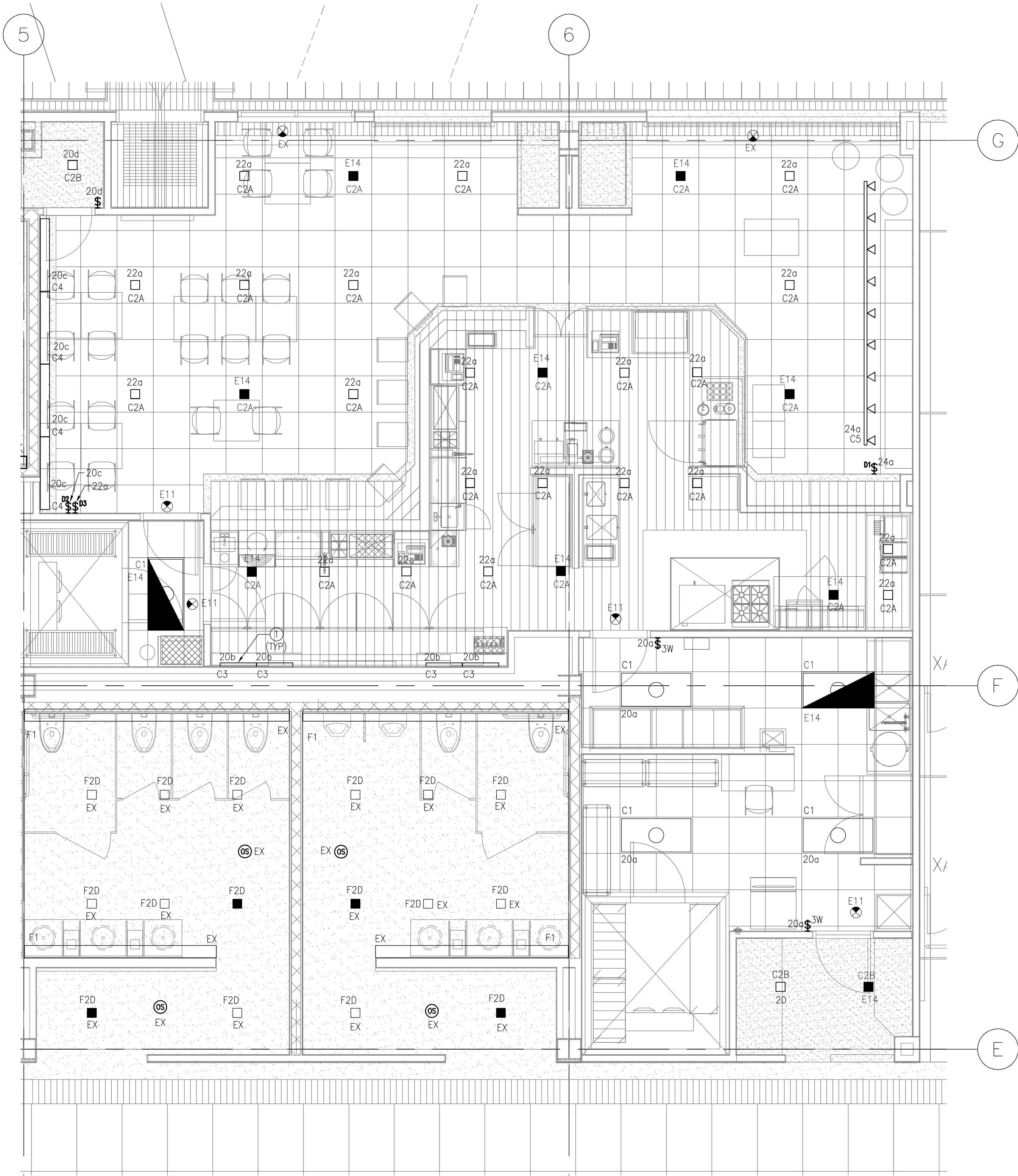
KEYED NOTES:

- ① UNDERCABINET LIGHTING FIXTURES TYPE "C3" ARE CONTROLLED BY STEP DIMMER WITH REMOTE TOUCH PAD (SUPPLIED WITH FIXTURE). COORDINATE LOCATION OF REMOTE TOUCH PAD WITH OWNER.

LIGHTING FIXTURE SCHEDULE									
TYPE	SYMBOL	DESCRIPTION	MANUFACTUR. & CATALOG NO.	LAMPS		FIXTURE TOTAL VA	VOLTAGE	MOUNTINGS: P-PENDANT R-RECESSED	REMARKS
				QTY	TYPE			S-SURFACE	
C1		RECESSED WET LOCATION TROFFER	LITHONIA 2WRT-G-432-A12125-120 OR APPROVED EQUAL BY LIGHTOLIER OR COLUMBIA	4	32W T8	120	120	R	
C2A		6"X6" RECESSED SQUARE DOWNLIGHT WITH MICROLUX TEMPERED SHATTERPROOF LENS AND DIMMING BALLAST	KIRLIN FRS-06088-77-ML-39 OR APPROVED EQUAL BY LIGHTOLIER OR COLUMBIA	1	42W CF	40	120	R	
C2B		SAME LIGHTING FIXTURES AS "C2A" WITHOUT DIMMING BALLAST. EMERGENCY LIGHTS AND LIGHTS IN BOH AREAS SHALL NOT BE DIMMED.	KIRLIN FRS-06088-77-ML OR APPROVED EQUAL BY LIGHTOLIER OR COLUMBIA	1	42W CF	40	120	R	
C3		UNDERCABINET LIGHT FIXTURE, DIMMABLE WITH HARD WIRE CONNECTION	LITHONIA RAZ24-RAZTRANS24 120-RAZDIM-UCD JB-UC ERC24 R12 OR APPROVED EQUAL BY LIGHTOLIER OR COLUMBIA	8	LED	13	24	S	
C4		FLUORESCENT WALL GRAZER, DIMMABLE	FOCAL POINT MINI-GRAZER FMG-BB-1T5HO-1C-120-D-L830 OR APPROVED EQUAL BY LIGHTOLIER OR COLUMBIA	1	T5HO	54	120	S	
C5		TRACK LIGHTING, DIMMABLE	BRUCK 220651mc (FIXTURE) 160032ch & 160033ch (TRACKS) T-600/120v (TRANSFORMER) SUPPLY LINKING CORDS AS NECESSARY. OR APPROVED EQUAL BY LIGHTOLIER OR LITHONIA	1	50W AR-111 (HALOGEN)	50	12	TRACK	SEE PLANS FOR TRACK LENGTHS AND QUANTITY OF LAMPS
		EDGE LIT LED EXIT SIGN.	COOPER LIGHTING SURELITES EEX SERIES OR APPROVED EQUAL BY ALKCO OR DAYBRITE		LED	6 - SINGLE FACE 12 - DBL FACE	277	S	

GENERAL NOTES FOR LIGHTING FIXTURE SCHEDULES

1. SEE MANUFACTURER DATA SHEETS FOR MORE INFORMATION.
2. CONTRACTOR TO PROVIDE ALL PARTS AND HARDWARE NECESSARY FOR A COMPLETE INSTALLATION.
3. ALL REMOTE LOW VOLTAGE TRANSFORMERS AND SECONDARY WIRING RUNS TO BE LOCATED AND INSTALLED BY CONTRACTOR TO LIMIT VOLTAGE DROP TO NO MORE THAN 5% MEASURED AT THE LAST LAMP.
4. CONTRACTOR TO INSTALL ALL COVE LIGHTING IN A CONTINUOUS FASHION SO AS TO MINIMIZE DARK SPOTS ON ADJACENT WALLS, FLOOR, OR CEILING.
5. REFER TO ARCHITECTURAL SHEETS FOR ADDITIONAL INFORMATION.
6. CONTRACTOR TO COORDINATE MOUNTING PROVISIONS FOR FIXTURES WITH CEILING TYPE.



1 ENLARGED SECOND FLOOR PLAN - CONCESSIONS AREA
1/4" = 1'-0"

RS&H
IMPROVING YOUR WORLD

Reynolds, Smith and Hills, Inc.

4525 Airport Approach Rd, Ste A
Duluth, Minnesota 55811
218-722-1227 Fax: 218-722-1052
www.rsandh.com

**DULUTH AIRPORT
AUTHORITY**

DULUTH
INTERNATIONAL
AIRPORT
DULUTH, MN

NEW PASSENGER
TERMINAL

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) 722-9306

M/E/P&F Engineers:

COSENTINI ASSOCIATES INC.
1 South Wacker Drive, 37th Floor, Chicago IL 60606
TEL: (312) 201-7400 / 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) 591-5079

REVISIONS

NO.	DESCRIPTION	DATE

DATE ISSUED: 02-17-12
REVIEWED BY: **MXB**
DRAWN BY: **JK**
DESIGNED BY: **JK**

AEP PROJECT NUMBER
213-1882-091
© 2010 REYNOLDS, SMITH AND HILLS, INC.

SHEET TITLE

ENLARGED
SECOND FLOOR
LIGHTING
PLAN AREA A

SHEET NUMBER

EL112C

BID PACKAGE 2C

GENERAL NOTES:

1. BASE BUILDING POWER RISER DIAGRAM SHOWN FOR REFERENCE UNLESS OTHERWISE INDICATED WITH "NEW" ON DIAGRAM. ADDITIONAL NEW WORK IS REQUIRED WITHIN EXISTING PANELBOARDS - SEE PANEL SCHEDULES ON DRAWING E301C FOR REQUIREMENTS.

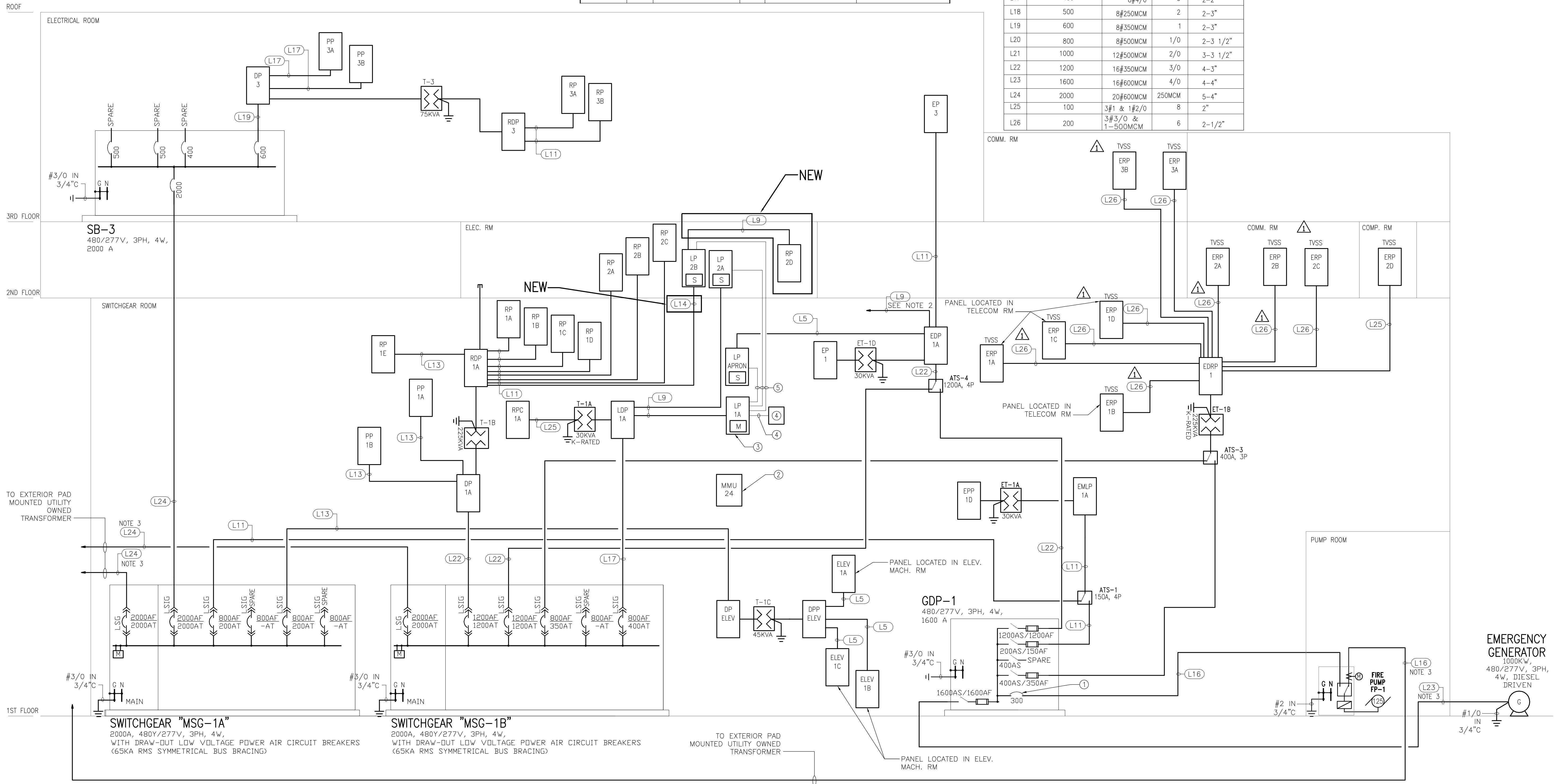
TABLE 3

TRANSFORMER (KVA)	480 VOLT SIDE		120/208 VOLT SIDE		
	OCD (AMPS)	FEEDER	OCD (AMPS)	NON "K" RATED TRANSFORMER FEEDER	GROUNDING ELECTRODE CONDUCTOR
9	15	3#12 - 3/4"C	40	4#8 - 3/4"C	1#8 - 1/2"C
15	30	3#10 - 3/4"C	50	4#6 - 1"C	1#8 - 1/2"C
30	50	3#6 - 1"C	100	4#2 - 1-1/4"C	1#8 - 1/2"C
45	70	3#4 - 1"C	150	4#1/0 - 2"C	1#6 - 1/2"C
75	125	3#1 - 1-1/4"C	250	4#250KCM - 2-1/2"C	1#2 - 3/4"C
112.5	175	3#2/0 - 1-1/2"C	400	(4)600KCM - 3-1/2"C	1#1/0 - 1"C
150	225	3#4/0 - 2"C	500	(8)250KCM - (2)2-1/2"C	1#1/0 - 1"C
225	350	(3)400KCM - 3"C	800	(8)600KCM - (2)3-1/2"C	1#3/0 - 1"C
300	500	(6)250KCM - (2)2-1/2"C	1000	(12)400KCM - (3)3"C	1#3/0 - 1"C
500	800	(6)500KCM - (2)3"C	1600	(20)400KCM - (5)3"C	1#250KCM - 1-1/4"C

SIZING OF 3PH, 4W & GROUND
FEEDERS (COPPER CONDUCTORS)

NOTE: PROVIDE 200% NEUTRAL FOR "ERP" PANELS

TAG	REQUIRED OVERCURRENT DEVICE (OCD) WITH FUSE OR C/B TRIP (AMPS)	QUANTITY AND SIZE OF CONDUCTORS AND CONDUIT		
		4WIRE SET	GROUND WIRE	CONDUIT(S)
L1	20	4#12	12	3/4"
L2	30	4#10	10	3/4"
L3	40	4#8	10	3/4"
L4	50	4#6	10	1"
L5	60	4#6	10	1"
L6	70	4#4	8	1 1/4"
L7	80	4#2	8	1 1/4"
L8	90	4#2	8	1 1/4"
L9	100	4#1	8	1 1/2"
L10	125	4#1	6	1 1/2"
L11	150	4#1/0	6	2"
L12	175	4#2/0	6	2"
L13	200	4#3/0	6	2"
L14	225	4#4/0	4	2 1/2"
L15	250	4#250MCM	4	3"
L16	300	4#350MCM	4	3"
L17	400	8#4/0	3	2-2"
L18	500	8#250MCM	2	2-3"
L19	600	8#350MCM	1	2-3"
L20	800	8#500MCM	1/0	2-3 1/2"
L21	1000	12#500MCM	2/0	3-3 1/2"
L22	1200	16#350MCM	3/0	4-3"
L23	1600	16#600MCM	4/0	4-4"
L24	2000	20#600MCM	250MCM	5-4"
L25	100	3#1 & 1#2/0	8	2"
L26	200	5#3/0 & 1-500MCM	6	2-1/2"



RS&H
IMPROVING YOUR WORLD

Reynolds, Smith and Hills, Inc.
4525 Airport Approach Rd, Ste A
Duluth, Minnesota 55811
218-722-1227 Fax: 218-722-1052
www.rsandh.com

**DULUTH AIRPORT
AUTHORITY**

DULUTH
INTERNATIONAL
AIRPORT
DULUTH, MN

NEW PASSENGER
TERMINAL

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) 722-9306

M/E/P/F Engineers:
COSENTINI ASSOCIATES INC.
1 South Wacker Drive, 37th Floor, Chicago IL 60606
TEL: (312) 201-7400 / 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) 591-5079

REVISIONS

NO.	DESCRIPTION	DATE

DATE ISSUED: 02-17-12
REVIEWED BY: **MXB**
DRAWN BY: **JK**
DESIGNED BY: **JK**

AEP PROJECT NUMBER
213-1882-091
© 2010 REYNOLDS, SMITH AND HILLS INC.

SHEET TITLE
**BLDG POWER
RISER DIAGRAM**

SHEET NUMBER

E300C

BID PACKAGE 2C

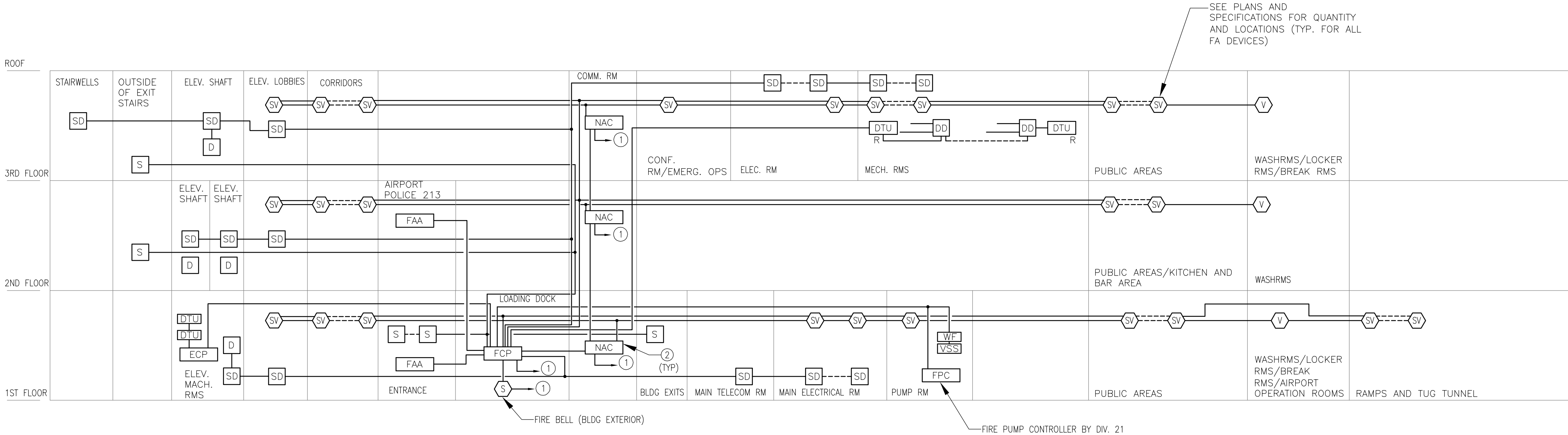
FA GENERAL NOTES:

1. OPENINGS FOR DUCT SMOKE DETECTORS ARE PROVIDED BY OTHERS.
2. RISER CIRCUITRY SHALL BE IN 2-HOUR RATED ENCLOSURE PROVIDED BY GENERAL CONTRACTOR.
3. FOR CLARITY, DTU'S ARE GENERALLY NOT SHOWN. REFER TO SPECIFICATIONS FOR REQUIREMENTS.
4. ALL PLACES OF ASSEMBLY, PUBLIC CORRIDORS, PUBLIC STORAGE ROOMS, ETC. SHALL BE PROVIDED WITH ALARM INDICATING DEVICES PER ADA, UL AND LOCAL AUTHORITY.
5. INTERFACE EIBS (ELECTRONIC INTERFACE BOXES) ASSOCIATED WITH ACCESS CONTROL SYSTEM WITH FIRE ALARM SYSTEM WHERE REQUIRED. SEE "ET" SERIES DRAWINGS FOR ADDITIONAL INFORMATION.

FA KEYED NOTES

- ① CONNECT TO SINGLE POLE, 20A CIRCUIT BREAKER.
- ② NOTIFICATION APPLIANCE CIRCUIT PANEL. LOCATED IN 2-HR ENCLOSURE. PROVIDE ADEQUATE QUANTITY OF NAC PANELS TO POWER NOTIFICATION DEVICES SHOWN ON PLANS AND NOTED IN SPECIFICATIONS.
- ③ QUANTITY OF DTU DEVICES TO BE VERIFIED WITH EQUIPMENT MANUFACTURER. TYPICAL FOR ALL DTU DEVICES SHOWN.

THE SUCCESSFUL MANUFACTURER SHALL SUBMIT DETAILED SHOP DRAWINGS AND SPECIFICATIONS FOR APPROVAL TO THE LOCAL FIRE PREVENTION BUREAU



FIRE ALARM DIAGRAM



Reynolds, Smith and Hills, Inc.
4525 Airport Approach Rd, Ste A
Duluth, Minnesota 55811
218-722-1227 Fax: 218-722-1052
www.rsandh.com



DULUTH
INTERNATIONAL
AIRPORT
DULUTH, MN

NEW PASSENGER
TERMINAL

- 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) 722-9306
- M/E/PFP Engineers:
COSENTINI ASSOCIATES INC.
1 South Wacker Drive, 37th Floor, Chicago IL 60606
TEL: (312) 201-7400 / 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) 591-5079

REVISIONS		
NO.	DESCRIPTION	DATE

DATE ISSUED: 02-17-12
REVIEWED BY: **XXX**
DRAWN BY: **JK**
DESIGNED BY: **JK**

AEP PROJECT NUMBER
213-1882-091
© 2010 REYNOLDS, SMITH AND HILLS INC.

SHEET TITLE
**FIRE ALARM AND
GROUNDING RISER
DIAGRAMS**

SHEET NUMBER
E301

BID PACKAGE 2C

			PANEL DISTRIBUTION: RDP-1A						
			SERVICE: 208/120V, 3PH, 4W + GND						
			BUS SIZE: 800A		LOAD:		NOTES:		
			MAIN DEVICE: 800A		CONN	276.0 kVA	CIRCUIT BREAKER PNL		
					DEM.	159.0 kVA	1- PROVIDE EMON		
					DEM.	441.0 Amps	METER FOR CIRCUIT		
FEDDER		FEDDER	LOAD (kVA)		DEVICES (A)		REMARKS		
No:		CONTROLLED	CONN.	DEM.	CB				
1		PANEL "RP-1A"	19.0	19.0	150				
2		PANEL "RP-1B"	25.0	25.0	150				
3		PANEL "RP-1C"	16.0	16.0	150				
4		PANEL "RP-1D"	30.0	30.0	150				
5		PANEL "RP-2A"	27.0	27.0	150				
6		PANEL "RP-2B"	29.0	29.0	150				
7		PANEL "LP-2B"	77.0	54.0	225	NOTE 1			
8		PANEL "RP-1E"	24.0	24.0	150				
9		PANEL "RP-2C"	29.0	29.0	150				

← REPLACE EXISTING 150A/3P CIRCUIT BREAKER FOR PANEL "LP-2B" FEED TO 225A/3P

CHANGE EXISTING 150A MCB IN PANEL "LP-2B" TO 225A MCB

			PANELBOARD: LP-2B (EXISTING PANEL)							
			SERVICE: 208/120V, 3PH, 4W + GND							
			BUS SIZE: 225A		LOAD:			NOTES: SQUARE D POWERLINK PNL		
			MAIN DEVICE: 225A		CONN	81.6 kVA	1 - PROVIDE CONTROLLABLE CIRCUIT BREAKER			
					DEM.	53.0 kVA	2-VIFY OCP DEVICE SIZE PER MANUFACTURER'S REQ.			
					DEM.	147.3 Amps	3 - PROVIDE NEW OCP DEVICE, SIZE AS INDICATED			
							4 - PROVIDE SHUNT TRIP CIRCUIT BREAKER			
CKT #	TRIP/ POLE		CIRCUIT DESCRIPTION		CONNECTED LOAD (VA)				TRIP/ POLE	CKT #
					PHASE A	PHASE B	PHASE C	CIRCUIT DESCRIPTION		
1	20/1		REC-GENERAL	360	510			GRILLE	2	15/2
3	20/1		REC-GENERAL			360	510			4
5	20/1		REC-ORDER INTERFACE					180	510	6
7	20/1		REC-MENU BOARD	180	510					8
9	20/1		REC-GENERAL			180	180			10
11	20/1		ICE MAKER					1,632	500	12
13	20/1		WALK-IN FREEZER	500	5,000					14
15	20/2	3	FREEZER COIL			905	5,000			16
17								905	5,000	18
19				2,162	708					20
21	25/3	2,3	FREEZER CONDENSOR			2,162	600			22
23								2,162	450	24
25	20/1		REC-REFRIGERATOR	1,200	576					26
27						793	576			28
29	20/3	3	DISPOSER W/SPRAY RINSE					793	576	30
31				193	250					32
33	20/1		WALK IN REFRIG.			600	1,176			34
35	20/1		REFRIGERATOR COIL					216		36
37				2,162	12,333					38
39	25/3	2,3	REFRIG. CONDENSOR			2,162	12,333		NEW PNL "RP-2D"	3,4
41								2,162	12,333	42
TOTAL CONNECTED LOADS:				6,757	19,887	7,162	20,375	8,050	19,369	

PANELBOARD: RP-2D (NEW PANEL)													
SERVICE: 208/120V, 3PH, 4W + GND													
			BUS SIZE: 100A			LOAD:		NOTES:					
			MAIN DEVICE: 100A		CONN	35.8 kVA	CIRCUIT BREAKER PANEL						
					DEM.	23.3 kVA	1 - CONFIRM OCP SIZE WITH EQUIP. MANUFACTURER						
					DEM.	64.7 Amps							
			CONNECTED LOAD (VA)										
CKT #	TRIP/ POLE		CIRCUIT DESCRIPTION			PHASE A	PHASE B	PHASE C	CIRCUIT DESCRIPTION			TRIP/ POLE	CKT #
1	20/1		REC-MICROWAVE	1,800	1,000				REC-SOUP WELL			20/1	2
3	20/1		EXHAUST HOOD			100	1,000		REC-SOUP WELL			20/1	4
5	20/1		REC-OVEN					600	500	REC-ICE MAKER		20/1	6
7	20/1		REC-REFRIG. PREP TABLE	948	1,380					REC-BLENDER		20/1	8
9	20/1		REC-CONVEYOR TOASTER			1,800	1,080			REC-COFFEE GRINDER		20/1	10
11	20/2		REC-SANDWICH GRILL					1,664	2,300	AIRPOT BREWER	1	30/2	12
13				1,664	2,300								14
15	20/1		REC-GENERAL			360	0			SPARE		20/1	16
17	20/1		REC-REFRIG. DISPLAY					864	0	SPARE		20/1	18
19	20/1		REC-SODA CARB.	840	2,250								20
21	20/1		REC-BEER SYSTEM			1,680	2,250			EXPRESSO MACHINE		30/2	22
23	20/1		REC-BACK BAR REFRIG.					780	73	BAKERY DISPLAY		20/1	24
25	20/1		REC-BACK BAR REFRIG.	780	360					EXPRESSO GRINDER		20/1	26
27	20/1		REC-BLENDER			1,800	468			UNDERCOUNTER REFRIG.		20/1	28
29	30/2		GLASS WASHER					1,872	180	REC-SERVING COUNTER		20/1	30
31				1,872	180					REC-SERVING COUNTER		20/1	32
33	20/1		REC-GENERAL			360				SPARE		20/1	34
35	20/1		REC-GENERAL					360		SPARE		20/1	36
37	20/1		REC-GENERAL	360						SPARE		20/1	38
39	20/1		SPARE							SPARE		20/1	40
41	20/1		SPARE							SPARE		20/1	42
TOTAL CONNECTED LOADS:				8,264	7,470	6,100	4,798	6,140	3,053				

PANELBOARD: RPC-1A - PNL W/TVSS, 200% NEUTRAL & ISO GRD (EX. PNL)														
SERVICE: 208/120V, 3PH, 4W + GND														
			BUS SIZE: 100A			LOAD:		NOTES:		CIRCUIT BREAKER PANEL				
			MAIN DEVICE: 100A			CONN	10.4 kVA	1-PROVIDE NEW ELECTRONIC SUB-METER FOR CKT BREAKER						
						DEM.	10.4 kVA							
						DEM.	29.0 Amps							
						CONNECTED LOAD (VA)								
CKT #	TRIP/ POLE	NOTES	CIRCUIT DESCRIPTION			PHASE A	PHASE B	PHASE C	CIRCUIT DESCRIPTION			TRIP/ POLE	CKT #	
1	20/1		REC-FIDS CHECK IN			800	1,000		REC-TVS, FLR 2			20/1	2	
3	20/1		REC-FIDS BAG/TNL				440	1,000	REC-TVS, FLR 2			20/1	4	
5	20/1		REC-FIDS FLR 2W					800	1,000	REC-TVS, FLR 2			20/1	6
7	20/1		REC-FIDS FLR 2E			800	1,000			REC-TVS, FLR 2			20/1	8
9	20/1		REC-FID MAINT. OFFICE				200	500		REC-SIGNAGE			20/1	10
11	20/1	1	P.O.S. KEYBRD/PRINTER					1,200	500	REC-SIGNAGE			20/1	12
13	20/1	1	P.O.S. KEYBRD/PRINTER			1,200				SPARE			20/1	14
15	20/1		SPARE							SPARE			20/1	16
17	20/1		SPARE							SPARE			20/1	18
19	20/1		SPARE							SPARE			20/1	20
21	20/1		SPARE							SPARE			20/1	22
23	20/1		SPARE							SPARE			20/1	24
25	20/1		SPARE							SPARE			20/1	26
27	20/1		SPARE							SPARE			20/1	28
29	20/1		SPARE							SPARE			20/1	30
31	20/1		SPARE							SPARE			20/1	32
33	20/1		SPARE							SPARE			20/1	34
35	20/1		SPARE					0	0	SPARE			20/1	36
37	20/1		SPARE			0	0							38
39	20/1		SPARE				0	0		TVSS			60/3	40
41	20/1		SPARE					0	0					42
TOTAL CONNECTED LOADS:						2,800	2,000	640	1,500	2,000	1,500			

			PANELBOARD: EPP-1D (EXISTING PANEL)										
			SERVICE: 208/120V, 3PH, 4W + GND										
			BUS SIZE: 100A		LOAD:			NOTES:	PLUG FUSE PANEL				
			MAIN DEVICE: 100A		CONN	4.2 kVA							
					DEM.	4.2 kVA							
					DEM.	11.7 Amps							
			CONNECTED LOAD (VA)										
					PHASE A	PHASE B		PHASE C					
					500	400							
			FIRE BELL						ACCESS CNTRL-FLR 1				
CKT #	TRIP/ POLE		CIRCUIT DESCRIPTION						CIRCUIT DESCRIPTION				
1	20/1		ACCESS CNRL-FLR 1				400	400		ACCESS CNTRL-FLR 1			
3	20/1		ACCESS CNRL-FLR 1						400	300	ACCESS CNTRL-FLR 2		
7	20/1		ACCESS CNRL-FLR 2		400	300					ACCESS CNTRL-FLR 2		
9	20/1		ACCESS CNRL-FLR 2				400				SPARE		
11	20/1		SPARE							100	ACCESS CNTRL-FLR 3		
13	20/1		SPARE			600					EM LGT-CONCESSIONS		
15	20/1		SPARE								SPARE		
17	20/1		SPARE								SPARE		
19	20/1		SPARE								SPARE		
21	20/1		SPARE								SPARE		
23	20/1		SPARE								SPARE		
25	20/1		SPARE								SPARE		
27	20/1		SPARE								SPARE		
29	20/1		SPARE								SPARE		
31	20/1		SPARE								SPARE		
33	20/1		SPARE								SPARE		
35	20/1		SPARE								SPARE		
37	20/1		SPARE								SPARE		
39	20/1		SPARE								SPARE		
41	20/1		SPARE								SPARE		
TOTAL CONNECTED LOADS:					900	1,300	800	400	400	400			



Reynolds, Smith and Hills, Inc.

4525 Airport Approach Rd, Ste A
Duluth, Minnesota 55811
218-722-1227 Fax: 218-722-1052
www.rsandh.com



DULUTH
INTERNATIONAL
AIRPORT
DULUTH, MN

NEW PASSENGER
TERMINAL

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) 722-9306

M/E/P/F/P Engineers:

COSENTINI ASSOCIATES

(THIS LIST OF ABBREVIATIONS DOES NOT APPLY TO ANY LETTERS
USED IN CONJUNCTION WITH SYMBOLS)

# (UNRELATED TO OTHER WORDS)	-	WIRE GAUGE NUMBER
Ø	-	PHASE
FØ	-	FUSED AT
C	-	CENTER LINE
C/B	-	CIRCUIT BREAKER
CONV/O	-	CONVENIENCE
C/T	-	OUTLET
	-	CURRENT
P/T	-	TRANSFORMER
	-	POTENTIAL
O/C	-	TRANSFORMER
C/C	-	OVERCURRENT
N/O	-	CENTER TO CENTER
N/O	-	NORMALLY OPEN
N/C	-	NORMALLY CLOSED
1/C, 2/C	-	ONE CONDUCTOR
3/C	-	TWO CONDUCTORS, ETC.

3 PHASE FEEDER VOLTAGE DROP CALCULATIONS					
(TO LIMIT VOLTAGE DROP TO 3% PER NEC 215.2)					
FEEDER SIZE	FEEDER OCP, A	MAXIMUM LOAD, A	VOLTAGE DROP FACTOR Ø 0.8 P.F. (VOLTS PER AMPERE PER 100FT)	MAXIMUM FEEDER LENGTH, FT	
#12	20	16	0.27	208V	480V
#10	30	24	0.17	144	333
#8	50	40	0.11	153	353
#6	60	48	0.073	142	327
#4	80	64	0.048	178	411
#2	100	80	0.032	203	469
#1	150	120	0.026	244	563
#1/0	175	140	0.023	200	462
#2/0	200	160	0.019	194	447
#3/0	225	180	0.016	205	474
#4/0	250	200	0.014	217	500
250KCM	300	240	0.012	223	514
300KCM	300	240	0.011	217	500
350KCM	350	280	0.01	236	545
400KCM	350	280	0.0095	223	514
500KCM	400	320	0.0085	235	541
600KCM	400	320	0.0085	229	529
600KCM	400	355	0.008	220	507

1 PHASE FEEDER VOLTAGE DROP CALCULATIONS				
(TO LIMIT VOLTAGE DROP TO 3% PER NEC 210.19)				
FEEDER SIZE	FEEDER OC, A	MAXIMUM LOAD, A	VOLTAGE DROP FACTOR @ 0.8 P.F. (VOLTS PER AMPERE PER 100FT)	MAXIMUM FEEDER LENGTH, FT 120V 277V
#12	20	16	0.31	73 168
#10	20	16	0.2	113 260
#8	20	16	0.13	173 400

NOTES:

- 1 - FOR FEEDERS IN EXCESS OF 300 FEET IN LENGTH PROVIDE NEXT LARGER SIZE CONDUCTORS. INCREASE CONDUIT SIZE AS REQUIRED.
- 2 - FOR REDUCED VOLTAGE STARTERS, DISCONNECT SWITCHES INTERPOSED INTO FEEDER BETWEEN STARTER AND MOTOR SHALL BE 6 POLE TYPE.
- 3 - PROVIDE A GROUND CONDUCTOR (SIZED PER CODE) FROM EACH VFD TO NEAREST GROUNDING ELECTRODE.

Reynolds, Smith and Hills, Inc.



**DULUTH AIRPORT
AUTHORITY**

NEW PASSENGER
TERMINAL

Structural Engineers:
MBJ CONSULTING ENG.
501 Lake Avenue South, Suite 300, Duluth MN 55802
TEL: (218) 722-1056 / FAX: (218) 722-9306

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) 591-5079

[illegible]

AEP PROJECT NUMBER
213-1882-091
© 2010 REYNOLDS, SMITH AND HILLS INC.

SHEET NUMBER

BID PACKAGE 2C

LIGHTING FIXTURE SCHEDULE (BACK OF HOUSE)									
TYPE	SYMBOL	DESCRIPTION	MANUFACTUR. & CATALOG NO.	LAMPS		FIXTURE TOTAL VA	VOLTAGE	MOUNTINGS: P--PENDANT R--RECESSED S--SURFACE	REMARKS
				QTY	TYPE				
A		FLUORESCENT WRAPAROUND WITH HIGH IMPACT ACRYLIC LENS	COLUMBIA WC4--232--EU--DR OR APPROVED EQUAL BY LIGHTOLIER OR LITHONIA	2	32W T8	60	277	P/S	
B		4', ENCLOSED, SURFACE OR PENDANT MOUNTED INDUSTRIAL T8 FLUORESCENT FIXTURE	LITHONIA CLM--232--277--GEB10IS OR APPROVED EQUAL BY COLUMBIA OR LIGHTOLIER	2	32W T8 PROVIDE GE SPX LAMP OR APPROVED EQUAL FOR FIXTURES IN CBIS RM 133	60	277	P/S	PROVIDE SWIVEL--STEM HANGER "SQ" OPTION FOR AREAS W/O FINISHED CLG
B2		SIMILAR TO FIXTURE "B" EXCEPT 120V	LITHONIA CLM--232--120--GEB10IS OR APPROVED EQUAL BY COLUMBIA OR LIGHTOLIER	2	32W T8	60	120	P/S	PROVIDE SWIVEL--STEM HANGER "SQ" OPTION FOR AREAS W/O FINISHED CLG
C		WALL OR CEILING MOUNTED GUARDED GLASS COVERED VAPOR--PROOF INCANDESCENT	HALUX ELBA20G5V OR ELJA20G5V. GE--H7 SERIES HUBBELL--V SERIES	1	100W--A21	100	120	S	ELEVATOR PITS
D		FULL CUTOFF METAL HALIDE WALL PACK. WET LOCATION LISTED	HUBBELL LCC--50P8--* OR APPROVED EQUAL BY COLUMBIA OR LITHONIA *--FINISH BY ARCHITECT	1	50W MH	70	277	S	EXTERIOR (BACK OF HOUSE)
D--EM		SAME AS TYPE "D" WITH EGRESS LAMP SOCKET. PROVIDE 50W HALOGEN EGRESS LAMP.	HUBBELL LCC--50P8--* OR APPROVED EQUAL BY COLUMBIA OR LITHONIA *--FINISH BY ARCHITECT	1	50W MH	70	277	S	EXTERIOR (BACK OF HOUSE)
F		4' SURFACE MOUNTED FLUORESCENT WALL BRACKET WITH T8 LAMPS.	COLUMBIA W4--232--E120 OR APPROVED EQUAL BY LIGHTOLIER OR LITHONIA	2	32W T8	60	277	S	STAIRWELL
G		2' SURFACE MOUNTED FLUORESCENT WALL BRACKET WITH T8 LAMPS.	COLUMBIA W2--217--EU OR APPROVED EQUAL BY LIGHTOLIER OR LITHONIA	2	17W T8	30	277	S	
H		2'x4' SURFACE MOUNT FLUORESCENT HIGH ABUSE FIXTURE. 18--GAUGE CRS HOUSING AND LENS FRAME.	KENALL HASEST124--3--32--IS--2--277--2F--2H--6 OR APPROVED EQUAL BY L.C. DOANE OR LIGHTOLIER	3	32W T8	90	277	S	
J		2'x4' SURFACE MOUNT FLUORESCENT FIXTURE.	COLUMBIA SM24--332--FSA12--EU OR APPROVED EQUAL BY LIGHTOLIER OR LITHONIA	3	32W T8	90	277	S	
K		UNDERCABINET FLUORESCENT FIXTURE	LITHONIA N2S--32--277--GEB10IS (48") N2S--25--277--GEB10IS (36") OR APPROVED EQUAL BY LIGHTOLIER OR LITHONIA	1	32W T8	30	277	S	LENGTH AS SHOWN ON PLANS
L		2'x4' SURFACE MOUNT FLUORESCENT FIXTURE.	COLUMBIA SM24--232--FSA12--EU OR APPROVED EQUAL BY LIGHTOLIER OR LITHONIA	2	32W T8	60	277	S	
M		2'x4' GRID MOUNT, AIR HANDLING, 18--CELL PARABOLIC FLUORESCENT FIXTURE.	LITHONIA 2ES8P--A--232--277--BILP OR APPROVED EQUAL BY COLUMBIA OR LIGHTOLIER	2	32W T8	48	277	G	
M2		SAME AS FIXTURE "M" BUT 120V.	LITHONIA 2ES8P--A--232--120--BILP OR APPROVED EQUAL BY COLUMBIA OR LIGHTOLIER	2	32W T8	48	120	G	
N		5"x48" LINEAR FLUORESCENT FIXTURE WITH COLD FORMED, POLYCARBONATE LENS. CEILING (PENDANT) MOUNT.	KENALL TSH548--C--3--32--EB--1--277 AND SUP--XX--OAH OPTION FOR SUSPENSION OR APPROVED EQUAL BY L.C. DOANE OR LIGHTOLIER	3	32W T8	80	277	P	FIXTURE SHALL BE MOUNTED 11' AFF
N2		SAME AS FIXTURE "N", WITH COLD WEATHER BALLAST OPTION ADDED.	KENALL TSH548--C--3--32--EB--1--277 AND SUP--XX--OAH OPTION FOR SUSPENSION AND "CW" OPTION (COLD WEATHER BALLAST) OR APPROVED EQUAL BY L.C. DOANE OR LIGHTOLIER	3	32W T8	80	277	P	FIXTURE SHALL BE MOUNTED 11' AFF
P		2'x4' RECESSED MOUNT FLUORESCENT WITH ACRYLIC LENS	LITHONIA 20T8--2--32--A12--277--GEB10IS OR APPROVED EQUAL BY LIGHTOLIER OR COLUMBIA	2	32W T8	58	277	S	
XA		EDGE LIT LED EXIT SIGN.	COOPER LIGHTING SURELITES EEX SERIES OR APPROVED EQUAL BY ALKCO OR DAYBRITE		LED	6 -- SINGLE FACE 12 -- DBL FACE	277	S	PUBLIC AREAS
XB		LED EXIT SIGN WITH STEEL HOUSING.	COOPER LIGHTING SURELITES SLX SERIES OR APPROVED EQUAL BY ALKCO OR DAYBRITE		LED	6 -- SINGLE FACE 12 -- DBL FACE	277	S	BACK OF HOUSE AREAS
XC		WEATHERPROOF EXIT SIGN.	COOPER LIGHTING SURELITES UX7 SERIES OR APPROVED EQUAL BY ALKCO OR DAYBRITE		LED	6 -- SINGLE FACE 12 -- DBL FACE	277	S	EXTERIOR AREAS

- GENERAL NOTES FOR LIGHTING FIXTURE SCHEDULES
- SEE MANUFACTURER DATA SHEETS FOR MORE INFORMATION.
 - CONTRACTOR TO PROVIDE ALL PARTS AND HARDWARE NECESSARY FOR A COMPLETE INSTALLATION.
 - ALL REMOTE LOW VOLTAGE TRANSFORMERS AND SECONDARY WIRING RUNS TO BE LOCATED AND INSTALLED BY CONTRACTOR TO LIMIT VOLTAGE DROP TO NO MORE THAN 5% MEASURED AT THE LAST LAMP.
 - CONTRACTOR TO INSTALL ALL COVE LIGHTING IN A CONTINUOUS FASHION SO AS TO MINIMIZE DARK SPOTS ON ADJACENT WALLS, FLOOR, OR CEILING.
 - REFER TO ARCHIECTURAL PLANS FOR SPECIFICATION OF ADDITIONAL LIGHTING FIXTURES INCLUDING THOSE, BUT NOT LIMITED TO, SHOWN IN PUBLIC AREAS, EXTERIOR AND APRON.
 - CONTRACTOR TO COORDINATE MOUNTING PROVISIONS FOR FIXTURES WITH CEILING TYPE.
 - TV CAMERA LIGHTS ARE TO BE RELOCATED FROM EXISTING TERMINAL TO NEW TERMINAL TO LOCATION AS SHOWN ON PLANS. PROVIDE 120--277V STEP UP TRANSFORMER IF EXISTING LIGHT FIXTURES ARE 120V.
 - PROVIDE CEILING MOUNTED DAYLIGHT SENSORS WITH ASSOCIATED LOW VOLTAGE POWER SUPPLYS TO CONTROL FIXTURES WHERE INDICATED ON DRAWINGS EL110, EL112 AND EL113.

Duluth New Terminal									
Lighting Schedule									
Type	Description	Mounting	Lamp Qty	Lamp Type	Total Fixture VA	Volts	Manufacturer	Model/Series Number	
F1	Low Profile linear fluorescent 4' architectural strip fixture with integral ballast. Provide length as required for fixtures shown in restrooms.	Suspended/Recessed/Cove	1	F28T5	Approx. 9VA/LF	277	Bartco Lighting	MIT5-1T/28-28W-277	
F1A	Low Profile linear fluorescent 4' architectural strip fixture with integral ballast	Suspended/Recessed	1	F54T5HO	60	277	Bartco Lighting	MIT5-1T/54-54W HO-277	
F1C	Low Profile linear fluorescent 4' architectural strip fixture with integral ballast and opaque lens	Surface	1	F28T5	35	277	Bartco Lighting	MIT5-1T/28-28W -277-LNO	
F1B	Low Profile linear fluorescent 2' architectural strip fixture with integral ballast.	Suspended/Recessed	1	F14T5	20	277	Bartco Lighting	MIT5-1T/14-14W -277	
F2	Suspended Cylinder, two level metal halide, Down light. See note 8 on this drawing.	Suspended	1	50W MH	60	277	Kirlin Lighting	HSR-09095-50	
F2A	Suspended Cylinder, two level metal halide, Down light. See note 8 on this drawing.	Suspended	1	70W MH	80	277	Kirlin Lighting	HSR-09095-70	
F2C	Open Appearance rectangular can light 4'x8"	Recessed	2	42W CFL	100	277	Kirlin Lighting	FRT-04092-77	
F2D	Open Appearance square can light 6" X 6"	Recessed	1	42W CFL	50	277	Kirlin Lighting	FRS-06088-77	
F2B	Suspended Cylinder, two level metal halide, Down light. See note 8 on this drawing.	Suspended	1	175W MH	215	277	Kirlin Lighting	HRS-12107-175	
F2B-E	Same as type "F2B" but with quartz lamp included								
F2E	Open Appearance square can light 6" X 6" with dimming ballast	Recessed	1	42W CFL	50	277	Kirlin Lighting	FRS-06088-39-77	
F2F	Wall washer square can light 6" X 6"	Recessed	1	42W CFL	50	277	Kurt Versen Kirlin Lighting	H8653FM-SY FRS-06096-77	
F2G	Open Appearance square can light 6" X 6"	Recessed	1	32W CFL	35	277	Kirlin Lighting	FRS-04087-57	
F3	Direct/indirect lay-in 2'x4' architectural lighting fixture.	Recessed	3	F28T5	100	277	Mark Arcitectural Lighting	MDLS 24 DF 3T5 EB	
F3C	Direct/indirect lay-in 2'x4' architectural lighting fixture.	Recessed	2	F28T5	70	277	Focal Point Mark Arcitectural Lighting	FAR 24 AC 2 T5 E 277 WH MDLS 24 DF 2T5 EB	
F3B	Direct/indirect asymmetric lay-in 2'x4' architectural lighting fixture w/ perforated side basket.	Recessed	2	F28T5	60	277	Focal Point	FBX 24 W 2 T5 E 277 PS WH	
F4	Pendant, Indirect canopy lighting	Pendent	1	150W MH	190	277	Elliptipar	M154-150C	
F5	Wall mounted security metal halide fixture	Surface	1	70W MH	80	277	Lithonia Lighting	WST 70M MD277 QRS	
F6	Pole mounted metal halide fixture, pole mounted 60' AFG	Pole mounted. Millerbernd Pole Model #UWLA 600, base "A", prime paint finish, type 2 brackets for poles attached to building and type 4R for the poles located at the apron. For building attached poles, contractor shall coordinate with architectural and structural drawings for special attachment.	1	1000W MH	1100	277	Sterner Infranor	876-1000MH-277V	
F7	Halogen TV Camera lights Similar to fixture "F1"		1	750W HAL	750	277	Lowel	"Tota", See note 7 on this sheet	
F8	4' Fluorscent fixture with acrylic diffuser	Suspended	1	F28T5	35	120	Bartco Lighting	MIT5-1T/28-28W-120	
F9			1	F28T5	35	277	Delray Lighting	ST54128.421	



Reynolds, Smith and Hills, Inc.
4525 Airport Approach Rd, Ste A
Duluth, Minnesota 55811
218--722--1227 Fax: 218--722--1052
www.rsandh.com



DULUTH
INTERNATIONAL
AIRPORT
DULUTH, MN

NEW PASSENGER
TERMINAL

- 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) 722-9306
- M/E/P&P Engineers:
COSENTINI ASSOCIATES INC.
1 South Wacker Drive, 37th Floor, Chicago IL 60606
TEL: (312) 201-7400 / 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) 591-5079

REVISIONS		
NO.	DESCRIPTION	DATE


DATE ISSUED: 02--17--12
REVIEWED BY: XXX
DRAWN BY: JK
DESIGNED BY: JK

AEP PROJECT NUMBER
213--1882--091
© 2010 REYNOLDS, SMITH AND HILLS INC.

SHEET TITLE
LIGHTING FIXTURE
SCHEDULE

SHEET NUMBER
E401
BID PACKAGE 2C

[illegible]


PANELBOARD: PP-1B													
SERVICE: 480/277V, 3PH, 4W + GND													
BUS SIZE: 200A				LOAD:				NOTES:		CIRCUIT BREAKER PANEL			
MAIN DEVICE: 200A				CONN 111.2 kVA				1-VERIFY OCP DEVICE SIZE PER MANUFACTURER'S REQ.					
				DEM. 111.2 kVA									
				DEM. 133.8 Amps									
				CONNECTED LOAD (VA)									
				PHASE A		PHASE B		PHASE C		CIRCUIT DESCRIPTION		NOTES	
CKT #	TRIP POLE	NOTES	CIRCUIT DESCRIPTION									TRIP POLE	CKT #
1				6,000	6,000								2
3	30/3	1	PASSENGER BRIDGE BAGLIFT			6,000		6,000		PASSENGER BRIDGE BAGLIFT		1	30/3
5								6,000		6,000			4
7				6,000	6,000								6
9	30/3	1	PASSENGER BRIDGE BAGLIFT			6,000		6,000		PASSENGER BRIDGE BAGLIFT		1	30/3
11								6,000		6,000			8
13	15/3		CU-1.2 (TUGTNL)	1,774	1,774					CU-1.1 (TUGTNL)			10
15						1,774		1,774				15/3	12
17								1,774		1,774			14
19	15/3		PUMP "P-14"	831	1,774			831		1,774			18
21						831		1,774					20
23								831		1,774			22
25	25	15/3	CU-2.1	1,968	3,048					CU-1.3 (TUGTNL)		15/3	24
27						1,968		3,048					26
29	30/3							1,968		3,048		20/3	28
31				942	942								30
33	15/3		EF-1.8 (TUG TUNNEL)			942		942		EF-1.9 (TUGTUNNEL)		15/3	32
35								942		942			34
37	20/1		SPARE							SPARE			36
39	20/1		SPARE							SPARE			38
41	20/1		SPARE							SPARE			40
43										SPARE			42
TOTAL CONNECTED LOADS:				17,515	19,538	17,515	19,538	17,515	19,538				

PANEL BOARD: PP-3A									
SERVICE: 480/277V, 3PH, 4W + GND									
BUS SIZE: 400A			LOAD:		NOTES:				
MAIN DEVICE: 400A			CONN	143.2 kVA	CIRCUIT BREAKER PANEL				
			DEM.	143.2 kVA					
			DEM.	172.4 Amps					
CKT #	TRIP POLE	CIRCUIT DESCRIPTION	CONNECTED LOAD (VA)				CIRCUIT DESCRIPTION	TRIP POLE	CKT #
			PHASE A	PHASE B	PHASE C				
1	40/3	PUMP "P-1"	5,820	0			PUMP "P-3"	40/3	2
				5,820	0				4
					5,820	0			STANDBY PUMP
3			5,820	2,106					8
5	40/3	PUMP "P-2"		5,820	2,106	PUMP "P-13"	15/3	10	
7					5,820			2,106	12
9									
11	40/3	AHU-1	5,820	0			SPARE	30/3	16
13				5,820	0				18
15						5,820			0
17	20/3	REF-1	3,048	0			SPARE	30/3	22
19				3,048	0				24
21					3,048	0			
23	60/3	AHU-3	7,482	305			TEF-1	15/3	30
25				7,482	305				32
27						7,482			305
29	25/3	REF-3	3,880	2,106			TEF-2	15/3	36
31				3,880	2,106				38
33					3,880	2,106			
35	60/3	AHU-4	7,482	3,880			REF-4	25/3	42
37				7,482	3,880				44
39						7,482			3,880
41					7,482	3,880			48
TOTAL CONNECTED LOADS:			39,352	8,397	39,352	8,397	39,352	8,397	

PANELBOARD: PP-3B															
SERVICE: 480/277V, 3PH, 4W + GND															
		BUS SIZE: 400A		LOAD:		NOTES:		CIRCUIT BREAKER PANEL							
		MAIN DEVICE: 400A		CONN 152.2 kVA											
				DEM. 152.2 kVA											
				DEM. 183.1 Amps											
CKT #	TRIP POLE	NOTES	CIRCUIT DESCRIPTION	CONNECTED LOAD (VA)						CIRCUIT DESCRIPTION	NOTES	TRIP POLE	CKT #		
				PHASE A		PHASE B		PHASE C							
1	15/3		CU-3.2 (ROOF)	1,774	1,774					CU-3.1 (ROOF)		15/3	2		
3						1,774	1,774						4		
5								1,774	1,774						6
7															8
9	40/3		AHU-5	5,820	0	5,820		0	5,820		0	SPARE	20/3	10	
11														12	
13	20/3		REF-5	3,048	21,339	3,048		21,339	3,048		21,339	AHU-2	110/3	14	
15														16	
17														18	
19	20/3		SPARE	0	9,422	0		9,422	0		9,422	REF-2	70/3	20	
21														22	
23														24	
25	15/1		FPB-3.1	2,548	859	1,413		1,413	1,413		2,548	FPB-3.6	15/1	26	
27	15/1		FPB-3.2			1,413		1,413	1,413		360	FPB-3.7	15/1	28	
29	15/1		FPB-3.3						1,413		2,548	FPB-3.8	15/1	30	
31	15/1		FPB-3.4	1,413	859	1,413		1,413	1,413		360	FPB-3.9	15/1	32	
33	15/1		FPB-3.5			1,413		1,413	1,413		360	FPB-2.1	15/1	34	
35	15/1		FPB-3.10						1,413		360	FPB-2.2	15/1	36	
37	15/1		FPB-3.11	1,413					2,548		804	SPARE	20/1	38	
39	20/1		FPB-3.12			2,548		804	804			HT TRACE-GUTTER	20/1	40	
41	20/1		SPARE						804			HT TRACE-GUTTER	20/1	42	
TOTAL CONNECTED LOADS:				16,016	24,743	16,016	36,165	13,468	36,217						


PANELBOARD: EP-3									
SERVICE: 480/277V, 3PH, 4W + GND									
BUS SIZE: 200A		LOAD:		NOTES: FUSIBLE SWITCH PANEL					
MAIN DEVICE: 150A		CONN	30.9 kVA						
		DEM.	30.9 kVA						
		DEM.	37.2 Amps						
CKT #	SW / FUSE POLE	CIRCUIT DESCRIPTION	CONNECTED LOAD (VA)			CIRCUIT DESCRIPTION	SW / FUSE POLE	CKT #	
			PHASE A	PHASE B	PHASE C				
1			0	2,106				2	
3	30AS/30AF	SPARE		0	2,106		PUMP "P-7"	30AS/15AF	
5	3P					0	2,106	3P	
7			0	2,106				6	
9	60AS/3P	FUTURE PUMP		0	2,106		PUMP "P-8"	30AS/15AF	
11	3P					0	2,106	3P	
13			0	2,106				10	
15	30AS/3P	SPARE		0	2,106		PUMP "P-9"	30AS/15AF	
17	3P					0	2,106	3P	
19			0	0				18	
21	60AS/3P	FUTURE PUMP		0	0		SPARE	30AS/3P	
23	3P					0	0	22	
25			3,048	942				24	
27	30AS/20AF	"EP-1.1"		3,048	942		"SF-2"	30AS/15AF	
29	3P					3,048	942	3P	
31			0	0				30	
33	60AS/3P	FUTURE PUMP		0	0		SPARE	30AS/3P	
35	3P					0	0	34	
37			0	0				36	
39	30AS/3P	SPARE		0	0		SPARE	30AS/3P	
41	3P					0	0	38	
TOTAL CONNECTED LOADS:			3,048	7,260	3,048	7,260		42	

NOTE: FUTURE PUMPS ARE A PART OF VALE DRAWINGS.



REYNOLDS, SMITH AND HILLS, INC.

4525 Airport Approach Rd. Ste A
Duluth, Minnesota 55811
218-722-1227 Fax: 218-722-1052
www.rsondh.com



**DULUTH AIRPORT
AUTHORITY**

DULUTH
INTERNATIONAL
AIRPORT
DULUTH, MN

NEW PASSENGER
TERMINAL

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) 722-9306

ME/PFP Engineers:
COSENTINI ASSOCIATES INC.
1 South Wacker Drive, 37th Floor, Chicago IL 60606
TEL: (312) 201-7400 / 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) 591-5079

REVISIONS

NO.	DESCRIPTION	DATE

DATE ISSUED: 02-17-12

REVIEWED BY: XXX

DRAWN BY: JK

DESIGNED BY: JK

AEP PROJECT NUMBER

213-1882-091

© 2010 REYNOLDS, SMITH AND HILLS INC.

SHEET TITLE

PANEL SCHEDULES

SHEET NUMBER

E404

BID PACKAGE 2C



PANELBOARD: RP-1A														
SERVICE: 208/120V, 3PH, 4W + GND														
BUS SIZE: 225A			LOAD:			NOTES:			CIRCUIT BREAKER PANEL					
MAIN DEVICE: 150A			CONN		18.6 kVA		1 - CONFIRM OCP SIZE WITH EQUIP. MANUFACTURER							
			DEM.		18.6 kVA									
			DEM.		51.6 Amps									
			CONNECTED LOAD (VA)											
CKT #	TRIP/ POLE	CIRCUIT DESCRIPTION	PHASE A		PHASE B		PHASE C		CIRCUIT DESCRIPTION			TRIP/ POLE	CKT #	
1			300	540					REC-GENERAL			201	2	
3	15/3	AC-1.3 (COMM. RM)			300	540			REC-GENERAL			201	4	
5							300	540	REC-GENERAL			201	6	
7	20/1	ELEC. DISPENSER	50	360					REC-WASHRMS			201	8	
9	20/1	REC-RAMP (GEN)			900	360			REC-WASHRMS			201	10	
11	20/1	REC-TUNNEL (GEN)					540	720	REC-GENERAL			201	12	
13	20/1	REC-EXTERIOR (GEN)	360	360					REC-OFFICE			201	14	
15	20/1	SPARE			0	500			FUME HOOD			201	16	
17	20/1	SPARE					0	1,500			WASHRM-ELEC DRYER	1	201	18
19	20/1	REC-ROVER	360	1,500							WASHRM-ELEC DRYER	1	201	20
21	20/1	REC-ROVER			540	360			REC-OFFICE			201	22	
23	20/1	SPARE					0	0	SPARE			201	24	
25	20/1	REC-GENERAL	720	0					SPARE			201	26	
27	20/1	REC-OFFICE/WRKST.			900	540			REC-GENERAL			201	28	
29	20/1	GARBAGE DISPOSAL					1,200	560	ELEV. PIT LTG/REC			201	30	
31	20/1	REFRIGERATOR	1,200	0					SPARE			201	32	
33	20/1	MICROWAVE			1,200	0			SPARE			201	34	
35	20/1	REC-BREAK RM					180	0	SPARE			201	36	
37	20/1	REC-BREAK RM	540	0					SPARE			201	38	
39	20/1	REC-REFRIG.			600	0			SPARE			201	40	
41	20/1	SPARE					0	0	SPARE			201	42	
TOTAL CONNECTED LOADS:			3,530	2,760	4,440	2,300	2,220	3,320						

PANELBOARD: RP-1D														
SERVICE: 208/120V, 3PH, 4W + GND														
BUS SIZE: 225A			LOAD:			NOTES:			CIRCUIT BREAKER PANEL					
MAIN DEVICE: 150A			CONN	30.2 kVA		1-PROVIDE EMON METER FOR CIRCUIT 2-VERIFY OCP SIZE PER MANUFACTURER'S REQUIREMENTS								
			DEM.	22.0 kVA										
			DEM.	61.1 Amps										
			CONNECTED LOAD (VA)											
CKT #	TRIP/ POLE		CIRCUIT DESCRIPTION		PHASE A	PHASE B	PHASE C	CIRCUIT DESCRIPTION			TRIP/ POLE	CKT #		
1					2,000	2,000						2		
3	30/3		REC-PSGR BRIDGE			2,000	2,000		REC-PSGR BRIDGE		30/3	4		
5			GRD SERVICE EQUIP.				2,000	2,000	GRD SERVICE EQUIP.			6		
7					2,000	2,000						8		
9	30/3		REC-PSGR BRIDGE			2,000	2,000		REC-PSGR BRIDGE		30/3	10		
11			GRD SERVICE EQUIP.				2,000	2,000	GRD SERVICE EQUIP.			12		
13	20/1		REC-GENERAL		180	180			REC-GENERAL		20/1	14		
15	20/1		REC-GENERAL			180	180		REC-GENERAL		201	16		
17	20/1	1	REC-GENERAL				180	180	REC-GENERAL	1	20/1	18		
19	20/1		REC-GENERAL		180	180			REC-GENERAL		201	20		
21	15/2	2	SHUTTER-ETD RM			510	510		SHUTTER-ETD RM	2	15/2	22		
23								510	510			24		
25	15/2	2	SHUTTER-ETD RM		510	510			OH DOOR-LDING DOCK	2	15/2	26		
27						510	510					28		
29	20/1	1	REC-ELEC. CART				180	0	SPARE		20/1	30		
31	20/1	1	REC-ELEC. CART		180	0			SPARE		201	32		
33	20/1	1	REC-ELEC. CART			180	0		SPARE		201	34		
35	20/1	1	REC-ELEC. CART				180		SPARE		20/1	36		
37	20/1		SPARE						SPARE		201	38		
39	20/1		SPARE						SPARE		20/1	40		
41	20/1		SPARE						SPARE		201	42		
TOTAL CONNECTED LOADS:					5,050	4,870	5,380	5,200	5,050	4,690				

PANELBOARD: RP-2B															
SERVICE: 208/120V, 3PH, 4W + GND															
BUS SIZE: 225A			LOAD:			NOTES:			CIRCUIT BREAKER PANEL						
MAIN DEVICE: 150A			CONN 30.6 kVA			1-VERIFY OCP DEVICE SIZE PER MANUFACTURER'S REQ.									
			DEM. 30.6 kVA												
			DEM. 85.0 Amps												
			CONNECTED LOAD (VA)												
CKT #	TRIP/ POLE		CIRCUIT DESCRIPTION		PHASE A		PHASE B		PHASE C		CIRCUIT DESCRIPTION			TRIP/ POLE	CKT #
1	20/1		REC-CHECK IN		360	900					REC-GENERAL				2
3	20/1		REC-GENERAL				540	360			REC-WASHRMS				4
5	20/1		REC- POLICE OFFICE						900	1,200	REC-VENDING MACH.				6
7	20/1		REC-GENERAL		540	1,200					REC-VENDING MACH.				8
9	15/1		CUH-2.2				300	720			REC-GENERAL				10
11	20/1		REC-TSA QUEUE						500	500	REC-CONCRSE COUNTER				12
13					937	500					REC-CONCRSE COUNTER				14
15	15/3		AC-2.1 (COMM. RM)				937	0			SPARE				16
17									937	510	GRILLE-TSA		1	15/2	18
19	15/1		CUH-2.3		300	510					GRILLE-TSA				20
21	15/1		CUH-2.4				300	831			GRILLE-TSA				22
23	20/1		REC-ELEC RM						360	831	GRILLE-TSA				24
25					1,920	831					WASHRM-ELEC DRYER				26
27	20/3	1	PARTITION WALL				1,920	1,500			WASHRM-ELEC DRYER				28
29									1,920	1,500	WASHRM-ELEC DRYER				30
31	20/1		EDGE LITE - 2ND FLR		1,200	1,500					WASHRM-ELEC DRYER		1		32
33	20/1		ELEC. DISPENSER				40	1,500			WASHRM-ELEC DRYER		1		34
35	20/1		SPARE						0	720	REC-GENERAL				36
37	20/1		SPARE		0	1,080					REC-GENERAL				38
39	20/1		SPARE				0				SPARE				40
41	20/1		SPARE						0		SPARE				42
TOTAL CONNECTED LOADS:					5,257	6,521	4,037	4,911	4,617	5,261					



PANELBOARD: RP-1B														
SERVICE: 208/120V, 3PH, 4W + GND														
BUS SIZE: 225A			LOAD:			NOTES:			CIRCUIT BREAKER PANEL					
MAIN DEVICE: 150A			CONN	24.5	kVA	1 - CONFIRM OCP SIZE WITH EQUIP. MANUFACTURER								
			DEM.	24.5	kVA									
			DEM.	68.0	Amps									
			CONNECTED LOAD (VA)											
CKT #	TRIP/ POLE	CIRCUIT DESCRIPTION	PHASE A		PHASE B		PHASE C		CIRCUIT DESCRIPTION			TRIP/ POLE	CKT #	
1	20/1	REC-RAC 4B	360	360					REC-TUNNEL (GEN)			201	2	
3	20/1	REC-RAC 4B			180	1,080			REC-GENERAL			201	4	
5	20/1	REC-RAC 5B					360	360	REC-BAG RM			201	6	
7	20/1	REC-RAC 5B	180	200					ELEC FCT/SP DISP, FLR 1			201	8	
9	20/1	REC-RAC 6B			360	30			ELEC DISPENSER			201	10	
11	20/1	REC-RAC 6B					180	20	ELEC DISPENSER			201	12	
13	20/1	REC-ELEC RM	360	0					SPARE			201	14	
15	20/1	REC-TELECOM			360	0			SPARE			201	16	
17	20/1	REC-GENERAL					720	360	REC-COUNTER			201	18	
19	20/1	REC-WASHRMS	540	720					REC-BHS MAINT.			201	20	
21	20/1	REC-GENERAL			720	720			REC-BHS MAINT.			201	22	
23	20/1	REC-GENERAL					720	720	REC-BHS MAINT.			201	24	
25	20/1	GARBAGE DISPOSAL	1,200	528					"CUBA-4"			201	26	
27	20/1	REFRIGERATOR			1,200	528			"EF-13"			15/1	28	
29	20/1	MICROW AVE.					1,200	180	REC-MAINT. OFFICE			15/1	30	
31	20/1	REC-RAC 1B	360	900					REC-EDIT WKST AT			201	32	
33	20/1	REC-RAC 1B			180	1,500			WASHRM-ELEC DRYER			1	201 34	
35	20/1	REC-RAC 2B					360	1,500	WASHRM-ELEC DRYER			1	201 36	
37	20/1	REC-RAC 2B	180	1,500					WASHRM-ELEC DRYER			1	201 38	
39	20/1	REC-RAC 3B			360	1,500			WASHRM-ELEC DRYER			1	201 40	
41	20/1	REC-RAC 3B					180	1,500	WASHRM-ELEC DRYER			1	201 42	
TOTAL CONNECTED LOADS:			3,180	4,208	3,360	5,358	3,720	4,640						

PANELBOARD: ELEV-1A																									
SERVICE: 208/120V, 3PH, 4W + GND																									
			BUS SIZE: 60A			LOAD:						NOTES:			CIRCUIT BREAKER PANEL										
			MAIN DEVICE: 60A			CONN		3.0 kVA																	
						DEM.		3.0 kVA																	
						DEM.		8.3 Amps																	
CONNECTED LOAD (VA)																									
												PHASE A		PHASE B		PHASE C		CIRCUIT DESCRIPTION		Floor Serving		TRIP/ POLE		CKT #	
1	20/1	Floor Serving	ELEV. #112 CAB LIGHTS			250	1,000							ELEV. #112 CONTROLLER				20/1	2						
3	20/1		ELEV. MACH RM REC.					180	528					CUH-1.1				20/1	4						
5	20/1		ELEV. RM SECURITY							500	528			EF-1.4				20/1	6						
7	20/1		SPARE			0	0							SPARE				20/1	8						
9	20/1		SPARE					0	0					SPARE				20/1	10						
11	20/1		SPARE							0	0			SPARE				20/1	12						
13	20/1		SPARE			0	0							SPARE				20/1	14						
15	20/1		SPARE					0	0					SPARE				20/1	16						
17	20/1		SPARE							0	0			SPARE				20/1	18						
TOTAL CONNECTED LOADS:						250	1,000	180	528	500	528														

PANELBOARD: ELEV-1B											
SERVICE: 208/120V, 3PH, 4W + GND											
BUS SIZE: 60A			LOAD:			NOTES:			CIRCUIT BREAKER PANEL		
MAIN DEVICE: 60A			CONN 2.9 kVA								
			DEM. 2.9 kVA								
			DEM. 8.2 Amps								
CONNECTED LOAD (VA)											
CKT #	TRIP/ POLE	Floor Serving	CIRCUIT DESCRIPTION			PHASE A	PHASE B	PHASE C	CIRCUIT DESCRIPTION		
1	20/1		ELEV. #124 CAB LIGHTS			250	1,000		ELEV. #124 CONTROLLER		
3	20/1		ELEV. MACH RM REC.				180	336			
5	20/1		ELEV. RM SECURITY					500	AC-1.2		
7	20/1		SPARE			0	336		SPARE		
9	20/1		SPARE				0	0	SPARE		
11	20/1		SPARE					0	SPARE		
13	20/1		SPARE			0	0		SPARE		
15	20/1		SPARE				0	0	SPARE		
17	20/1		SPARE					0	SPARE		
TOTAL CONNECTED LOADS:						250	1,336	180	336	500	336

PANELBOARD: ELEV-1C																					
SERVICE: 208/120V, 3PH, 4W + GND																					
			BUS SIZE: 60A			LOAD:						NOTES:			CIRCUIT BREAKER PANEL						
			MAIN DEVICE: 60A			CONN: 2.9 kVA															
						DEM: 2.9 kVA															
						DEM: 8.2 Amps															
CONNECTED LOAD (VA)																					
CKT #	TRIP/ POLE	Floor Serving	CIRCUIT DESCRIPTION			PHASE A		PHASE B		PHASE C		CIRCUIT DESCRIPTION			Floor Serving	TRIP/ POLE	CKT #				
1	20/1		ELEV. #105 CAB LIGHTS			250	1,000					ELEV. #105 CONTROLLER				20/1	2				
3	20/1		ELEV. MACH RM REC.					180	336								4				
5	20/1		ELEV. RM SECURITY							500	336						6				
7	20/1		SPARE			0	336									15/3	8				
9	20/1		SPARE					0	0			SPARE					20/1				
11	20/1		SPARE							0	0	SPARE					20/1				
13	20/1		SPARE			0	0					SPARE					20/1				
15	20/1		SPARE					0	0			SPARE					20/1				
17	20/1		SPARE							0	0	SPARE					20/1				
TOTAL CONNECTED LOADS:						250	1,336	180	336	500	336										

1

PANELBOARD: ERP-1A - PNL W/TVSS, 200% NEUTRAL & ISO GRD											
SERVICE: 208/120V, 3PH, 4W + GND											
BUS SIZE: 200A			LOAD:			NOTES:			CIRCUIT BREAKER PANEL		
MAIN DEVICE: 200A			CONN 8.1 kVA			1-PROVIDE EMON METER FOR CIRCUIT					
			DEM. 8.1 kVA								
			DEM. 22.4 Amps								
CONNECTED LOAD (VA)											
CKT #	TRIP/ POLE	NOTES	CIRCUIT DESCRIPTION			PHASE A	PHASE B	PHASE C	CIRCUIT DESCRIPTION		
1	20/1		REC-XRAY PODIUM			750	500		FIRE BELL		
3	20/1		REC-CASHER				250	500	REC-FDRS		
5	20/1		SPARE					0	500 REC-MCC		
7	20/1		SPARE			0	360		REC-CONTROL RM		
9	20/1		REC COMP-OFFICE				250	720	REC-CONTROL RM		
11	20/1		REC-INTERVIEW					250	0 SPARE		
13	20/1		REC-ADIT RM			250	0		SPARE		
15	20/1		REC-INTERVIEW				250	250	REC-OFFICE		
17	20/1		REC-ROVER					250	500 REC-SEC XRAY		
19	20/1		REC-ROVER			250	500		REC-SEC XRAY		
21	20/1		REC-ROVER				250	0	SPARE		
23	20/1		REC-ROVER					250	0 SPARE		
25	20/1		REC-ROVER			250	0		SPARE		
27	20/1		REC-ROVER				250	0	SPARE		
29	20/1		REC-ROVER					250	0 SPARE		
31	20/1		REC-ROVER			250	0		SPARE		
33	20/1		REC-ROVER				250	0	SPARE		
35	20/1		SPARE					0	0 SPARE		
37	20/1		SPARE			0	0				
39	20/1		SPARE				0	0	TVSS		
41	20/1		SPARE					0	0		
TOTAL CONNECTED LOADS:						1,750	1,360	1,500	1,470	1,000	1,000

1

PANELBOARD: ERP-1B - PNL W/TVSS, 200% NEUTRAL & ISO GRD												
SERVICE: 208/120V, 3PH, 4W + GND												
BUS SIZE: 200A			LOAD:			NOTES:			CIRCUIT BREAKER PANEL			
MAIN DEVICE: 200A			CONN	16.0 kVA								
			DEM.	16.0 kVA								
			DEM.	44.4 Amps								
CONNECTED LOAD (VA)												
CKT #	TRIP/ POLE	NOTES	CIRCUIT DESCRIPTION		PHASE A	PHASE B	PHASE C	CIRCUIT DESCRIPTION		TRIP/ POLE	CKT #	
1	20/1		REC-OFFICE		500	250		REC-COMM. RM		20/1	2	
3	20/1		REC-CLG DUPLEX			500	250	REC-COMM. RM		20/1	4	
5	20/1		REC-CLG DUPLEX				500	250	REC-COMM. RM		20/1	6
7	20/1		REC-BAG RMS		500	250		REC-COMM. RM		20/1	8	
9	20/1		REC-OFFICE			250	250	REC-COMM. RM		20/1	10	
11	20/1		REC-OPS				500	250	REC-COMM. RM		20/1	12
13	20/1		REC-RAC 1		1,080	250		REC-COMM. RM		20/1	14	
15	20/1		REC-RAC 2			1,080	250	REC-COMM. RM		20/1	16	
17	20/1		REC-RAC 3				1,080	0	SPARE		20/1	18
19	20/1		SPARE		0	1,080		REC-RAC 6		20/1	20	
21	20/1		SPARE			0	1,080	REC-RAC 4		20/1	22	
23	20/1		REC-CLG DUPLEX				500	1,080	REC-RAC 5		20/1	24
25	20/1		REC-CLG DUPLEX		500	250		REC-EDT WRKSTAT.		20/1	26	
27	20/1		REC-CLG DUPLEX			500	250	REC-EDT WRKSTAT.		20/1	28	
29	20/1		REC-CLG DUPLEX				500	250	REC-EDT WRKSTAT.		20/1	30
31	20/1		REC-CLG DUPLEX		500	250		REC-EDT WRKSTAT.		20/1	32	
33	20/1		REC-CLG DUPLEX			500	250	REC-EDT WRKSTAT.		20/1	34	
35	20/1		REC-CLG DUPLEX				500	0	SPARE		20/1	36
37	20/1		SPARE		0	0		TVSS		60/3	38	
39	20/1		SPARE			0	0				40	
41	20/1		SPARE				0	0			42	
TOTAL CONNECTED LOADS:					3,080	2,330	2,830	2,330	3,580	1,830		

SECURITY/TECHNOLOGY SYSTEMS LEGEND

	COMMUNICATION OUTLET – (2) RJ-45 CAT6 JACKS (SEE NOTE 12)
	COMMUNICATION OUTLET – (3) RJ-45 CAT6 JACKS (SEE NOTE 12)
	COMMUNICATION OUTLET – (4) RJ-45 CAT6 JACKS (SEE NOTE 12)
	TV OUTLET – (1) TYPE F JACK & (2) RJ-45 JACKS, 80" A.F.F. (SEE NOTE 12).
	WALL PHONE OUTLET – (1) RJ-45 CAT6 JACK WITH WALL PHONE MOUNTNG PLATE. INSTALLED 54" A.F.F. FOR SIDE REACH AND 48" A.F.F. FOR FORWARD REACH LOCATION PER ADA. (SEE NOTE 12).
	DATA OUTLET, IN FLOOR BOX, QUANTITY OF JACKS BASED ON SYMBOL ABOVE.
	JUNCTION BOX
	ELECTRICAL CONNECTION
	DUPLEX ELECTRICAL OUTLET. PROVIDE 2#12, 1#12 GND IN 3/4" CONDUIT TO PANEL INDICATED. PROVIDE ADDITIONAL CIRCUIT BREAKERS AS REQUIRED. UPDATE PANEL CIRCUIT DIRECTORY WITH TYPE WRITTEN CIRCUIT INFORMATION.
	QUAD COMMUNICATION POWE OUTLET. PROVIDE 2#12, 1#12 GND IN 3/4" CONDUIT TO PANEL INDICATED. PROVIDE ADDITIONAL CIRCUIT BREAKERS AS REQUIRED. UPDATE PANEL CIRCUIT DIRECTORY WITH TYPE WRITTEN CIRCUIT INFORMATION.
	SINGLE PORT ELECTRICAL OUTLET, NEMA STYLE INDICATED ON PLANS. PROVIDE NEMA L6-30 W/ 2#10, 1#10GND IN 1" C UNLESS OTHERWISE INDICATED.
	COMMUNICATION CONDUIT, CONCEALED, 1" MINIMUM, "IDF" INDICATES TERMINATION POINT.
	802.11 WIRELESS ACCESS POINT. (SEE NETWORK RISER)
	INTELLIGENT FIELD PANEL (SEE ACCESS CONTROL RISER)
	ELECTRICAL INTERFACE BOX (SEE ACCESS CONTROL RISER) PROVIDE COMPLETE CONDUIT TO IFP LOCATION. "IDF-#" INDICATES LOCATION OF INTELLIGENT FIELD PANEL, SEE FLOOR PLANS. PROVIDE JBOX WITH 2#12, 1#10 GND IN 3/4"C TO NEAREST EMERGENCY POWER PANEL.
	CARD READER. (SEE ACCESS CONTROL RISER)
	CODE BLUE OR SIMILAR AREA OF RESCUE VOICE COMMUNICATOR
	PTZ (PAN/TILT/ZOOM) CCTV CAMERA. (SEE VIDEO SURVEILLANCE RISER DIAGRAM)
	FIXED CCTV CAMERA. (SEE VIDEO SURVEILLANCE RISER DIAGRAM)
	LCD DISPLAY (MUFIDS/PUBLIC DISPLAY)
	LCD TV (PUBLIC DISPLAY W/ TUNER AND SPEAKERS)
	SECURITY BOUNDARY – PART 1542 SECURITY IDENTIFICATION DISPLAY AREA (SIDA). BADGE REQUIRED TO BE WORN AT ALL TIMES.
	STERILE BOUNDARY – PART 1542 TSA SCREENED STERILE BOUNDARY INSIDE TERMINAL PAST SECURITY CHECKPOINT.
	SECURE AREA BOUNDARY – NON PART 1542 ACCESS OWNER CONTROLLED BOUNDARY.
	SECURITY ACCESS POINT IDENTIFICATION. TOP = NUMBER, BOTTOM = POINT TYPE. (SEE ACCESS CONTROL DETAILS)
	19" OPEN FRAME COMMUNICATIONS RACK. (SEE COMM RACK ELEVATIONS)
	ENCLOSED COMM EQUIPMENT CABINET. (SEE COMM RACK ELEVATIONS)
	GENERIC CABLE TRAY, WIDTH AS INDICATED
	TELEPHONE TERMINAL BOARD, 4'x8' PAINTED WHITE W/ FIRE RETARDANT PAINT (2) COATS REQUIRED. PROVIDE QUANTITY AS REQUIRED TO COVER WALLS AS INDICATED ON PLANS.

	DURESS ALARM
	DURESS ALARM WITH KEY RESET
	INTERCOM MASTER STATION AND KEY RESET (DURESS ALARM)
	DURESS STROBE – CLG MTD WHITE STROBE SYSTEM SENSOR 24V DC, 15cd SCW-P-LENSB
	FLIGHT INFORMATION INPUT WORKSTATION (SEE MUFIDS RISER)
	WORKSTATION (SEE NETWORK RISER)

GENERAL SECURITY/TECHNOLOGY SYSTEMS NOTES

- SECURITY/ TECHNOLOGY WIRING PATHWAY INFRASTRUCTURE IS EXISTING U.O.N.
- PROVIDE WIRING AND DEVICES INCLUDING HEADEND EQUIPMENT FOR FIDS, CATV, PUBLIC TV, OPS CENTERS CCAS & CCTV SYSTEMS.
- ALL WORK SHALL BE PERFORMED IN STRICT ACCORDANCE WITH THE LATEST ISSUE OF THE NATIONAL ELECTRICAL CODE (NFPA 70), THE LIFE SAFETY CODE (NFPA 101), OSHA, THE NATIONAL FIRE CODES, THE AMERICANS WITH DISABILITIES ACT, STATE AND LOCAL CODES.
- ALL COMMUNICATION WIRING SHALL COMPLY WITH APPLICABLE ETA/TIA STANDARDS.
- INSTALL MATERIALS AND EQUIPMENT IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS AND INDUSTRY STANDARDS.
- ALL MATERIALS AND EQUIPMENT USED ON THIS PROJECT SHALL BE NEW, U.L. APPROVED/LISTED, U.O.N.
- ALL WIRING SHALL BE INSTALLED IN CONDUIT AS INDICATED ON THE DRAWINGS, MINIMUM CONDUIT SIZE SHALL BE ¾" U.O.N. TRADE SIZE. CONCRETE ENCASED, OUTDOOR, AND UNDERGROUND CONDUIT SHALL BE RIGID GALVANIZED STEEL U.O.N. SET SCREW FITTINGS ARE NOT PERMITTED. FLEXIBLE CONDUIT SHALL NOT EXCEED 36" IN LENGTH, U.O.N. ALL CONDUIT RUNS SHALL BE CONCEALED IN FINISHED AREAS. WHERE IT IS IMPRACTICAL TO CONCEAL CONDUIT RUNS, PROVIDE SHOP DRAWINGS SHOWING SURFACE METAL RACEWAY LAYOUT FOR APPROVAL OF THE ENGINEER AND OWNER. ALL CONDUIT BENDS FOR DATA WIRING SHALL BE SMOOTH LONG RADIUS TYPE, "LB" TYPE FITTINGS SHALL NOT BE USED. EXTERIOR BURIED CONDUIT RUNS SHALL BE MINIMUM 24" BELOW FINISHED GRADE. PROVIDE CAUTION TAPE 12" BELOW GRADE. BACKFILL PER SPECIFICATION.
- PROVIDE GROUND STRAP ACROSS ALL CABLE TRAY JOINTS. GROUND CABLE TRAY TO SERVICE GROUND WITH #1/0 BARE COPPER IN 1" CONDUIT.
- ALL BRANCH CIRCUIT CONDUCTORS SHALL BE #12AWG TYPE THHN INSULATED COPPER, MINIMUM U.O.N. ALL HOME RUNS OF 100' OR LONGER SHALL BE #10AWG TYPE THHN/THWN INSULATED COPPER, MINIMUM U.O.N. EACH EQUIPMENT BRANCH CIRCUIT SHALL INCLUDE AN EQUIPMENT GROUNDING CONDUCTOR SIZED PER NEC AND RUN TOGETHER WITH THE PHASE CONDUCTORS.
- ALL EMERGENCY CIRCUITS SHALL BE RUN IN SEPARATE CONDUITS. EMERGENCY CIRCUIT CONDUIT SHALL BE PERMANENTLY IDENTIFIED WITH A RED BAND AT TEN FOOT INTERVALS AND AT ALL JUNCTION AND PULL BOXES. FIRE ALARM CIRCUITS SHALL BE RUN IN RED EMT AND ALL JUNCTION AND PULL BOX COVERS PAINTED RED.
- ALL SECURITY SYSTEM CONDUIT SHALL BE SEPARATE, COMPLETE, AND FULLY FUNCTIONAL. SECURITY SYSTEM WIRING SHALL BE RUN IN BLUE EMT AND ALL JUNCTION AND PULL BOX COVERS PAINTED BLUE.
- ALL ELECTRICAL WIRING DEVICES INDICATED TO BE INSTALLED IN MASONRY WALLS OR FLOORS SHALL BE FLUSH MOUNTED, INCLUDING BRANCH CIRCUIT PANEL BOARDS, UNLESS OTHERWISE NOTED. THE CONDUITS TO ASSOCIATED ELECTRICAL EQUIPMENT SHALL BE CONCEALED IN WALLS OR FLOOR. DO NOT LOCATE ELECTRICAL OUTLETS AND DEVICES ON WALL PANEL JOINTS. REFER TO ARCHITECTURAL BUILDING ELEVATIONS FOR WALL PANEL LAYOUT AND PANEL JOINT LOCATIONS
- ALL LIGHT SWITCHES AND DUPLEX RECEPTACLES SHALL BE RATED FOR 20 AMPERE AT 125 VAC. ALL EXTERIOR RECEPTACLES SHALL BE 125VAC, 20A RATED GFI TYPE IN WEATHER PROOF ENCLOSURES U.O.N. EXTERIOR RECEPTACLES MUST BE WEATHERPROOF WITH THE ATTACHMENT PLUG INSERTED. ALL DISCONNECT SWITCHES SHALL BE THE HEAVY DUTY TYPE TIME DELAY, TYPE RK5 AND INDICATING TYPE RK5 FUSES.
- FOR 120 VOLT/20AMP BRANCH CIRCUITS FROM OTHER THAN COMMUNICATION PANELS, CONTRACTOR MAY USE A COMMON NEUTRAL FOR A MAXIMUM OF THREE DIFFERENT PHASE CONDUCTORS (PHASES A, B, & C). A MAXIMUM OF THREE PHASE CONDUCTORS PLUS THREE NEUTRAL CONDUCTORS OR THREE PHASE CONDUCTORS PLUS A #10 NEUTRAL MAY BE RUN IN A SINGLE BRANCH CIRCUIT CONDUIT.
- PROVIDE 4"x4"x2.5" JUNCTION BOX FOR COMMUNICATIONS OUTLET, PROVIDE SINGLE GANG MUD RING ADAPTER. PROVIDE 1" TO ACCESSIBLE CEILING SPACE. PROVIDE PLENUM RATED CAT6 CABLING TO COMM. ROOM AS INDICATED. OUTLETS SHALL MATCH ELECTRICAL OUTLET COLOR, MATERIAL AND MOUNTING HEIGHT UNLESS OTHERWISE INDICATED. COMMUNICATION OUTLETS INSTALLED OUTDOOR SHALL BE WEATHERPROOF CONNECTIONS OR INSTALLED WITH A HINGED GASKETED COVER AND CLEAR PLEXIGLASS SHIELD.
- ALL EMPTY CONDUITS SHALL CONTAIN JET LINE #232 POLYOLEFIN 200 LB. TEST PULL STRING.
- EACH PANEL BOARD SHALL BE PROVIDED WITH A TYPEWRITTEN CIRCUIT DIRECTORY SECURED TO THE INSIDE OF THE DOOR IN A STEEL FRAME. EACH PANEL BOARD, TRANSFORMER, AUTOMATIC TRANSFER SWITCH, AND MAIN SWITCHGEAR/SWITCHBOARD SHALL BE IDENTIFIED WITH AN ENGRAVED NAMEPLATE.
- CONDUITS, WIRE WAYS AND CABLE TRAYS SHALL BE SUPPORTED FROM BUILDING STRUCTURE AND NOT FROM OTHER PIPES, DUCTS OR EXISTING RACKS U.O.N.
- THE CONTRACTOR SHALL THOROUGHLY REVIEW THE PROJECT DRAWINGS AND SPECIFICATIONS AND VISIT THE SITE TO DETERMINE THE FULL EXTENT OF THE WORK, THE BID SUBMITTED SHALL BE CONSTRUED AS EVIDENCE THAT THE BIDDER HAS COMPLIED WITH THESE REQUIREMENTS AND SHALL ENSURE THAT ALL WORK MEET OR EXCEED THE PROJECT REQUIREMENTS. ANY ALLEGED DISCREPANCIES SHALL BE BROUGHT TO THE ENGINEER'S ATTENTION PRIOR TO BID SUBMITTAL.
- THE CONTRACTOR IS REMINDED THAT ELECTRICAL SERVICE TO AND FOR MECHANICAL, KITCHEN AND OTHER EQUIPMENT ARE BASED ON EQUIPMENT DESIGN DATA. THE VALUES MAY DIFFER DEPENDING UPON THE ACTUAL EQUIPMENT TO BE FURNISHED. ANY MODIFICATION TO THE ELECTRICAL CIRCUITING, BASED UPON ACTUAL EQUIPMENT SELECTION, SHALL BE MADE AT NO ADDITIONAL COST TO THE OWNER.
- CONTRACTOR SHALL MAKE ALL REQUIRED OPENINGS THROUGH FOUNDATION WALLS,FLOORS, WALLS, CEILINGS, AND ROOFS AS REQUIRED FOR THE WORK INDICATED. WHERE CABLES OR CONDUITS ARE REQUIRED TO PASS THROUGH FIRE RATED WALL, FLOOR OR CEILING, THEY SHALL BE SEALED WITH 3M FIRE STOP OR APPROVED EQUAL. THE APPROVED FIRE STOP METHOD SHALL COMPLY WITH ARTICLES 300-21 OF NEC AND SHALL BE UL LISTED UNDER "THROUGH -PENETRATION FIRE STOP SYSTEM (XHEZ)" IN UL FIRE RESISTANCE DIRECTORY. PROVIDE MINIMUM 1" EMT THROUGH WALL PENETRATIONS. DAMAGED INSULATION MUST BE REPLACED.
- CONTRACTOR IS RESPONSIBLE FOR ALL DAMAGE DURING CONSTRUCTION. THE CONTRACTOR SHALL REPAIR/REPLACE ALL MATERIAL AND/OR EQUIPMENT DAMAGED, REPAIR SHALL RETURN THE DAMAGED ITEMS BACK TO THEIR ORIGINAL STATE, AS A MINIMUM, AS DETERMINED BY THE OWNER.
- ALL REFUSE AND DEBRIS SHALL BE REMOVED FROM THE PROJECT SITE AND DISPOSED OF LEGALLY BY THE CONTRACTOR. RETURN ANY SALVAGEABLE EQUIPMENT TO THE OWNER.
- ANY EXISTING UTILITIES LOCATED IN THE AREA OF CONSTRUCTION WHICH REQUIRE RELOCATION SHALL BE COORDINATED WITH THE OWNER TEN DAYS IN ADVANCE, MINIMUM.

ABBREVIATION

AC	ABOVE COUNTER	EN	EXISTING TO BE REPLACED	MH	MOUNTING HEIGHT
AFF	ABOVE FINISHED FLOOR	EPB	ELECTRICAL PULL BOX	MTD	MOUNTED, MOUNTING
AFG	ABOVE FINISHED GRADE	ER	EXISTING TO BE REMOVED	NEC	PER LATEST NATIONAL ELECTRICAL CODES
ATS	AUTOMATIC TRANSFER SWITCH	ERP	EXISTING IN RELOCATED POSITION	NIC	NOT IN CONTRACT
B	BOTTOM	EWG	ELECTRIC WATER COOLER	NL	NIGHT LIGHT (UNSWITCHED)
BC	BELOW COUNTER	EWH	ELECTRIC WATER HEATER	OHE	OVERHEAD ELECTRIC
BID	BAGGAGE INFORMATION DISPLAY	EX	EXISTING TO REMAIN	P	PUBLIC
BKR	BREAKER	EXP	EXPLOSION PROOF	PL	PILOT LIGHT
C	CONDUIT	EXR	EXISTING TO BE RELOCATED	SCP	SECURITY CONTROL PANEL
CCTV	CLOSED CIRCUIT TELEVISION	FACP	FIRE ALARM CONTROL PANEL	SSTC	SOUND SYSTEM TERMINAL CABINET
CH	COUNTER HEIGHT	FATC	FIRE ALARM TRANSPONDER CABINET	STC	STARTER
CKT	CIRCUIT	FAAP	FIRE ALARM ANNUNCIATOR PANEL	STR	SECURITY TERMINAL CABINET
CLG	CEILING HEIGHT	FID	FLIGHT INFORMATION DISPLAY	T	TOP
CP	COMMUNICATIONS PANEL	GCTC	GATE CONTROL TERMINAL CABINET	TBB	TELEPHONE BACKBOARD
CPB	COMMUNICATIONS PULL BOX	GFI	GROUND FAULT INTERRUPTER	TGB	TELECOMMUNICATIONS GROUNDING BUSBAR
CTR	CONTACTOR	GID	GATE INFORMATION DISPLAY	TMGB	TELECOMMUNICATIONS MAIN GROUNDING BUSBAR
CTS	CLOSED CIRCUIT TV SWITCHING EQUIPMENT	GROUND		TVSS	TRANSIENT VOLTAGE SURGE SUPPRESSION
D/S	DISCONNECT SWITCH	HID	HIGH INTENSITY DISCHARGE	UGE	UNDERGROUND ELECTRIC
DTC	DATA TERMINAL CABINET	PATC	PUBLIC ADDRESS TERMINAL CABINET	U.O.N.	UNLESS OTHERWISE NOTED
E	EMERGENCY	IDF	INTERMEDIATE DISTRIBUTION FRAME	VDB	VOICE/DATA/BACKBOARD
ECB	ENCLOSED CIRCUIT BREAKER	IFP	INTELLIGENT FIELD PANEL	W	WALL
EIB	ELECTRICAL INTERFACE BOX	MDF	MAIN DISTRIBUTION FRAME	WHT	WHITE
				WP	WEATHERPROOF

WARNING: THIS RECORD CONTAINS SENSITIVE SECURITY INFORMATION THAT IS CONTROLLED UNDER 49 CFR PARTS 15 AND 1520. NO PART OF THIS RECORD MAY BE DISCLOSED TO PERSONS WITHOUT A "NEED TO KNOW", AS DEFINED IN 49 CFR PARTS 15 AND 1520, EXCEPT WITH THE WRITTEN PERMISSION OF THE ADMINISTRATOR OF THE TRANSPORTATION SECURITY ADMINISTRATION OR THE SECRETARY OF TRANSPORTATION. UNAUTHORIZED RELEASE MAY RESULT IN CIVIL PENALTY OR OTHER ACTION. FOR U.S. GOVERNMENT AGENCIES, PUBLIC DISCLOSURE IS GOVERNED BY 5 U.S.C. 552 AND 49 CFR PARTS 15 AND 1520.



Reynolds, Smith and Hills, Inc.
4525 Airport Approach Rd, Ste A
Duluth, Minnesota 55811
218-722-1227 Fax: 218-722-1052
www.rsandh.com



DULUTH
INTERNATIONAL
AIRPORT
DULUTH, MN

NEW PASSENGER
TERMINAL

CONSULTANTS

Interior Architects:
SJA ARCHITECTS
11 E Superior Street Suite 340, Duluth MN 55802
TEL: (218) 724-8578 / FAX: (218) 722-8717

Structural Engineers:
MBJ CONSULTING ENG.
501 Lake Avenue South, Suite 300, Duluth MN 55802
TEL: (218) 722-1056 / FAX: (218) 722-8306

M/E/P/F 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:
APPOLO DESIGN
2432 East First Street, Duluth MN 55812
TEL: (218) 591-5079

REVISIONS

NO.	DESCRIPTION	DATE
	100% REVIEW	12.15.10
	BID PACKAGE 2A	01.24.11
1	BP2A ADDENDUM 1	02.25.11
	BP2A CONFERENCE SET	05.02.11
	BID PACKAGE 2B REVIEW	07.16.11
	BID PACKAGE 2B	08.23.11
	BP2B CONFERENCE	10.21.11

DATE ISSUED: 02-10-12

REVIEWED BY: BA

DRAWN BY: RJL

DESIGNED BY: BA/RJL

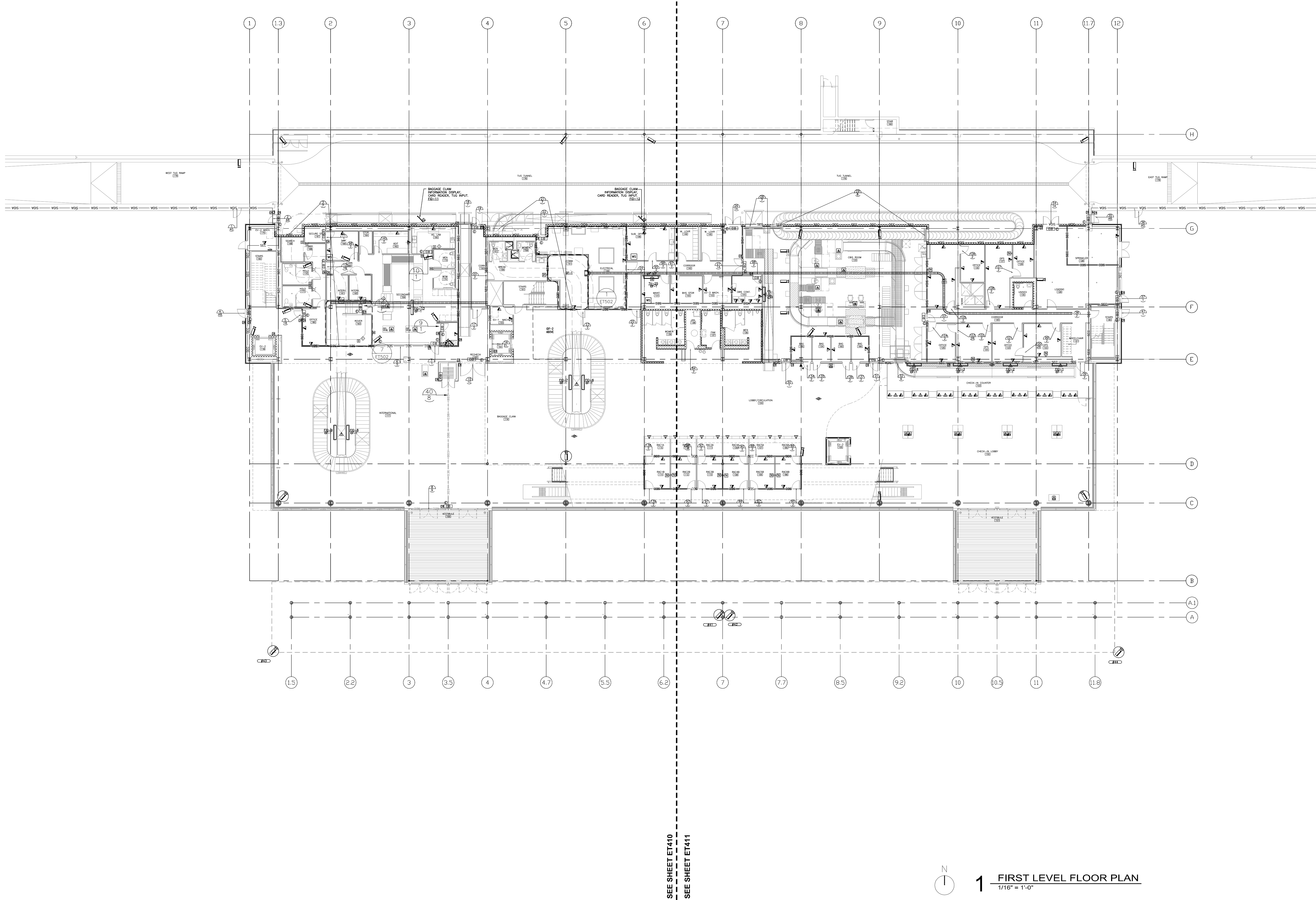
AEP PROJECT NUMBER
213-1882-091
© 2010 REYNOLDS, SMITH AND HILLS INC.

SHEET TITLE
TECHNOLOGY/
SECURITY SYSTEMS
LEGEND & NOTES

SHEET NUMBER

ET001

BID PACKAGE 2C



WARNING: THIS RECORD CONTAINS SENSITIVE SECURITY INFORMATION THAT IS CONTROLLED UNDER 49 CFR PARTS 15 AND 1520. NO PART OF THIS RECORD MAY BE DISCLOSED TO PERSONS WITHOUT A "NEED TO KNOW", AS DEFINED IN 49 CFR PARTS 15 AND 1520, EXCEPT WITH THE WRITTEN PERMISSION OF THE ADMINISTRATOR OF THE TRANSPORTATION SECURITY ADMINISTRATION OR THE SECRETARY OF TRANSPORTATION. UNAUTHORIZED RELEASE MAY RESULT IN CIVIL PENALTY OR OTHER ACTION. FOR U.S. GOVERNMENT AGENCIES, PUBLIC DISCLOSURE IS GOVERNED BY 5 U.S.C. 552 AND 49 CFR PARTS 15 AND 1520.



Reynolds, Smith and Hills, Inc.
4525 Airport Approach Rd, Ste A
Duluth, Minnesota 55811
218-722-1227 Fax: 218-722-1062
www.rsandh.com



DULUTH
INTERNATIONAL
AIRPORT
DULUTH, MN

NEW PASSENGER
TERMINAL

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) 722-8306

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) 591-5079

REVISIONS

NO.	DESCRIPTION	DATE
	100% REVIEW	12.15.10
	BID PACKAGE 2A	01.24.11
1	BP2A ADDENDUM 2	02.25.11
	BP2A CONFORMANCE SET	05.02.11
	BID PACKAGE 2B REVIEW	07.16.11
	BID PACKAGE 2B	08.23.11
	BP2B CONFORMANCE	10.21.11
2	BP2A RFP-179	11.21.11

DATE ISSUED: 02-10-12

REVIEWED BY: BA

DRAWN BY: RJL

DESIGNED BY: BA

AEP PROJECT NUMBER

213-1882-091

© 2010 REYNOLDS, SMITH AND HILLS INC.

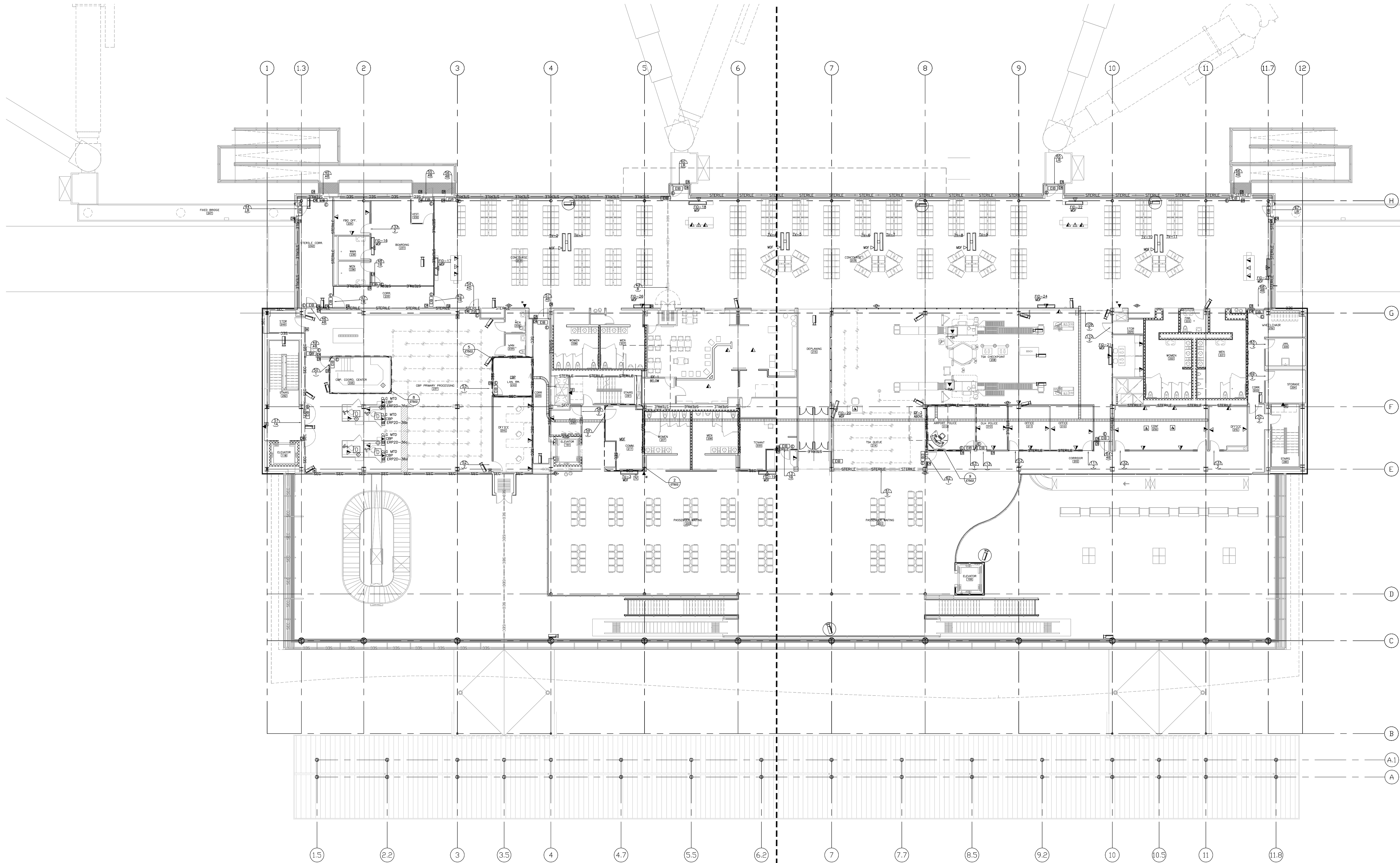
SHEET TITLE

TECHNOLOGY
FIRST FLOOR
PLAN

SHEET NUMBER

ET401

BID PACKAGE 2C



WARNING: THIS RECORD CONTAINS SENSITIVE SECURITY INFORMATION THAT IS CONTROLLED UNDER 49 CFR PARTS 15 AND 1520. NO PART OF THIS RECORD MAY BE DISCLOSED TO PERSONS WITHOUT A "NEED TO KNOW", AS DEFINED IN 49 CFR PARTS 15 AND 1520, EXCEPT WITH THE WRITTEN PERMISSION OF THE ADMINISTRATOR OF THE TRANSPORTATION SECURITY ADMINISTRATION OR THE SECRETARY OF TRANSPORTATION. UNAUTHORIZED RELEASE MAY RESULT IN CIVIL PENALTY OR OTHER ACTION. FOR U.S. GOVERNMENT AGENCIES, PUBLIC DISCLOSURE IS GOVERNED BY 5 U.S.C. 552 AND 49 CFR PARTS 15 AND 1520.

RS&H
IMPROVING YOUR WORLD

Reynolds, Smith and Hills, Inc.
4525 Airport Approach Rd, Ste A
Duluth, Minnesota 55811
218-722-1227 Fax: 218-722-1052
www.rsandh.com

**DULUTH AIRPORT
AUTHORITY**

**DULUTH
INTERNATIONAL
AIRPORT
DULUTH, MN**

**NEW PASSENGER
TERMINAL**

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) 722-8306
ME/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) 591-5079

REVISIONS		
NO.	DESCRIPTION	DATE
1000	REVIEW	12.15.10
	BID PACKAGE 2A	01.24.11
1	BP2A ADDENDUM 2	02.25.11
	BP2A CONFORMANCE SET	05.02.11
	BID PACKAGE 2B REVIEW	07.16.11
	BID PACKAGE 2B	08.23.11
	BP2B CONFORMANCE	10.21.11
2	BP2A RFP-179	11.21.11

DATE ISSUED: 02-10-12
REVIEWED BY: BA
DRAWN BY: RJL
DESIGNED BY: BA

AEP PROJECT NUMBER
213-1882-091
© 2010 REYNOLDS, SMITH AND HILLS INC.

SHEET TITLE
**TECHNOLOGY
SECOND FLOOR
PLAN**

SHEET NUMBER

ET402

BID PACKAGE 2C

2 SECOND LEVEL FLOOR PLAN
1/16" = 1'-0"



Reynolds, Smith and Hills, Inc.
4525 Airport Approach Rd, Ste A
Duluth, Minnesota 55811
218-722-1227 Fax: 218-722-1052
www.rsandh.com



**DULUTH AIRPORT
AUTHORITY**

**DULUTH
INTERNATIONAL
AIRPORT
DULUTH, MN**

NEW PASSENGER TERMINAL

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) 722-9306

ME/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) 591-5079

REVISIONS

NO.	DESCRIPTION	DATE
	100% REVIEW	12.15.10
1	BID PACKAGE 2A	01.24.11
	BP2A ADDENDUM 2	02.25.11
	BP2A CONFORMANCE SET	05.02.11
	BID PACKAGE 2B REVIEW	07.16.11
	BID PACKAGE 2B	08.23.11
2	BP2B CONFORMANCE	10.21.11
	BP2A RFP-179	11.21.11

DATE ISSUED: 02-10-12

REVIEWED BY: BA

DRAWN BY: RJL

DESIGNED BY: BA

AEP PROJECT NUMBER

213-1882-091

© 2010 REYNOLDS, SMITH AND HILLS INC.

SHEET TITLE

TECHNOLOGY

THIRD FLOOR

THIRD FLOOR PLAN

PLAN

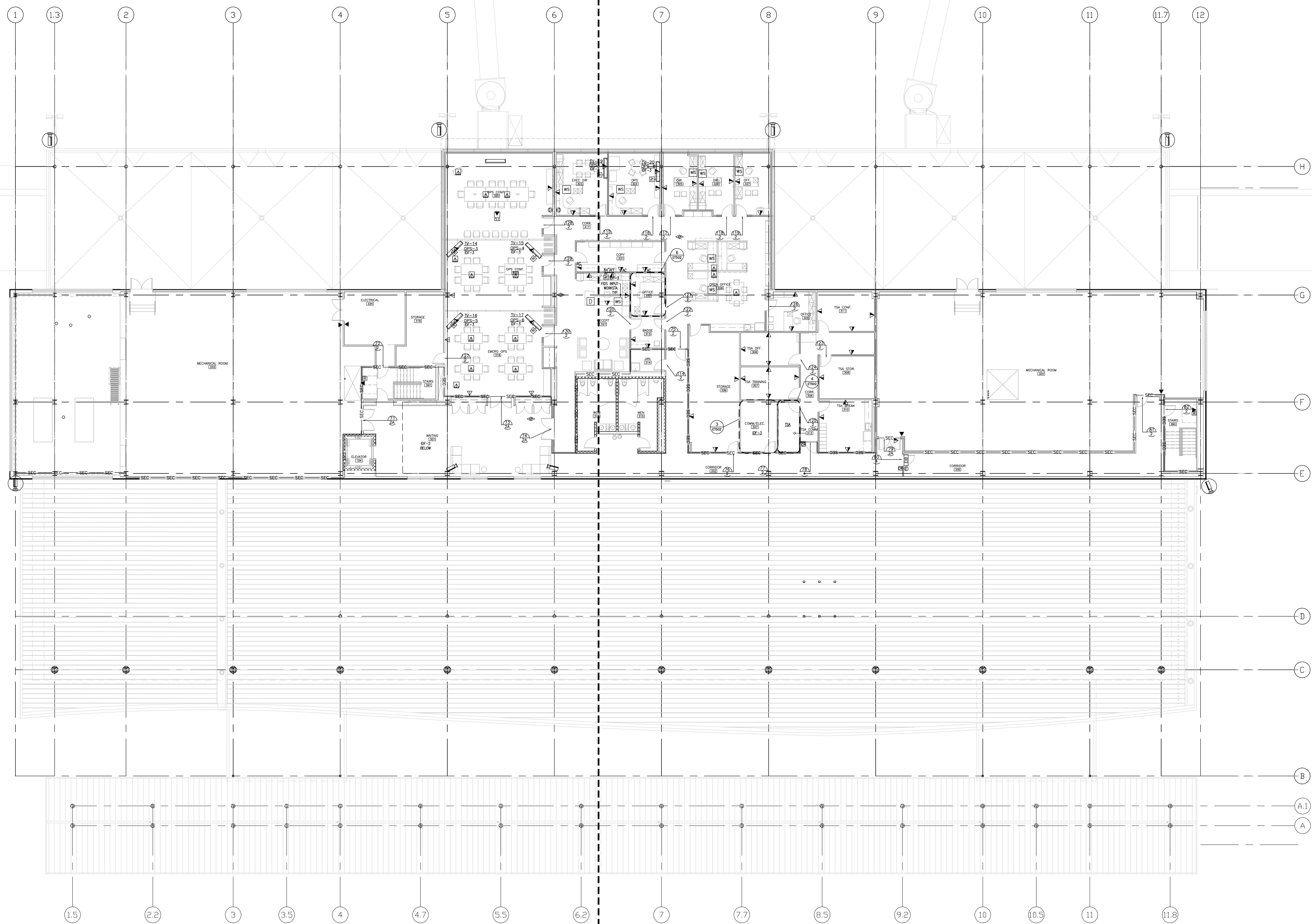
QUESTIONS

SHEET NUMBER

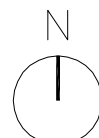
5540

E1403

BID PACKAGE 2C

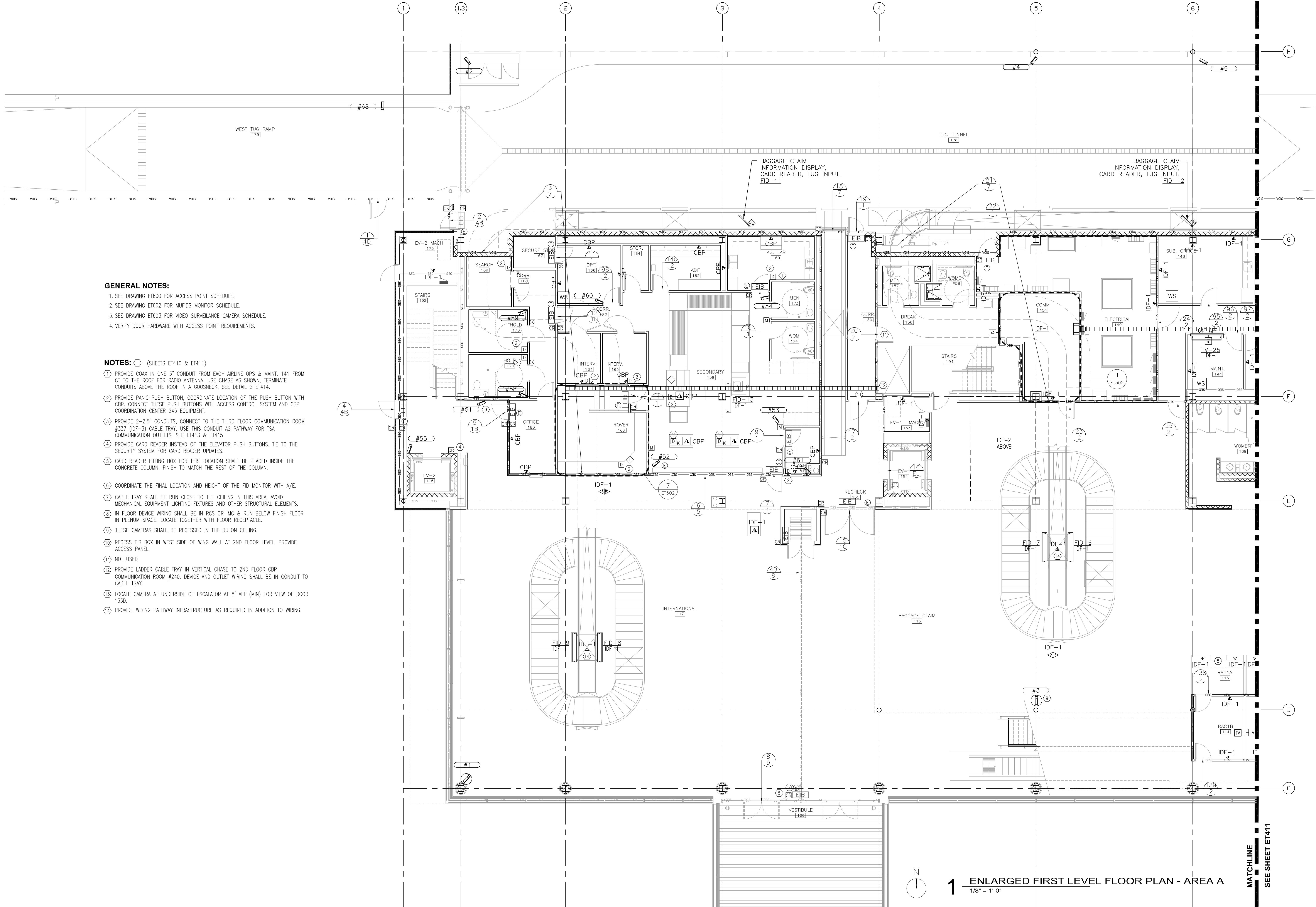


SEE SHEET ET414
SEE SHEET ET415



3 THIRD LEVEL FLOOR PLAN

WARNING: THIS RECORD CONTAINS SENSITIVE SECURITY INFORMATION THAT IS CONTROLLED UNDER 49 CFR PARTS 15 AND 1520. NO PART OF THIS RECORD MAY BE DISCLOSED TO PERSONS WITHOUT A "NEED TO KNOW", AS DEFINED IN 49 CFR PARTS 15 AND 1520, EXCEPT WITH THE WRITTEN PERMISSION OF THE ADMINISTRATOR OF THE TRANSPORTATION SECURITY ADMINISTRATION OR THE SECRETARY OF TRANSPORTATION. UNAUTHORIZED RELEASE MAY RESULT IN CIVIL PENALTY OR OTHER ACTION. FOR U.S. GOVERNMENT AGENCIES, PUBLIC DISCLOSURE IS GOVERNED BY 5 U.S.C. 552 AND 49 CFR PARTS 15 AND 1520.



GENERAL NOTES:

1. SEE DRAWING ET600 FOR ACCESS POINT SCHEDULE.
2. SEE DRAWING ET602 FOR MUFIDS MONITOR SCHEDULE.
3. SEE DRAWING ET603 FOR VIDEO SURVEILLANCE CAMERA SCHEDULE.
4. VERIFY DOOR HARDWARE WITH ACCESS POINT REQUIREMENTS.

NOTES: ○ (SHEETS ET410 & ET411)

1. PROVIDE COAX IN ONE 3" CONDUIT FROM EACH AIRLINE OPS & MAINT. 141 FROM CT TO THE ROOF FOR RADIO ANTENNA. USE CHASE AS SHOWN, TERMINATE CONDUITS ABOVE THE ROOF IN A GOOSNECK. SEE DETAIL 2 ET414.
2. PROVIDE PANIC PUSH BUTTON, COORDINATE LOCATION OF THE PUSH BUTTON WITH CBP. CONNECT THESE PUSH BUTTONS WITH ACCESS CONTROL SYSTEM AND CBP COORDINATION CENTER 245 EQUIPMENT.
3. PROVIDE 2-2.5" CONDUITS, CONNECT TO THE THIRD FLOOR COMMUNICATION ROOM #337 (IDF-3) CABLE TRAY. USE THIS CONDUIT AS PATHWAY FOR TSA COMMUNICATION OUTLETS. SEE ET413 & ET415
4. PROVIDE CARD READER INSTEAD OF THE ELEVATOR PUSH BUTTONS. TIE TO THE SECURITY SYSTEM FOR CARD READER UPDATES.
5. CARD READER FITTING BOX FOR THIS LOCATION SHALL BE PLACED INSIDE THE CONCRETE COLUMN. FINISH TO MATCH THE REST OF THE COLUMN.
6. COORDINATE THE FINAL LOCATION AND HEIGHT OF THE FID MONITOR WITH A/E.
7. CABLE TRAY SHALL BE RUN CLOSE TO THE CEILING IN THIS AREA, AVOID MECHANICAL EQUIPMENT LIGHTING FIXTURES AND OTHER STRUCTURAL ELEMENTS.
8. IN FLOOR DEVICE WIRING SHALL BE IN RGS OR IMC & RUN BELOW FINISH FLOOR IN PLENUM SPACE. LOCATE TOGETHER WITH FLOOR RECEPTACLE.
9. THESE CAMERAS SHALL BE RECESSED IN THE RULON CEILING.
10. RECESS EIB BOX IN WEST SIDE OF WING WALL AT 2ND FLOOR LEVEL. PROVIDE ACCESS PANEL.
11. NOT USED
12. PROVIDE LADDER CABLE TRAY IN VERTICAL CHASE TO 2ND FLOOR CBP COMMUNICATION ROOM #240. DEVICE AND OUTLET WIRING SHALL BE IN CONDUIT TO CABLE TRAY.
13. LOCATE CAMERA AT UNDERSIDE OF ESCALATOR AT 8' AFF (MIN) FOR VIEW OF DOOR 133D.
14. PROVIDE WIRING PATHWAY INFRASTRUCTURE AS REQUIRED IN ADDITION TO WIRING.

WARNING: THIS RECORD CONTAINS SENSITIVE SECURITY INFORMATION THAT IS CONTROLLED UNDER 49 CFR PARTS 15 AND 1520. NO PART OF THIS RECORD MAY BE DISCLOSED TO PERSONS WITHOUT A "NEED TO KNOW", AS DEFINED IN 49 CFR PARTS 15 AND 1520, EXCEPT WITH THE WRITTEN PERMISSION OF THE ADMINISTRATOR OF THE TRANSPORTATION SECURITY ADMINISTRATION OR THE SECRETARY OF TRANSPORTATION. UNAUTHORIZED RELEASE MAY RESULT IN CIVIL PENALTY OR OTHER ACTION. FOR U.S. GOVERNMENT AGENCIES, PUBLIC DISCLOSURE IS GOVERNED BY 5 U.S.C. 552 AND 49 CFR PARTS 15 AND 1520.

RS&H
IMPROVING YOUR WORLD

Reynolds, Smith and Hills, Inc.
4525 Airport Approach Rd, Ste A
Duluth, Minnesota 55811
218-722-1227 Fax: 218-722-1052
www.rsandh.com

**DULUTH AIRPORT
AUTHORITY**

**DULUTH
INTERNATIONAL
AIRPORT
DULUTH, MN**

**NEW PASSENGER
TERMINAL**

CONSULTANTS

Interior Architects:
SJA ARCHITECTS
11 E Superior Street Suite 340, Duluth MN 55802
TEL: (218) 724-8578 / FAX: (218) 722-8717

Structural Engineers:
MBJ CONSULTING ENG.
501 Lake Avenue South, Suite 300, Duluth MN 55802
TEL: (218) 722-1056 / FAX: (218) 722-8306

M/E/P/F/P 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) 591-5079

REVISIONS

NO.	DESCRIPTION	DATE
1000	REVIEW	12.15.10
	BID PACKAGE 2A	01.24.11
1	BP2A ADDENDUM 2	02.25.11
	BP2A CONFORMANCE SET	05.02.11
	BID PACKAGE 2B REVIEW	07.16.11
	BID PACKAGE 2B	08.23.11
	BP2B CONFORMANCE	10.21.11
2	BP2A RFP-179	11.21.11

DATE ISSUED: 02-10-12
REVIEWED BY: BA
DRAWN BY: RJL
DESIGNED BY: BA

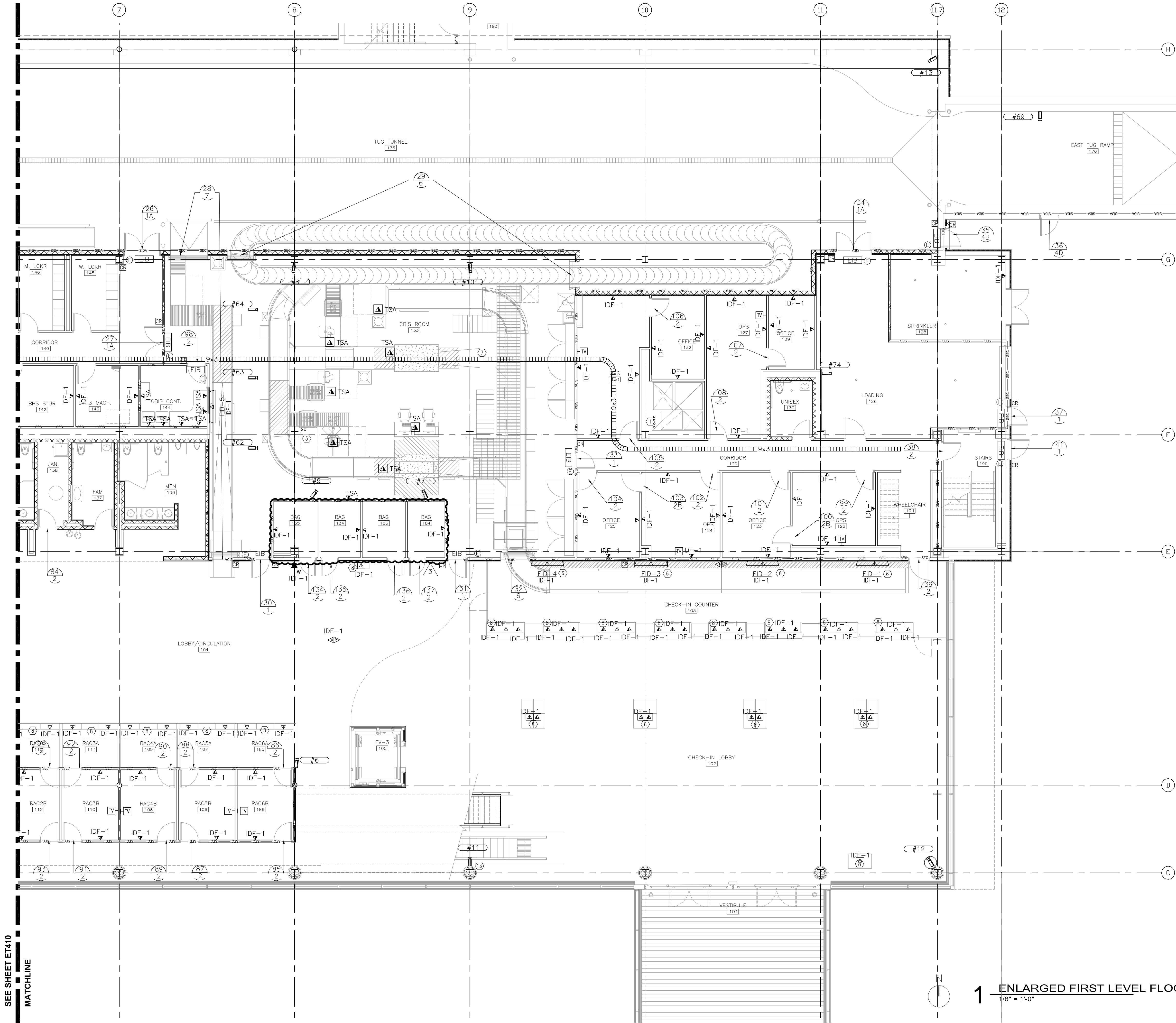
AEP PROJECT NUMBER
213-1882-091
© 2010 REYNOLDS, SMITH AND HILLS INC.

SHEET TITLE
**TECHNOLOGY
FIRST FLOOR
PLAN
AREA A**

SHEET NUMBER

ET410

BID PACKAGE 2C



SEE SHEET ET410
MATCHLINE

WARNING: THIS RECORD CONTAINS SENSITIVE SECURITY INFORMATION THAT IS CONTROLLED UNDER 49 CFR PARTS 15 AND 1520. NO PART OF THIS RECORD MAY BE DISCLOSED TO PERSONS WITHOUT A "NEED TO KNOW", AS DEFINED IN 49 CFR PARTS 15 AND 1520, EXCEPT WITH THE WRITTEN PERMISSION OF THE ADMINISTRATOR OF THE TRANSPORTATION SECURITY ADMINISTRATION OR THE SECRETARY OF TRANSPORTATION. UNAUTHORIZED RELEASE MAY RESULT IN CIVIL PENALTY OR OTHER ACTION. FOR U.S. GOVERNMENT AGENCIES, PUBLIC DISCLOSURE IS GOVERNED BY 5 U.S.C. 552 AND 49 CFR PARTS 15 AND 1520.

GENERAL NOTES:

1. SEE DRAWING ET600 FOR ACCESS POINT SCHEDULE.
2. SEE DRAWING ET602 FOR MUFIDS MONITOR SCHEDULE.
3. SEE DRAWING ET603 FOR VIDEO SURVEILLANCE CAMERA SCHEDULE.
4. VERIFY DOOR HARDWARE WITH ACCESS POINT REQUIREMENTS.

NOTES: (SHEETS ET410 & ET411)

1. PROVIDE COAX IN ONE 3" CONDUIT FROM EACH AIRLINE OPS & MAINT. 141 FROM CT TO THE ROOF FOR RADIO ANTENNA. USE CHASE AS SHOWN. TERMINATE CONDUITS ABOVE THE ROOF IN A GOOSENECK. SEE DETAIL 2 ET414.
2. PROVIDE PANIC PUSH BUTTON. COORDINATE LOCATION OF THE PUSH BUTTON WITH CBP. CONNECT THESE PUSH BUTTONS WITH ACCESS CONTROL SYSTEM AND CBP COORDINATION CENTER 245 EQUIPMENT.
3. PROVIDE 2-2.5" CONDUITS, CONNECT TO THE THIRD FLOOR COMMUNICATION ROOM #337 (IDF-3) CABLE TRAY. USE THIS CONDUIT AS PATHWAY FOR TSA COMMUNICATION OUTLETS. SEE ET413 & ET415
4. PROVIDE CARD READER INSTEAD OF THE ELEVATOR PUSH BUTTONS. TIE TO THE SECURITY SYSTEM FOR CARD READER UPDATES.
5. CARD READER FITTING BOX FOR THIS LOCATION SHALL BE PLACED INSIDE THE CONCRETE COLUMN. FINISH TO MATCH THE REST OF THE COLUMN.
6. COORDINATE THE FINAL LOCATION AND HEIGHT OF THE FID MONITOR WITH A/E.
7. CABLE TRAY SHALL BE RUN CLOSE TO THE CEILING IN THIS AREA, AVOID MECHANICAL EQUIPMENT LIGHTING FIXTURES AND OTHER STRUCTURAL ELEMENTS.
8. IN FLOOR DEVICE WIRING SHALL BE IN RGS OR IMC & RUN BELOW FINISH FLOOR IN PLENUM SPACE. LOCATE TOGETHER WITH FLOOR RECEPTACLE.
9. THESE CAMERAS SHALL BE RECESSED IN THE RULON CEILING.
10. RECESS EIB BOX IN WEST SIDE OF WING WALL AT 2ND FLOOR LEVEL. PROVIDE ACCESS PANEL.
11. NOT USED
12. PROVIDE LADDER CABLE TRAY IN VERTICAL CHASE TO 2ND FLOOR CBP COMMUNICATION ROOM #240. DEVICE AND OUTLET WIRING SHALL BE IN CONDUIT TO CABLE TRAY.
13. LOCATE CAMERA AT UNDERSIDE OF ESCALATOR AT 8' AFF (MIN) FOR VIEW OF DOOR 1330
14. PROVIDE WIRING PATHWAY INFRASTRUCTURE AS REQUIRED IN ADDITION TO WIRING.

1 ENLARGED FIRST LEVEL FLOOR PLAN - AREA B
1/8" = 1'-0"

RS&H
IMPROVING YOUR WORLD

Reynolds, Smith and Hills, Inc.
4525 Airport Approach Rd, Ste A
Duluth, Minnesota 55811
218-722-1227 Fax: 218-722-1052
www.rsandh.com

**DULUTH AIRPORT
AUTHORITY**

**DULUTH
INTERNATIONAL
AIRPORT
DULUTH, MN**

**NEW PASSENGER
TERMINAL**

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) 722-8306

M/E/P/F 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) 591-5079

REVISIONS

NO.	DESCRIPTION	DATE
	100% REVIEW	12.15.10
	BID PACKAGE 2A	01.24.11
1	BP2A ADDENDUM 2	02.25.11
	BP2A CONFORMANCE SET	05.02.11
	BID PACKAGE 2B REVIEW	07.16.11
	BID PACKAGE 2B	08.23.11
	BP2B CONFORMANCE	10.21.11
2	BP2A RFP-179	11.21.11

DATE ISSUED: 02-10-12

REVIEWED BY: BA

DRAWN BY: RJL

DESIGNED BY: BA

AEP PROJECT NUMBER
213-1882-091

© 2010 REYNOLDS, SMITH AND HILLS INC.

SHEET TITLE
**TECHNOLOGY
FIRST FLOOR
PLAN
AREA B**

SHEET NUMBER

ET411

BID PACKAGE 2C

REVISIONS		
NO.	DESCRIPTION	DATE
1002	REVIEW	12.15.10
	BID PACKAGE 2A	01.24.11
1	BP2A ADDENDUM 2	02.25.11
	BP2A CONFORMANCE SET	05.02.11
	BID PACKAGE 2B REVIEW	07.16.11
	BID PACKAGE 2B	08.23.11
	BP2B CONFORMANCE	10.21.11
2	BP2A RFP-179	11.21.11

DATE ISSUED: 02-10-12
REVIEWED BY: BA
DRAWN BY: RJL
DESIGNED BY: BA

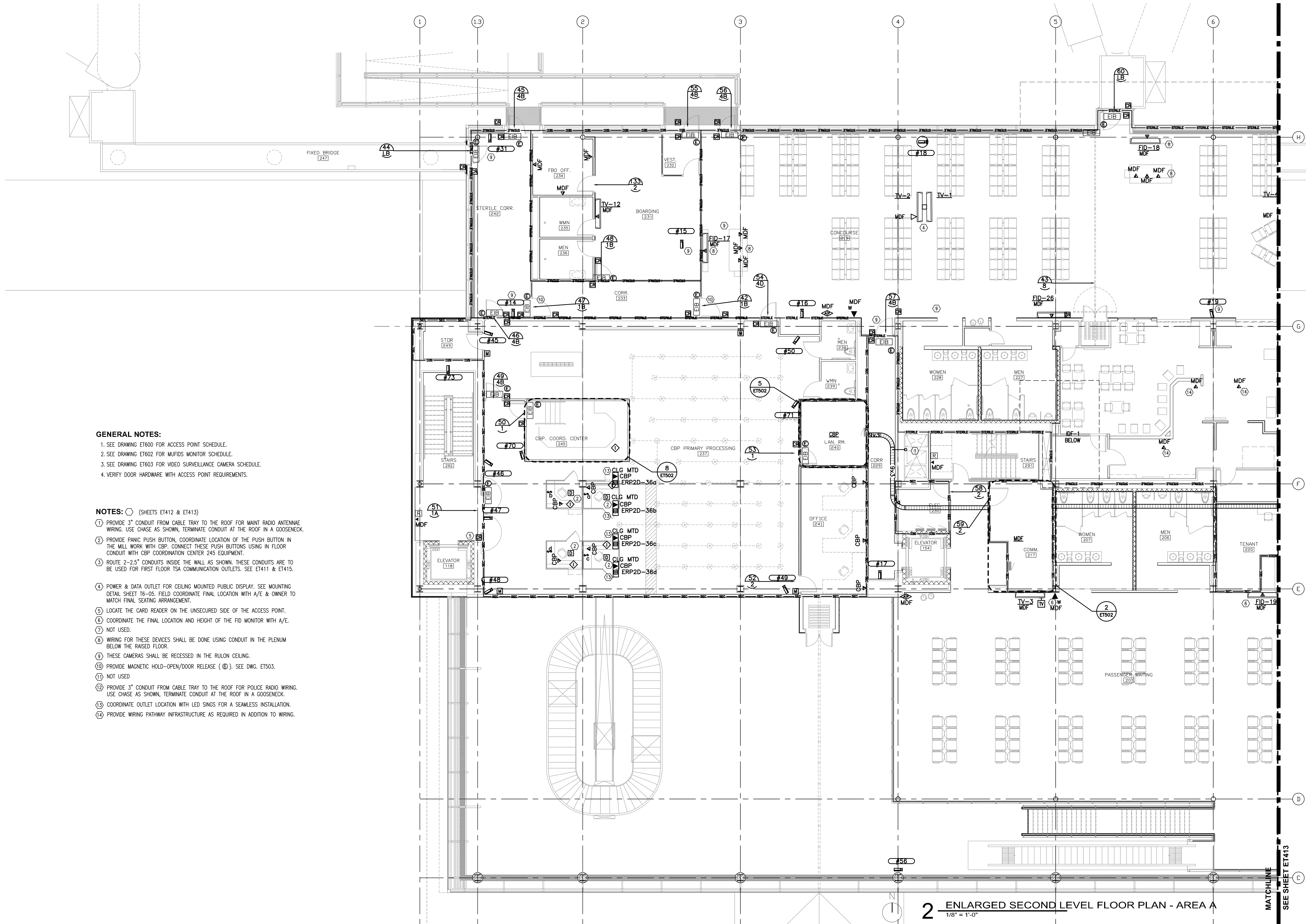
A&P PROJECT NUMBER
213-1882-001
© 2010 REYNOLDS, SMITH AND HILLS INC.

SHEET TITLE
**TECHNOLOGY
SECOND FLOOR
PLAN
AREA A**

SHEET NUMBER

ET412

BID PACKAGE 2C



GENERAL NOTES:

1. SEE DRAWING ET600 FOR ACCESS POINT SCHEDULE.
2. SEE DRAWING ET602 FOR MUFIDS MONITOR SCHEDULE.
3. SEE DRAWING ET603 FOR VIDEO SURVEILLANCE CAMERA SCHEDULE.
4. VERIFY DOOR HARDWARE WITH ACCESS POINT REQUIREMENTS.

NOTES: (SHEETS ET412 & ET413)

- 1 PROVIDE 3" CONDUIT FROM CABLE TRAY TO THE ROOF FOR MAINT RADIO ANTENNAE WIRING. USE CHASE AS SHOWN, TERMINATE CONDUIT AT THE ROOF IN A GOOSENECK.
- 2 PROVIDE PANIC PUSH BUTTON, COORDINATE LOCATION OF THE PUSH BUTTON IN THE MILL WORK WITH CBP. CONNECT THESE PUSH BUTTONS USING IN FLOOR CONDUIT WITH CBP COORDINATION CENTER 245 EQUIPMENT.
- 3 ROUTE 2-2.5" CONDUITS INSIDE THE WALL AS SHOWN. THESE CONDUITS ARE TO BE USED FOR FIRST FLOOR TSA COMMUNICATION OUTLETS. SEE ET411 & ET415.
- 4 POWER & DATA OUTLET FOR CEILING MOUNTED PUBLIC DISPLAY. SEE MOUNTING DETAIL SHEET T6-05. FIELD COORDINATE FINAL LOCATION WITH A/E & OWNER TO MATCH FINAL SEATING ARRANGEMENT.
- 5 LOCATE THE CARD READER ON THE UNSECURED SIDE OF THE ACCESS POINT.
- 6 COORDINATE THE FINAL LOCATION AND HEIGHT OF THE FID MONITOR WITH A/E.
- 7 NOT USED.
- 8 WIRING FOR THESE DEVICES SHALL BE DONE USING CONDUIT IN THE PLENUM BELOW THE RAISED FLOOR.
- 9 THESE CAMERAS SHALL BE RECESSED IN THE RULON CEILING.
- 10 PROVIDE MAGNETIC HOLD-OPEN/DOOR RELEASE (Ⓢ). SEE DWG. ET503.
- 11 NOT USED.
- 12 PROVIDE 3" CONDUIT FROM CABLE TRAY TO THE ROOF FOR POLICE RADIO WIRING. USE CHASE AS SHOWN, TERMINATE CONDUIT AT THE ROOF IN A GOOSENECK.
- 13 COORDINATE OUTLET LOCATION WITH LED SINGS FOR A SEAMLESS INSTALLATION.
- 14 PROVIDE WIRING PATHWAY INFRASTRUCTURE AS REQUIRED IN ADDITION TO WIRING.

WARNING: THIS RECORD CONTAINS SENSITIVE SECURITY INFORMATION THAT IS CONTROLLED UNDER 49 CFR PARTS 15 AND 1520. NO PART OF THIS RECORD MAY BE DISCLOSED TO PERSONS WITHOUT A "NEED TO KNOW", AS DEFINED IN 49 CFR PARTS 15 AND 1520, EXCEPT WITH THE WRITTEN PERMISSION OF THE ADMINISTRATOR OF THE TRANSPORTATION SECURITY ADMINISTRATION OR THE SECRETARY OF TRANSPORTATION. UNAUTHORIZED RELEASE MAY RESULT IN CIVIL PENALTY OR OTHER ACTION. FOR U.S. GOVERNMENT AGENCIES, PUBLIC DISCLOSURE IS GOVERNED BY 5 U.S.C. 552 AND 49 CFR PARTS 15 AND 1520.

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) 722-8306

MEP/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) 591-5079

GENERAL NOTES:

1. SEE DRAWING ET600 FOR ACCESS POINT SCHEDULE.
2. SEE DRAWING ET602 FOR MUFIDS MONITOR SCHEDULE.
3. SEE DRAWING ET603 FOR VIDEO SURVEILLANCE CAMERA SCHEDULE.
4. VERIFY DOOR HARDWARE WITH ACCESS POINT REQUIREMENTS.

NOTES: (SHEETS ET412 & ET413)

1. PROVIDE 3" CONDUIT FROM CABLE TRAY TO THE ROOF FOR MAINT RADIO ANTENNAE WIRING. USE CHASE AS SHOWN, TERMINATE CONDUIT AT THE ROOF IN A GOOSENECK.
2. PROVIDE PANIC PUSH BUTTON, COORDINATE LOCATION OF THE PUSH BUTTON IN THE MILL WORK WITH CBP. CONNECT THESE PUSH BUTTONS USING IN FLOOR CONDUIT WITH CBP COORDINATION CENTER 245 EQUIPMENT.
3. ROUTE 2-2.5" CONDUITS INSIDE THE WALL AS SHOWN. THESE CONDUITS ARE TO BE USED FOR FIRST FLOOR TSA COMMUNICATION OUTLETS. SEE ET411 & ET415.
4. POWER & DATA OUTLET FOR CEILING MOUNTED PUBLIC DISPLAY. SEE MOUNTING DETAIL SHEET T6-05. FIELD COORDINATE FINAL LOCATION WITH A/E & OWNER TO MATCH FINAL SEATING ARRANGEMENT.
5. LOCATE THE CARD READER ON THE UNSECURED SIDE OF THE ACCESS POINT.
6. COORDINATE THE FINAL LOCATION AND HEIGHT OF THE FID MONITOR WITH A/E.
7. NOT USED.
8. WIRING FOR THESE DEVICES SHALL BE DONE USING CONDUIT IN THE PLENUM BELOW THE RAISED FLOOR.
9. THESE CAMERAS SHALL BE RECESSED IN THE RULON CEILING.
10. PROVIDE MAGNETIC HOLD-OPEN/DOOR RELEASE (Ⓢ). SEE DWG. ET503.
11. NOT USED.
12. PROVIDE 3" CONDUIT FROM CABLE TRAY TO THE ROOF FOR POLICE RADIO WIRING. USE CHASE AS SHOWN, TERMINATE CONDUIT AT THE ROOF IN A GOOSENECK.
13. COORDINATE OUTLET LOCATION WITH LED SINGS FOR A SEAMLESS INSTALLATION.
14. PROVIDE WIRING PATHWAY INFRASTRUCTURE AS REQUIRED IN ADDITION TO WIRING.

REVISIONS

NO.	DESCRIPTION	DATE
1000	REVIEW	12.15.10
	BID PACKAGE 2A	01.24.11
1	BP2A ADDENDUM 2	02.25.11
	BP2A CONFORMANCE SET	05.02.11
	BID PACKAGE 2B REVIEW	07.16.11
	BID PACKAGE 2B	08.23.11
	BP2B CONFORMANCE	10.21.11
2	BP2A RFP-179	11.21.11

DATE ISSUED: 02-10-12

REVIEWED BY: BA

DRAWN BY: RJL

DESIGNED BY: BA

AEP PROJECT NUMBER

213-1882-091

© 2010 REYNOLDS, SMITH AND HILLS INC.

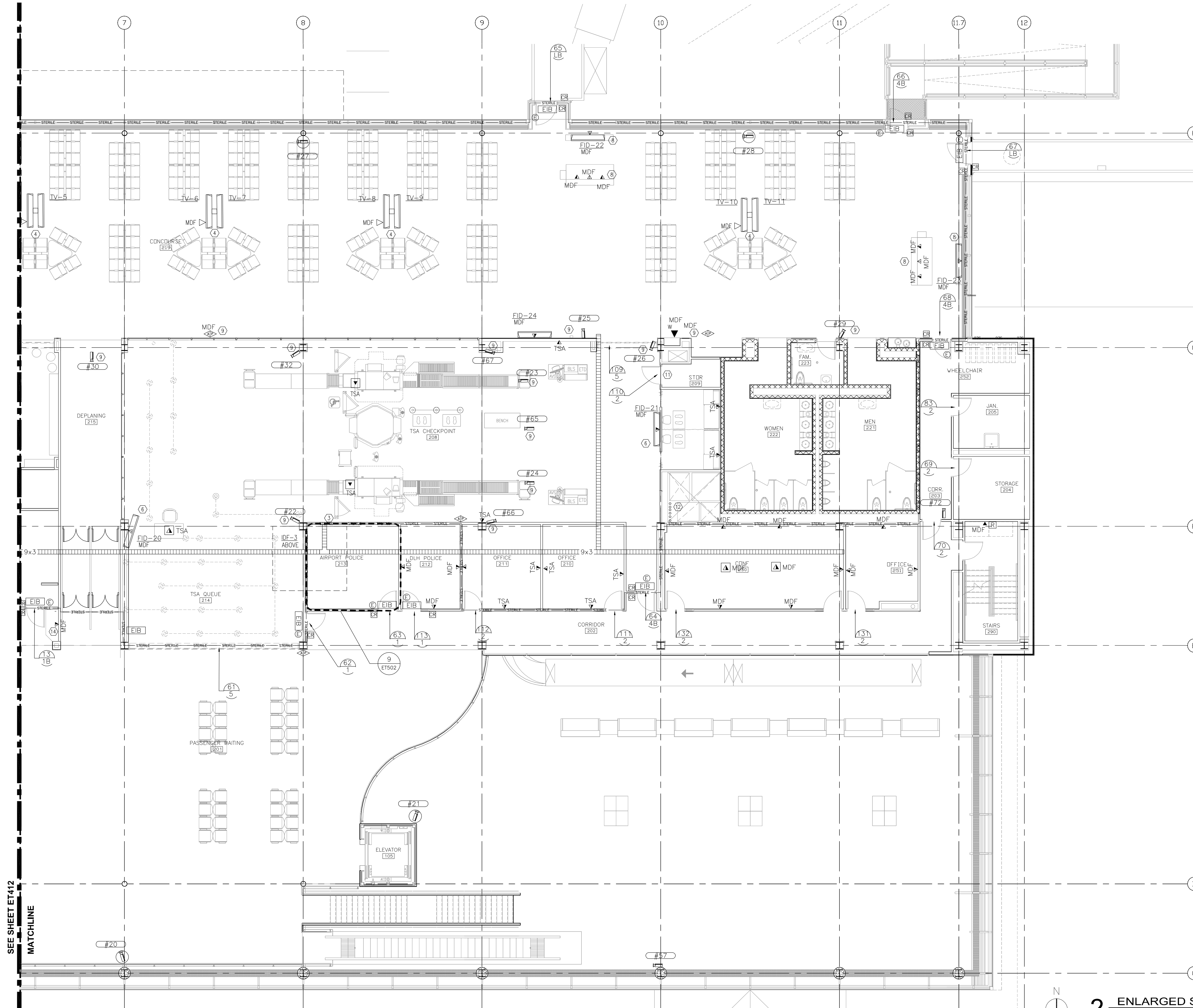
SHEET TITLE

**TECHNOLOGY
SECOND FLOOR
PLAN
AREA B**

SHEET NUMBER

ET413

BID PACKAGE 2C



2 ENLARGED SECOND LEVEL FLOOR PLAN - AREA B
1/8" = 1'-0"

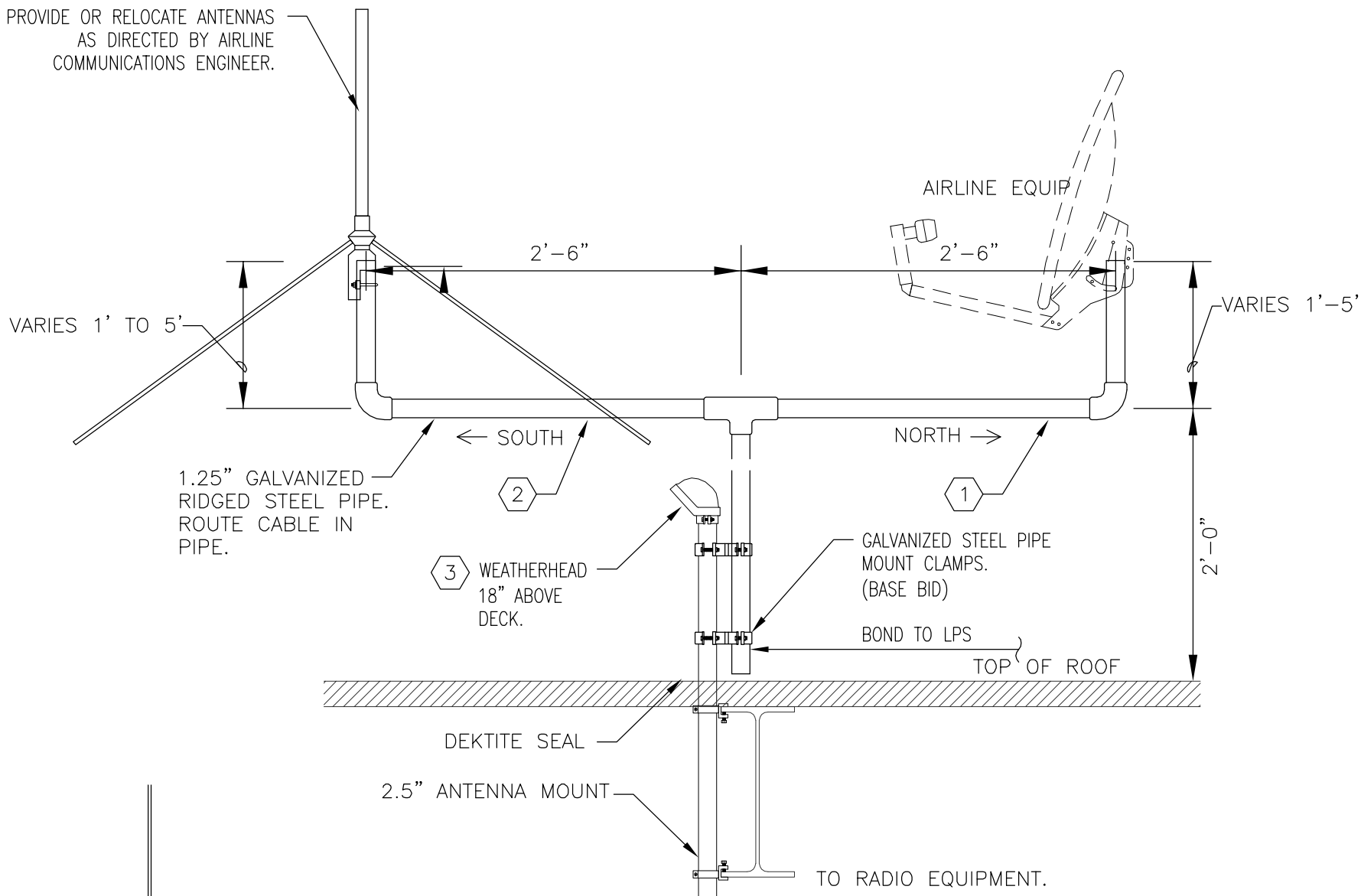
WARNING: THIS RECORD CONTAINS SENSITIVE SECURITY INFORMATION THAT IS CONTROLLED UNDER 49 CFR PARTS 15 AND 1520. NO PART OF THIS RECORD MAY BE DISCLOSED TO PERSONS WITHOUT A "NEED TO KNOW", AS DEFINED IN 49 CFR PARTS 15 AND 1520, EXCEPT WITH THE WRITTEN PERMISSION OF THE ADMINISTRATOR OF THE TRANSPORTATION SECURITY ADMINISTRATION OR THE SECRETARY OF TRANSPORTATION. UNAUTHORIZED RELEASE MAY RESULT IN CIVIL PENALTY OR OTHER ACTION. FOR U.S. GOVERNMENT AGENCIES, PUBLIC DISCLOSURE IS GOVERNED BY 5 U.S.C. 552 AND 49 CFR PARTS 15 AND 1520.

GENERAL NOTES:

1. SEE DRAWING ET600 FOR ACCESS POINT SCHEDULE.
2. SEE DRAWING ET602 FOR MUFIDS MONITOR SCHEDULE.
3. SEE DRAWING ET603 FOR VIDEO SURVEILLANCE CAMERA SCHEDULE.
4. VERIFY DOOR HARDWARE WITH ACCESS POINT REQUIREMENTS.

NOTES:

- (SHEETS ET414 & ET415)
1. SEE DRAWINGS ET411 & ET412
 2. PROVIDE A PUSH BUTTON AND THE WIRING REQUIRED FOR THE RECEPTIONIST TO BUZZ PEOPLE IN DURING WORKING HOURS.
 3. PROVIDE 1-3" CONDUIT INSIDE THE COLUMN, CONNECT TO THE SECOND FLOOR CABLE TRAY AS SHOWN. THIS CONDUIT IS TO BE USED AS WIREWAY FOR TSA COMMUNICATION OUTLETS. SEE ET413
 4. POWER & DATA OUTLET FOR CEILING MOUNTED OPS-1 TO OPS-6 ARE TO BE PLACED ABOVE CEILING. PROVIDE PEERLESS MOUNT #PLOW-UNI. AND ALL REQUIRED HARDWARE FOR A COMPLETE INSTALLATION. ROUTE THE WIRING INSIDE THE COLUMN. PENETRATE THE CEILING TILE IN THE CENTER.
 5. PROVIDE LMR-400DB 50 OHM FLEXIBLE LOW LOSS WATERTIGHT COAXIAL CABLE TO ROOFTOP ANTENNA VIA ANTENNA CONDUIT ROOF PENETRATION. SEE A104 TERMINATE W/N CONNECTOR MONT AND CONNECT VHF ANTENNA ANDREN #DB224FAA PER DETAIL 2 ET414.
 6. PROVIDE 2-2.5" CONDUITS, CONNECT TO THE FIRST FLOOR JUNCTION BOX. THIS CONDUIT IS TO BE USED AS WIREWAY FOR TSA COMMUNICATION OUTLETS. SEE ET413 & ET411
 7. PROVIDE CEILING MOUNTED COMMERCIAL GRADE FULL HD PROJECTOR. COORDINATE EXACT LOCATION WITH OWNER. CEILING COMMUNICATION OUTLET TO BE LOCATED NEXT TO THE PROJECTOR.
 8. PROVIDE DUAL CONNECTION TO IDF-3.
 9. 55" LED TV, 1920X1080 NATIVE RESOLUTION, ETHERNET CONTROL, PIP, SCHEDULING, TILE MATRIX W/ THIN BEZEL (0.65" OR LESS) AND CABLE COVER. MONITOR SHALL BE LG 55LE530C OR APPROVED EQUAL. CONNECT TO NETWORK SWITCH.



ANTENNA NOTES

1. CONTRACTOR SHALL COORDINATE RADIO SCOPE OF WORK WITH EACH AIRLINE. CONTRACTOR SHALL NOTIFY AIRLINE OF WORK SCHEDULE.
2. CONTRACTOR SHALL WORK CLOSELY WITH AIRLINE RADIO TECHNICIAN. TECHNICIAN MAY WISH TO BE PRESENT DURING FINAL INSTALLATION. CONTRACTOR SHALL ACQUIRE AIRLINE APPROVAL OF ANTENNA INSTALLATION.
3. ANTENNAS # A3, A4, A5, A6 ARE FOR AIRLINE USE. PROVIDE FOR COAX FOR TWO ANTENNAS, UHF (GROUND TO GROUND) AND VHF (AIR TO GROUND). PROVIDE CONDUIT ROUGH IN FOR ALL OTHER ANTENNA LOCATIONS.
4. CONTRACTOR SHALL PROVIDE ENGRAVED LABEL AT EACH ANTENNA. LABEL SHALL INDICATE AIRLINE, FREQUENCY AND OWNER CONTACT INFORMATION.
5. ALL OUTDOOR COMPONENTS SHALL BE WEATHERPROOF. PROVIDE DEKITE DIVERTER FLASHING SYSTEM FOR ALL PIPE PENETRATIONS (SEE <http://www.itwbuildex.com/dekrite.htm>).
6. EQUIPMENT LIST DIAGRAMIC AND TO BE VERIFIED WITH AIRLINE / AND OR AIRPORT BEFORE INSTALLATION. ASSUME 8 RADIO ROOMS, AND 2 ADDITIONAL ROOF ANTENNA LOCATIONS.

ANTENNA NOTES:

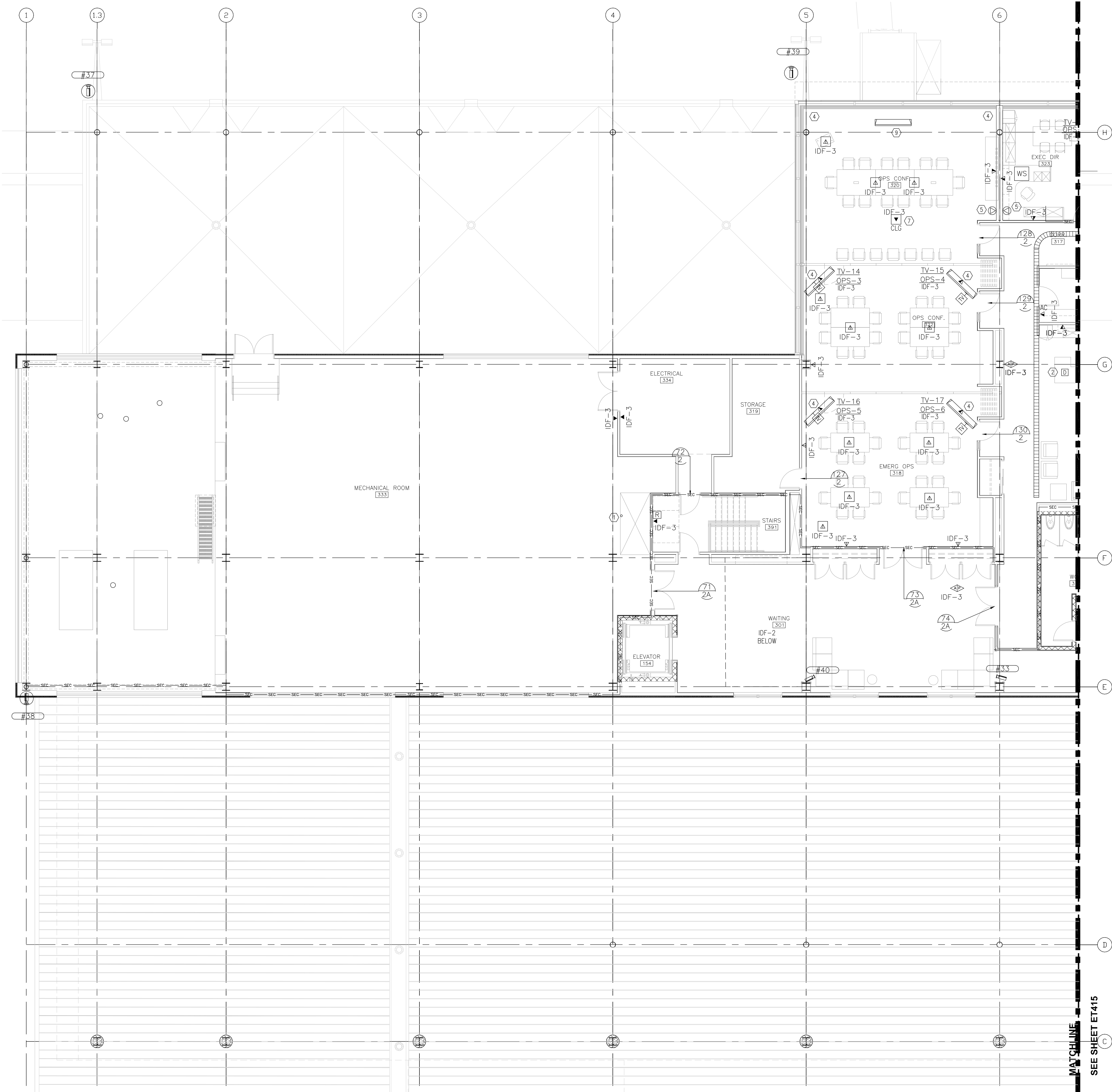
1. PROVIDE (2) LMR-300-75 OHM FLEXIBLE LOW LOSS COAXIAL CABLE TO AIRLINE COMM TTB BACKBOARD. PROVIDE 4' SLACK IN 1' COIL AT BOTH ENDS. TERMINATE WITH WEATHERPROOF "F" MALE CONNECTORS.
2. PROVIDE (1) LMR-600 50 OHM FLEXIBLE LOW LOSS COAXIAL CABLE. PROVIDE 10' SLACK AT AIRLINE RADIO LOCATION. TERMINATE WITH WEATHERPROOF "N" MALE CONNECTORS.
3. PROVIDE AN ADDITIONAL 4' SLACK IN A 1' COIL FOR ALL CABLES AT WEATHER HEAD FOR FUTURE MODIFICATIONS TO CABLES.
4. PROVIDE 1/4" x 1" x 12" GROUND BAR 12" BELOW CEILING. GROUND BAR SHALL BE HARGER GB141112E OR EQUAL. PROVIDE #2 GROUND CONDUCTOR TO SYSTEM GROUND. FOR EACH ANTENNA CABLE, PROVIDE A GAS TUBE SURGE PROTECTOR WITH MOUNTING BRACKET, N-FEMALE CONNECTORS, SURGE PROTECTOR SHALL BE POLYPHASED RGT OR EQUAL.

2 TYPICAL ANTENNA

ET414

SCALE: NOT TO SCALE

WARNING: THIS RECORD CONTAINS SENSITIVE SECURITY INFORMATION THAT IS CONTROLLED UNDER 49 CFR PARTS 15 AND 1520. NO PART OF THIS RECORD MAY BE DISCLOSED TO PERSONS WITHOUT A "NEED TO KNOW", AS DEFINED IN 49 CFR PARTS 15 AND 1520, EXCEPT WITH THE WRITTEN PERMISSION OF THE ADMINISTRATOR OF THE TRANSPORTATION SECURITY ADMINISTRATION OR THE SECRETARY OF TRANSPORTATION. UNAUTHORIZED RELEASE MAY RESULT IN CIVIL PENALTY OR OTHER ACTION. FOR U.S. GOVERNMENT AGENCIES, PUBLIC DISCLOSURE IS GOVERNED BY 5 U.S.C. 552 AND 49 CFR PARTS 15 AND 1520.



3 ENLARGED THIRD LEVEL FLOOR PLAN - AREA A

1/8" = 1'-0"

RS&H
IMPROVING YOUR WORLD

Reynolds, Smith and Hills, Inc.
4525 Airport Approach Rd, Ste A
Duluth, Minnesota 55811
218-722-1227 Fax: 218-722-1062
www.rsandh.com

**DULUTH AIRPORT
AUTHORITY**

**DULUTH
INTERNATIONAL
AIRPORT
DULUTH, MN**

**NEW PASSENGER
TERMINAL**

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) 722-8306

ME/P-F/P 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

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

REVISIONS

NO.	DESCRIPTION	DATE
1000	REVIEW	12.15.10
	BID PACKAGE 2A	01.24.11
1	BP2A ADDENDUM 2	02.25.11
	BP2A CONFORMANCE SET	05.02.11
	BID PACKAGE 2B REVIEW	07.16.11
	BID PACKAGE 2B	08.23.11
	BP2B CONFORMANCE	10.21.11
2	BP2A RFP-179	11.21.11

DATE ISSUED: 02-10-12
REVIEWED BY: BA
DRAWN BY: RJL
DESIGNED BY: BA

AEP PROJECT NUMBER
213-1882-091
© 2010 REYNOLDS, SMITH AND HILLS INC.

SHEET TITLE
**TECHNOLOGY
THIRD FLOOR
PLAN
AREA A**

SHEET NUMBER

ET414

BID PACKAGE 2C



- GENERAL NOTES:**
1. SEE DRAWING ET600 FOR ACCESS POINT SCHEDULE.
 2. SEE DRAWING ET602 FOR MUFIDS MONITOR SCHEDULE.
 3. SEE DRAWING ET603 FOR VIDEO SURVEILLANCE CAMERA SCHEDULE.
 4. VERIFY DOOR HARDWARE WITH ACCESS POINT REQUIREMENTS.
- NOTES:** (SHEETS ET414 & ET415)
1. SEE DRAWINGS ET411 & ET412
 2. PROVIDE A PUSH BUTTON AND THE WIRING REQUIRED FOR THE RECEPTIONIST TO BUZZ PEOPLE IN DURING WORKING HOURS.
 3. PROVIDE 1-3" CONDUIT INSIDE THE COLUMN, CONNECT TO THE SECOND FLOOR CABLE TRAY AS SHOWN. THIS CONDUIT IS TO BE USED AS WIREWAY FOR TSA COMMUNICATION OUTLETS. SEE ET413
 4. POWER & DATA OUTLET FOR CEILING MOUNTED OPS-1 TO OPS-6 ARE TO BE PLACED ABOVE CEILING. PROVIDE PEERLESS MOUNT #PLCM-UNL AND ALL REQUIRED HARDWARE FOR A COMPLETE INSTALLATION. ROUTE THE WIRING INSIDE THE COLUMN. PENETRATE THE CEILING TILE IN THE CENTER.
 5. PROVIDE LMR-4000B 50 OHM FLEXIBLE LOW LOSS WATERTIGHT COAXIAL CABLE TO ROOFTOP ANTENNA VIA ANTENNA CONDUIT ROOF PENETRATION. SEE A104 TERMINATE W/N CONNECTOR MONT AND CONNECT VHF ANTENNA ANDREN #0B224FAA PER DETAIL 2 ET414.
 6. PROVIDE 2-2.5" CONDUITS, CONNECT TO THE FIRST FLOOR JUNCTION BOX. THIS CONDUIT IS TO BE USED AS WIREWAY FOR TSA COMMUNICATION OUTLETS. SEE ET413 & ET411
 7. PROVIDE CEILING MOUNTED COMMERCIAL GRADE FULL HD PROJECTOR, COORDINATE EXACT LOCATION WITH OWNER. CEILING COMMUNICATION OUTLET TO BE LOCATED NEXT TO THE PROJECTOR.
 8. PROVIDE DUAL CONNECTION TO IDF-3.
 9. 55" LED TV, 1920X1080 NATIVE RESOLUTION, ETHERNET CONTROL, PIP, SCHEDULING, TILE MATRIX W/ THIN BEZEL (0.65" OR LESS) AND CABLE COVER. MONITOR SHALL BE LG 55LE530C OR APPROVED EQUAL. CONNECT TO NETWORK SWITCH.

3 ENLARGED THIRD LEVEL FLOOR PLAN - AREA B
1/8" = 1'-0"

WARNING: THIS RECORD CONTAINS SENSITIVE SECURITY INFORMATION THAT IS CONTROLLED UNDER 49 CFR PARTS 15 AND 1520. NO PART OF THIS RECORD MAY BE DISCLOSED TO PERSONS WITHOUT A "NEED TO KNOW", AS DEFINED IN 49 CFR PARTS 15 AND 1520, EXCEPT WITH THE WRITTEN PERMISSION OF THE ADMINISTRATOR OF THE TRANSPORTATION SECURITY ADMINISTRATION OR THE SECRETARY OF TRANSPORTATION. UNAUTHORIZED RELEASE MAY RESULT IN CIVIL PENALTY OR OTHER ACTION. FOR U.S. GOVERNMENT AGENCIES, PUBLIC DISCLOSURE IS GOVERNED BY 5 U.S.C. 552 AND 49 CFR PARTS 15 AND 1520.



Reynolds, Smith and Hills, Inc.
4525 Airport Approach Rd, Ste A
Duluth, Minnesota 55811
218-722-1227 Fax: 218-722-1052
www.rsandh.com



**DULUTH INTERNATIONAL AIRPORT
DULUTH, MN**

NEW PASSENGER TERMINAL

- 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) 722-8306
- 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:
APPOLO DESIGN
2432 East First Street, Duluth MN 55812
TEL: (218) 991-5079

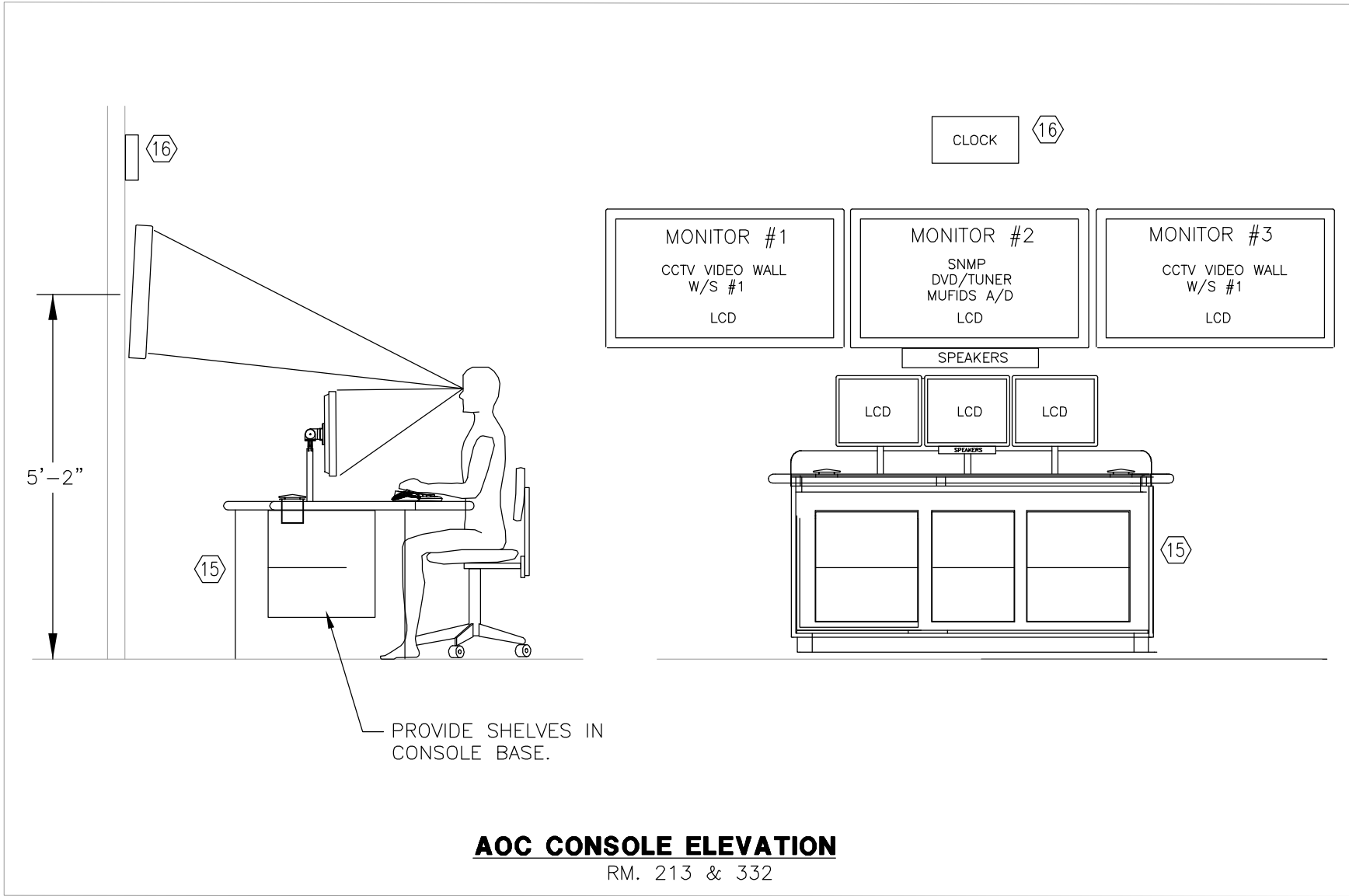
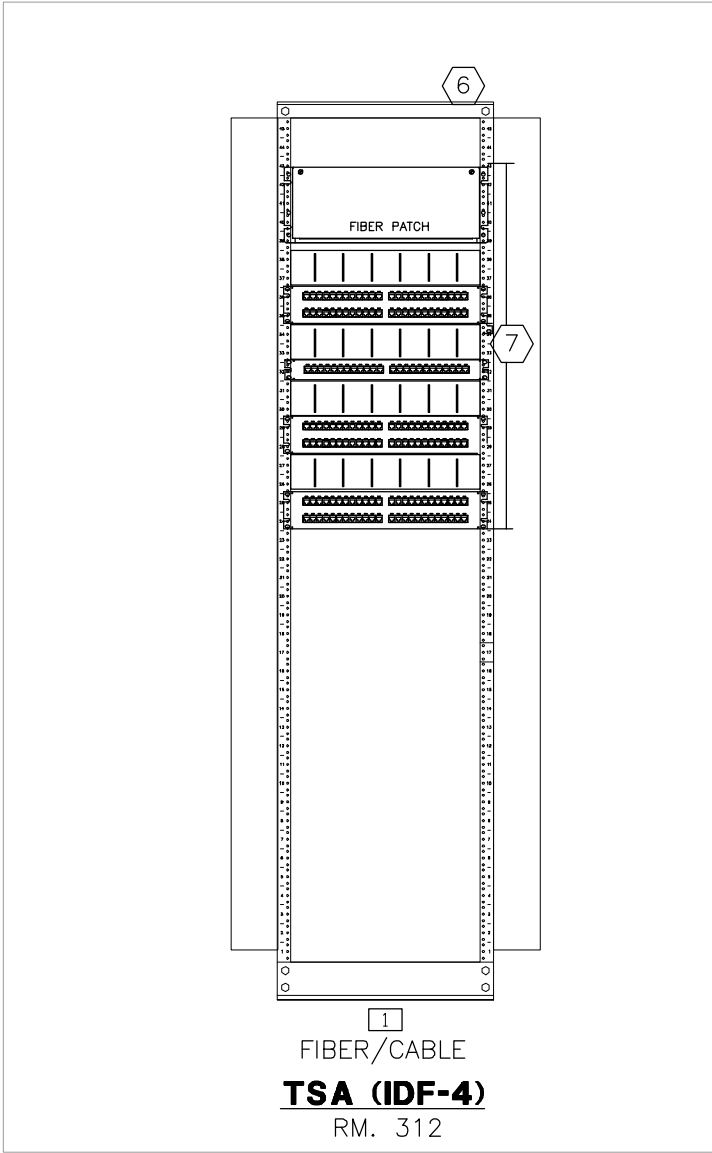
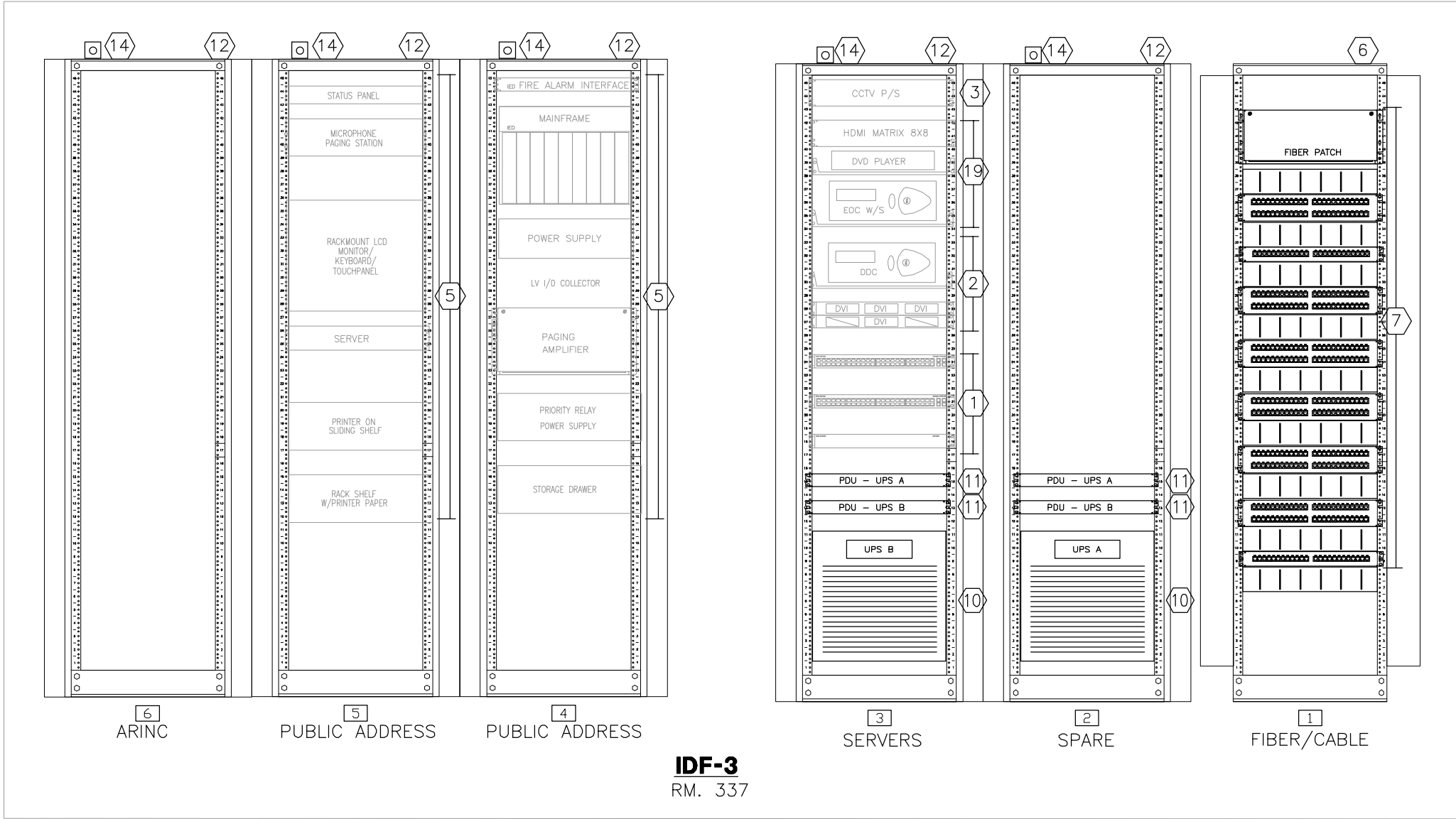
REVISIONS		
NO.	DESCRIPTION	DATE
1000	REVIEW	12.15.10
	BID PACKAGE 2A	01.24.11
1	BP2A ADDENDUM 2	02.25.11
	BP2A CONFORMANCE SET	05.02.11
	BID PACKAGE 2B REVIEW	07.16.11
	BID PACKAGE 2B	08.23.11
	BP2B CONFORMANCE	10.21.11
2	BP2A RFP-179	11.21.11

DATE ISSUED: 02-10-12
REVIEWED BY: BA
DRAWN BY: RJL
DESIGNED BY: BA

AEP PROJECT NUMBER
213-1882-091
© 2010 REYNOLDS, SMITH AND HILLS INC.

SHEET TITLE
**TECHNOLOGY
THIRD FLOOR
PLAN
AREA B**

SHEET NUMBER
ET415
BID PACKAGE 2C

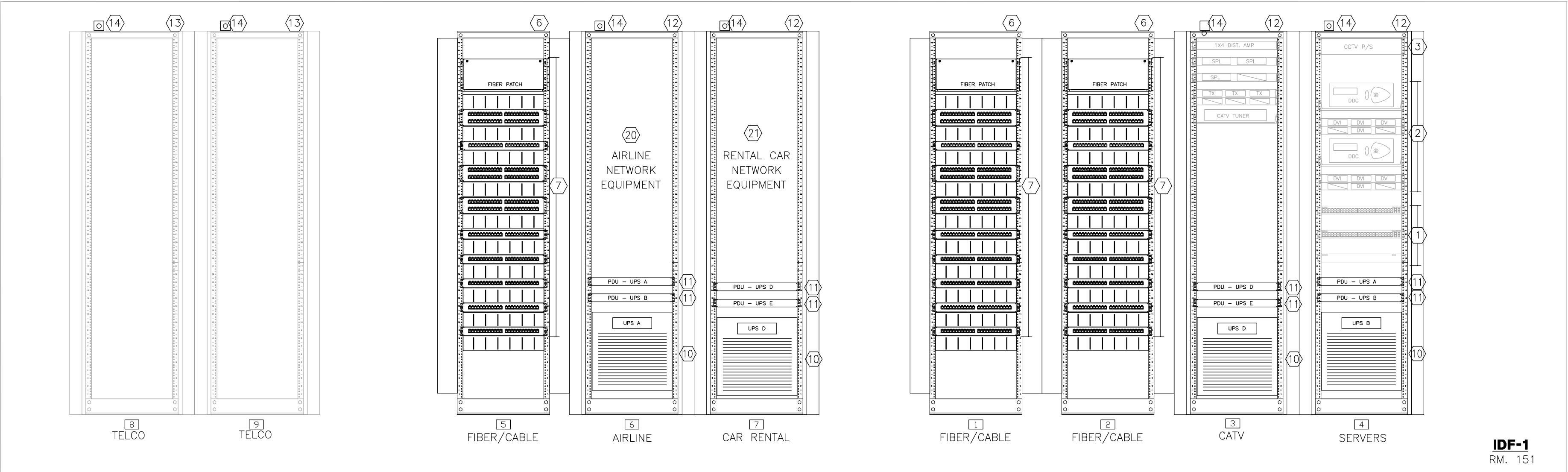
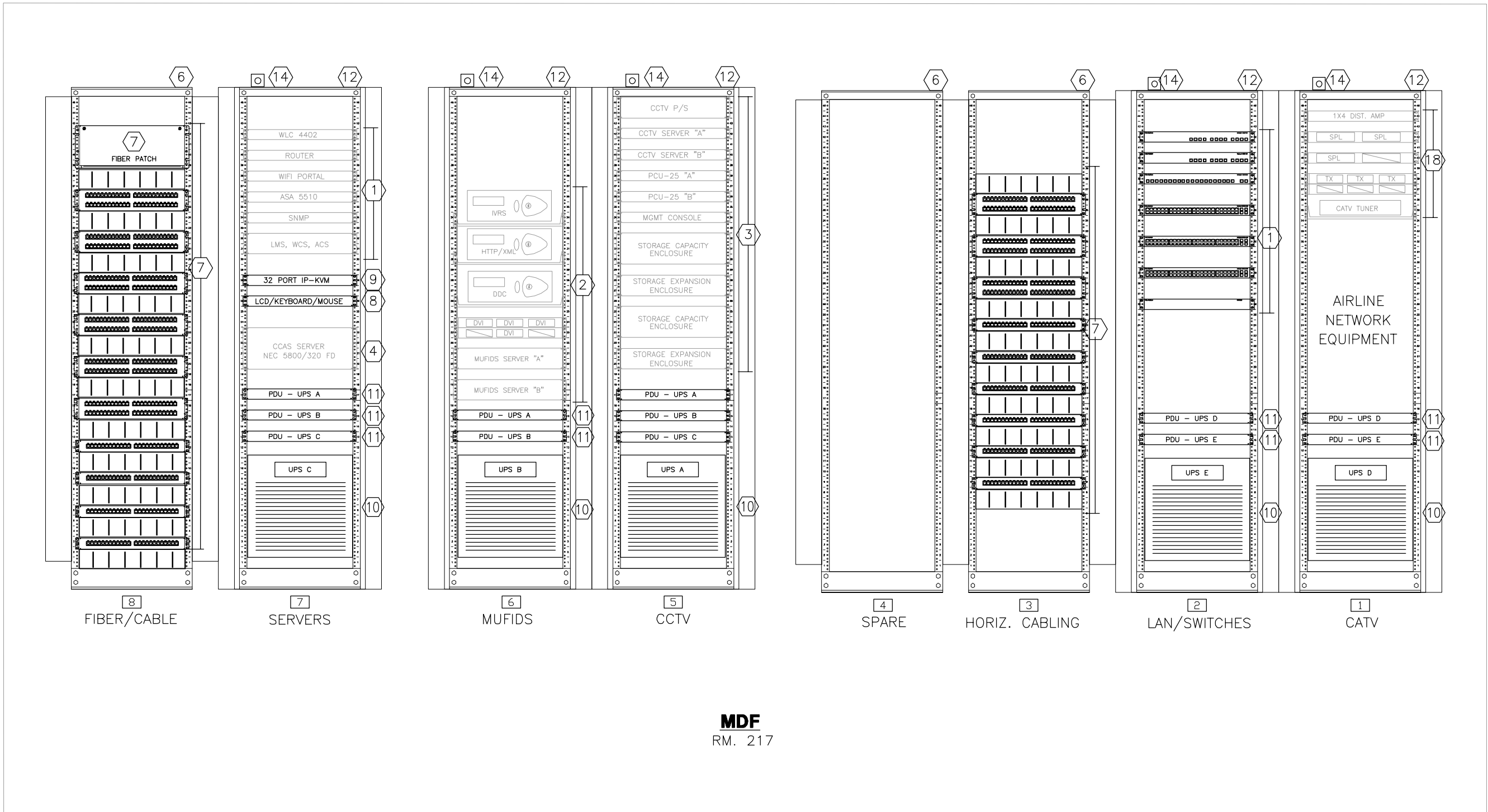
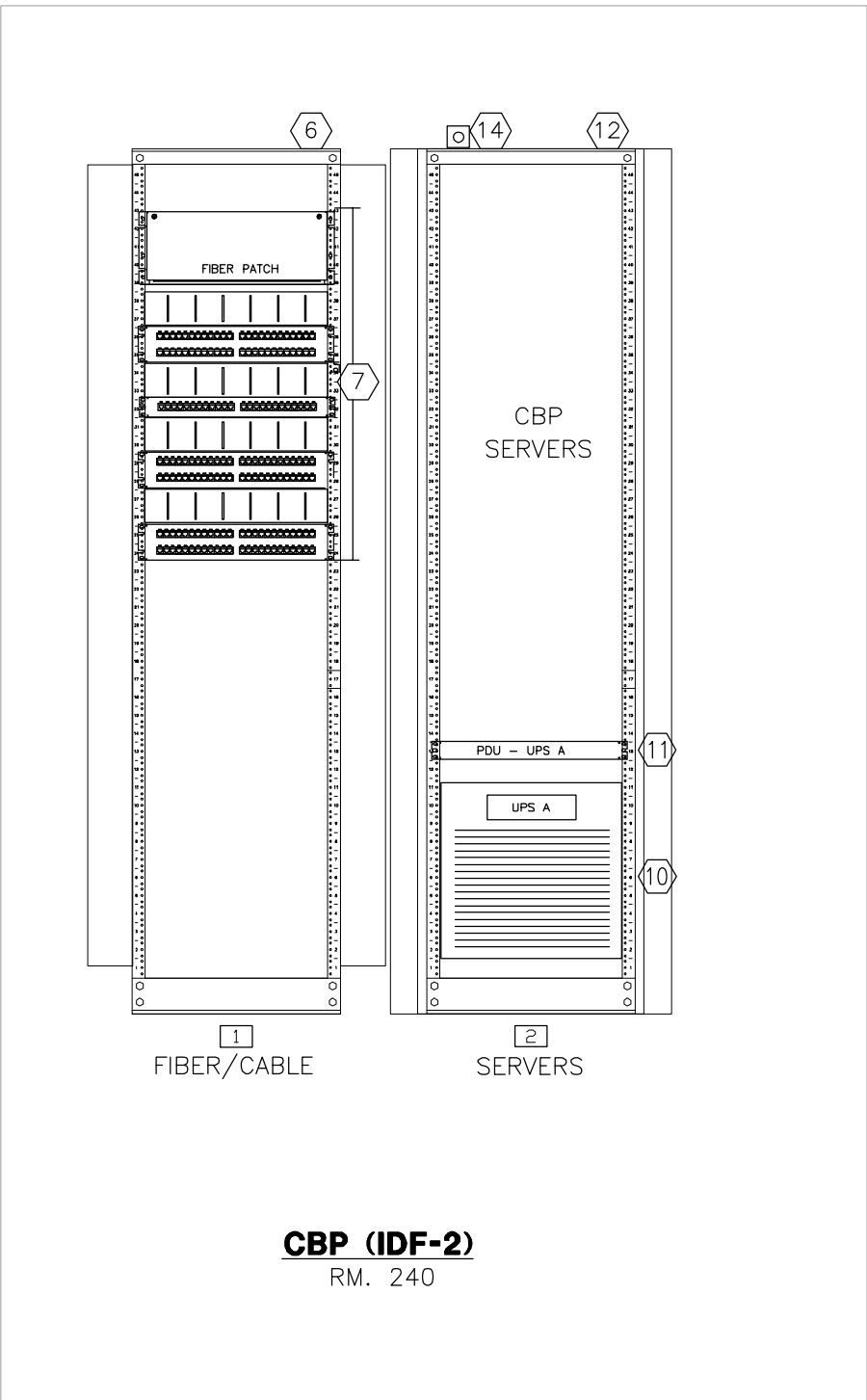


GENERAL NOTES

- ALL RACK ELEVATIONS ARE FOR CONCEPT ONLY. COORDINATE MOUNTING AND LAYOUT OF ALL HARDWARE AND DEVICES WITH INTEGRATORS. SUBMIT SHOP DRAWINGS INDICATING RACK LAYOUTS FOR APPROVAL.
- SUBMIT SHOP DRAWINGS AND DATA SHEETS FOR ALL COMPONENTS. SHOP DRAWINGS SHALL INCLUDE CABLE IDENTIFICATION ASSIGNMENTS AND PORT USAGE. DRAWINGS SHALL CLEARLY IDENTIFY POINT TO POINT INFORMATION FOR A COMPLETE SYSTEM.
- REFER TO SPECIFICATION SECTIONS 16710, 16715, 16716 FOR ADDITIONAL DETAILS AND REQUIREMENTS.
- ALL RACKS, DEVICES AND CABLES SHALL BE CLEARLY IDENTIFIED BASED UPON SYSTEM TYPE, LOCATION, IDENTIFICATION #, DESTINATION, ETC. REFER TO PREMISE DISTRIBUTION SPECIFICATION FOR ADDITIONAL IDENTIFICATION REQUIREMENTS.
- LABELS SHALL BE CREATED USING AN ELECTRONIC LABEL MAKER, AS SPECIFIED. NO HANDWRITTEN LABELS WILL BE ACCEPTABLE.
- PROVIDE WIRE MANAGEMENT SYSTEMS ABOVE AND BELOW EACH PATCH PANEL.
- REFER TO DRAWING ET6-04 FOR NETWORK SCOPE AND ET6-06 FOR FIBER OPTIC CABLING SCOPE OF WORK.
- MANUFACTURER AND MODEL NUMBERS ARE USED TO ESTABLISH QUALITY AND PERFORMANCE OF THE SYSTEM. ANY EQUIPMENT THAT MEETS OR EXCEEDS THE PERFORMANCE SHALL BE CONSIDERED AND APPROVED AT THE DISCRETION OF THE ENGINEER AND/OR OWNER.
- PROVIDE 1U SPACE BETWEEN SERVERS AND RACK MOUNTED HARDWARE. PROVIDE BLANK COVER PLATES FOR ALL UN-USED RACK SPACE IN CABINETS. USE BLANK PLATES TO PROVIDE IDENTIFICATION LABELS FOR EQUIPMENT.
- PATCH CORDS AND CABLING SHALL BE COLOR CODED BETWEEN SYSTEMS AND FUNCTION. DEVELOP AND SUBMIT COLOR CODING SCHEME TO A/E FOR APPROVAL.
- PROVIDE BONDING PER SPECIFICATION SECTION 16716 AS REQUIRED. TELECOMMUNICATIONS BONDING BACKBONE PROVIDED UNDER PREVIOUS PACKAGE WORKSCOPE.

NOTES

- NETWORK SCOPE OF WORK. SEE SHEET ET6-04.
- MUFIDS SCOPE OF WORK. SEE SHEET ET6-02.
- CCTV SCOPE OF WORK. SEE SHEET ET6-03.
- CCAS SCOPE OF WORK. SEE SHEET ET6-01.
- PUBLIC ADDRESS, SCOPE OF WORK BY OTHERS.
- 19" OPEN FRAME RACK, 19" x 84"/45U WITH 6" WIDE VERTICAL CABLING CHANNEL AND SNAP ON COVER. RACK SHALL BE CHATTSWORTH GLOBAL STANDARD RACK OR EQUAL.
- FIBER OPTIC AND HORIZONTAL CABLING. PROVIDE ADDITIONAL PATCH PANELS AND WIRE MANAGEMENT AS REQUIRED. PROVIDE SEPERATE PATCH PANEL FOR EACH TENANT SPACE.
- 17" PULLOUT LCD W/ KEYBOARD AND TOUCHPAD. SYSTEM SHALL BE BELKIN OMNIVIEW F1DC101P-SR OR EQUAL.
- 32 PORT KVM W/ 4 USER REMOTE IP. KVM SHALL BE RARITAN DOMINION KX II-432 OR EQUAL. PROVIDE COMPUTER INTERFACE MODULES (CIM) AS REQUIRED FOR ALL SERVERS LOCATED IN RACK. COORDINATE WITH ALL SYSTEM INTEGRATORS. PROVIDE (CIMS) FOR EQUIPMENT IN IDF LOCATIONS. CROSS-PATCH FROM IDF TO MDF KVM VIA CAT6 CABLE.
- 4KVA, N+1 (6KVA TOTAL) UPS. UPS SHALL BE 208V INPUT, 120V OUTPUT AND SHALL CONTAIN A REDUNDANT INTELLIGENCE MODULE, (4) SYBT2 BATTERY MODULES, RACK MOUNTING HARDWARE AND NETWORK MANAGEMENT CARD WITH ENVIRONMENTAL SENSING. CONNECT UPS TO 208V/30A OUTLET. CONNECT TO NETWORK.
- RACK MOUNTED, METERED, POWER DISTRIBUTION UNIT (PDU), 1U, 20A, 120V, (8) 5-20R OUTLETS, L5-20P INPUT. APC AP7801 OR EQUAL. NETWORK CONNECTION NOT REQUIRED.
- 19" GANGABLE ENCLOSURE. 19"x36" x 84"/45U (27.32WX39.62DX84"H), PROVIDE PERFORATED METAL FRONT DOORS AND INTELLIGENT FAN REAR DOORS. PROVIDE SIDE PANELS ON EACH END. PROVIDE ADDITIONAL CABLE MANAGEMENT AS REQUIRED FOR A NEAT AND PROFESSIONAL CABLING SYSTEM. ENCLOSURE SHALL BE CHATTSWORTH M-SERIES MEGAFRAME CABINET OR EQUAL. COORDINATE ADDITIONAL REQUIREMENTS WITH EACH SYSTEM.
- RACKS AND EQUIPMENT TO BE PROVIDED BY TELEPHONE COMPANY. CONTRACTOR SHALL COORDINATE INSTALLATION OF POWER CIRCUITS WITH TELCO EQUIPMENT.
- POWER RECEPTACLE FOR RACK EQUIPMENT. INSTALL ABOVE RACK. SEE ELECTRICAL DRAWINGS FOR CIRCUIT INFORMATION.
- PROVIDE A COMPLETE CONSOLE WITH ALL REQUIRED COMPONENTS TO MATCH THE CONFIGURATION SHOWN ON THE DRAWINGS. THE CONSOLE SHALL BE A MODULAR CONSOLE AS MANUFACTURED BY WINSTED (PRESTIGE SIGHT-LINE) WITH CUSTOM FREEFORM WORK SURFACE, TRESKO OR APPROVED EQUAL MANUFACTURER. THE CONSOLE FINISHES WILL BE SELECTED BY THE A/E FROM STANDARD AVAILABLE COLORS FROM THE MANUFACTURER. PROVIDE MULTI-PURPOSE LOCKING DOORS, CORNER FILLERS, TRIPPLE MONITOR MOUNT, DATA POWER RAIL AND ACCESSORIES AS REQUIRED FOR A COMPLETE CONSOLE SYSTEM. SUBMIT A 1/4" SCALE DIMENSIONAL SHOP DRAWING FOR THE EQUIPMENT. SEE DETAIL 6 ET5-02 FOR ROOM LAYOUT.
- DIGITAL WALL CLOCK W/ 4" RED LETTERS, 4 DIGIT, ETHERNET CONNECTION WITH POWER OVER ETHERNET (POE). CONNECT TO NETWORK SWITCH. USE NTP TIME SERVER. SEE NETWORK RISER ET6-04. CLOCK SHALL BE INOVA SOLUTIONS, BRG PRECISION PRODUCTS, OR EQUAL.
- NOT USED.
- PUBLIC TV DISPLAY EQUIPMENT. SEE PUBLIC DISPLAY RISER ET6-05.
- OPS CENTER DISPLAY EQUIPMENT. SEE OPS CENTER DISPLAY RISER ET6-05.
- PROVIDE 4-6U LOCKABLE SECTIONS IN AIRLINE CABINET FOR AIRLINE EQUIPMENT.
- PROVIDE 6-4U LOCKABLE SECTIONS IN RENT A CAR CABINET FOR RENT A CAR EQUIPMENT.



WARNING: THIS RECORD CONTAINS SENSITIVE SECURITY INFORMATION THAT IS CONTROLLED UNDER 49 CFR PARTS 15 AND 1520. NO PART OF THIS RECORD MAY BE DISCLOSED TO PERSONS WITHOUT A "NEED TO KNOW", AS DEFINED IN 49 CFR PARTS 15 AND 1520, EXCEPT WITH THE WRITTEN PERMISSION OF THE ADMINISTRATOR OF THE TRANSPORTATION SECURITY ADMINISTRATION OR THE SECRETARY OF TRANSPORTATION. UNAUTHORIZED RELEASE MAY RESULT IN CIVIL PENALTY OR OTHER ACTION. FOR U.S. GOVERNMENT AGENCIES, PUBLIC DISCLOSURE IS GOVERNED BY 5 U.S.C. 552 AND 49 CFR PARTS 15 AND 1520.

RS&H
IMPROVING YOUR WORLD

Reynolds, Smith and Hills, Inc.
4525 Airport Approach Rd, Ste A
Duluth, Minnesota 55811
218-722-1227 Fax: 218-722-1052
www.rsandh.com

DULUTH AIRPORT AUTHORITY

**DULUTH INTERNATIONAL AIRPORT
DULUTH, MN**

NEW PASSENGER TERMINAL

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) 722-8506

ME/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) 591-5079

REVISIONS

NO.	DESCRIPTION	DATE
	100% REVIEW	12.15.10
	BID PACKAGE 2A	01.24.11
1	BP2A ADDENDUM 1	02.25.11
	BP2A PERFORMANCE SET	05.02.11
	BID PACKAGE 2B REVIEW	07.16.11
	BID PACKAGE 2B	08.23.11
	BP2B PERFORMANCE	10.21.11
2	BP2A RFP-179	11.21.11

DATE ISSUED: 02-10-12
REVIEWED BY: BA
DRAWN BY: RJL
DESIGNED BY: BA

AEP PROJECT NUMBER

213-1882-091

© 2010 REYNOLDS, SMITH AND HILLS INC.

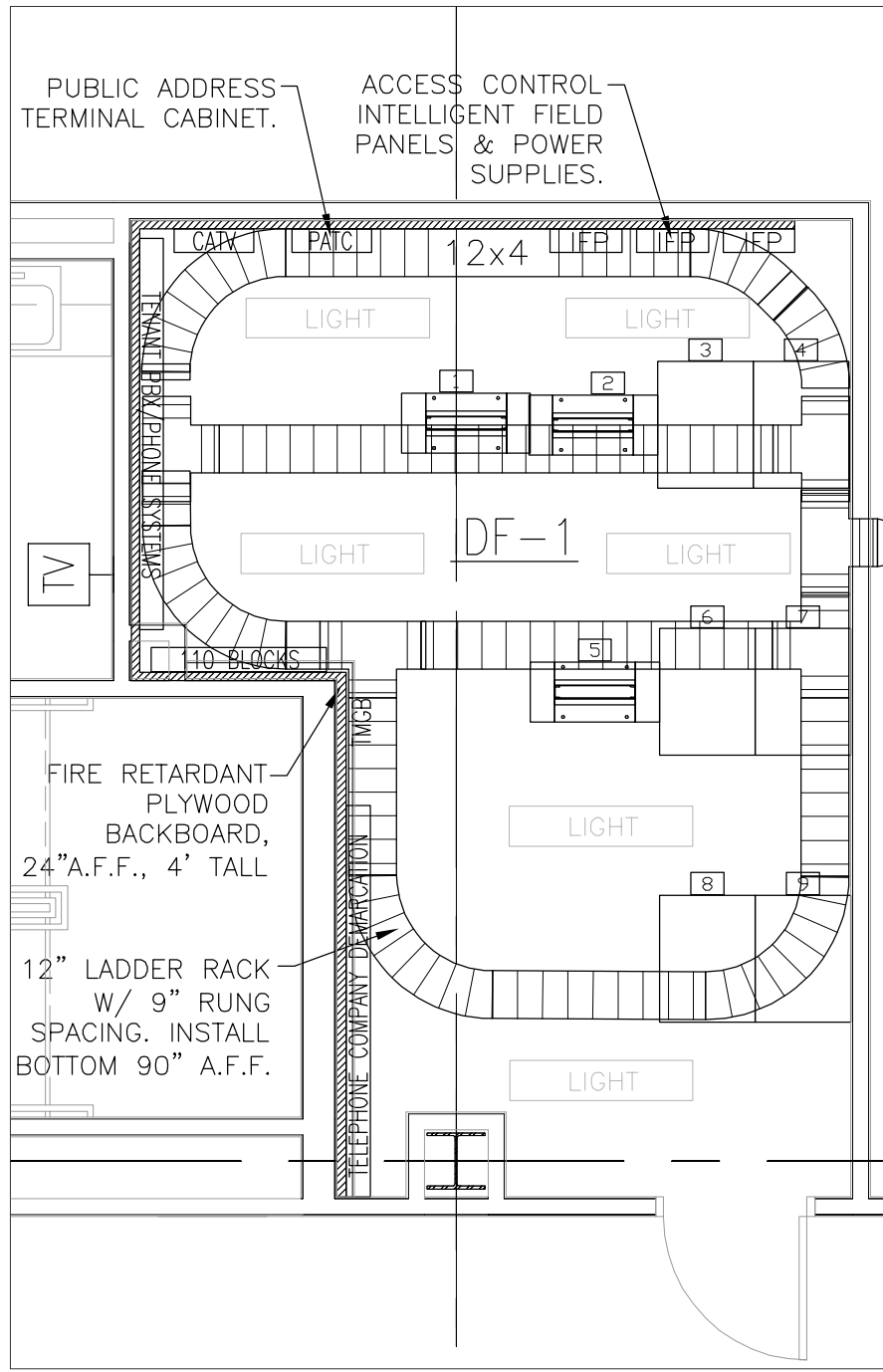
SHEET TITLE

**COMMUNICATIONS
EQUIPMENT RACK
ELEVATIONS**

SHEET NUMBER

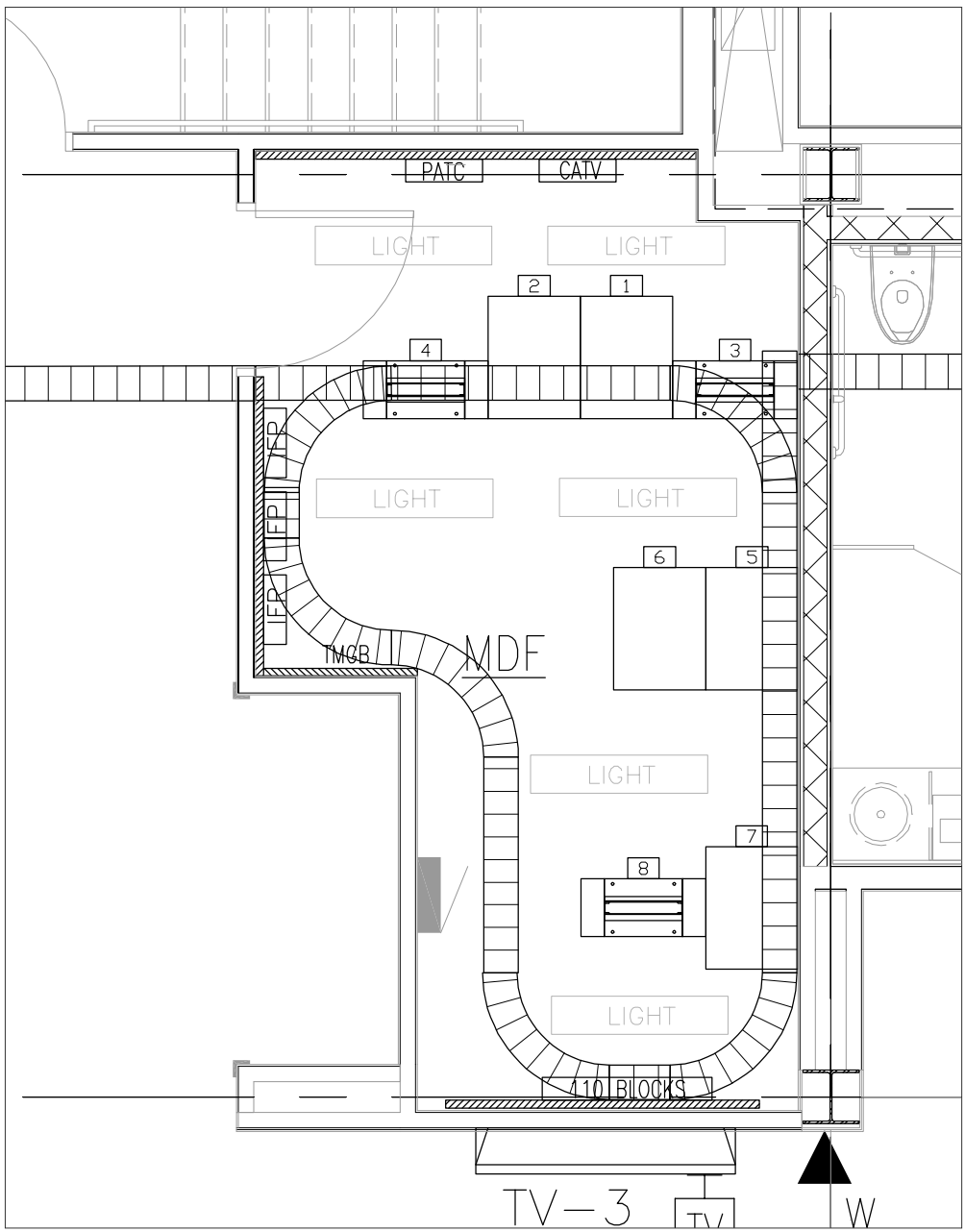
ET501

BID PACKAGE 2C



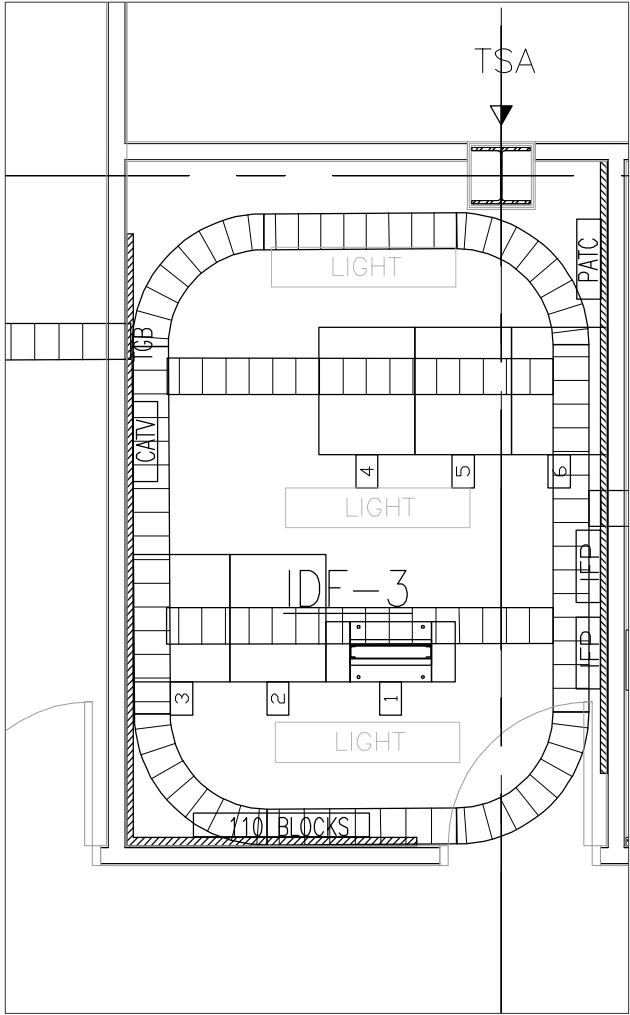
1
ET502

ENLARGED IDF-1 TELE-COM ROOM #151
SCALE: 1/4"=1' 0"



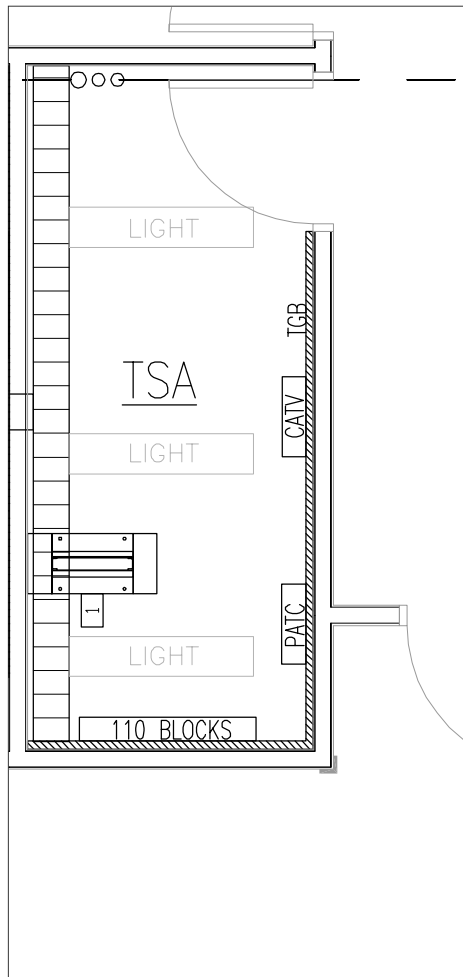
2
ET502

ENLARGED MDF COMM. ROOM #217
SCALE: 1/4"=1' 0"



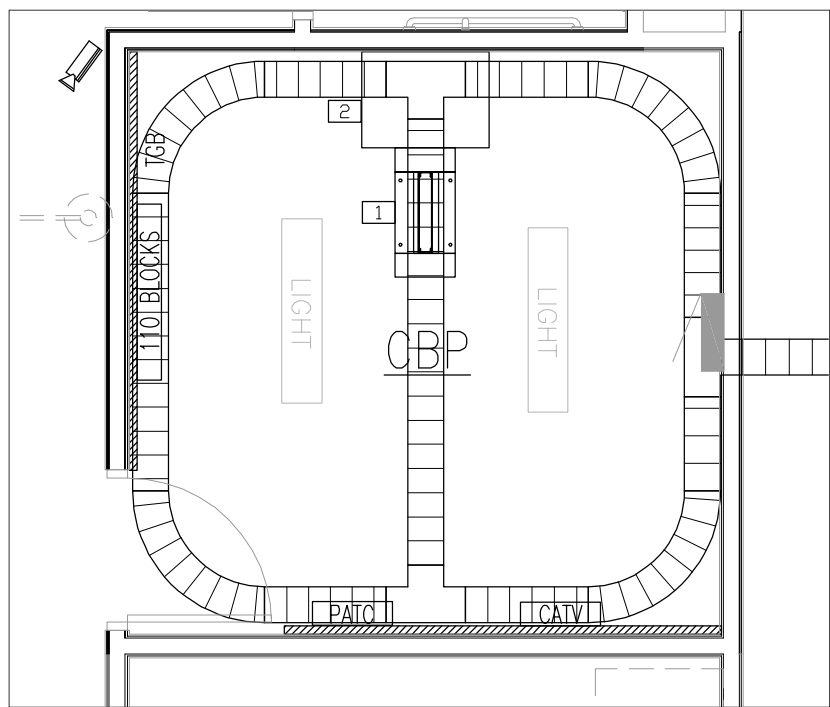
3
ET502

ENLARGED IDF-3 COMM. ROOM #337
SCALE: 1/4"=1' 0"



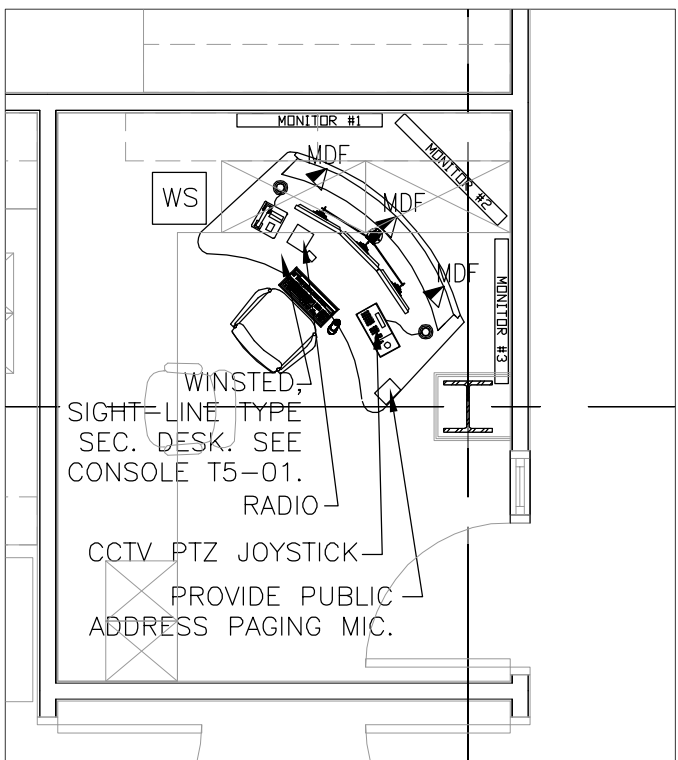
4
ET502

ENLARGED TSA TELECOM ROOM (IDF-4) #312
SCALE: 1/4"=1' 0"



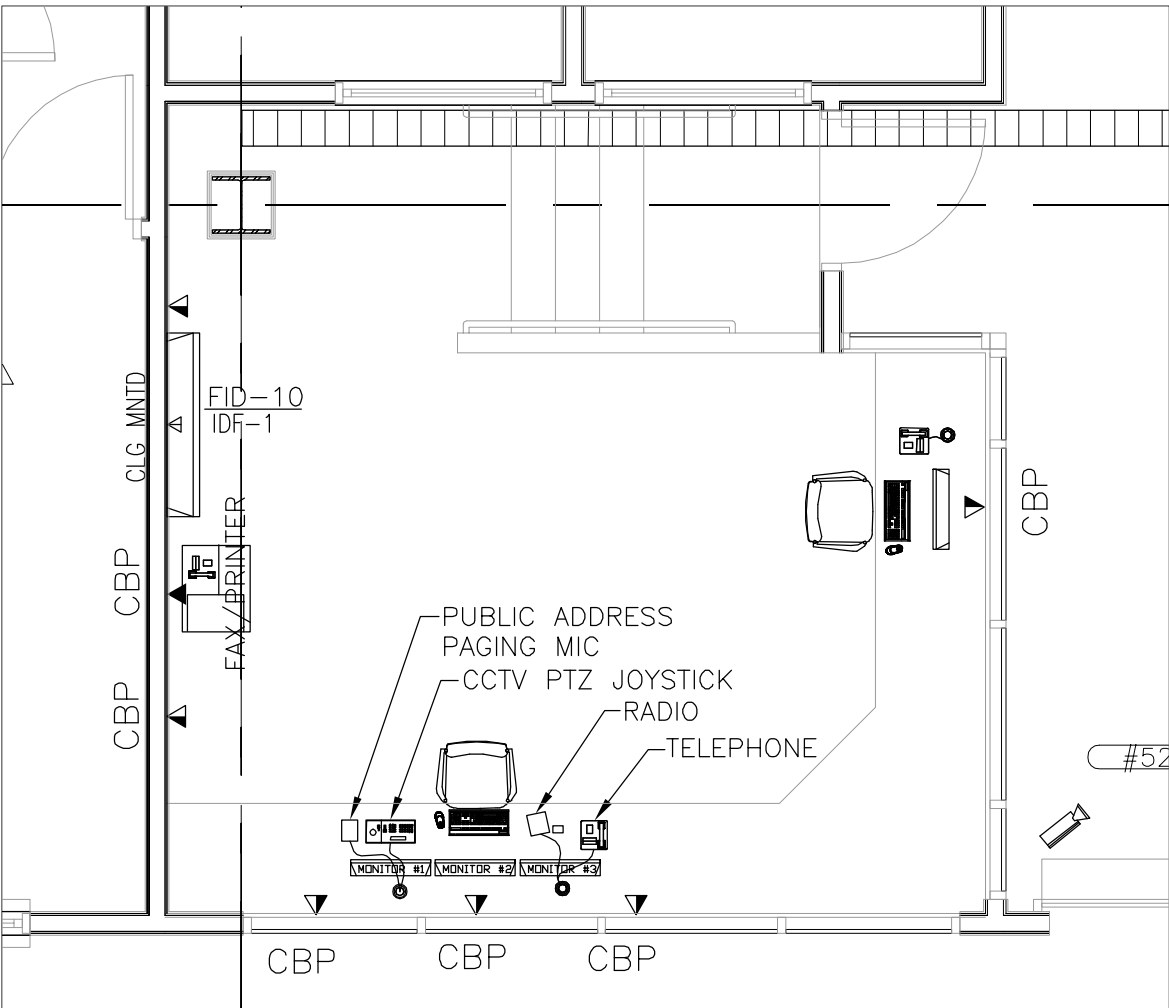
5
ET502

ENLARGED CBP COMPUTER ROOM (IDF-2) #240
SCALE: 1/4"=1' 0"



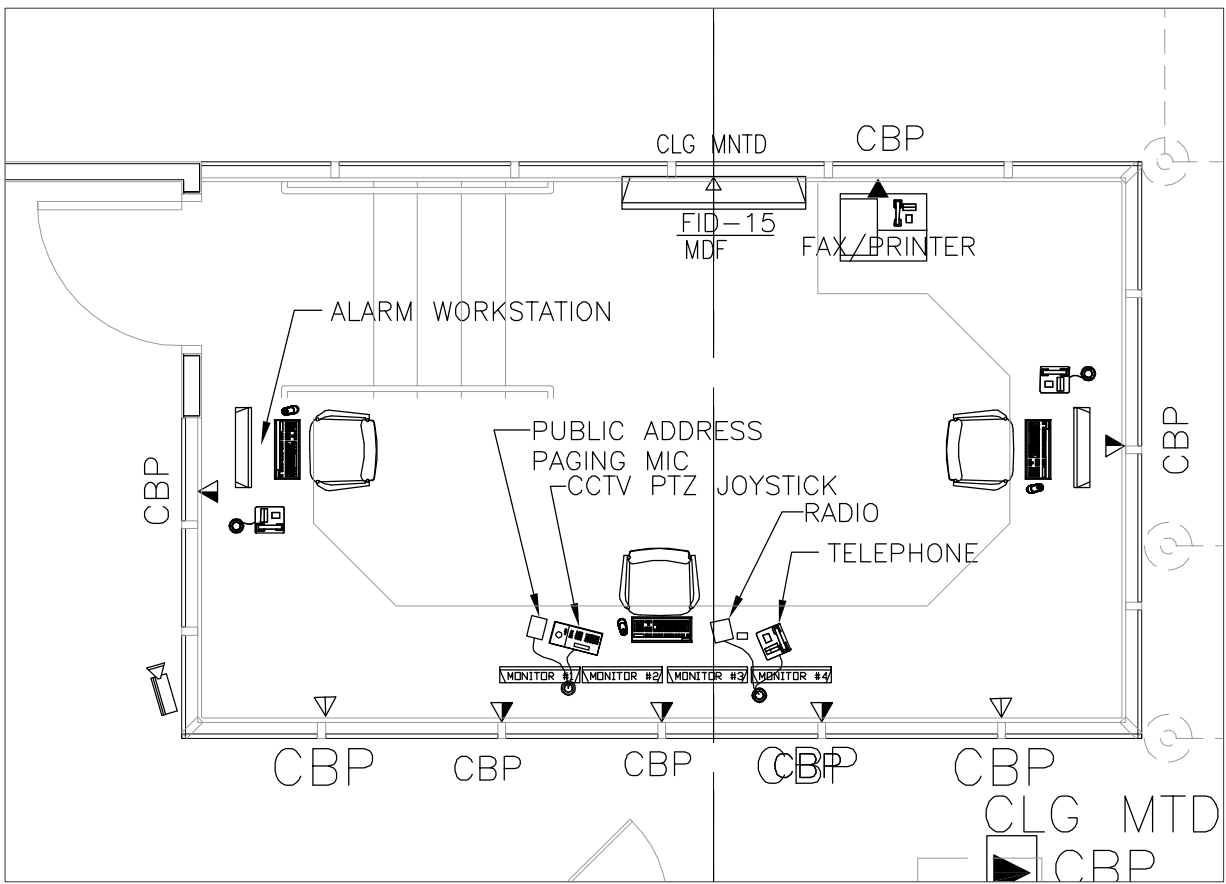
3
ET502

ENLARGED OFFICE #332
SCALE: 1/4"=1' 0"



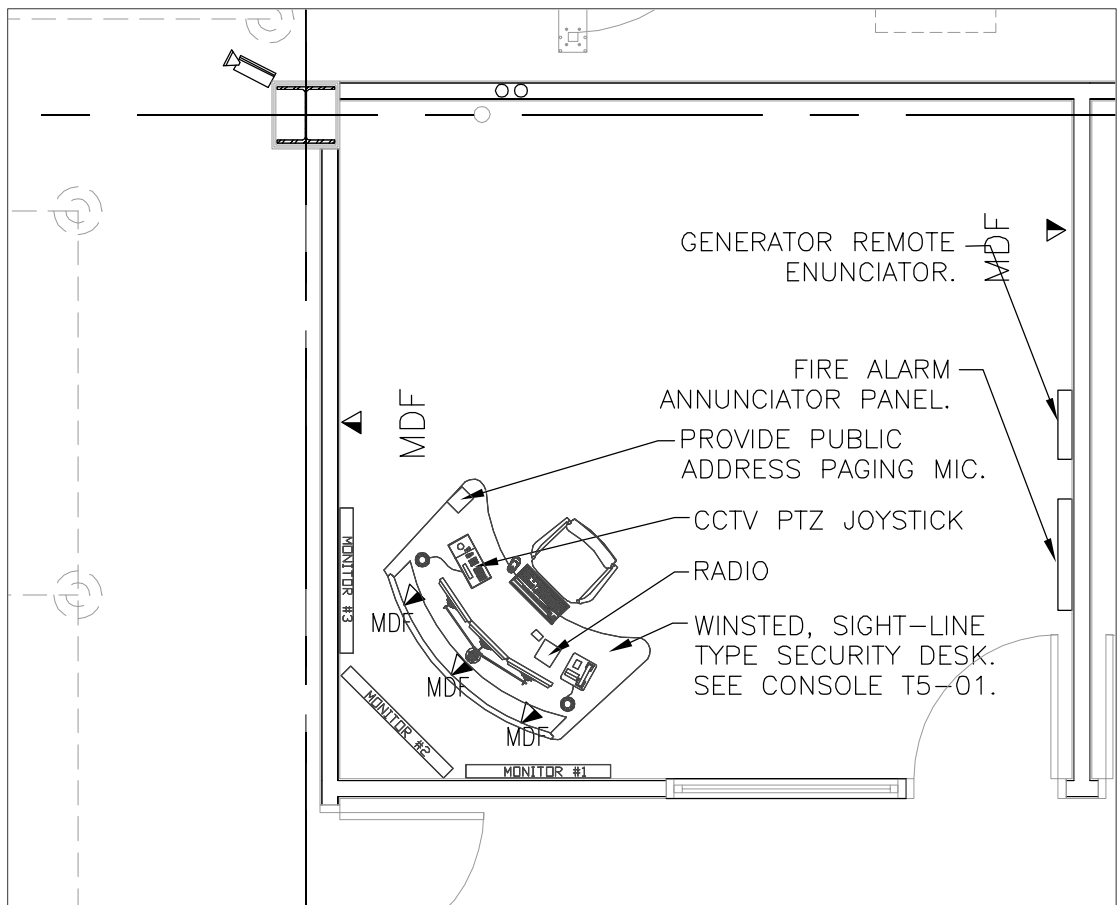
7
ET502

ENLARGED CBP ROVER ROOM #163
SCALE: 1/4"=1' 0"



8
ET502

ENLARGED CBP COORD. CTR ROOM #245
SCALE: 1/4"=1' 0"



9
ET502

ENLARGED AIRPORT POLICE #213
SCALE: 1/4"=1' 0"

WARNING: THIS RECORD CONTAINS SENSITIVE SECURITY INFORMATION THAT IS CONTROLLED UNDER 49 CFR PARTS 15 AND 1520. NO PART OF THIS RECORD MAY BE DISCLOSED TO PERSONS WITHOUT A "NEED TO KNOW", AS DEFINED IN 49 CFR PARTS 15 AND 1520, EXCEPT WITH THE WRITTEN PERMISSION OF THE ADMINISTRATOR OF THE TRANSPORTATION SECURITY ADMINISTRATION OR THE SECRETARY OF TRANSPORTATION. UNAUTHORIZED RELEASE MAY RESULT IN CIVIL PENALTY OR OTHER ACTION. FOR U.S. GOVERNMENT AGENCIES, PUBLIC DISCLOSURE IS GOVERNED BY 5 U.S.C. 552 AND 49 CFR PARTS 15 AND 1520.

RS&H
IMPROVING YOUR WORLD

Reynolds, Smith and Hills, Inc.
4525 Airport Approach Rd, Ste A
Duluth, Minnesota 55811
218-722-1227 Fax: 218-722-1062
www.rsandh.com

**DULUTH AIRPORT
AUTHORITY**

**DULUTH
INTERNATIONAL
AIRPORT
DULUTH, MN**

**NEW PASSENGER
TERMINAL**

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) 722-8306

ME/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) 591-5079

REVISIONS

NO.	DESCRIPTION	DATE
100%	REVIEW	12.15.10
	BID PACKAGE 2A	01.24.11
1	BP2A ADDENDUM 1	02.25.11
	BP2A CONFERENCE SET	05.02.11
	BID PACKAGE 2B REVIEW	07.16.11
	BID PACKAGE 2B	08.23.11
	BP2B CONFERENCE	10.21.11
2	BP2A RFP-179	11.21.11

DATE ISSUED: 02-10-12
REVIEWED BY: BA
DRAWN BY: RJL
DESIGNED BY: BA

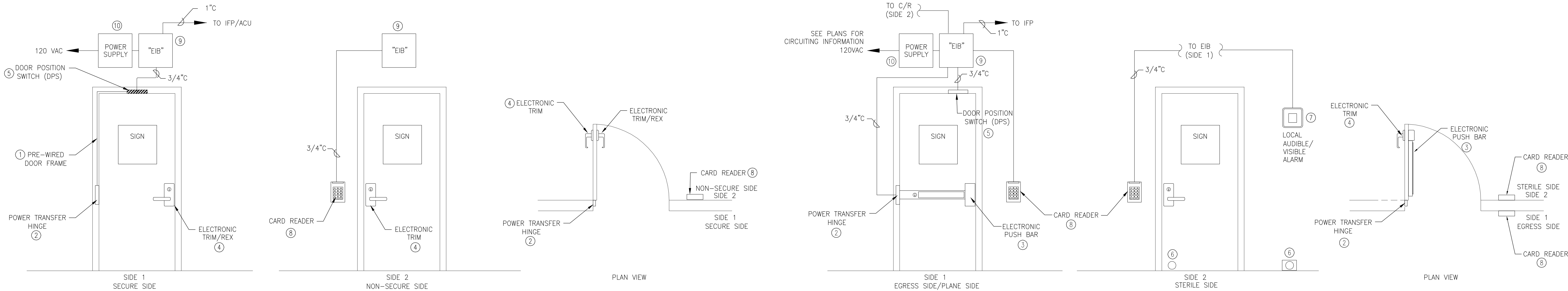
AEP PROJECT NUMBER
213-1882-091
© 2010 REYNOLDS, SMITH AND HILLS INC.
SHEET TITLE

**ENLARGED
ROOM PLANS**

SHEET NUMBER

ET502

BID PACKAGE 2C



SIDE 1 – EGRESS/SECURE SIDE

- DOOR HARDWARE SHALL BE RELEASED WITH NO DELAY EGRESS UPON ACTIVATION OF ELECTRONIC TRIM/REX.
- DOOR HARDWARE SHALL BE RELEASED UPON AN AUTHORIZED ACCESS NOTIFICATION FROM THE ACCESS CONTROL SYSTEM FOR TYPE 1A.

SIDE 2 – NON-SECURE SIDE

- DOOR HARDWARE SHALL BE RELEASED UPON AN AUTHORIZED ACCESS NOTIFICATION FROM ACCESS CONTROL SYSTEM.

DOOR OPERATION UNDER LOSS OF POWER:

- ELECTRONIC TRIM/REX SHALL FAIL SAFE.
- ELECTRONIC TRIM SHALL FAIL SECURE.
- MASTER KEY SHALL OVERRIDE/OPEN DOOR HARDWARE

TYPE 1A, 1B, 1C, AND 1D DESCRIPTIONS

- TYPE 1 SHOWN IN DETAIL.
- TYPE 1A IS THE SAME AS TYPE 1 (SGL CARD READER) EXCEPT WITH DOUBLE DOORS (PROVIDE DPS BOTH DOORS).
- TYPE 1B IS THE SAME AS TYPE 1 EXCEPT WITH DUAL CARD READER (SGL DOOR, SIDE 1 SIGN TYPE 4).
- TYPE 1C IS THE SAME AS TYPE 1B EXCEPT DOUBLE DOOR (DBL DOOR).
- TYPE 1D IS THE SAME AS TYPE 1 EXCEPT ELECTRONIC TRIM/REX IS REPLACED WITH ELECTRONIC PUSH BAR/REX ON SIDE 1..

TYPE "LB" GENERAL NOTES

- PROVIDE 20A CIRCUIT FROM EMERGENCY PANEL. ONE CIRCUIT SHALL FEED NO MORE THAN 4 DOORS. LABEL PANEL SCHEDULE "ACCESS CONTROL DOOR".
- PROVIDE CONDUIT FOR AUDIBLE/VISIBLE ALARM UNDER THIS PACKAGE.

DOOR OPERATION UNDER ALARM CONDITIONS:

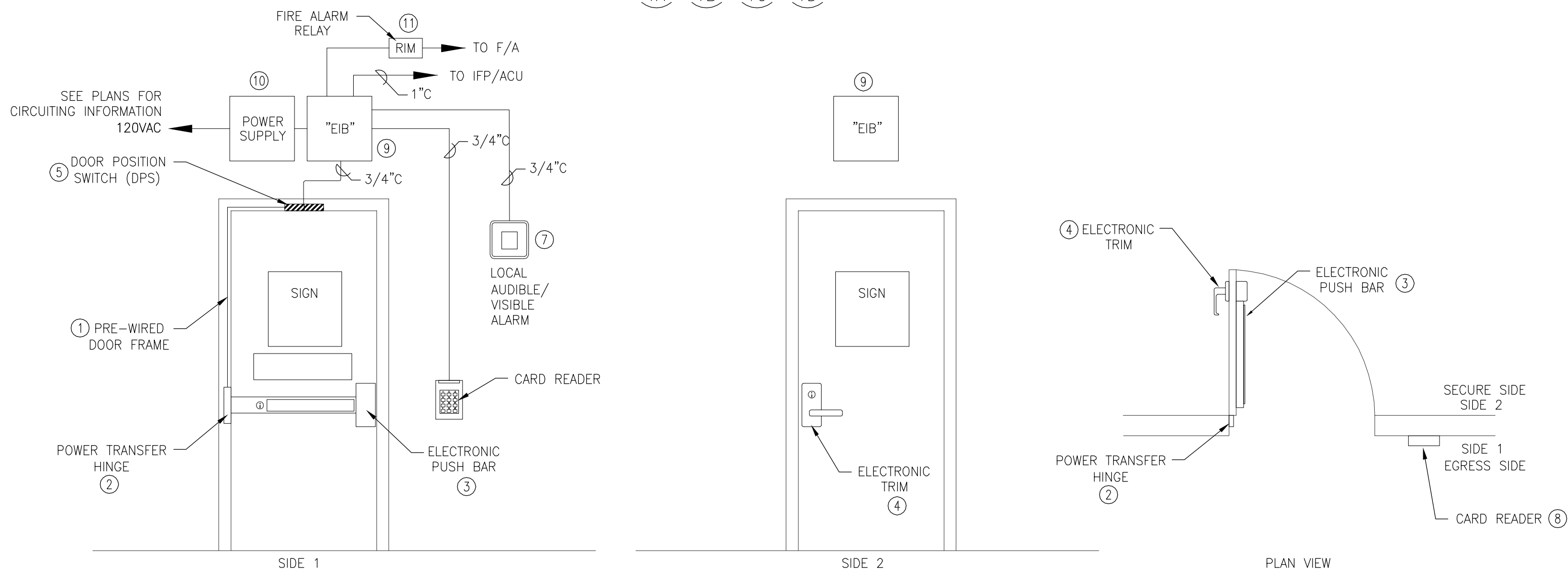
- THERE SHALL BE NO DELAY ENTERING BUILDING FROM PLANE SIDE IN CASE OF FIRE ON PLANE.

TYPE LB ACCESS POINT [#]LB

PASSENGER LOADING BRIDGE

TYPE 1 ACCESS POINT [#]1

TERMINAL OPERATIONAL DOOR
(SEE NOTES FOR TYPES 1A, 1B, 1C AND 1D DOORS)



SIDE 1 – EGRESS SIDE

- DOOR HARDWARE SHALL BE RELEASED AFTER 15 SECOND DELAY EGRESS UPON ACTIVATION OF ELECTRONIC PUSH BAR BY PRESSING BAR FOR 3 TO 5 SECONDS.
- DOOR HARDWARE SHALL BE RELEASED IMMEDIATELY UPON AN AUTHORIZED ACCESS NOTIFICATION FROM ACCESS CONTROL SYSTEM.
- ACTIVATE LOCAL AUDIBLE/VISIBLE ALARM ON ANY FORCED ENTRY OR EGRESS ALARM INDICATION.
- RELEASE DOOR WITHOUT DELAY OR ALARM UPON ACTIVATION OF RIM BY FIRE ALARM SYSTEM ACTIVATION.

SIDE 2 – STERILE SIDE/SECURE SIDE

- DOOR HARDWARE SHALL BE RELEASED WITH NO DELAY EGRESS UPON ACTIVATION OF ELECTRONIC TRIM/REX.
- DOOR HARDWARE SHALL BE RELEASED UPON AN AUTHORIZED ACCESS NOTIFICATION FROM THE ACCESS CONTROL SYSTEM FOR TYPE 4A.

DOOR OPERATION UNDER ALARM CONDITIONS:

- FIRE ALARM SHALL ALLOW THE ACCESS THROUGH THE DOOR WITHOUT DELAY UPON THE DETECTION OF A FIRE ALARM WITHIN THE ZONE (SMOKE OR SPRINKLER ONLY). PULL STATION SHALL NOT BYPASS THE DELAY REQUIREMENT.

DOOR OPERATION UNDER LOSS OF POWER:

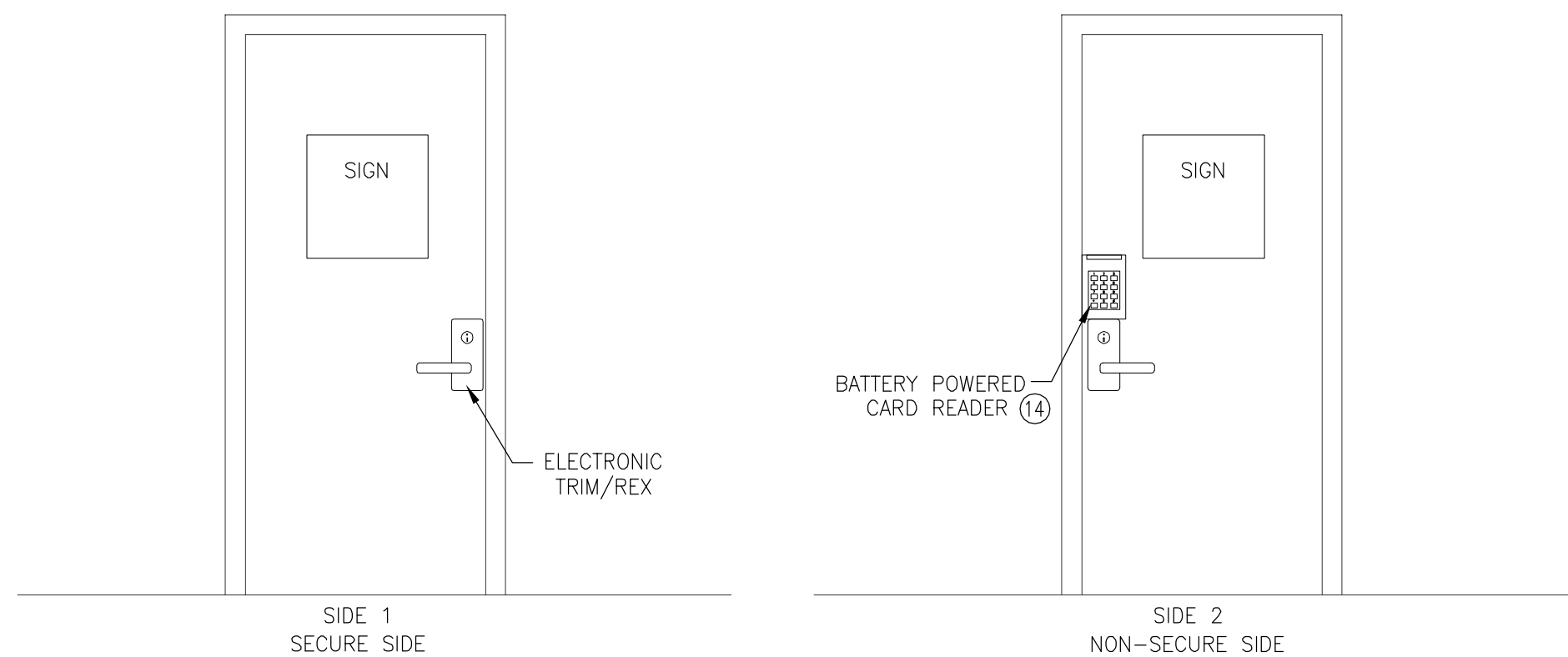
- ELECTRONIC PUSH BAR SHALL FAIL SAFE.
- ELECTRONIC TRIM SHALL FAIL SECURE.

TYPE 4A, 4B, 4C AND 4D DESCRIPTIONS

- TYPE 4 SHOWN IN DETAIL.
- TYPE 4A IS THE SAME AS TYPE 4 EXCEPT WITH DOUBLE DOORS. PROVIDE DPS ON BOTH DOORS.
- TYPE 4B IS THE SAME AS TYPE 4 EXCEPT WITH DUAL CARD READER.
- TYPE 4C IS THE SAME AS TYPE 4B EXCEPT WITH DOUBLE DOORS.
- TYPE 4D IS THE SAME AS TYPE 4 EXCEPT THERE IS NO HARDWARE ON SIDE 2. (ONE WAY DOOR).

TYPE 4A, 4B, 4C AND 4D GENERAL NOTES

- PROGRAM READER TO ALLOW AUTHORIZED USERS TO KEY-IN THE TIME TO KEEP DOOR OPEN. ONCE THE DOOR IS CLOSED THE DOOR SHALL RESET INTO SECURE POSITION.
- ACTIVATE A PRE-ALARM ON CARD READER TO INDICATE EXPIRATION OF TIME IS NEARING. COORDINATE PRE-ALARM TIME WITH OWNER.
- DELAYED EGRESS CRASH BAR SHALL RE-SECURE UPON DETECTION FROM DPS THAT DOOR HAS BEEN CLOSED AND NOT RELY ON INTEGRATED TIMER.
- MONITOR RELEASE COUNTDOWN ON ACCESS CONTROL AS AN ALARM CONDITION.



NOTES:

- PROVIDE ONE PANEL INTERFACE MODULE (PIM) WITH POWER SUPPLY PER 12 OR FEWER LOCKS.
- LOCATE PIM FOR OPTIMAL LOCK COMMUNICATION.
- CONNECT TO ACCESS CONTROL IN COMMUNICATION ROOM.

TYPE 2A & 2B DESCRIPTIONS

- TYPE 2 SHOWN IN DETAIL.
- TYPE 2A IS THE SAME AS TYPE 2 EXCEPT WITH DOUBLE DOORS. PROVIDE DPS ON BOTH DOORS.
- TYPE 2B IS THE SAME AS TYPE 2 EXCEPT WITH DUAL CARD READER.

TYPE 2 ACCESS POINT [#]2

ACCESS CONTROL SYSTEM GENERAL NOTES

- MANUFACTURER AND MODEL NUMBERS ARE USED TO ESTABLISH QUALITY AND PERFORMANCE OF THE SYSTEM. ANY EQUIPMENT THAT MEETS OR EXCEEDS THE PERFORMANCE SHALL BE CONSIDERED AND APPROVED AT THE DISCRETION OF THE ENGINEER AND/OR OWNER.
- REFER TO ACCESS POINT SCHEDULE DWG ET600 FOR DOOR CONFIGURATION AND SIGNAGE TYPE. SEE ET5-05 FOR SECURITY SIGNAGE.
- ACCESS CONTROL SYSTEM SHALL MONITOR OR INTERFACE WITH THE FOLLOWING ITEMS AT EACH ACCESS POINT (IF AVAILABLE):
 - CARD READER TAMPER
 - EIB TAMPER
 - POWER SUPPLY TAMPER
 - DOOR POSITION SWITCHES
 - POWER SUPPLY POWER FAIL
 - POWER SUPPLY BATTERY LOW/FAIL
 - REQUEST TO EXIT (REX)
 - PANIC BAR ALARM – COUNTDOWN (DELAYED EGRESS ONLY)
 - FIRE ALARM RELEASE (DELAYED EGRESS ONLY)
 - LOCAL ALARM
- DOORS TO BE HELD OPEN FOR LONGER THAN 30 SECONDS SHALL:
 - ALLOW AUTHORIZED USERS TO KEY-IN THE TIME TO KEEP DOOR OPEN. ONCE THE DOOR IS CLOSED, THE DOOR SHALL RESET INTO SECURE POSITION.
 - ACTIVATE A PRE-ALARM AUDIO BEEP ON CARD READER TO INDICATE EXPIRATION OF TIME IS NEARING. COORDINATE PRE-ALARM TIME WITH OWNER.
 - AFTER PRE-ALARM AND PRIOR TO EXPIRATION OF TIME DOORS WITH MAGNETIC HOLD OPEN DEVICES SHALL RELEASE DOOR TO PREVENT HOLD OPEN ALARM.
 - EXPIRATION OF TIME SHALL ACTIVATE THE HORN/STROBE AT THE DOOR AND A STEADY BEEP ON THE READER.
- SEE ET504 FOR ACCESS POINT/DOOR HARDWARE SCHEDULE.

WARNING: THIS RECORD CONTAINS SENSITIVE SECURITY INFORMATION THAT IS CONTROLLED UNDER 49 CFR PARTS 15 AND 1520. NO PART OF THIS RECORD MAY BE DISCLOSED TO PERSONS WITHOUT A "NEED TO KNOW", AS DEFINED IN 49 CFR PARTS 15 AND 1520, EXCEPT WITH THE WRITTEN PERMISSION OF THE ADMINISTRATOR OF THE TRANSPORTATION SECURITY ADMINISTRATION OR THE SECRETARY OF TRANSPORTATION. UNAUTHORIZED RELEASE MAY RESULT IN CIVIL PENALTY OR OTHER ACTION. FOR U.S. GOVERNMENT AGENCIES, PUBLIC DISCLOSURE IS GOVERNED BY 5 U.S.C. 552 AND 49 CFR PARTS 15 AND 1520.

RS&H
IMPROVING YOUR WORLD

Reynolds, Smith and Hills, Inc.
4525 Airport Approach Rd, Ste A
Duluth, Minnesota 55811
218-722-1227 Fax: 218-722-1052
www.rsandh.com

**DULUTH AIRPORT
AUTHORITY**

**DULUTH
INTERNATIONAL
AIRPORT
DULUTH, MN**

**NEW PASSENGER
TERMINAL**

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) 722-8306

M/E/P/F/P 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:
APPOD DESIGN
2432 East First Street, Duluth MN 55812
TEL: (218) 591-5079

REVISIONS

NO.	DESCRIPTION	DATE
	100% REVIEW	12.15.10
	BD PACKAGE 2A	01.24.11
1	BP2A ADDENDUM 2	02.25.11
	BP2A CONFORMANCE SET	05.02.11
	BD PACKAGE 2B REVIEW	07.16.11
	BD PACKAGE 2B	08.23.11
2	BP2B ADDENDUM 2	09.15.11
	BP2B CONFORMANCE	10.21.11

DATE ISSUED: 02-10-12

REVIEWED BY: BA

DRAWN BY: RJL

DESIGNED BY: BA

AEP PROJECT NUMBER

213-1882-091

© 2010 REYNOLDS, SMITH AND HILLS INC.

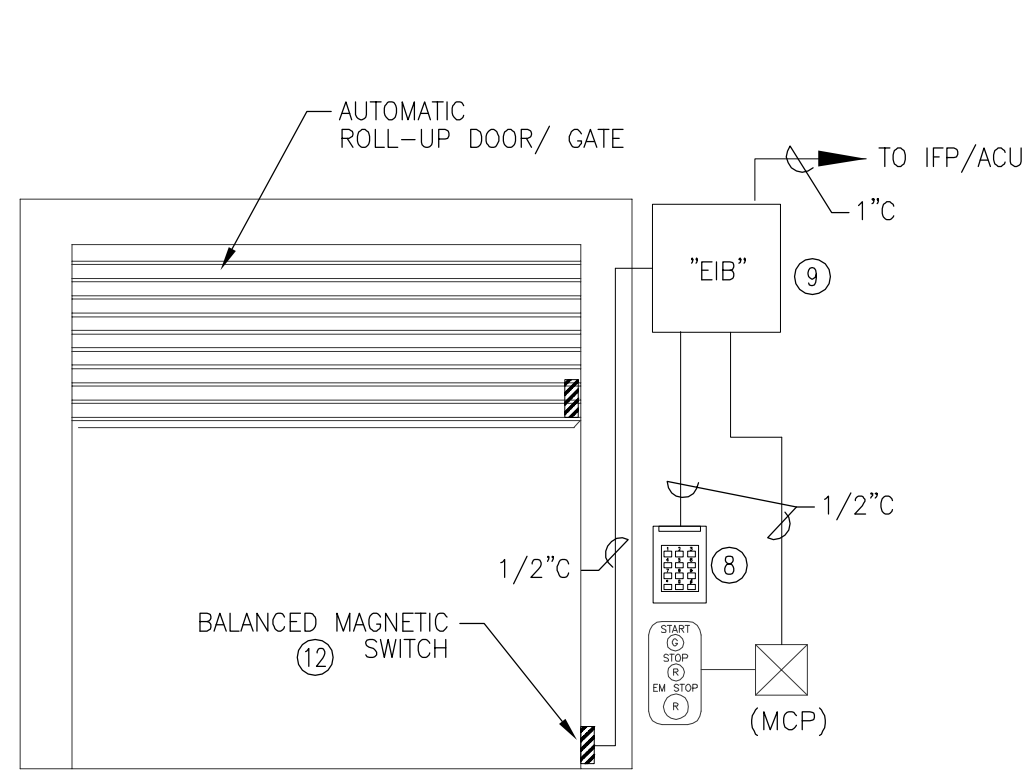
SHEET TITLE

**ACCESS CONTROL
DETAILS**

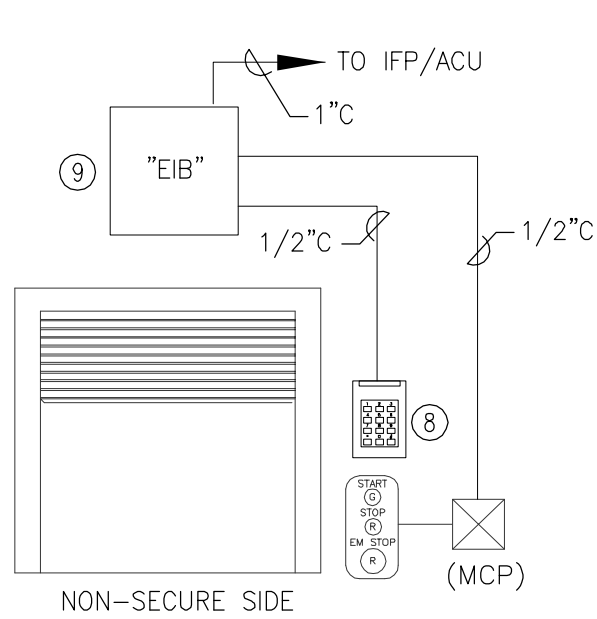
SHEET NUMBER

ET503

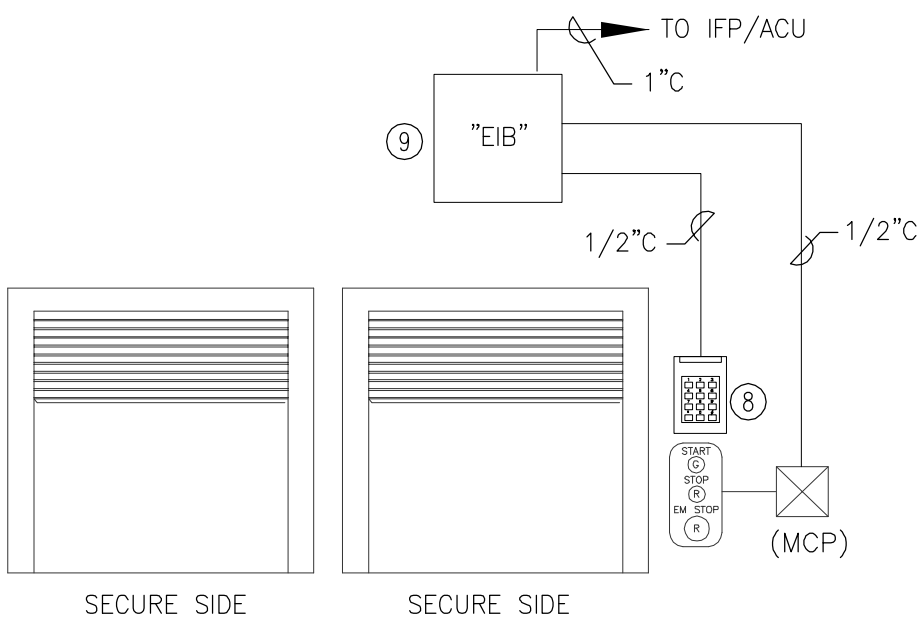
BID PACKAGE 2C



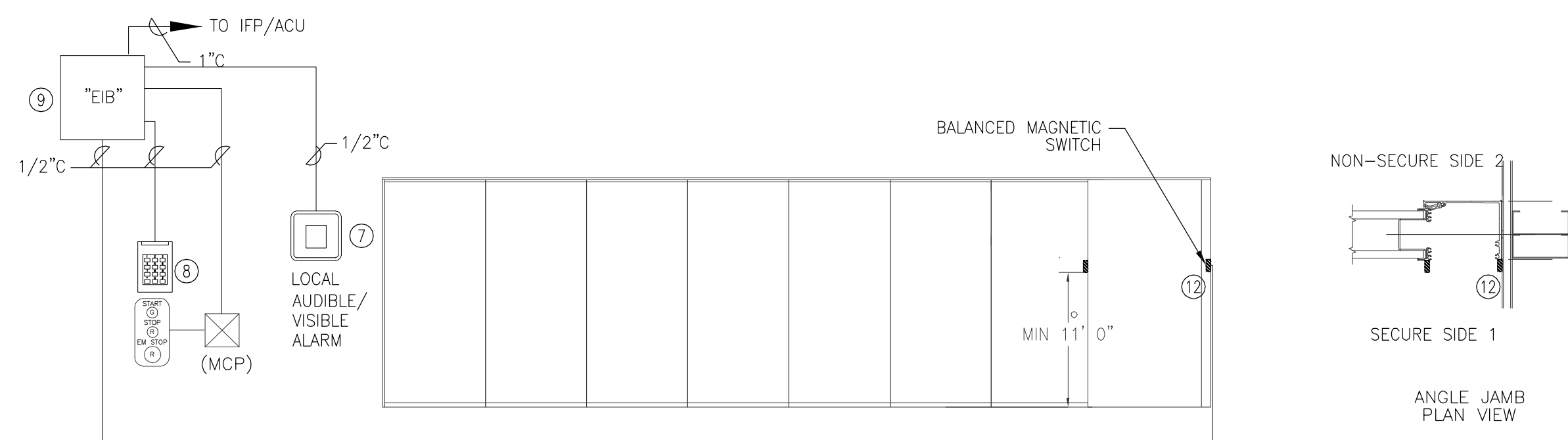
1. INTERFACE THE ACCESS CONTROL SYSTEM OPERATION WITH THE ROLL-UP DOOR/ GATE (MCP). CARD READER SHALL BE USED TO ACTIVATE THE ROLL-UP DOOR CONTROL PUSH BUTTONS. LOCATE CARD READER NEAR ROLL-UP DOOR PUSH BUTTONS.
2. PROVIDE THE OPTION FOR AUTOMATIC OPEN OR CLOSE OF DOOR WITH CARD SWIPE ONLY.



1. INTERFACE THE ACCESS CONTROL SYSTEM OPERATION WITH THE BAGGAGE BELT SYSTEM THROUGH THE BAGGAGE BELT MOTOR CONTROL PANEL (MCP). THE ROLL-UP DOORS SHALL REMAIN OPEN ONLY IF THE BAGGAGE SYSTEM IS OPERATIONAL AND SHALL INDICATE ALARM CONDITIONS IF THE DOOR IS OPEN AND THE BAGGAGE SYSTEM HAS STOPPED FOR AN ADJUSTABLE PERIOD OF 1 TO 15 MINUTES. CARD READER SHALL BE USED TO ACTIVATE THE BAGGAGE CLAIM CONVEYOR CONTROL PUSH BUTTONS.
2. MOUNT THE CARD READER NEXT TO THE CONTROLS FOR THE BAGGAGE SYSTEM.
3. USE BAGGAGE SYSTEM LIMIT SWITCHES TO SENSE DOOR POSITION OTHERWISE PROVIDE WIDE GAP BALANCED MAGNETIC SWITCH.



1. INTERFACE THE ACCESS CONTROL SYSTEM OPERATION WITH THE BAGGAGE BELT SYSTEM THROUGH THE BAGGAGE BELT MOTOR CONTROL PANEL (MCP). THE ROLL-UP DOORS SHALL REMAIN OPEN ONLY IF THE BAGGAGE SYSTEM IS OPERATIONAL AND SHALL INDICATE ALARM CONDITIONS IF THE DOOR IS OPEN AND THE BAGGAGE SYSTEM HAS STOPPED FOR AN ADJUSTABLE PERIOD OF 1 TO 15 MINUTES. CARD READER SHALL BE USED TO ACTIVATE THE BAGGAGE CLAIM DEVICE CONTROL PUSH BUTTONS.
2. MOUNT THE CARD READER NEXT TO THE CONTROLS FOR THE BAGGAGE SYSTEM. COORDINATE LAY-OUT WITH MUFIDS TUG INPUT STATION, 15" MUFIDS MONITOR AND PA MICROPHONE SYSTEM.
3. USE BAGGAGE SYSTEM LIMIT SWITCHES TO SENSE DOOR POSITION OTHERWISE PROVIDE WIDE GAP BALANCED MAGNETIC SWITCH.



1. INTERFACE THE ACCESS CONTROL SYSTEM OPERATION WITH THE ELECTRIFIED PARTITION (MCP). CARD READER SHALL BE USED TO ACTIVATE THE ELECTRIFIED PARTITION CONTROL PUSH BUTTONS. LOCATE CARD READER NEAR ELECTRIFIED PARTITION DOOR PUSH BUTTONS.
2. PROVIDE THE OPTION FOR AUTOMATIC OPEN OR CLOSE OF DOOR WITH CARD SWIPE ONLY.

TYPE 5 ACCESS POINT

ROLL-UP DOOR/ GATE

TYPE 6 ACCESS POINT

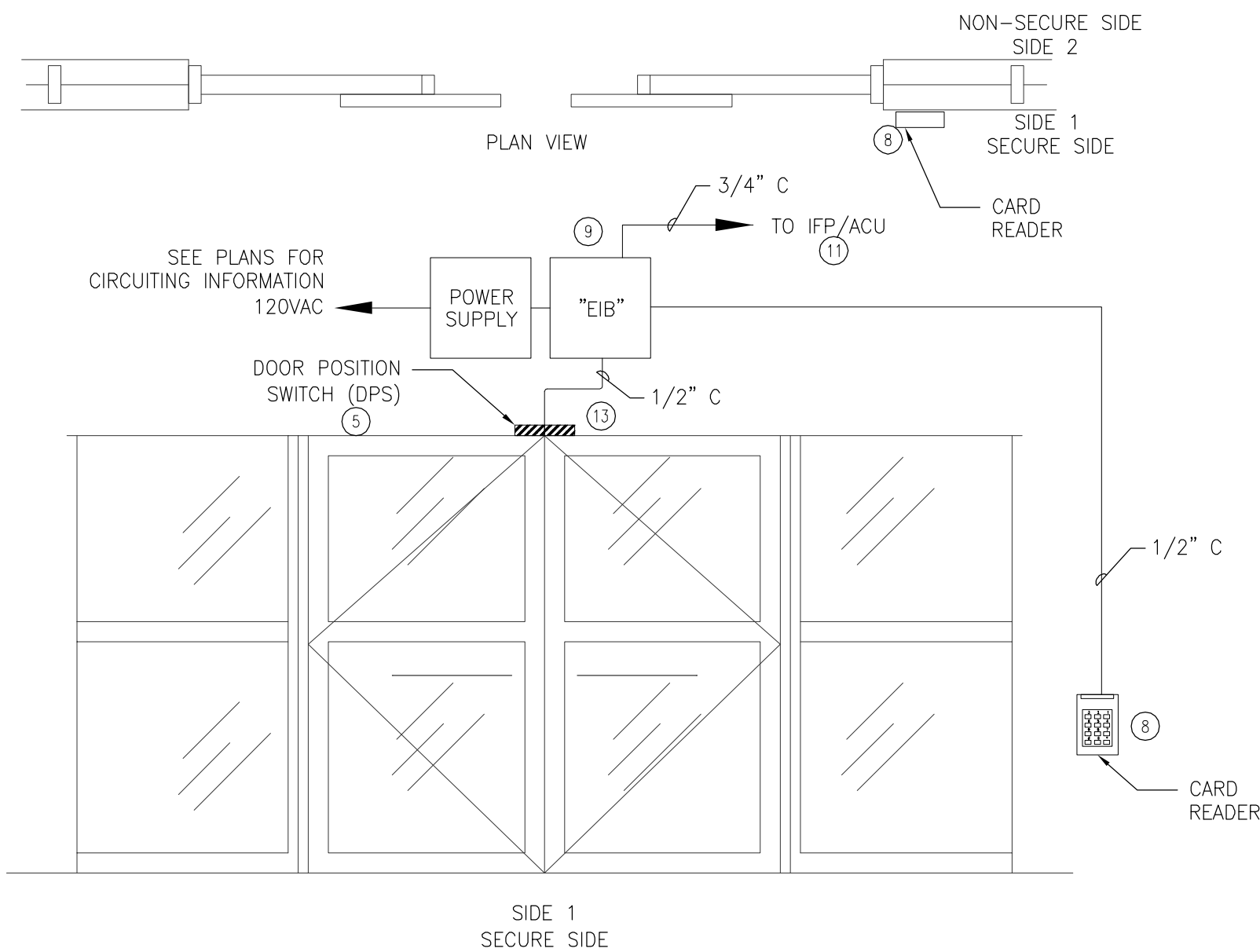
OUTBOUND TICKET COUNTER BAGGAGE BELT

TYPE 7 ACCESS POINT

INBOUND BAGGAGE CLAIM BAGGAGE BELT

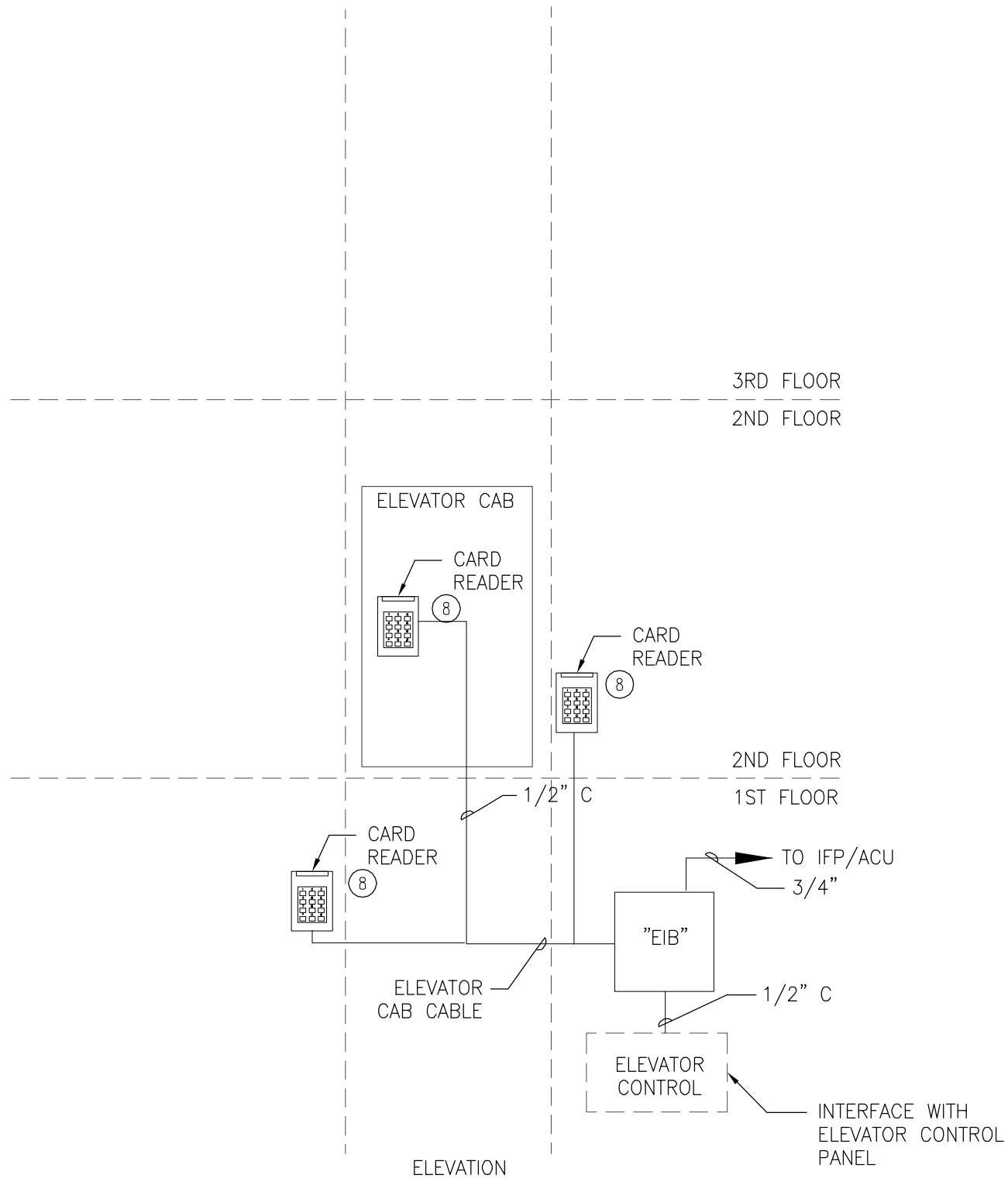
TYPE 8 ACCESS POINT

ELECTRIFIED PARTITION



TYPE 9 ACCESS POINT

SLIDING GLASS TERMINAL DOOR



DOOR OPERATION UNDER ALARM CONDITIONS:

1. FIRE ALARM SHALL RESTRICT ACCESS TO THE ELEVATOR. ACCESS CONTROL SHALL NOT ALLOW ACCESS. FIRE MARSHALL KEY SHALL ALLOW ACCESS BUT PROVIDE ALARM ON ACCESS CONTROL SYSTEM.

TYPE "EL" GENERAL NOTES

1. ADDRESSABLE RELAY WITH N.O. & N.C. DRY CONTACTS TO BE LOCATED IN THE ELEVATOR MACHINE ROOM. THE ACCESS CONTROL CONTRACTOR SHALL INTERFACE WITH THE ELEVATOR CONTROLS SO THE CARD READER WILL ENABLE ELEVATOR CALL BUTTONS FOR USER CONFIGURATION PERIOD OF 1-30 SECONDS.

ELEVATOR SEQUENCE OF OPERATION

PUBLIC OPERATION

1. UNDER NORMAL OPERATION THE ELEVATOR WEST DOORS ARE CLOSED AT ALL TIMES

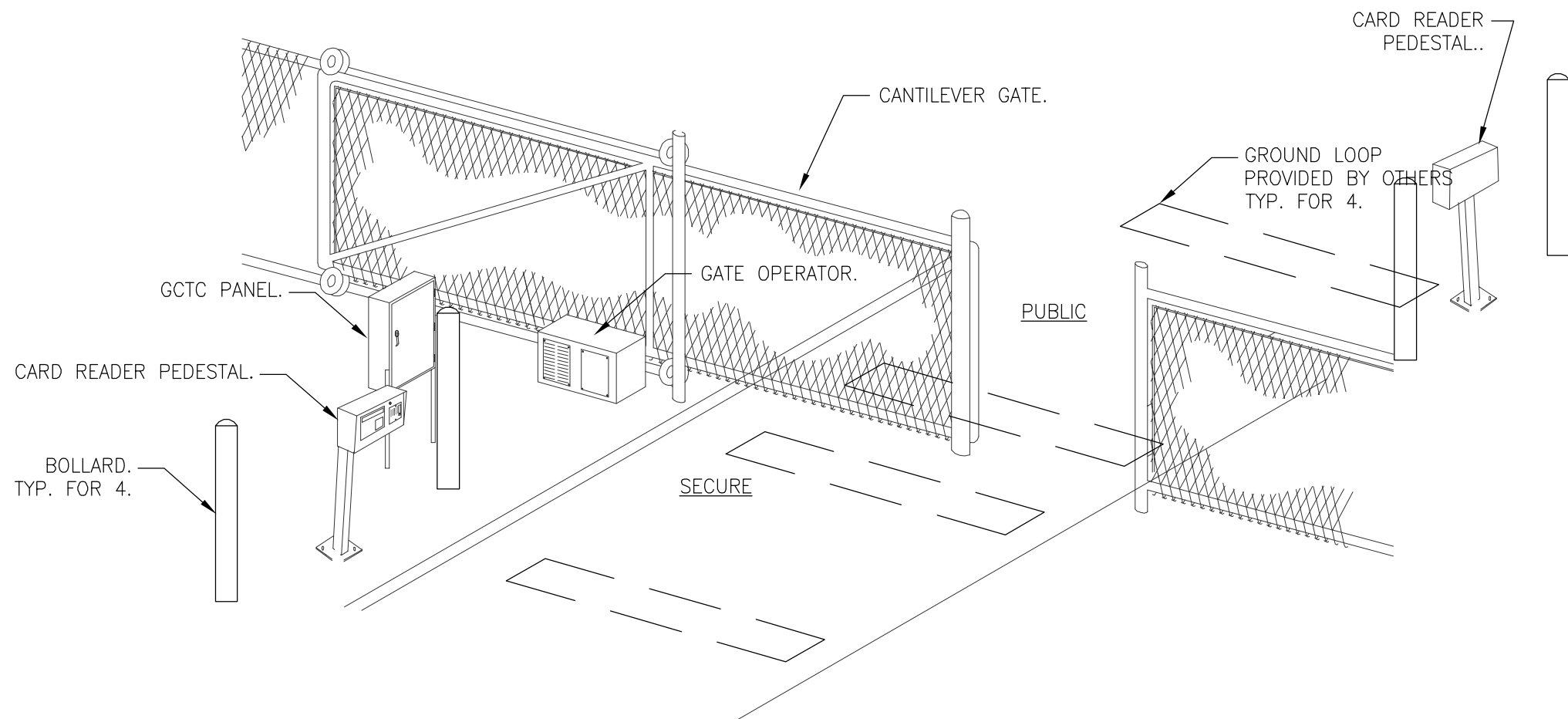
CBP OPERATION

1. UPON CLOSURE OF THE INTERNATIONAL DIVIDING WALLS AND CBP VERIFICATION OF EMPTY CAR, ELEVATOR 154 WILL BE PLACED UNDER CBP CONTROL BY THE IN CAR CARD READER ALLOWING CALLS FROM CORRIDOR 155 OR CORRIDOR 229 PUSH BUTTONS AND PROVIDING ALARM NOTIFICATION THAT THE CAR IS IN CBP SERVICE.
2. "ELEVATOR NOT AVAILABLE" SIGN WILL BE ILLUMINATED AT EAST ELEVATOR DOORS ON THE 1st 2nd and 3rd LEVELS. EAST ELEVATOR DOOR CALL STATIONS FROM BAG CLAIM 116, PASSENGER WAITING 201 AND WAITING 301 SHALL NOT BE ANSWERED UNTIL ELEVATOR IS RETURNED TO PUBLIC USE.
3. IF THE DPS ON EITHER SIDE DIVIDING WALL INDICATES "OPEN" A CARD ACCESS ALARM WILL SOUND, THE ELEVATOR 154 WILL RETURN TO THE 1st LEVEL & PARK WITH WEST DOORS OPEN.
4. UPON COMPLETION OF INTERNATIONAL PASSENGER PROCESSING, CBP WILL RELEASE ELEVATOR USING THE IN-CAR CARD READER WITH CARD AND PIN # ENTRY WHICH WILL CLOSE WEST DOOR, TURN OFF "ELEVATOR NOT AVAILABLE" SIGN, AND OPEN EAST DOOR.

TYPE EL ACCESS POINT

SECURE ELEVATOR

ACCESS POINT/DOOR HARDWARE SCHEDULE:			
DESCRIPTION	SPEC. #	MANUFACTURER / MODEL	REMARKS
① PRE-CONDUITED DOOR FRAME	—	ASSA ABLOY / ELECTROLYNX	PROVIDED IN TERMINAL PACKAGE SCOPE
② ELECTRIFIED HINGE	—	ELECTROLYNX QC8 & QC12	PROVIDED IN TERMINAL PACKAGE SCOPE
③ ELECTRONIC PUSH BAR	—	CORBIN RUSSWIN EDS0000 SERIES	PROVIDED IN TERMINAL PACKAGE SCOPE
④ ELECTRONIC TRIM	—	CORBIN RUSSWIN ML20900 SERIES	PROVIDED IN TERMINAL PACKAGE SCOPE
⑤ DOOR POSITION SWITCH (BMS)	13700	SECURITRON DPS-M-GY OR GE 1076CW	
⑥ MAGNETIC HOLD-OPEN/DOOR RELEASE	—	RIXSON 980	FLOOR MOUNTED
⑦ AUDIBLE/VISUAL ALARM	13700	SYSTEM SENSOR P4R	4 WIRE, WHITE, WALL MOUNTED
⑧ CARD READER	13700	HID RK40	
⑨ ELECTRONIC INTERFACE BOX	13700		READER INTERFACE AND I/O MODULES
⑩ POWER SUPPLY	13700	ALTRONIX AL125UL	1A, 12VDC, 7.2AH BATTERY
⑪ FIRE ALARM RELAY	—	PROVIDE AS REQUIRED	USE TERMINAL PACKAGE FIRE ALARM INTEGRATOR
⑫ WIDE GAP BALANCED MAGNETIC SWITCH	13700	SECURITRON MSS-1	
⑬ TWO POINT LOCK SOLOINOID	8460		
⑭ NETWORKED WIRELESS LOCK (WITH BATTERIES)	—	SCHLAGE AD 400	SMART CARD AND KEYPAD
⑮ PANEL INTERFACE	—	SCHLAGE PIM 400	WITH POWER SUPPLY AS REQUIRED BY FIELD SURVEY



TYPE 12 NOTES:

1. CONTRACTOR SHALL INTERFACE WITH GATE OPERATOR CONTROL PANEL.
2. PROVIDE WIDE GAP BALANCED MAGNETIC SWITCH AT ALL GATE LOCATIONS.
3. PROVIDE RELAYS TO INTERFACE WITH GROUND LOOPS USED AS REQUEST TO EXIT.

TYPE 12 ACCESS POINT

VEHICLE GATE

WARNING: THIS RECORD CONTAINS SENSITIVE SECURITY INFORMATION THAT IS CONTROLLED UNDER 49 CFR PARTS 15 AND 1520. NO PART OF THIS RECORD MAY BE DISCLOSED TO PERSONS WITHOUT A "NEED TO KNOW", AS DEFINED IN 49 CFR PARTS 15 AND 1520, EXCEPT WITH THE WRITTEN PERMISSION OF THE ADMINISTRATOR OF THE TRANSPORTATION SECURITY ADMINISTRATION OR THE SECRETARY OF TRANSPORTATION. UNAUTHORIZED RELEASE MAY RESULT IN CIVIL PENALTY OR OTHER ACTION. FOR U.S. GOVERNMENT AGENCIES, PUBLIC DISCLOSURE IS GOVERNED BY 5 U.S.C. 552 AND 49 CFR PARTS 15 AND 1520.

RS&H
IMPROVING YOUR WORLD

Reynolds, Smith and Hills, Inc.
4525 Airport Approach Rd, Ste A
Duluth, Minnesota 55811
218-722-1227 Fax: 218-722-1062
www.rsandh.com

DULUTH INTERNATIONAL AIRPORT
DULUTH, MN

DULUTH INTERNATIONAL AIRPORT
DULUTH, MN

NEW PASSENGER TERMINAL

CONSULTANTS

Interior Architects:
SJA ARCHITECTS
11 E Superior Street Suite 340, Duluth MN 55802
TEL: (218) 724-8578 / FAX: (218) 722-8717

Structural Engineers:
MBJ CONSULTING ENG.
501 Lake Avenue South, Suite 300, Duluth MN 55802
TEL: (218) 722-1056 / FAX: (218) 722-8306

M/E/P/F 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:
APPOLO DESIGN
2432 East First Street, Duluth MN 55812
TEL: (218) 591-5079

REVISIONS

NO.	DESCRIPTION	DATE
1005	REVIEW	12.15.10
	BID PACKAGE 2A	01.24.11
1	BP2A ADDENDUM 1	02.25.11
	BP2A CONFORMANCE SET	05.02.11
	BID PACKAGE 2B REVIEW	07.16.11
	BID PACKAGE 2B	08.23.11
2	BP2B ADDENDUM 2	09.15.11
	BP2B CONFORMANCE	10.21.11

DATE ISSUED: 02-10-12

REVIEWED BY: BA

DRAWN BY: RJL

DESIGNED BY: BA

AEP PROJECT NUMBER

213-1882-091

© 2010 REYNOLDS, SMITH AND HILLS INC.

SHEET TITLE

ACCESS CONTROL DETAILS

SHEET NUMBER

ET504

BID PACKAGE 2C

Reynolds, Smith and Hills, Inc.
4525 Airport Approach Rd, Ste A
Duluth, Minnesota 55811
218-722-1227 Fax: 218-722-1062
www.rsandh.com



DULUTH
INTERNATIONAL
AIRPORT
DULUTH, MN

NEW PASSENGER
TERMINAL

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) 722-8306

M/E/P/F/P 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) 591-5079

REVISIONS

NO.	DESCRIPTION	DATE
	100% REVIEW	12.15.10
	BID PACKAGE 2A	01.24.11
1	BP2A ADDENDUM 1	02.25.11
	BP2A CONFORMANCE SET	05.02.11
	BID PACKAGE 2B REVIEW	07.16.11
	BID PACKAGE 2B	08.23.11
	BP2B CONFORMANCE	10.21.11

DATE ISSUED: 02-10-12

REVIEWED BY: BA

DRAWN BY: RJL

DESIGNED BY: BA

AEP PROJECT NUMBER

213-1882-091

© 2010 REYNOLDS, SMITH AND HILLS INC.

SHEET TITLE

ACCESS CONTROL
SIGNS

SHEET NUMBER

ET505

BID PACKAGE 2C



TYPE 1 SIGN



TYPE 2 SIGN



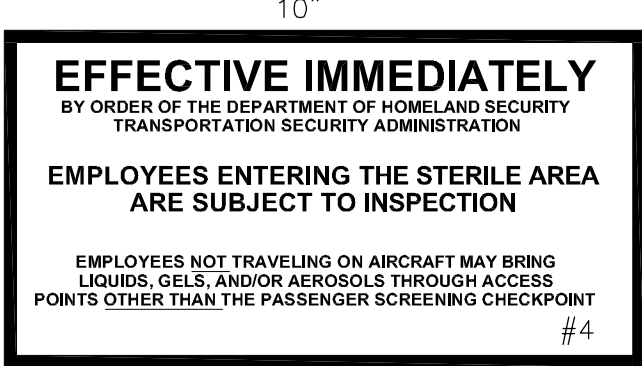
TYPE 3 SIGN



TYPE 4 SIGN



TYPE 5 SIGN



TYPE 6 SIGN



TYPE 7 SIGN



TYPE 8 SIGN



TYPE 9 SIGN

SIGN TYPES

SIGN NOTES:

- SIGNAGE SHALL BE PROVIDED AS INDICATED ON THE DRAWINGS AT SELECTED ACCESS POINTS TO PROVIDE INFORMATION FOR THE USERS.
- SIGNS SHALL BE VINYL WITH ADHESIVE BACK.
- EMERGENCY EXIT LETTERING SHALL BE 1" MINIMUM IN HEIGHT PER LIFE SAFETY CODE/BUILDING CODE.
- BORDER SHALL BE 3/16" BLACK.
- FONT SHALL BE ARIAL BLACK FOR LARGE BOLD AND ARIAL FOR SMALLER TEXT.
- BACKGROUND/TEXT COLORS:
 - #1 - BLUE BACKGROUND W/ WHITE TEXT
 - #2 - RED BACKGROUND W/ WHITE TEXT
 - #3 - YELLOW/ORANGE BACKGROUND W/ BLACK TEXT
 - #4 - WHITE BACKGROUND W/ BLACK TEXT
- PROVIDE SIGN TYPE 6 AT ALL DOORS WITH A TYPE 1 SIGN (STERILE AREA).
- PROVIDE SIGN TYPE 4 AT ALL TYPE "4" DOORS. (DELAYED EGRESS).
- PROVIDE SIGN TYPE 5 AT ALL TYPE "LB" DOORS. (PLANE EGRESS)
- PROVIDE SIGN TYPES 1, 2 OR 3 AT ALL POINTS CROSSING A SIDA OR STERILE BOUNDARY. TYPES 7 & 8 SHALL ONLY BE USED ON NON-SECURE/SECURE OR SECURE/SECURE POINTS.
- GLASS DOOR SIGNAGE SHALL INCORPORATE IDENTICALLY SIZED SIGNS ON BOTH SIDES (BACK TO BACK).

ACCESS POINT SCHEDULE											
POINT ID	DOOR #	TERM POINT	LOCATION	POINT TYPE	REF DWG	CCTV CAMERA	SECURITY LINE		SIGNAGE		NOTES
							SIDE 1	SIDE 2	SIDE 1	SIDE 2	
1	179C	IDF-1	TUG DRIVE TO LANDSIDE	4D	ET410	#68	SIDA	NON-SECURE	TYPE 3	TYPE 2	ALARM WHEN OPEN, NO HARDWARE SET
2	176E	IDF-1	TUG DRIVE TO LANDSIDE	4B	ET410	#2	SIDA	NON-SECURE	TYPE 3	TYPE 2	
3	-	IDF-1	INTERNATIONAL 117 TO TUG TUNNEL	7	ET410	#1,#2	NON SECURE	SIDA	-	-	BAGGAGE BELT
4	117A	IDF-1	INTERNATIONAL 117 TO LANDSIDE	4B	ET410	#51	SECURE	NON-SECURE	TYPE 4	TYPE 2	
5	180A	IDF-1	INTERNATIONAL 117 TO OFFICE 180	1B	ET410	#1	SECURE	NON-SECURE	TYPE 7	TYPE 8	
6	159A	IDF-1	INTERNATIONAL 117 TO SEC. X-RAY 159	5	ET410	#1	NON-SECURE	SECURE	-	-	
7	159B	IDF-1	INTERNATIONAL 117 TO SEC. X-RAY 159	1	ET410	#1	SECURE	NON-SECURE	TYPE 8	TYPE 7	
8	100A	IDF-1	VESTIBULE 100 TO INTERNATIONAL 117	9	ET410	#1	NON-SECURE	SECURE	-	-	
9	181A	IDF-1	SECONDARY 159 TO CASH 181	1	ET410	#52	SECURE	SECURE	TYPE 7	TYPE 8	
10	160A	IDF-1	SECONDARY 159 TO AG. LAB 160	1	ET410	#52	SECURE	SECURE	TYPE 7	TYPE 8	
11	166B	IDF-1	OFFICE 166 TO SECURE STORAGE 167	1	ET410	#60	SECURE	SECURE	TYPE 7	TYPE 8	
12	168A	IDF-1	CORRIDOR 168 TO CORRIDOR 182	1B	ET410	#54	SECURE	SECURE	TYPE 8	TYPE 7	
13	220A	MDF	PASSENGER WAITING 201 TO TENANT 220	1B	ET412	-	UNSECURE	STERILE	TYPE 3	TYPE 1	VERIFY DOOR HARDWARE SET
14	163A	IDF-1	SECONDARY 159 TO ROVER 163	1	ET410	#53	SECURE	SECURE	TYPE 8	TYPE 7	
15	155B	IDF-1	BAGGAGE CLAIM 116 TO RECHECK 155	1C	ET410	#3	SECURE	NON-SECURE	TYPE 8	TYPE 7	
16	154	IDF-1	RECHECK 155 TO ELEV. 154	EL	ET410	-	-	-	-	-	
17	150A	IDF-1	RECHECK 155 TO CORRIDOR 150	2	ET410	-	SECURE	NON-SECURE	TYPE 8	TYPE 7	
18	-	IDF-1	RECHECK 155 TO TUG TUNNEL	7	ET410	#4	NON-SECURE	SIDA	-	-	BAGGAGE BELT
19	176F	IDF-1	RECHECK 155 TO TUG TUNNEL	1	ET410	#4	SECURE	SIDA	TYPE 2	TYPE 3	
20	156A	IDF-1	CORRIDOR 150 TO BREAK 156	2	ET410	-	SECURE	SECURE	TYPE 7	TYPE 8	
21	-	IDF-1	BAGGAGE CLAIM 116 TO TUG TUNNEL	7	ET410	#4,#3	NON-SECURE	SIDA	-	-	BAGGAGE BELT
22	149A	IDF-1	ELECTRICAL 149 TO TUG TUNNEL	1	ET410	#4	SECURE	SIDA	TYPE 2	TYPE 3	
23	151A	IDF-1	BAGGAGE CLAIM 116 TO COMM. 151	2	ET410	-	SECURE	NON-SECURE	TYPE 8	TYPE 7	
24	149B	IDF-1	CORRIDOR 140 TO ELECTRICAL 149	2	ET410	-	SECURE	SECURE	TYPE 8	TYPE 7	
25	140A	IDF-1	CORRIDOR 140 TO BAGGAGE CLAIM 116	2	ET410	#3	SECURE	NON-SECURE	TYPE 8	TYPE 7	
26	140B	IDF-1	CORRIDOR 140 TO TUG TUNNEL	1A	ET411	#5	SECURE	SIDA	TYPE 2	TYPE 3	
27	133C	IDF-1	CORRIDOR 140 TO CBIS ROOM 133	1A	ET411	-	SECURE	SECURE	TYPE 8	TYPE 7	
28	-	IDF-1	CBIS ROOM 133 TO TUG TUNNEL	7	ET411	#5,#6,#7,#8	NON-SECURE	SIDA	-	-	BAGGAGE BELT
29	-	IDF-1	CBIS ROOM 133 TO TUG TUNNEL	6	ET411	#5,#7,#9,#13	SECURE	SIDA	-	-	BAGGAGE BELT
30	133A	IDF-1	LOBBY/CIRCULATION 104 TO CBIS 133	1	ET411	#6	SECURE	NON-SECURE	TYPE 8	TYPE 7	
31	133D	IDF-1	LOBBY/CIRCULATION 104 TO CBIS 133	1	ET411	#10,#11	SECURE	NON-SECURE	TYPE 8	TYPE 7	
32	-	IDF-1	CHECK IN COUNTER 103 TO CBIS 133	6	ET411	#10,#11	NON-SECURE	SECURE	-	-	
33	120B	IDF-1	CORRIDOR 120 TO CBIS ROOM 133	1	ET411	-	SECURE	SECURE	TYPE 8	TYPE 7	
34	176A	IDF-1	LOADING 126 TO TUG TUNNEL	1A	ET411	#13	SECURE	SIDA	TYPE 2	TYPE 3	
35	176B	IDF-1	TUG TUNEL 176 TO LANDSIDE	4B	ET411	#13	SIDA	NON-SECURE	TYPE 3	TYPE 2	ALARM WHEN OPEN
36	178C	IDF-1	EAST TUG RAMP 178 TO LANDSIDE	4D	ET411	#69	SIDA	NON-SECURE	TYPE 3	TYPE 2	ALARM WHEN OPEN, NO HARDWARE SET
37	126B	IDF-1	LANDSIDE TO LOADING 126	1	ET411	-	SECURE	NON-SECURE	TYPE 8	TYPE 7	
38	190A	IDF-1	CORRIDOR 126 TO LOADING 126	2	ET411	-	SECURE	NON-SECURE	TYPE 8	TYPE 7	
39	120A	IDF-1	CHECK-IN LOBBY TO CORRIDOR 120	2	ET411	#12	SECURE	NON-SECURE	TYPE 8	TYPE 7	
40	117B	IDF-1	BAGGAGE CLAIM 116 TO INTERNATIONAL 117	8	ET410	-	SECURE	NON-SECURE	-	-	
41	190B	IDF-1	LANDSIDE TO STAIRS	1	ET411	-	NON-SECURE	NON-SECURE	-	-	
42	219A	MDF	CONCOURSE 219 TO CORRIDOR 233	1B	ET412	#18	STERILE	STERILE	TYPE 8	TYPE 7	
43	219C	MDF	CONCOURSE 219 TO CONCOURSE 219	8	ET412	#18,#19	SECURE	NON-SECURE	-	-	
44	242A	MDF	STERILE CORRIDOR 242 TO RAMP 247	1B	ET412	#14	SIDA	STERILE	TYPE 1	TYPE 2	
45	242C	MDF	STERILE CORRIDOR 242 APRON	4B	ET412	#14	STERILE	SIDA	TYPE 2	TYPE 1	
46	237C	MDF	STERILE CORRIDOR 242 TO CBP PRIM. PROC.	4B	ET412	#31	SECURE	STERILE	TYPE 1	TYPE 2	
47	233B	MDF	STERILE CORRIDOR 242 TO CORRIDOR 233	1B	ET412	#31	STERILE	STERILE	TYPE 2	TYPE 3	
48	231A	MDF	CORRIDOR 233 TO BOARDING 231	1B	ET412	-	STERILE	STERILE	TYPE 2	TYPE 3	
49	237B	MDF	CBP PRIM. PROC. 237 TO CBP PRIM. PROC.	4B	ET412	#45	SECURE	SECURE	TYPE 2	TYPE 3	
50	245A	MDF	CBP PRIM. PROC. 237 TO CBP COORD. CNTR.	1	ET412	-	SECURE	SECURE	TYPE 3	TYPE 2	
51	237A	MDF	CBP PRIM. PROC. 237 TO STAIRS 292	1A	ET412	#30	SECURE	NON-SECURE	TYPE 3	TYPE 2	
52	241A	MDF	CBP PRIM. PROC. 237 TO OFFICE 241	2	ET412	-	SECURE	SECURE	-	-	
53	240A	MDF	CBP PRIM. PROC. 237 TO LAN. RM. 240.	1	ET412	-	SECURE	SECURE	TYPE 3	TYPE 3	
54	237D	MDF	CBP PRIM. PROC. 237 TO DEPARTURE LOUNGE	4D	ET412	#18,#49	SECURE	STERILE	TYPE 3	-	
55	232A	MDF	VESTIBULE 232 TO APRON	4B	ET412	#15	STERILE	SIDA	TYPE 2	TYPE 1	
56	219I	MDF	DEPARTURE LOUNGE 219 TO APRON	4B	ET412	#16	STERILE	SIDA	TYPE 2	TYPE 1	
57	219B	MDF	DEPARTURE LOUNGE 219 TO CORRIDOR 229	4B	ET412	#17	SECURE	STERILE	TYPE 1	TYPE 2	
58	230A	MDF	PASSENGER WAITING 201 TO ELEC. RM 230	2	ET412	-	NON-SECURE	SECURE	TYPE 7	TYPE 8	
59	217A	MDF	PASSENGER WAITING 201 TO COMM. RM. 217	2	ET412	-	NON-SECURE	SECURE	TYPE 7	TYPE 8	
60	219H	MDF	DEPARTURE LOUNGE 219 TO BOARDING BRIDGE	1B	ET412	#19	SIDA	STERILE	TYPE 1	TYPE 2	
61	214A	MDF	PASSENGER WAITING 201 TO TSA QUEUE	5	ET413	#21	NON SECURE	STERILE	-	-	
62	214B	MDF	PASSENGER WAITING 201 TO TSA QUEUE	1	ET413	#21	NON-SECURE	STERILE	TYPE 3	TYPE 1	
63	213A	MDF	PASSENGER WAITING 201 TO AIRPORT POLICE	1	ET413	#21	NON-SECURE	SECURE	TYPE 7	TYPE 8	
64	208A	MDF	CORRIDOR 202 TO TSA CHECKPOINT 208	4B	ET413	#26	NON-SECURE	STERILE	TYPE 3	TYPE 1	
65	219G	MDF	CONCOURSE 219 TO BOARDING BRIDGE	1B	ET413	#25	SIDA	STERILE	TYPE 1	TYPE 2	
66	219F	MDF	CONCOURSE 219 TO APRON	4B	ET413	#29	STERILE	SIDA	TYPE 2	TYPE 1	
67	219E	MDF	CONCOURSE 219 TO FIXED BRIDGE 248	1B	ET413	#29	SIDA	STERILE	TYPE 1	TYPE 2	

GENERAL NOTES:

1. SEE DRAWINGS ET503, ET504 FOR ACCESS POINT DETAILS.
2. SEE DRAWING ET505 FOR ACCESS POINT SIGNAGE.
3. SEE DRAWING ET601 FOR ACCESS POINT RISER DIAGRAM AND NOTES.

ACCESS POINT SCHEDULE											
POINT ID	DOOR #	TERM POINT	LOCATION	POINT TYPE	REF DWG	CCTV CAMERA	SECURITY LINE		SIGNAGE		NOTES
							SIDE 1	SIDE 2	SIDE 1	SIDE 2	
68	203B	MDF	CONCOURSE 219 TO COORIDOR 203	4B	ET413	#28	STERILE	SECURE	—	—	
69	204A	MDF	CORRIDOR 203 TO TELECOM 204	2	ET413	—	SECURE	SECURE	—	—	
70	203A	MDF	CORRIDOR 202 TO CORRIDOR 203	2	ET413	—	SECURE	NON-SECURE	—	—	
71	333A	IDF-3	WAITING 301 TO MECHANICAL ROOM 333	2A	ET414	#33	SECURE	NON-SECURE	—	—	
72	391B	IDF-3	STAIRS 391 TO ELECTRICAL 334	2	ET414	—	SECURE	NON-SECURE	—	—	
73	318A	IDF-3	WAITING 301 TO EMERGENCY OPS 318	2A	ET414	#40	SECURE	NON-SECURE	—	—	
74	317A	IDF-3	WAITING 301 TO RECEPTION 321	2A	ET414	#40	SECURE	NON-SECURE	—	—	
75	302A	IDF-3	CORRIDOR 302 TO OPEN OFFICE 328	2	ET415	—	SECURE	NON-SECURE	—	—	
76	336A	IDF-3	CORRIDOR 302 TO STORAGE 336	2	ET415	—	NON-SECURE	SECURE	—	—	
77	337A	IDF-3	CORRIDOR 302 TO COM/ELEC 337	2	ET415	—	NON-SECURE	SECURE	—	—	
78	306A	IDF-3	CORRIDOR 302 TO CORRIDOR 306	4	ET415	—	SECURE	NON-SECURE	—	—	
79	304A	IDF-3	CORRIDOR 302 TO MECHANICAL 304	2A	ET415	—	SECURE	NON-SECURE	—	—	
80	335C	IDF-3	CORRIDOR 302 TO CORRIDOR 335	4	ET415	—	NON-SECURE	SECURE	—	—	
81	304B	IDF-3	CORRIDOR 335 TO MECHANICAL 304	2	ET415	—	SECURE	SECURE	—	—	
82	390A	IDF-3	CORRIDOR 335 TO STAIRS 390	2	ET415	—	SECURE	NON-SECURE	—	—	
83	205A	MDF	CORRIDOR 209 TO JAN 205	2	ET413	—	SECURE	SECURE	—	—	
84	138A	IDF-1	LOBBY/CIRCULATION 104 TO JAN 138	2	ET411	—	SECURE	NON-SECURE	—	—	
85	186A	IDF-1	LOBBY/CIRCULATION 104 TO RAC6B	2	ET411	—	SECURE	NON-SECURE	—	—	
86	185A	IDF-1	RAC6A TO RAC6B	2	ET411	—	SECURE	NON-SECURE	—	—	
87	106A	IDF-1	LOBBY/CIRCULATION 104 TO RAC5B	2	ET411	—	SECURE	NON-SECURE	—	—	
88	107A	IDF-1	RAC5A TO RAC5B	2	ET411	—	SECURE	NON-SECURE	—	—	
89	108A	IDF-1	LOBBY/CIRCULATION 104 TO RAC4B	2	ET411	—	SECURE	NON-SECURE	—	—	
90	109A	IDF-1	RAC4A TO RAC4B	2	ET411	—	SECURE	NON-SECURE	—	—	
91	110A	IDF-1	LOBBY/CIRCULATION 104 TO RAC3B	2	ET411	—	SECURE	NON-SECURE	—	—	
92	111A	IDF-1	RAC3A TO RAC3B	2	ET411	—	SECURE	NON-SECURE	—	—	
93	112A	IDF-1	LOBBY/CIRCULATION 104 TO RAC2B	2	ET411	—	SECURE	NON-SECURE	—	—	
94	113A	IDF-1	RAC2A TO RAC2B	2	ET411	—	SECURE	NON-SECURE	—	—	
95	148A	IDF-1	CORRIDOR 140 TO SUB.OFFICE148	2	ET410	—	SECURE	SECURE	—	—	
96	141A	IDF-1	CORRIDOR 140 TO MAINT.141	2	ET410	—	SECURE	SECURE	—	—	
97	142A	IDF-1	CORRIDOR 140 TO BHS STOR 142	2	ET410	—	SECURE	SECURE	—	—	
98	166A	IDF-1	CORRIDOR 120 TO OFFICE 166	2	ET410	—	SECURE	SECURE	—	—	
99	122A	IDF-1	CORRIDOR 120 TO OPS 122	2	ET411	—	SECURE	SECURE	—	—	
100	123B	IDF-1	OPS 122 TO OFFICE 123	2B	ET411	—	SECURE	SECURE	—	—	
101	123A	IDF-1	CORRIDOR 120 TO OFFICE 123	2	ET411	—	SECURE	SECURE	—	—	
102	124A	IDF-1	CORRIDOR 120 TO OPS 124	2	ET411	—	SECURE	SECURE	—	—	
103	125B	IDF-1	OPS 124 TO OFFICE 125	2B	ET411	—	SECURE	SECURE	—	—	
104	125A	IDF-1	CORRIDOR 120 TO OFFICE 125	2	ET411	—	SECURE	SECURE	—	—	
105	131A	IDF-1	CORRIDOR 120 TO OPS 131	2	ET411	—	SECURE	SECURE	—	—	
106	131B	IDF-1	OPS 131 TO OFFICE 132	2	ET411	—	SECURE	SECURE	—	—	
107	127B	IDF-1	OFFICE 129 TO OPS 127	2	ET411	—	SECURE	SECURE	—	—	
108	127A	IDF-1	CORRIDOR 120 TO OPS 127	2	ET411	—	SECURE	SECURE	—	—	
109	208B	MDF	CONCOURSE 219 TO TSA CHECKPOINT 208	5	ET413	—	STERILE	SECURE	—	—	
110	209A	MDF	TSA CHECKPOINT 208 TO STOR 209	2	ET413	—	SECURE	SECURE	—	—	
111	210A	MDF	TSA CHECKPOINT 208 TO REMOTE V 210	2	ET413	—	SECURE	SECURE	—	—	
112	211A	MDF	TSA CHECKPOINT 208 TO TSA 211	2	ET413	—	SECURE	NON-SECURE	—	—	
113	212A	MDF	CORRIDOR 202 TO DLH POLICE 112	2	ET413	—	SECURE	NON-SECURE	—	—	
114	314A	IDF-3	COORIDOR 302 TO JAN 314	2	ET415	—	SECURE	NON-SECURE	—	—	
115	323A	IDF-3	CORRIDOR 317 TO EXEC. DIR 323	2	ET415	—	SECURE	SECURE	—	—	
116	324A	IDF-3	CORRIDOR 317 TO OPS 324	2	ET415	—	SECURE	SECURE	—	—	
117	325A	IDF-3	OPEN OFFICE 328 TO DIR 325	2	ET415	—	SECURE	SECURE	—	—	
118	326A	IDF-3	OPEN OFFICE 328 TO DIR 326	2	ET415	—	SECURE	SECURE	—	—	
119	327A	IDF-3	OPEN OFFICE 328 TO OFF 327	2	ET415	—	SECURE	SECURE	—	—	
120	313B	IDF-3	RECEPT 321 TO BADGE 313	2	ET415	—	SECURE	SECURE	—	—	
121	332A	IDF-3	OPEN OFFICE 328 TO OFFICE 332	2	ET415	—	SECURE	SECURE	—	—	
122	313A	IDF-3	OPEN OFFICE 328 TO BADGE 313	2	ET415	—	SECURE	SECURE	—	—	
123	309A	IDF-3	CORRIDOR 306 TO TSA OFF 311	2	ET415	—	SECURE	SECURE	—	—	
124	308A	IDF-3	CORRIDOR 306 TO TSA OFF 312	2	ET415	—	SECURE	SECURE	—	—	
125	312A	IDF-3	CORRIDOR 306 TO OFFICE 305	2	ET415	—	SECURE	SECURE	—	—	
126	305A	IDF-3	OPEN OFFICE 328 TO OFFICE 305	2	ET415	—	SECURE	SECURE	—	—	
127	319A	IDF-3	EMERG OPS 318 TO STORAGE 319	2	ET414	—	SECURE	SECURE	—	—	
128	320A	IDF-3	CORRIDOR 317 TO OPS CONF 320	2	ET414	—	SECURE	SECURE	—	—	
129	322A	IDF-3	CORRIDOR 317 TO OPS CONF 322	2	ET414	—	SECURE	SECURE	—	—	
130	318A	IDF-3	RECEPT 321 TO EMERG OPS 318	2	ET414	—	SECURE	SECURE	—	—	
131	251A	IMDF	CORRIDOR 203 TO OFFICE 251	2	ET413	—	NON-SECURE	SECURE	—	—	
132	250A	MDF	CORRIDOR 203 TO CONF 250	2	ET413	—	NON-SECURE	SECURE	—	—	
133	234A	MDF	BOARDING 231 TO FBO OFFICE 234	2	ET412	—	SECURE	SECURE	—	—	
134	135A	IDF-1	LOBBY/ CIRCULATION 104 TO BAG 135	2	ET411	—	NON-SECURE	SECURE	—	—	
135	134A	IDF-1	LOBBY/ CIRCULATION 104 TO BAG 134	2	ET411	—	NON-SECURE	SECURE	—	—	
136	183A	IDF-1	LOBBY/ CIRCULATION 104 TO BAG 183	2	ET411	—	NON-SECURE	SECURE	—	—	
137	184A	IDF-1	LOBBY/ CIRCULATION 104 TO BAG 184	2	ET411	—	NON-SECURE	SECURE	—	—	
138	115A	IDF-1	LOBBY/CIRCULATION 104 TO RAC1B	2	ET410	—	NON-SECURE	SECURE	—	—	
139	114A	IDF-1	RAC1A TO RAC1B	2	ET410	—	NON-SECURE	SECURE	—	—	
140	162A	IDF-1	CORRIDOR 182 TO ADIT 162	2	ET410	—	SECURE	SECURE	—	—	

REVISIONS		
NO.	DESCRIPTION	DATE
	100% REVIEW	12.15.10
	BID PACKAGE 2A	01.24.11
1	BP2A ADDENDUM 1	02.25.11
	BP2A CONFORMANCE SET	05.02.11
	BID PACKAGE 2B REVIEW	07.16.11
	BID PACKAGE 2B	08.23.11
	BP2B CONFORMANCE	10.21.11
2	BP2A RFP-179	11.21.11

DATE ISSUED: 02-10-12
REVIEWED BY: BA
DRAWN BY: RJL
DESIGNED BY: BA

AEP PROJECT NUMBER
213-1882-091
© 2010 REYNOLDS, SMITH AND HILLS INC.
SHEET TITLE

**SECURITY
RISER**

SHEET NUMBER

ET601

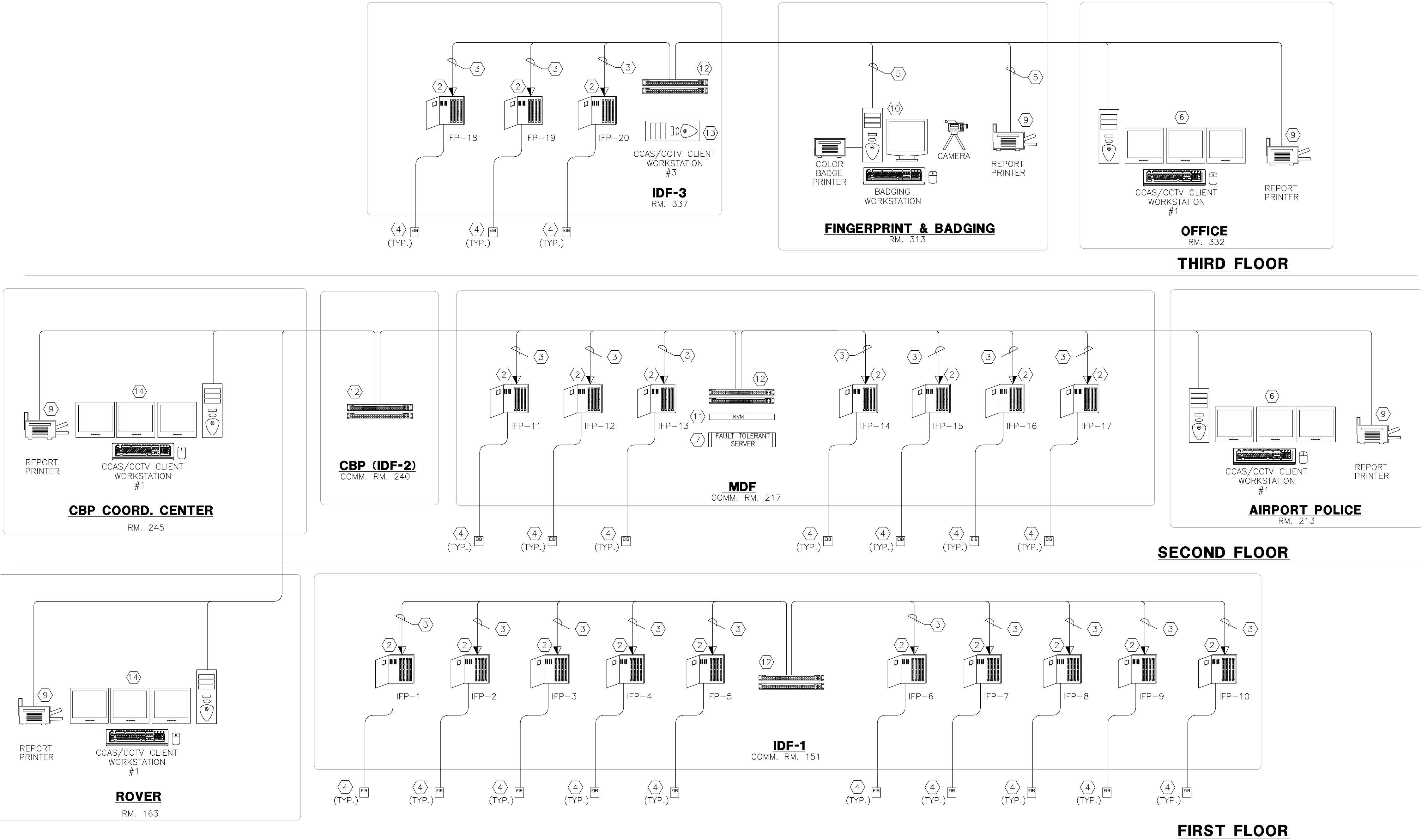
BID PACKAGE 2C

GENERAL NOTES:

- REFER TO SPECIFICATIONS SECTION 13700 FOR COMPUTER CONTROLLED ACCESS SYSTEM (CCAS) SCOPE OF WORK.
- REFER TO SPECIFICATIONS SECTIONS 16710, 16716, 16717 FOR PREMISE WIRING SYSTEM SCOPE OF WORK.
- CONTRACTOR SHALL SUBMIT DETAILED SHOP DRAWINGS AND PRODUCT DATASHEETS FOR ALL COMPONENTS. SHOP DRAWINGS SHALL SHOW ALL COMPONENTS, POINT TO POINT WIRING DIAGRAMS, HARDWARE & SOFTWARE CONFIGURATIONS, CABLE COLOR CODING AND COMPONENT FUNCTIONS. HARDWARE SHALL NOT BE PURCHASED OR INSTALLED UNTIL SUBMITTALS HAVE BEEN APPROVED BY A/E.
- ON ALL TYPE 1 & 1A ACCESS POINTS CARD READERS SHALL BE LOCATED ON THE UNSECURED SIDE OF THE DOOR.
- CONTRACTOR SHALL COMPLY WITH THE AIRPORT SECURITY AND SAFETY REQUIREMENTS WHILE WORKING AT THE AIRPORT TERMINAL AND AIRFIELD AREAS. CONTRACTOR SHALL BE RESPONSIBLE FOR ANY TSA (TRANSPORTATION SECURITY ADMINISTRATION) FINES INCURRED DUE TO THEIR OR THEIR SUB-CONTRACTOR'S, NEGLIGENCE.
- MANUFACTURER AND MODEL NUMBERS ARE USED TO ESTABLISH QUALITY AND PERFORMANCE OF THE SYSTEM. ANY EQUIPMENT THAT MEETS OR EXCEEDS THE PERFORMANCE SHALL BE CONSIDERED AND APPROVED AT THE DISCRETION OF THE ENGINEER AND/OR OWNER.
- THE SCOPE SHALL INCLUDE IMPLEMENTATION, SETUP AND TRAINING OF THE OWNERS STAFF AND CONNECTION TO ALL THE EQUIPMENT SHOWN ON THE DRAWINGS. CONTRACTOR SHALL PROVIDE ALL COMPONENTS REQUIRED TO CONNECT THE ACCESS CONTROL SYSTEM TO THE NETWORK. THE CONTRACTOR SHALL COORDINATE WITH SECURITY EQUIPMENT SUPPLIERS TO CONNECT AND TEST THE NETWORK DEVICES. THE CONTRACTOR SHALL COORDINATE WITH AIRPORT "IT" SUPPORT PERSONNEL AND CONSULTANTS.
- CONTRACTOR SHALL LABEL ALL PATCH PANELS, CABLES AND TERMINATION LOCATIONS. LABELS SHALL BE TYPE WRITTEN. REFER TO SPECIFICATIONS FOR LABELING REQUIREMENTS.
- PROVIDE GRAPHICAL MAPS OF TERMINAL AREAS, FLOORS AND SITE. GRAPHICAL MAPS SHALL BE PROGRAMMED WITH ACCESS POINTS AND CAMERAS. MAPS SHALL BE CAD VECTOR BASED FORMAT.
- SEE SHEET T5-01 FOR EQUIPMENT RACK LAYOUTS. PROVIDE DETAILED RACK LAYOUTS OF EQUIPMENT FOR APPROVAL.
- PROVIDE CRYSTAL REPORTS FOR CUSTOM REPORT GENERATION. PROVIDE CONNECTION TO ACCESS CONTROL DATABASE.
- SEE DRAWINGS ET503 AND ET504 FOR DOOR ACCESS POINT TYPES.

NOTES:

- 2 CARD READER INTELLIGENT FIELD PANEL (IFP) AS SPECIFIED IN SPECIFICATION SECTION 13700.
- 16 CARD READER INTELLIGENT FIELD PANEL (IFP) AS SPECIFIED IN SPECIFICATION SECTION 13700. ALLOW FOR A MINIMUM OF 20% FUTURE EXPANSION.
- (3) CAT 6 CABLES TERMINATED ON COM OUTLET. COM OUTLET SHALL BE INSTALLED INSIDE IFP WHERE APPLICABLE.
- ELECTRONIC INTERFACE BOX (EIB), TYPICALLY (1) EIB IS LOCATED AT EACH ACCESS POINT. EIB SHALL CONTAIN (1) DUAL READER MODULES & ADDITIONAL I/O BOARDS AS REQUIRED. EIB'S SHALL BE LOCATED ON THE SECURE SIDE OF THE ACCESS POINT UNLESS OTHERWISE INDICATED.
- COMMUNICATIONS OUTLET INSTALLED UNDER TERMINAL PACKAGE D.
- CCAS/CCTV CLIENT WORKSTATION. WORKSTATION SHALL BE INTEL CORE 2 QUAD Q9950, 2.83GHZ, 4GB RAM, 250GB HARD DRIVE, 512MB NVIDIA QUADRO NVS 420. WORKSTATION SHALL BE DELL OPTIPLEX 960 MINI TOWER OR EQUAL. PROVIDE (3) 19" LCD MONITORS. LCD MONITORS SHALL SUPPORT 280X1024 DVI OR DISPLAYPORT. INSTALL IN CONSOLE. SEE DETAIL 9, T5-02 & CONSOLE ELEVATION T5-01.
- PROVIDE FAULT TOLERANT OR DUAL CONFIGURATION SERVER. SEE SPECIFICATIONS (SECTION 13700) FOR COMPLETE SPECS.
- NOT USED
- PROVIDE PRINTERS AS SPECIFIED IN SPECIFICATION SECTION 13700.
- PROVIDE BADGING CAMERA, PRINTER AS SPECIFIED IN SPECIFICATIONS SECTION 13700. WORKSTATION SHALL BE SAME AS HEX NOTE 6 EXCEPT PROVIDE (1) 19" MONITOR.
- KVM SWITCH. SEE T5-01. CONNECT CCAS SERVERS TO KVM VIA CROSS PATCH TO MDF.
- NETWORK SCOPE ON T6-04. COORDINATE PORT CONFIGURATIONS AND REQUIREMENTS WITH NETWORK SCOPE. BALANCE PORT USAGE BETWEEN NETWORK SWITCHES. PROVIDE REDUNDANT CONNECTION FOR SERVERS.
- RACK MOUNTED CCAS/CCTV CLIENT WORKSTATION FOR EMERGENCY OPERATIONS CENTER (EOC). PROVIDE SAME WORKSTATION AS HEX NOTE 6 EXCEPT DUAL OUTPUT 512MB ATI RADEON HD4670 & (1) 17" RACK MOUNTED MONITOR. PROVIDE WIRELESS KEYBOARD MOUSE. KEYBOARD MOUSE SHALL BE WIRELESS COMPUTING RF-420 OR EQUAL. PROVIDE USB EXTENDER OVER UTP TO EXTEND USB RECEIVER TO EOC SPACE FOR WIRELESS KEYBOARD & MOUSE. CONNECT VIDEO OUTPUT 1 TO LOCAL MONITOR AND VIDEO OUTPUT 2 TO HDMI SWITCHER. HDMI OUTPUT SHALL PROVIDE VIDEO & AUDIO. SEE T6-05 FOR OPS CENTER DISPLAY RISER. PROVIDE RACK MOUNTING KITS FOR ALL RACK HARDWARE.
- CCAS/CCTV CLIENT WORKSTATION. WORKSTATION SHALL BE INTEL CORE 2 QUAD Q9950, 2.83GHZ, 4GB RAM, 250GB HARD DRIVE, 512MB NVIDIA QUADRO NVS 420. WORKSTATION SHALL BE DELL OPTIPLEX 960 MINI TOWER OR EQUAL. PROVIDE (3) 20" LCD MONITORS. LCD MONITORS SHALL SUPPORT 1280X1024 DVI OR DISPLAYPORT. INSTALL IN CONSOLE. SEE DETAILS 7&8, T5-02



WARNING: THIS RECORD CONTAINS SENSITIVE SECURITY INFORMATION THAT IS CONTROLLED UNDER 49 CFR PARTS 15 AND 1520. NO PART OF THIS RECORD MAY BE DISCLOSED TO PERSONS WITHOUT A "NEED TO KNOW", AS DEFINED IN 49 CFR PARTS 15 AND 1520, EXCEPT WITH THE WRITTEN PERMISSION OF THE ADMINISTRATOR OF THE TRANSPORTATION SECURITY ADMINISTRATION OR THE SECRETARY OF TRANSPORTATION. UNAUTHORIZED RELEASE MAY RESULT IN CIVIL PENALTY OR OTHER ACTION. FOR U.S. GOVERNMENT AGENCIES, PUBLIC DISCLOSURE IS GOVERNED BY 5 U.S.C. 552 AND 49 CFR PARTS 15 AND 1520.

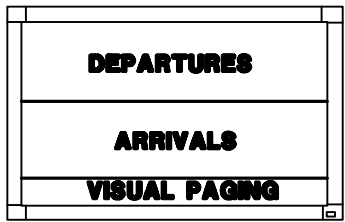
MUFIDS DISPLAY SCHEDULE								
MUFIDS ID	TERM. POINT	LOCATION OF DISPLAY	MUFIDS TYPE	MONITOR SIZE & TYPE	MOUNT TYPE	MOUNT MODEL	REF. DRAWING	REMARKS
FID-1	IDF-1	CHECK-IN LOBBY #102	FID	55" LED	TILT	PEERLESS ST660	ET411	
FID-2	IDF-1	CHECK-IN LOBBY #102	FID	55" LED	TILT	PEERLESS ST660	ET411	
FID-3	IDF-1	CHECK-IN LOBBY #102	FID	55" LED	TILT	PEERLESS ST660	ET411	
FID-4	IDF-1	CHECK-IN LOBBY #102	FID	55" LED	TILT	PEERLESS ST660	ET411	
FID-5	IDF-1	CBIS ROOM #133	FID	32" LCD	TILT	PEERLESS ST660	ET411	PROVIDED BY OWNER
FID-6	IDF-1	BAGGAGE CLAIM #104	BID	47" LED	TILT	PEERLESS ST660	ET410	
FID-7	IDF-1	BAGGAGE CLAIM #104	BID	47" LED	TILT	PEERLESS ST660	ET410	
FID-8	IDF-1	INTERNATIONAL #117	BID	47" LED	TILT	PEERLESS ST660	ET410	
FID-9	IDF-1	INTERNATIONAL #117	BID	47" LED	TILT	PEERLESS ST660	ET410	
FID-10	IDF-1	ROVER #163	FID	32" LCD	TILT	PEERLESS ST660	ET410	PROVIDED BY OWNER
FID-11	IDF-1	TUG TUNNEL #176	BID	15" LED	ARTICULATING	PEERLESS SAL730P	ET410	
FID-12	IDF-1	TUG TUNNEL #176	BID	15" LED	ARTICULATING	PEERLESS SAL730P	ET410	
FID-13	IDF-1	SECONDARY #159	FID	42" LED	TILT	PEERLESS ST660	ET410	
FID-14						PEERLESS ST660		
FID-15	MDF	CBP COORDINATION CNTR. #245	FID	32" LCD	TILT	PEERLESS ST660	ET412	PROVIDED BY OWNER
FID-16								
FID-17	MDF	CONCOURSE GATE 1 #219	GID	42" LED	TILT	PEERLESS ST660	ET412	
FID-18	MDF	CONCOURSE GATE 2 #219	GID	42" LED	TILT	PEERLESS ST660	ET412	
FID-19	MDF	PASSENGER WAITING #201	FID	47" LED	TILT	PEERLESS ST660	ET412	
FID-20	MDF	TSA QUEUE #214	TSA	47" LED	ARTICULATING	PEERLESS SA750PU	ET413	WITH AUDIO
FID-21	MDF	TSA CHECKPOINT #208	FID	47" LED	TILT	PEERLESS ST660	ET413	--
FID-22	MDF	CONCOURSE GATE 3 #219	GID	42" LED	TILT	PEERLESS ST660	ET413	
FID-23	MDF	CONCOURSE GATE 4 #219	GID	42" LED	TILT	PEERLESS ST660	ET413	--
FID-24	MDF	CONCOURSE EAST #219	FID	47" LED	TILT	PEERLESS ST660	ET413	
FID-25	IDF-3	RECEPTION #321	FID	32" LCD	TILT	PEERLESS ST660	ET415	PROVIDED BY OWNER
FID-26	MDF	CONCOURSE WEST #219	FID	47" LED	TILT	PEERLESS ST660	ET412	
FID-27	IDF-3	OPS CENTER DISPLAY SYSTEM	FID	--	--	--	--	ARRIVALS
FID-28	IDF-3	OPS CENTER DISPLAY SYSTEM	FID	--	--	--	--	DEPARTURES
FID-29	IDF-3	OPS CENTER DISPLAY SYSTEM	FID	--	--	--	--	ARRIVE/DEPART

GENERAL NOTES

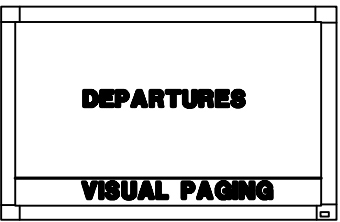
- CONTRACTOR SHALL PROVIDE DETAILED SHOP DRAWINGS FOR ALL COPPER PATCH PANEL CONNECTIONS, RACKS AND EQUIPMENT LAYOUTS. THE SHOP DRAWINGS SHALL CLEARLY SHOW POINT TO POINT CONNECTIONS AND LOCATION OF ALL PATCH PANELS, SIZE, QTY, AND PORT USAGE. THESE DRAWINGS INDICATE TYPICAL CONNECTIONS. PROVIDE ADDITIONAL RACKS AND OTHER ACCESSORIES REQUIRED TO PROVIDE A COMPLETE AND OPERATIONAL SYSTEM.
- THE CONTRACTOR SHALL COMPLY WITH THE AIRPORT SECURITY AND SAFETY REQUIREMENTS WHILE WORKING AT THE AIRPORT TERMINAL AND AIRFIELD AREAS.
- MANUFACTURER AND MODEL NUMBERS ARE USED TO ESTABLISH QUALITY AND PERFORMANCE OF THE SYSTEM. ANY EQUIPMENT THAT MEETS OR EXCEEDS THE PERFORMANCE SHALL BE CONSIDERED AND APPROVED AT THE DISCRETION OF THE ENGINEER AND/OR OWNER.
- THE SCOPE SHALL INCLUDE IMPLEMENTATION, SETUP, TRAINING TO THE OWNERS STAFF, AIRLINE PERSONAL AND CONNECTION TO ALL THE EQUIPMENT SHOWN ON THE DRAWINGS. CONTRACTOR SHALL PROVIDE ALL COMPONENTS REQUIRED TO CONNECT FLIGHT INFORMATION DISPLAY SYSTEM TO THE NETWORK. THE CONTRACTOR SHALL COORDINATE WITH MUFIDS EQUIPMENT SUPPLIERS TO CONNECT AND TEST THE NETWORK DEVICES. THE CONTRACTOR SHALL COORDINATE WITH AIRPORT "IT" SUPPORT PERSONAL AND CONSULTANTS. SEE NETWORK RISER SHEET ET6-04 FOR NETWORK SCOPE OF WORK.
- REFER TO SPECIFICATION SECTION 13742 FOR COMPUTER HARDWARE AND SOFTWARE REQUIREMENTS.
- CONTRACTOR SHALL LABEL ALL PATCH PANELS, CABLES AND TERMINATION LOCATIONS. LABELS SHALL BE TYPE WRITTEN. REFER TO SPECIFICATIONS FOR LABELING REQUIREMENTS.
- INSTALL FIDS CLIENT SOFTWARE OR WEB INTERFACE SHORTCUT ON AIRPORT OPERATIONS WORKSTATION.
- PROGRAM LCD MONITORS TO TURN ON AND OFF BASED ON A OWNER DEFINED SCHEDULE.
- PROVIDE INSTALLATION OF NEC NAVISET SOFTWARE ON A MINIMUM OF 2 AIRPORT IT DEFINED WORKSTATIONS. INSTALL NEC NAVISET SOFTWARE ON INPUT WORKSTATION LOCATED IN RECEPTION AREA.
- CONFIGURE DISPLAYS TO PROVIDE AUTOMATIC EMAIL NOTIFICATION TO AIRPORT IT.
- DISABLE DISPLAY LOCAL CONTROLS TO PREVENT PUBLIC TAMPERING.

NOTES:

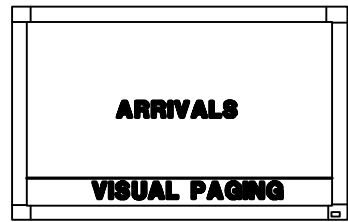
- 42" LED MONITOR, 1920X1080 NATIVE RESOLUTION, ETHERNET CONTROL, PIP, SCHEDULING, TILE MATRIX W/ THIN BEZEL (0.65" OR LESS) AND CABLE COVER. MONITOR SHALL BE LG 42LE530C OR APPROVED EQUAL. CONNECT TO NETWORK SWITCH.
- 47" LED MONITOR, 1920X1080 NATIVE RESOLUTION, ETHERNET CONTROL, PIP, SCHEDULING, TILE MATRIX W/ THIN BEZEL (0.65" OR LESS) AND CABLE COVER. MONITOR SHALL BE LG 47LE530C OR APPROVED EQUAL. CONNECT TO NETWORK SWITCH.
- CAT6 CABLES TERMINATED ON COMM OUTLET. PROVIDE ADDITIONAL OUTLETS AS INDICATED ON PLANS.
- INPUT STATION/VISUAL PAGING STATION AS MANUFACTURED BY DELL (MODEL OPTIPLEX SX270) OR APPROVED EQUAL. SEE SPECIFICATIONS FOR COMPLETE SYSTEM SPECIFICATION.
- FIDS CONVERTER PROVIDED BY OTHERS. INSTALL PER FIDS VENDOR INSTRUCTIONS.
- PROVIDE 3 OPTIONS FOR EACH GRAPHIC DISPLAY SCREEN FOR OWNER'S APPROVAL. THE GATE COUNTERS SHALL HAVE AIRLINE GRAPHIC DISPLAYS AS APPROVED BY THE AIRLINES.
- HDMI CABLE.
- NOT USED.
- 15" LCD DISPLAY WALL MOUNTED FOR TUG OPERATOR. DISPLAY SHALL SHOW SAME INFORMATION AS RESPECTIVE BID DISPLAY. DISPLAY SHALL HAVE HIGH BRIGHTNESS 500 CD/M2 OR GREATER AND HIGH CONTRAST 800:1 OR GREATER. DISPLAY SHALL BE NEC ASLCD52V-BK OR EQUAL. PROVIDE DUST COVER.
- NOT USED.
- KVM SWITCH PROVIDED ON ET5-01. CONNECT ALL SERVERS TO KVM IN MDF. CROSS-PATCH IDF DEVICES TO MDF KVM.
- NETWORK SWITCHES PROVIDED ON ET6-04. COORDINATE NETWORK SWITCH PORT CONFIGURATIONS AND REQUIREMENTS WITH NETWORK SCOPE OF WORK.
- NOT USED
- PROVIDE MONITOR AS INDICATED IN HEX NOTE 1. PROVIDE TV TUNER (NTSC/ATSC/QAM) & SPEAKER OPTION.
- NOT USED
- PROVIDE (3) SEPERATE DVI VIDEO OUTPUTS FROM DDC FOR OPERATIONS CENTER DISPLAYS. DVI EXTENDERS NOT REQUIRED. SEE OPERATIONS CENTER DISPLAY RISER ET6-05.
- PROVIDE SPEAKERS & AUDIO UTP BALUN EXTENSION FROM DDC FOR TSA MONITOR.
- 55" LED MONITOR, 1920X1080 NATIVE RESOLUTION, ETHERNET CONTROL, PIP, SCHEDULING, TILE MATRIX W/ THIN BEZEL (0.65" OR LESS) AND CABLE COVER. MONITOR SHALL BE LG 55LE530C OR APPROVED EQUAL. CONNECT TO NETWORK SWITCH.
- PROVIDE WORK STATION PER SPEC 16801. SEE TYPE PER LOCATION SCHEDULE.



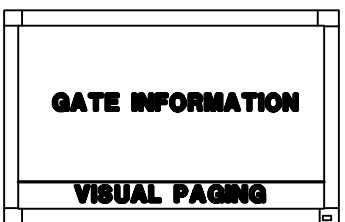
TYPE 1



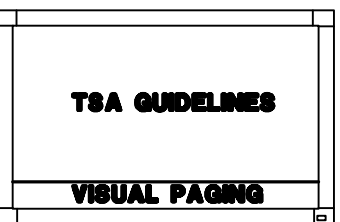
TYPE 2



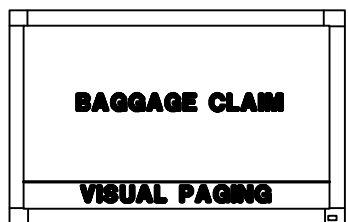
TYPE 3



TYPE 4



TYPE 5



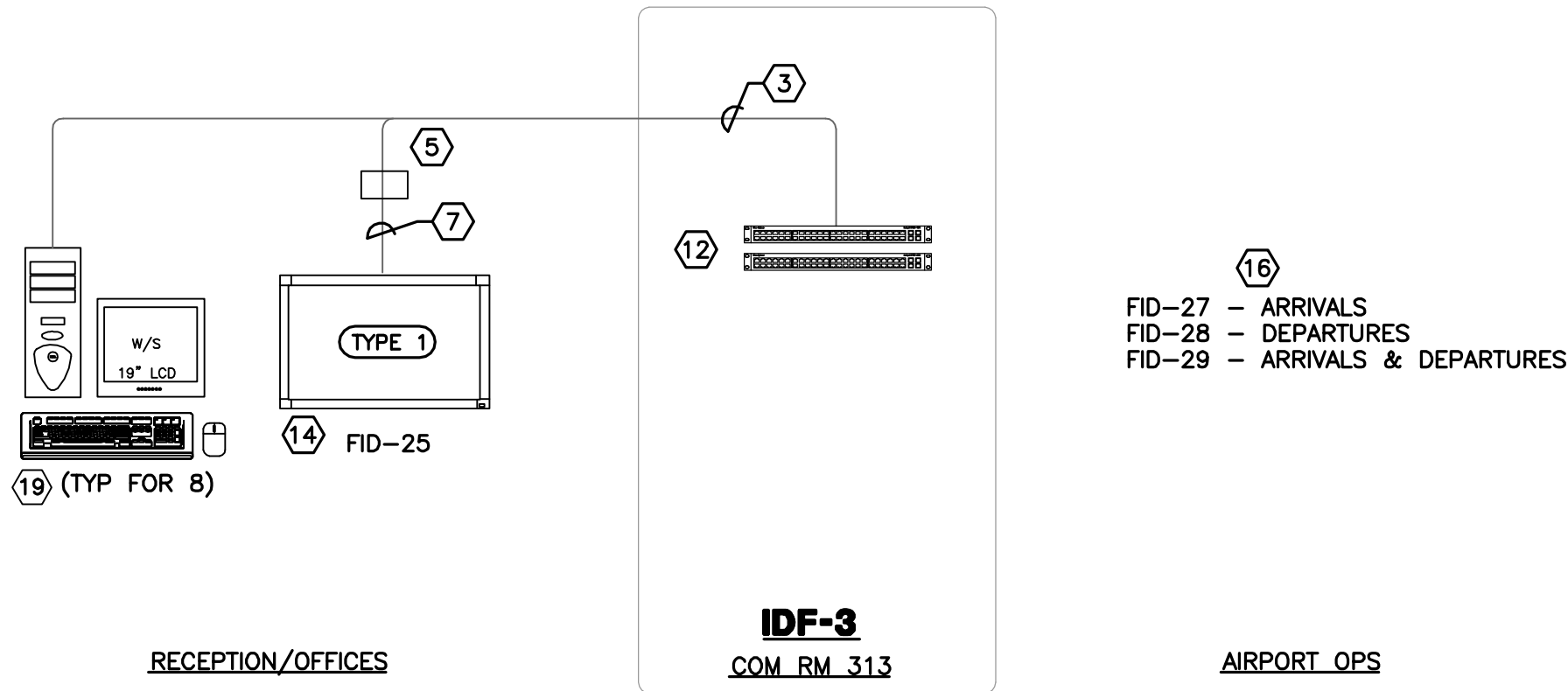
TYPE 6

WORK STATION SCHEDULE		
LOCATION OF WORK STATION	WORK STATION TYPE	SPEC REFERENCE
OPS #122	DESKTOP	13742
OPS #124	DESKTOP	13742
OPS #127	DESKTOP	13742
OPS #131	DESKTOP	13742
MAINT. #141	LAPTOP	16801
SUB. OFFICE #148	DESKTOP	16801
EXEC DIR #323	LAPTOP	16801
OPS #324	LAPTOP	16801
DIR. #325	LAPTOP	16801
DIR. #326	DESKTOP	16801
OFFICE #327	DESKTOP	16801
OPEN OFFICE #328	DESKTOP	16801
OPEN OFFICE #328	DESKTOP	16801
RECEPT. #321	DESKTOP	16801

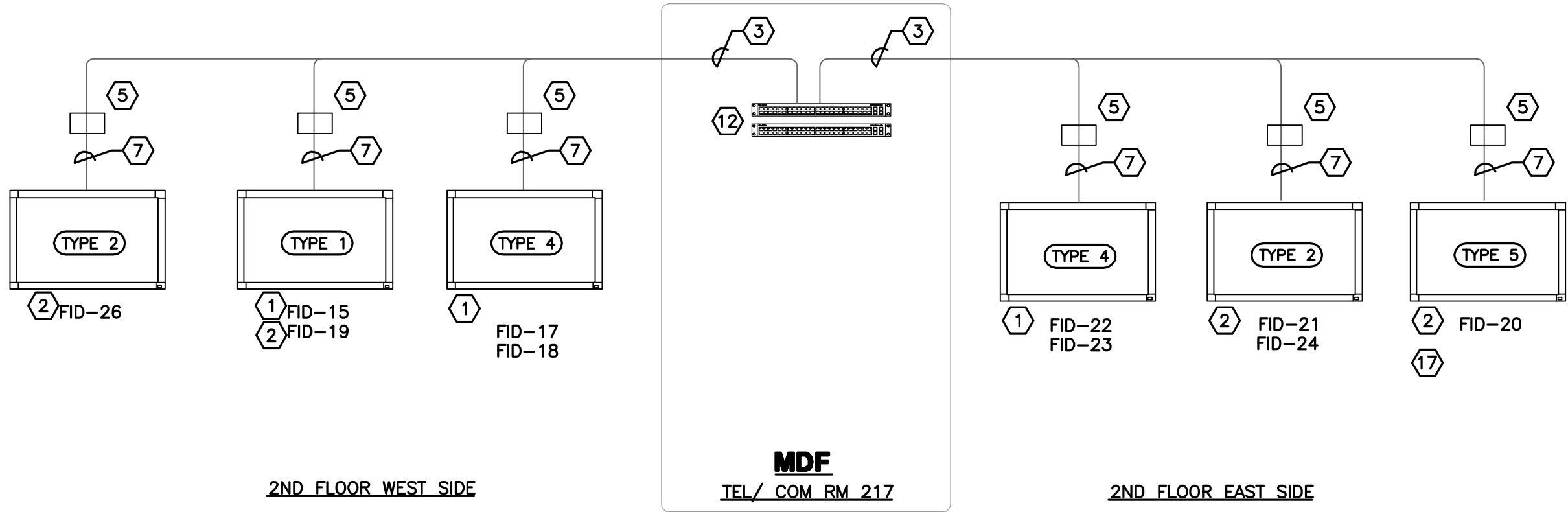


MUFIDS RISER

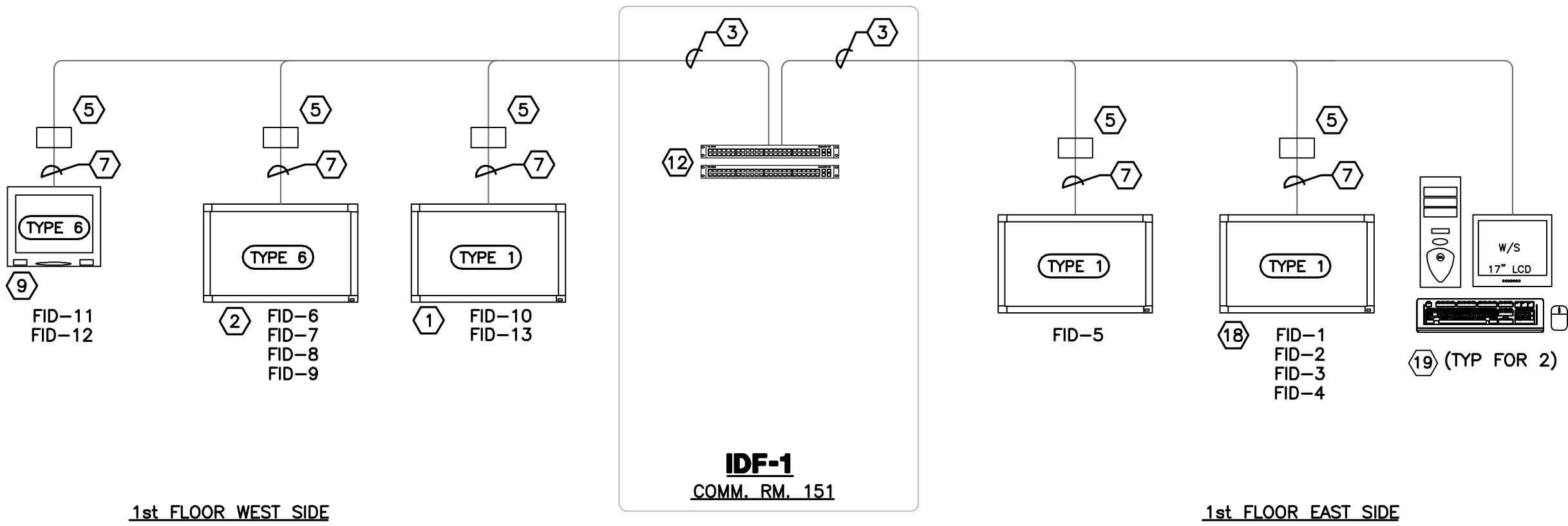
SCALE: NTS



THIRD FLOOR



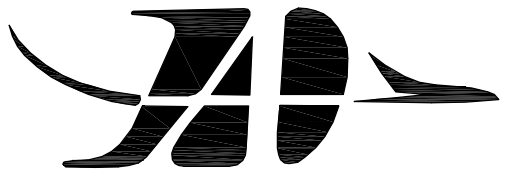
SECOND FLOOR



FIRST FLOOR



Reynolds, Smith and Hills, Inc.
4685 Airport Approach Rd, Ste A
Duluth, Minnesota 55801
216-722-1227 Fax: 216-722-1062
www.rsandh.com



DULUTH AIRPORT
AUTHORITY

DULUTH
INTERNATIONAL
AIRPORT
DULUTH, MN

NEW PASSENGER
TERMINAL

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) 722-8306

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) 591-5079

REVISIONS

NO.	DESCRIPTION	DATE
	100% REVIEW	12.15.10
	BID PACKAGE 2A	01.24.11
1	BP2A ADDENDUM 1	02.25.11
	BP2A CONFERENCE SET	05.02.11
	BID PACKAGE 2B REVIEW	07.16.11
	BID PACKAGE 2B	08.23.11
	BP2B CONFERENCE	10.21.11
2	BP2B RTP	12.15.11

DATE ISSUED: 02-10-12
REVIEWED BY: BA
DRAWN BY: RJL
DESIGNED BY: BA

ASP PROJECT NUMBER
213-1882-091
© 2010 REYNOLDS, SMITH AND HILLS INC.
SHEET TITLE

MUFIDS
RISER

SHEET NUMBER

ET602

BID PACKAGE 2C

WARNING: THIS RECORD CONTAINS SENSITIVE SECURITY INFORMATION THAT IS CONTROLLED UNDER 49 CFR PARTS 15 AND 1520. NO PART OF THIS RECORD MAY BE DISCLOSED TO PERSONS WITHOUT A "NEED TO KNOW", AS DEFINED IN 49 CFR PARTS 15 AND 1520, EXCEPT WITH THE WRITTEN PERMISSION OF THE ADMINISTRATOR OF THE TRANSPORTATION SECURITY ADMINISTRATION OR THE SECRETARY OF TRANSPORTATION. UNAUTHORIZED RELEASE MAY RESULT IN CIVIL PENALTY OR OTHER ACTION. FOR U.S. GOVERNMENT AGENCIES, PUBLIC DISCLOSURE IS GOVERNED BY 5 U.S.C. 552 AND 49 CFR PARTS 15 AND 1520.

CCTV CAMERA SCHEDULE													
CAMERA ID	TERM. POINT	LOCATION SHOWN BY CAMERA	LENS TYPE	LENS MM	INDOOR OUTDOOR	MOUNT TYPE	MOUNT HEIGHT	CAMERA SYSTEM MODEL	ENCLOSURE	VIDEO/DATA CABLE	POWER SUPPLY	POWER CABLE	REFERENCE DRAWING
#1	IDF-1	INTERNATIONAL #117	PTZ	--	INDOOR	TYPE-3	10'-0"	CAM#2	PENDANT DOME	CAT6	28 VAC	2#14	ET401
#2	IDF-1	TUG TUNEL #176	FIXED	2.8-12	INDOOR	TYPE-3	12'-0"	CAM#1	PENDANT DOME	CAT6	PoE	--	ET401
#3	IDF-1	BAGGAGE CLAIM # 116	PTZ	--	INDOOR	TYPE-4	13'-4"	CAM#2	RECESSED DOME	CAT6	28 VAC	2#14	ET401
#4	IDF-1	TUG TUNNEL #176	FIXED	2.8-12	INDOOR	TYPE-3	12'-0"	CAM#1	PENDANT DOME	CAT6	PoE	--	ET401
#5	IDF-1	TUG TUNNEL #176	FIXED	2.8-12	INDOOR	TYPE-3	12'-0"	CAM#1	PENDANT DOME	CAT6	PoE	--	ET401
#6	IDF-1	LOBBY CIRCULATION #104	FIXED	2.8-12	INDOOR	TYPE-4	13'-4"	CAM#1	RECESSED DOME	CAT6	PoE	--	ET401
#7	IDF-1	EDT #133	FIXED	2.8-12	INDOOR	TYPE-3	10'-0"	CAM#1	PENDANT DOME	CAT6	PoE	--	ET401
#8	IDF-1	EDT #133	FIXED	2.8-12	INDOOR	TYPE-3	10'-0"	CAM#1	PENDANT DOME	CAT6	PoE	--	ET401
#9	IDF-1	EDT #133	FIXED	2.8-12	INDOOR	TYPE-3	10'-0"	CAM#1	PENDANT DOME	CAT6	PoE	--	ET401
#10	IDF-1	EDT #133	FIXED	2.8-12	INDOOR	TYPE-3	10'-0"	CAM#1	PENDANT DOME	CAT6	PoE	--	ET401
#11	IDF-1	CHEK-IN LOBBY #102	FIXED	2.8-12	INDOOR	TYPE-3	15'-0"	CAM#1	PENDANT DOME	CAT6	PoE	--	ET401
#12	IDF-1	CHEK-IN LOBBY #102	PTZ	--	INDOOR	TYPE-4	10'-0"	CAM#2	PENDANT DOME	CAT6	28 VAC	2#14	ET401
#13	IDF-1	TUG TUNNEL #176	FIXED	2.8-12	INDOOR	TYPE-3	12'-0"	CAM#1	PENDANT DOME	CAT6	PoE	--	ET401
#14	MDF	DOORS #247A, 233	FIXED	2.8-12	INDOOR	TYPE-4	13'-4"	CAM#1	RECESSED DOME	CAT6	PoE	--	ET402
#15	MDF	DOORS 232A, 232B	FIXED	2.8-12	INDOOR	TYPE-4	10'-0"	CAM#1	RECESSED DOME	CAT6	PoE	--	ET402
#16	MDF	DOOR #219 I	FIXED	2.8-12	INDOOR	TYPE-4	13'-4"	CAM#1	RECESSED DOME	CAT6	PoE	--	ET402
#17	MDF	CORRIDOR #229	FIXED	2.8-12	INDOOR	TYPE-4	10'-0"	CAM#1	RECESSED DOME	CAT6	PoE	--	ET402
#18	MDF	CONCOURSE WEST SIDE	PTZ	--	INDOOR	TYPE-4	13'-4"	CAM#2	RECESSED DOME	CAT6	28 VAC	2#14	ET402
#19	MDF	PBB DOOR #219 H	FIXED	2.8-12	INDOOR	TYPE-4	13'-4"	CAM#1	RECESSED DOME	CAT6	PoE	--	ET402
#20	MDF	PASSENGER WAITING #201	PTZ	--	INDOOR	TYPE-3	10'-0"	CAM#2	PENDANT DOME	CAT6	28 VAC	2#14	ET402
#21	MDF	DOORS # 210-215	PTZ	--	INDOOR	TYPE-3	10'-0"	CAM#2	PENDANT DOME	CAT6	28 VAC	2#14	ET402
#22	MDF	TSR AREA	FIXED	2.8-12	INDOOR	TYPE-4	10'-0"	CAM#1	RECESSED DOME	CAT6	PoE	--	ET402
#23	MDF	TSR BAGGAGE BELT	FIXED	2.8-12	INDOOR	TYPE-4	10'-0"	CAM#1	RECESSED DOME	CAT6	28 VAC	2#14	ET402
#24	MDF	TSR BAGGAGE BELT	FIXED	2.8-12	INDOOR	TYPE-4	10'-0"	CAM#1	RECESSED DOME	CAT6	28 VAC	2#14	ET402
#25	MDF	PBB DOOR # 219 G	FIXED	2.8-12	INDOOR	TYPE-4	13'-4"	CAM#1	RECESSED DOME	CAT6	PoE	--	ET402
#26	MDF	TSR AREA #209	FIXED	2.8-12	INDOOR	TYPE-4	10'-0"	CAM#1	RECESSED DOME	CAT6	28 VAC	2#14	ET402
#27	MDF	CONCOURSE CENTER	PTZ	--	INDOOR	TYPE-4	13'-4"	CAM#2	RECESSED DOME	CAT6	28 VAC	2#14	ET402
#28	MDF	CONCOURSE EAST SIDE	PTZ	--	INDOOR	TYPE-4	13'-4"	CAM#2	RECESSED DOME	CAT6	28 VAC	2#14	ET402
#29	MDF	PBB DOOR 219 F	FIXED	2.8-12	INDOOR	TYPE-4	13'-4"	CAM#1	RECESSED DOME	CAT6	PoE	--	ET402
#30	MDF	DEPLANING #215	FIXED	2.8-12	INDOOR	TYPE-4	10'-0"	CAM#1	RECESSED DOME	CAT6	PoE	--	ET402
#31	MDF	DOOR 237 & 233	FIXED	2.8-12	INDOOR	TYPE-4	13'-4"	CAM#1	RECESSED DOME	CAT6	PoE	--	ET402
#32	MDF	TSR CHECKPOINT #208	FIXED	2.8-12	INDOOR	TYPE-4	10'-0"	CAM#1	RECESSED DOME	CAT6	PoE	--	ET402
#33	IDF-3	WAITING #301	FIXED	2.8-12	INDOOR	TYPE-4	10'-0"	CAM#1	RECESSED DOME	CAT6	PoE	--	ET403
#34	IDF-3	APRON CENTER EAST	PTZ	--	OUTDOOR	TYPE-1	51'-0"	CAM#2	PENDANT DOME	CAT6	28 VAC	2#14	ET403
#35	IDF-3	APRON EAST	PTZ	--	OUTDOOR	TYPE-1	51'-0"	CAM#2	PENDANT DOME	CAT6	28 VAC	2#14	ET403
#36	IDF-3	LANDSIDE EAST	PTZ	--	OUTDOOR	TYPE-6	51'-0"	CAM#2	PENDANT DOME	CAT6	28 VAC	2#14	ET403
#37	IDF-3	APRON WEST	PTZ	--	OUTDOOR	TYPE-1	51'-0"	CAM#2	PENDANT DOME	CAT6	28 VAC	2#14	ET403
#38	IDF-3	LANDSIDE WEST	PTZ	--	OUTDOOR	TYPE-6	51'-0"	CAM#2	PENDANT DOME	CAT6	28 VAC	2#14	ET403
#39	IDF-3	APRON CENTER WEST	PTZ	--	OUTDOOR	TYPE-1	51'-0"	CAM#2	PENDANT DOME	CAT6	28 VAC	2#14	ET403
#40	IDF-3	WAITING #301	FIXED	2.8-12	INDOOR	TYPE-4	10'-0"	CAM#1	RECESSED DOME	CAT6	PoE	--	ET403
#41	IDF-1	FRONT CANOPY	PTZ	--	OUTDOOR	TYPE-1	12'-0"	CAM#2	PENDANT DOME	CAT6	28 VAC	2#14	ET401
#42	IDF-1	FRONT CANOPY	PTZ	--	OUTDOOR	TYPE-1	12'-0"	CAM#2	PENDANT DOME	CAT6	28 VAC	2#14	ET401
#43	IDF-1	FRONT CANOPY	PTZ	--	OUTDOOR	TYPE-3	13'-0"	CAM#2	PENDANT DOME	CAT6	28 VAC	2#14	ET401
#44	IDF-1	FRONT CANOPY	PTZ	--	OUTDOOR	TYPE-3	13'-0"	CAM#2	PENDANT DOME	CAT6	28 VAC	2#14	ET401
#45	MDF	CBP PRIMARY PROC. #237	FIXED	2.8-12	INDOOR	TYPE-4	10'-0"	CAM#1	RECESSED DOME	CAT6	PoE	--	ET412
#46	MDF	CBP PRIMARY PROC. #237	FIXED	2.8-12	INDOOR	TYPE-4	10'-0"	CAM#1	RECESSED DOME	CAT6	PoE	--	ET412
#47	MDF	CBP PRIMARY PROC. #237	FIXED	2.8-12	INDOOR	TYPE-4	10'-0"	CAM#1	RECESSED DOME	CAT6	PoE	--	ET412
#48	MDF	CBP PRIMARY PROC. #237	FIXED	2.8-12	INDOOR	TYPE-4	10'-0"	CAM#1	RECESSED DOME	CAT6	PoE	--	ET412
#49	MDF	CBP PRIMARY PROC. #237	FIXED	2.8-12	INDOOR	TYPE-4	10'-0"	CAM#1	RECESSED DOME	CAT6	PoE	--	ET412
#50	MDF	CBP PRIMARY PROC. #237	FIXED	2.8-12	INDOOR	TYPE-4	10'-0"	CAM#1	RECESSED DOME	CAT6	PoE	--	ET412
#51	IDF-1	ELEVATOR #118 LOBBY	FIXED	2.8-12	INDOOR	TYPE-4	9'-8"	CAM#1	RECESSED DOME	CAT6	PoE	--	ET410
#52	IDF-1	SECONDARY #159	FIXED	2.8-12	INDOOR	TYPE-4	9'-0"	CAM#1	RECESSED DOME	CAT6	PoE	--	ET410
#53	IDF-1	SECONDARY #159	FIXED	2.8-12	INDOOR	TYPE-4	9'-0"	CAM#1	RECESSED DOME	CAT6	PoE	--	ET410
#54	IDF-1	SECONDARY #159	FIXED	2.8-12	INDOOR	TYPE-4	9'-0"	CAM#1	RECESSED DOME	CAT6	PoE	--	ET410
#55	IDF-1	STAIRS #192	FIXED	2.8-12	INDOOR	TYPE-4	9'-8"	CAM#1	RECESSED DOME	CAT6	PoE	--	ET410
#56	MDF	ESCALATOR WEST	FIXED	2.8-12	INDOOR	TYPE-3	15'-0"	CAM#1	PENDANT DOME	CAT6	PoE	--	ET412
#57	MDF	ESCALATOR EAST	FIXED	2.8-12	INDOOR	TYPE-3	15'-0"	CAM#1	PENDANT DOME	CAT6	PoE	--	ET413
#58	IDF-1	HOLD #171	FIXED	2.8-12	INDOOR	TYPE-2	9'-0"	CAM#1	SURFACE DOME	CAT6	PoE	--	ET410
#59	IDF-1	HOLD #170	FIXED	2.8-12	INDOOR	TYPE-2	9'-0"	CAM#1	SURFACE DOME	CAT6	PoE	--	ET410
#60	IDF-1	OFFICE #166	FIXED	2.8-12	INDOOR	TYPE-4	9'-0"	CAM#1	RECESSED DOME	CAT6	PoE	--	ET410
#61	IDF-1	CASH #181	FIXED	2.8-12	INDOOR	TYPE-4	9'-0"	CAM#1	RECESSED DOME	CAT6	PoE	--	ET410
#62	IDF-1	CBIS ROOM #133	FIXED	2.8-12	INDOOR	TYPE-5	10'-0"	CAM#1	PENDANT DOME	CAT6	PoE	--	ET410
#63	IDF-1	CBIS ROOM #133	FIXED	2.8-12	INDOOR	TYPE-5	10'-0"	CAM#1	PENDANT DOME	CAT6	PoE	--	ET410
#64	IDF-1	CBIS ROOM #133	FIXED	2.8-12	INDOOR	TYPE-5	10'-0"	CAM#1	PENDANT DOME	CAT6	PoE	--	ET412
#65	MDF	TSR CHECKPOINT #208	FIXED	2.8-12	INDOOR	TYPE-4	10'-0"	CAM#1	RECESSED DOME	CAT6	PoE	--	ET413
#66	MDF	TSR CHECKPOINT #208	FIXED	2.8-12	INDOOR	TYPE-4	10'-0"	CAM#1	RECESSED DOME	CAT6	PoE	--	ET412
#67	MDF	TSR CHECKPOINT #208	FIXED	2.8-12	INDOOR	TYPE-4	10'-0"	CAM#1	RECESSED DOME	CAT6	PoE	--	ET413
#68	IDF-1	WEST TAG RAMP #179	FIXED	2.8-12	INDOOR	TYPE-3	10'-0"	CAM#1	PENDANT DOME	CAT6	PoE	--	ET410
#69	IDF-1	EAST TAG RAMP #178	FIXED	2.8-12	INDOOR	TYPE-3	10'-0"	CAM#1	PENDANT DOME	CAT6	PoE	--	ET411
#70	MDF	DOORS #233B & 245A	FIXED	2.8-12	INDOOR	TYPE-4	10'-0"	CAM#1	RECESSED DOME	CAT6	PoE	--	ET412
#71	MDF	CBP PRIM PROCESS #237	FIXED	2.8-12	INDOOR	TYPE-4	10'-0"	CAM#1	RECESSED DOME	CAT6	PoE	--	ET412
#72	MDF	DOOR #203B	FIXED	2.8-12	INDOOR	TYPE-4	10'-0"	CAM#1	RECESSED DOME	CAT6	PoE	--	ET413
#73	MDF	STAIRS #292	FIXED	2.8-12	INDOOR	TYPE-5	10'-0"	CAM#1	RECESSED DOME	CAT6	PoE	--	ET412
#74	IDF-1	DOORS 126	FIXED	2.8-12	INDOOR	TYPE-5	12'-0"	CAM#1	PENDANT DOME	CAT6	PoE	--	ET411
#75	IDF-1	LOWER ACCESS RD. ENTR.	FIXED	2.8-12	INDOOR	TYPE 1	12'-0"	CAM#2	PENDANT DOME W/ARM	--	--	--	--
#76	MDF	SHORT TERM PARK. ENTR.	FIXED	2.8-12	INDOOR	TYPE 1	12'-0"	CAM#2	PENDANT DOME W/ARM	--	--	--	--
#77	MDF	LONG TERM PARK. ENTR.	FIXED	2.8-12	INDOOR	TYPE 1	12'-0"	CAM#2	PENDANT DOME W/ARM	--	--	--	--
#78	MDF	EXIT LANE 1	FIXED	2.8-12	INDOOR	TYPE 1	12'-0"	CAM#2	PENDANT DOME W/ARM	--	--	--	--
#79	MDF	EXIT LANE 2	FIXED	2.8-12	INDOOR	TYPE 1	12'-0"	CAM#2	PENDANT DOME W/ARM	--	--	--	--
#80	MDF	EXIT LANE 3	FIXED	2.8-12	INDOOR	TYPE 1	12'-0"	CAM#2	PENDANT DOME W/ARM	--	--	--	--

NOTES: PROVIDE HEATER/BLOWER AND ENVIRONMENTAL OPTIONS ON ALL OUTDOOR UNITS.
CAM#1- PROVIDE DAY/NIGHT (0.5 LUX OR LESS MIN) FIXED MINI DOME 1.3 MEGAPIXEL (MIN), PROGRESSIVE SCAN, 2.8-12MM OR EQUIVALENT, H264/MJPEG ENCODING MULTI-STREAM CAMERA. CAMERA SHALL BE ARECONT MV1355DN, IQNVISION ALLIANCE 10A21, AXIS P3344-V OR APPROVED EQUAL.
CAM#2- PROVIDE DAY/NIGHT (0.5 DOME CAMERA W/ 36X ZOOM & IMAGE STABILIZATION, CAMERA SHALL BE BOSCH AUTODOME IS000 SERIES, 36X, PANASONIC WV-NS964, AXIS 233D OR APPROVED EQUAL.

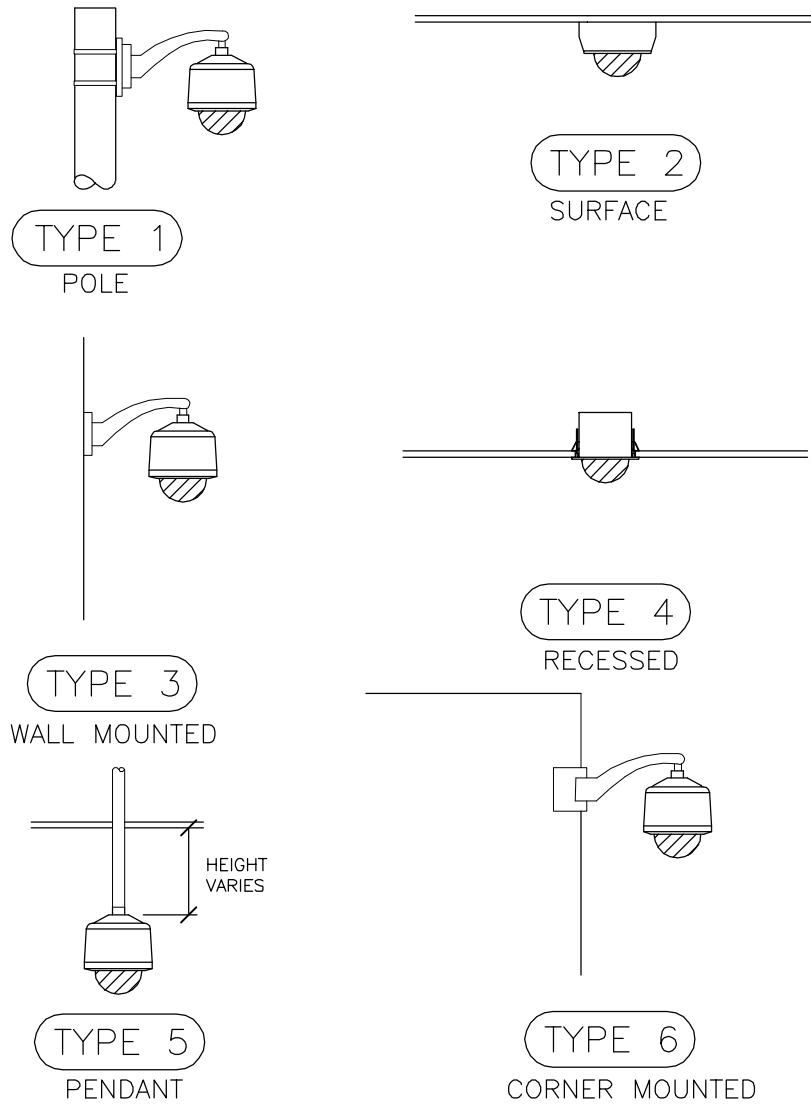
GENERAL NOTES CCTV SYSTEM

- THE RISER DIAGRAM AND FLOOR PLAN INDICATE GENERAL LOCATION AND FUNCTIONAL REQUIREMENTS. CONTRACTOR SHALL PROVIDE ALL RELATED COMPONENTS TO PROVIDE AN OPERATIONAL SYSTEM.
- CONTRACTOR SHALL SUBMIT DETAILED SHOP DRAWINGS AND PRODUCT DATASHEETS FOR ALL COMPONENTS. SHOP DRAWINGS SHALL SHOW ALL COMPONENTS, POINT TO POINT WIRING DIAGRAMS, HARDWARE & SOFTWARE CONFIGURATIONS, CABLE COLOR CODING AND COMPONENT FUNCTIONS. HARDWARE SHALL NOT BE PURCHASED OR INSTALLED UNTIL SUBMITTALS HAVE BEEN APPROVED BY A/E.
- THE CCTV CAMERA PRESETS SHALL BE INTEGRATED WITH THE ACCESS CONTROL SYSTEM. ACTIVATION OF AN ACCESS CONTROL EVENT (E.G. ALARM) SHALL POINT THE CAMERAS IN THE VICINITY, ON PUBLIC AND SECURE SIDE, TO THE LOCATION AND RECORD IT AT FULL FRAME RATE (30FPS/4CIF OR 15FPS/2MP) AND DISPLAY ON SELECTED MONITORS.
- ALL CAMERAS SHALL HAVE A PRE-ASSIGNED HOME POSITION. IF NO CONTROL IS BEING EXECUTED FOR A PERIOD OF 5 MINUTES THE CAMERA SHALL RETURN TO ITS HOME POSITION. THE OPERATOR SHALL HAVE AN OPTION TO LOCK CAMERA IN A NEW TEMPORARY POSITION.
- REFER TO CCTV SCHEDULE FOR CABLING INFORMATION.
- THE MANUFACTURER AND MODEL NUMBERS ARE USED TO ESTABLISH QUALITY AND PERFORMANCE OF THE SYSTEM. APPROVED EQUAL EQUIPMENT THAT MEETS OR EXCEEDS THE PERFORMANCE MAY BE USED. CONTRACTOR SHALL PROVIDE ANY AND ALL ADDITIONAL OPTIONS/COMPONENTS REQUIRED TO MEET THE SPECIFICATION REQUIREMENTS AND TO PROVIDE A FULLY OPERATIONAL SYSTEM.
- ALL CABLES ROUTED OUTSIDE OF THE COMMUNICATIONS ROOM SHALL BE PLENUM RATED OR IN CONDUIT.
- ALL FIBER OPTIC CABLE ROUTED OUTSIDE OF THE CABLE TRAY SHALL BE IN 1" MINIMUM CONDUIT.
- CCTV WIRE SIZES LARGER THAN #14 AWG REQUIRE A SPLICE TO ACCOMMODATE THE TERMINAL BLOCK, EXCEPT DINION IP CAMERA WHERE WIRE SIZES LARGER THAN #18 AWG REQUIRE A SPLICE.
- FIXED CAMERA LENS SHALL BE VARIFOCAL WITH IR CORRECTION.
- CAMERA MOUNTING TYPES ARE BASED UPON GENERAL PERFORMANCE. CONTRACTOR SHALL PERFORM A STUDY AND ENGINEER A CLEAN MOUNTING SYSTEM AT ALL LOCATIONS AS REQUIRED FOR OPTIMAL VIEW BY CAMERA. CONTRACTOR SHALL NOTIFY A/E IF THERE ARE ANY CONFLICTS AND SHALL MOVE CAMERA UPTO 25' FROM LOCATION SHOWN ON PLANS AS DIRECTED BY A/E OR OWNER. ALL CABLES SHALL BE CONCEALED.
- REFER TO SPECIFICATION 13700 FOR CCAS/CCTV SCOPE OF WORK.
- SEE SHEET ET5-01 FOR EQUIPMENT RACK LAYOUTS. PROVIDE DETAILED RACK LAYOUTS OF EQUIPMENT FOR APPROVAL.
- PROVIDE SURGE SUPPRESSION ON ALL OUTDOOR COMMUNICATION CABLES. PROVIDE PROTECTION ON BOTH ENDS OF CABLE. BOND TO GROUNDING SYSTEM. SURGE PROTECTORS SHALL BY CYLIX OR EQUAL.
- ALL PATCH CORDS SHALL BE COLOR CODED. SUBMIT COLOR CODING SCHEME TO A/E FOR APPROVAL.

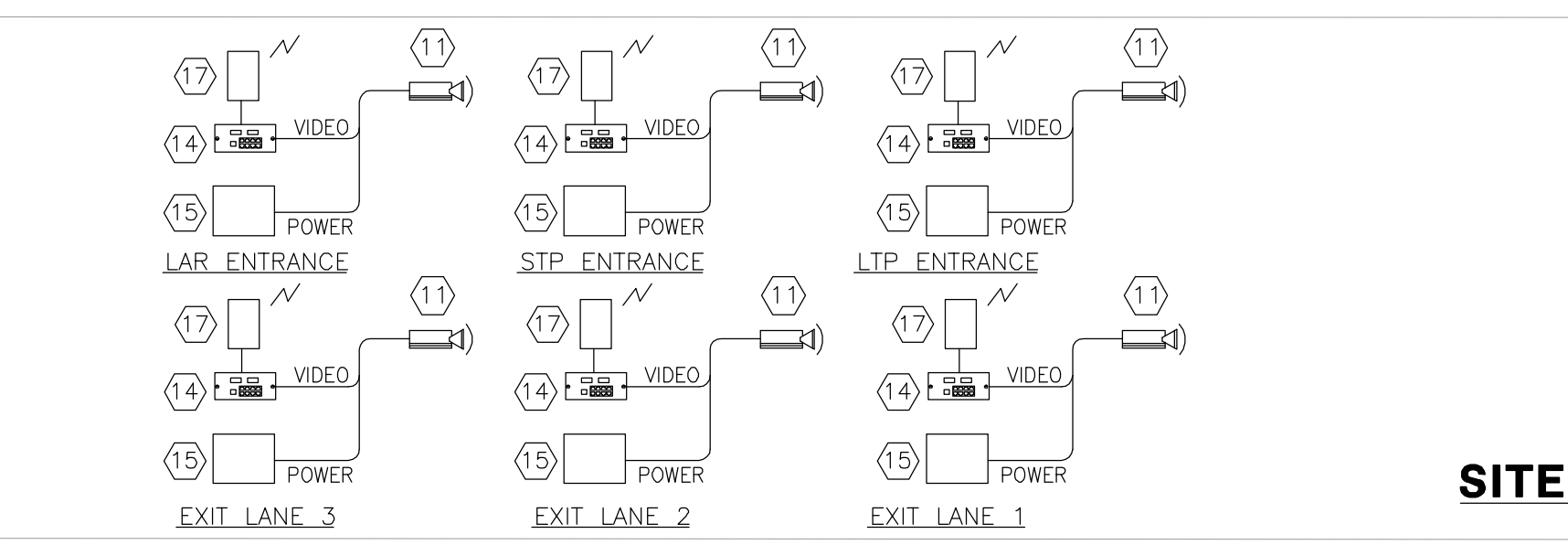
- VIDEO MANAGEMENT SYSTEM SHALL CALL UP ALARM VIDEO ON A MINIMUM OF (3) ALARM SCREENS AND PROVIDE THE FOLLOWING FUNCTIONS: CALL UP SITE MAP, CHANGE SITE MAP DOOR ICON STATE/IMAGE, CHANGE THE RECORDING RATE OF THE CAMERA, LOG THE ALARM IN THE LOG BOOK, CAUSE A PTZ TO GO TO A PREPOSITION.
- CONFIGURE SITE MAPS. VECTOR BASED AUTOCAD "DWG" FORMAT SITE MAPS TO BE PROVIDE BY OWNER. SITE MAPS SHALL BE CREATED FOR THE FOLLOWING VIEWS: CONCOURSE "A", CONCOURSE "B", LANDSIDE, SECURITY CHECKPOINT, VEHICLE GATES, TERMINAL EXTERIOR, ARFF/AOC AND AT MINIMUM (2) ADDITIONAL OWNER DEFINED VIEWS. SUBMIT VIEWS TO A/E AND OWNER FOR APPROVAL BEFORE ADDING DEVICES. COORDINATE DEVICE LOCATIONS WITH OWNER. SITE MAPS SHALL SHOW ALL CAMERAS AND ACCESS CONTROL POINTS/DOORS.
- CREATE CAMERA SEQUENCE GROUPS. GROUPS SHALL INCLUDE: CONCOURSE "A", CONCOURSE "B", LANDSIDE, SECURITY CHECKPOINT, VEHICLE GATES, TERMINAL EXTERIOR, ARFF/AOC, FRONT CANOPY AND AT MINIMUM (2) ADDITIONAL OWNER DEFINED SEQUENCE GROUPS. DETERMINE SEQUENCE ORDER AND DURATION WITH OWNER. TRAIN OWNER TO ASSIGN SEQUENCE GROUPS TO MONITORS.
- CONFIGURE AT A MINIMUM (1) MONITOR GROUP. MONITOR GROUP SHALL INCLUDE: ALL MONITORS, ASSIGN (4) MONITOR NUMBERS PER ANALOG DECODER, (16) MONITOR NUMBERS PER VIDEO MANAGEMENT WORKSTATION. SUBMIT MONITOR NUMBER LAYOUT TO A/E AND OWNER FOR APPROVAL. PROVIDE TYPEWRITTEN LABELS ON MONITORS INDICATING MONITOR NUMBERS.

VIDEO SURVEILLANCE RISER

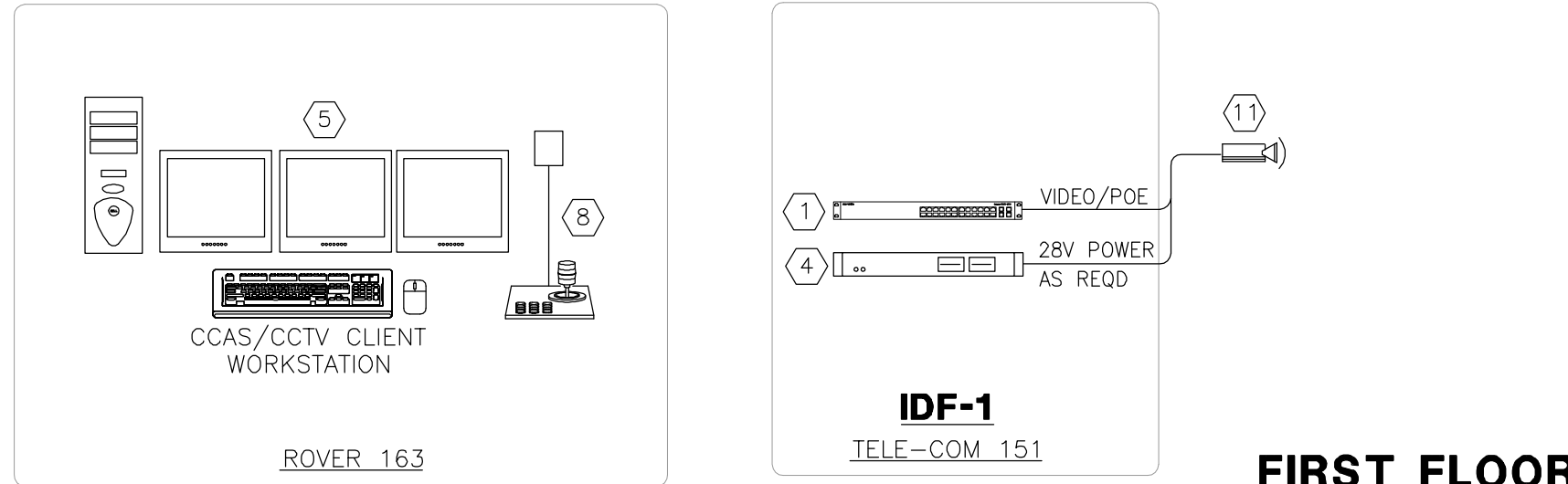
SCALE: NTS



SITE



FIRST FLOOR

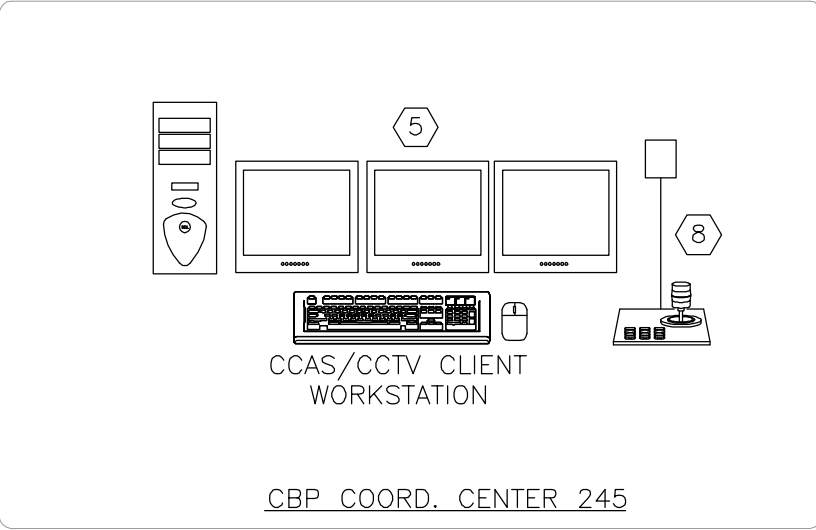


FIRST FLOOR

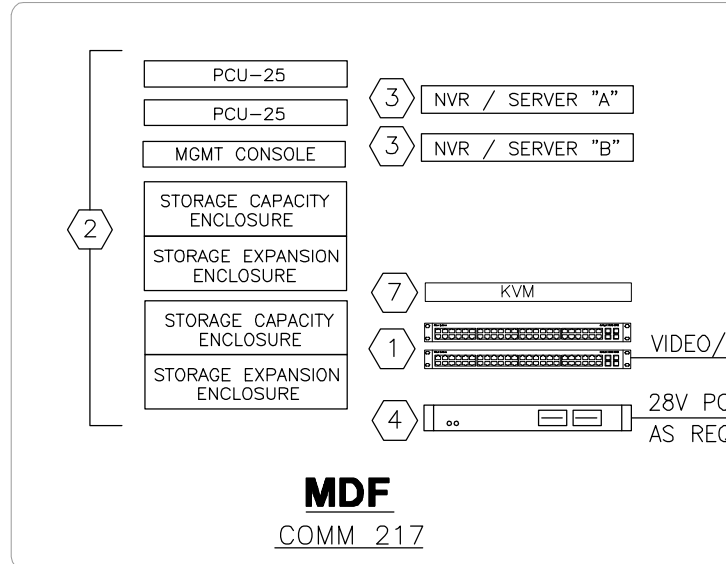


MDF

COMM 217

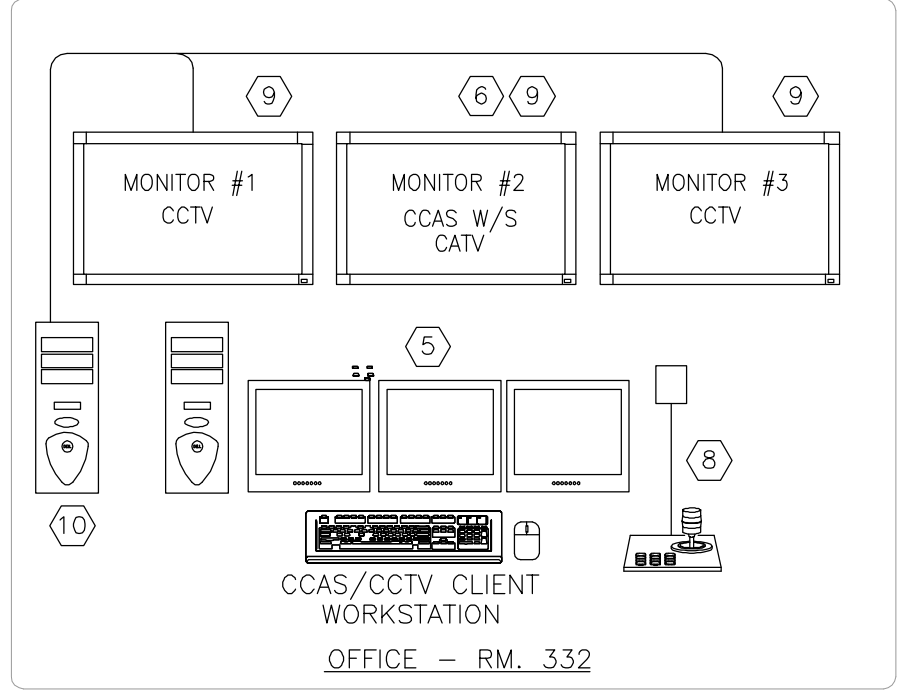
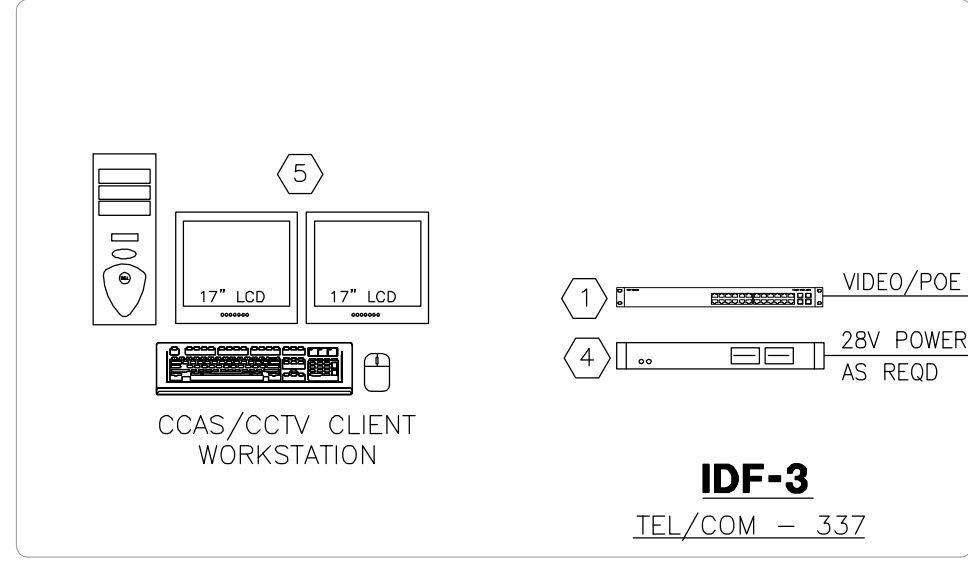


CBP COORD. CENTER 245



IDF-3

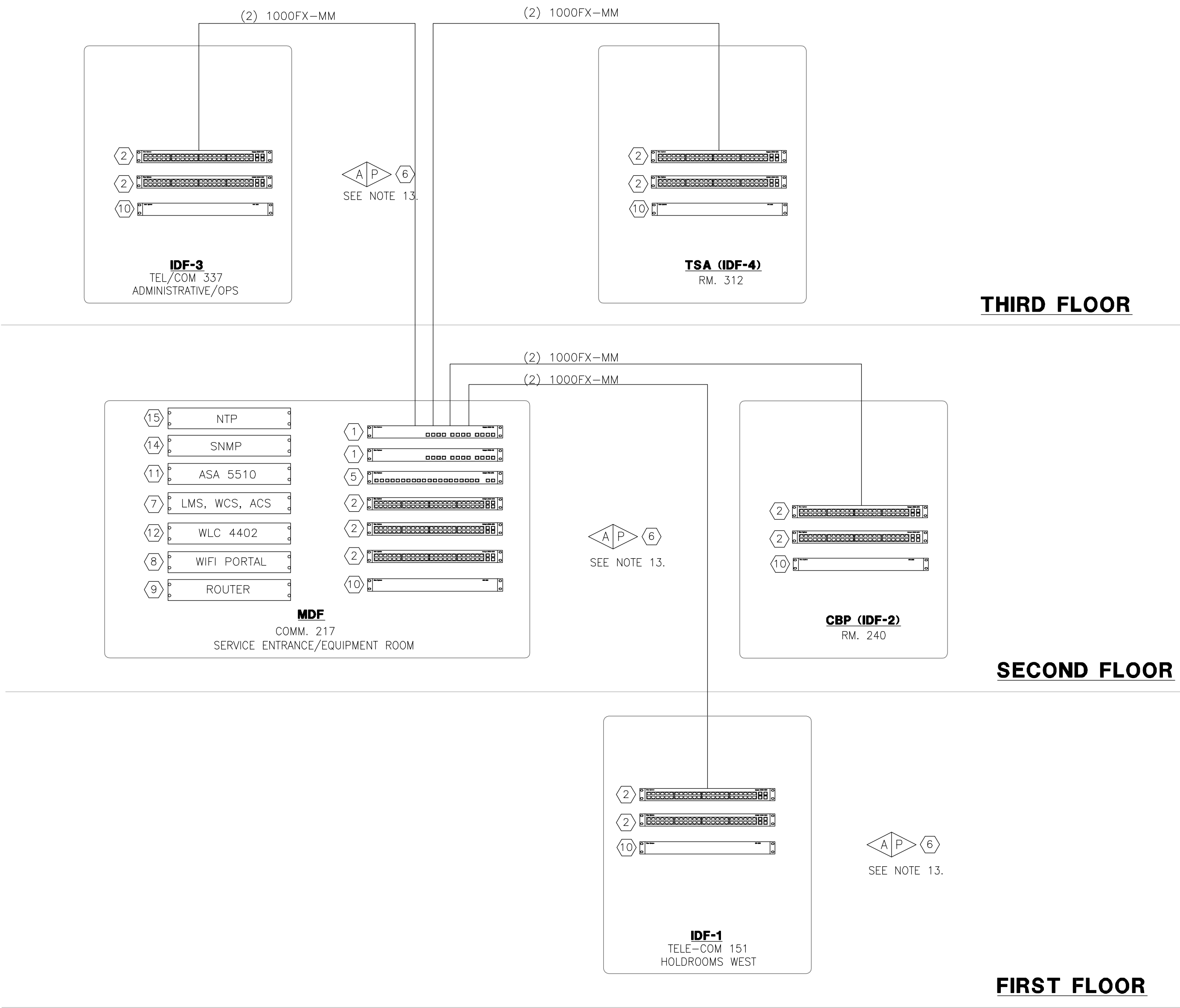
TEL/COM - 337



THIRD FLOOR

GENERAL NOTES

- REFER TO SPECIFICATIONS SECTION 16710 FOR PREMISE WIRING SYSTEM SCOPE OF WORK, SECTION 16715 FOR COMMUNICATIONS NETWORK EQUIPMENT.
- CONTRACTOR SHALL PROVIDE DETAILED SHOP DRAWINGS FOR ALL FIBER AND COPPER CABLES AND PATCH PANELS CONNECTIONS. THE SHOP DRAWINGS SHALL CLEARLY SHOW LOCATION OF ALL PATCH PANELS, SIZE, QTY, AND PORT USAGE. THESE DRAWINGS INDICATE TYPICAL CONNECTIONS. PROVIDE ADDITIONAL ACCESSORIES REQUIRED TO PROVIDE A COMPLETE AND OPERATIONAL SYSTEM.
- MANUFACTURER AND MODEL NUMBERS ARE USED TO ESTABLISH QUALITY AND PERFORMANCE OF THE SYSTEM. ANY EQUIPMENT THAT MEETS OR EXCEEDS THE PERFORMANCE SHALL BE CONSIDERED AND APPROVED AT THE DISCRETION OF THE ENGINEER AND/OR OWNER.
- THE SCOPE SHALL INCLUDE DESIGN, IMPLEMENTATION, SETUP AND TRAINING TO THE OWNERS STAFF AND CONNECTION TO ALL THE EQUIPMENT SHOWN ON THE DRAWINGS. CONTRACTOR SHALL PROVIDE ALL COMPONENTS REQUIRED TO CONNECT THE ETHERNET BASED SYSTEMS TO THE NETWORK. THE CONTRACTOR SHALL COORDINATE WITH AIRPORT "IT" SUPPORT PERSONNEL AND CONSULTANTS.
- CONTRACTOR SHALL LABEL ALL PATCH CABLES AND NETWORK COMPONENTS. LABELS SHALL BE TYPE WRITTEN. REFER TO SPECIFICATIONS FOR LABELING REQUIREMENTS.
- THE NETWORK IMPLEMENTATION SHALL BE PERFORMED BY A QUALIFIED INFORMATION TECHNOLOGY (IT) PROFESSIONAL.
 - THE IT PROFESSIONAL SHALL HAVE A MINIMUM OF TEN YEARS EXPERIENCE IN NETWORK INSTALLATION OF SIMILAR COMPLEXITY.
 - THE IT PROFESSIONAL SHALL HAVE AT A MINIMUM CCIE "CISCO CERTIFIED INTERNETWORK EXPERT" CERTIFICATION AND SHALL BE FAMILIAR WITH NETWORK REDUNDANCY, ACCESS CONTROL LISTS (ACL), ROUTING, SECURITY, CONVERGED NETWORKS, QUALITY OF SERVICE "QOS", VIRTUAL PRIVATE NETWORKS (VPN) AND BROADBAND TECHNOLOGIES.
 - SUBMIT QUALIFICATION INFORMATION TO A/E FOR APPROVAL.
 - THE IT PROFESSIONAL SUPPORT OFFICE SHALL BE WITHIN 150 MILE RADIUS OF AIRPORT.
- THE NETWORK INSTALLATION SHALL INCLUDE FURNISHING AND INSTALLATION OF ALL NETWORK EQUIPMENT AS SPECIFIED HEREIN TO PROVIDE A COMPLETELY OPERATIONAL NETWORK.
- VLANs SHALL BE CREATED TO SEPARATE NETWORKED SYSTEMS. VLANs SHALL BE SPANNED ACROSS SWITCHES. VLANs SHALL INCLUDE BUT NOT BE LIMITED TO, SECURITY, MUFIDS, ADMIN, BUILDING AUTOMATION, PUBLIC ADDRESS, VOICE, ETC. INTERVLAN ROUTING SHALL BE UTILIZED ONLY AS REQUIRED AND ACL'S (ACCESS CONTROL LISTS) SHALL BE CREATED TO RESTRICT ACCESS TO AUTHORIZED PERSONNEL AND DEVICES ONLY. ONLY REQUIRED PORTS SHALL BE OPENED. CONTRACTOR SHALL SUBMIT DETAILED SHOP DRAWINGS INDICATING IP ASSIGNMENTS AND PROPOSED ACCESS CONTROL CONFIGURATIONS TO THE ENGINEER FOR APPROVAL.
- ALL CISCO COMPONENTS SHALL CARRY SMARTNET 8X5 NEXT BUSINESS DAY FOR A MINIMUM OF 2 YEARS.
- PROVIDE ALL TRANSCEIVERS FOR A COMPLETE AND OPERATIONAL SYSTEM.
- NETWORK INTEGRATOR SHALL COORDINATE WITH ALL SYSTEMS TO PROVIDE ADDRESSES, DETERMINE QOS LEVELS AND OTHER NETWORK CONFIGURATION SUPPORT. SYSTEMS SHALL INCLUDE BUT NOT BE LIMITED TO, HVAC CONTRACTOR FOR BUILDING AUTOMATION, PA CONTRACTOR FOR PUBLIC ADDRESS, MUFIDS CONTRACTOR, AIRPORT ADMINISTRATION IT, SECURITY INTEGRATOR AND ELECTRICAL CONTRACTOR FOR METERING AND TRANSFER SWITCH WEB SERVERS. PROVIDE IP ADDRESSING RANGES/SUBNETS TO INTEGRATORS TO USE FOR THEIR DEVICES.
- ALL NETWORK CONFIGURATIONS SHALL BE BACKED UP TO SERVER. IN THE EVENT A SWITCH FAILS, CONFIGURATIONS SHALL BE EASILY UPDATED TO REPLACEMENT HARDWARE.
- CONTRACTOR SHALL COORDINATE AND PROVIDE CONNECTION OF PUBLIC WIFI INTERNET (CABLE MODEM OR DSL) AND T1 INTERNET SERVICE TO THE NETWORK. OWNER WILL COORDINATE PURCHASE OF SERVICES. SUBMIT FIREWALL CONFIGURATIONS TO A/E FOR APPROVAL.
- NETWORK SHALL BE FULLY REDUNDANT. PROVIDE STACKING INTERFACE BETWEEN NETWORK SWITCHES AT EACH LOCATION. PROVIDE DUAL FIBER CONNECTION TO CORE SWITCH.
- FIBER PATCHES AND CROSS PATCHING NOT SHOWN FOR CLARITY. CONTRACTOR SHALL PROVIDE ALL PATCH CABLES AS REQUIRED FOR NETWORK CONNECTIVITY. SEE COMMUNICATION RISER DIAGRAM ET6-06.
- CONNECT ALL SERVERS TO KVM AS INDICATED ON SHEET ET5-01.
- SEE SHEET ET5-01 FOR EQUIPMENT RACK LAYOUTS. PROVIDE DETAILED RACK LAYOUTS OF EQUIPMENT FOR APPROVAL.
- CONTRACTOR SHALL CREATE VPN CONNECTIONS FOR EACH VLAN SYSTEM FOR REMOTE MAINTENANCE AND TESTING. SUBMIT LIST OF ACCOUNTS AND PASSWORDS TO AIRPORT IT.



1
ET604
NETWORK RISER
SCALE: NTS

FOR REFERENCE ONLY

NOTES:

- ETHERNET SWITCH, 12 SFP PORTS, ENHANCED IMAGE IP SERVICES AND 32GBPS STACKING. SWITCH SHALL BE CISCO C3750G-12S-E OR APPROVED EQUAL. SWITCHES SHALL BE STACKED AND OPERATE AS A SINGLE LOGICAL UNIT.
- ETHERNET SWITCH, 48 ETHERNET 10/100/1000 PORTS WITH IEEE 802.3af PoE AND 4 SFP UNLINKS WITH STANDARD IMAGE. SWITCH SHALL BE CISCO C3750G-48PS-S OR APPROVED EQUAL.
- NOT USED.
- HARDENED ETHERNET SWITCH, 12 10/100 ETHERNET PORTS AND 2 100BASE-FX PORTS. SWITCH SHALL BE CISCO 2955C-12 OR APPROVED EQUAL. PROVIDE MOUNTING HARDWARE AND POWER SUPPLY AS REQUIRED.
- ETHERNET SWITCH, 24 100BASE-FX PORTS AND 2 SFP UPLINKS WITH STANDARD IMAGE. SWITCH SHALL BE CISCO C3750-24FS-S OR APPROVED EQUAL.
- WIRELESS ACCESS POINT 802.11g. ACCESS POINT SHALL BE CISCO AIRONET 1140G/N LIGHTWEIGHT ACCESS POINT. CONTRACTOR SHALL PROVIDE SEVEN (6) ABOVE CEILING OR CONCEALED PLUS TWO (2) SPARE ACCESS POINTS. CONTRACTOR SHALL PERFORM A WIRELESS RADIO SITE SURVEY TO DETERMINE ACCESS POINT LOCATIONS FOR COMPLETE BUILDING COVERAGE. SUBMIT STUDY AND WIRELES POINT LOCATION DRAWINGS TO A/E FOR APPROVAL, IN COMPLIANCE WITH SPECIFICATION SECTION 16715, PRIOR TO INSTALLATION. PROVIDE PLENUM RATED CAT6 CABLE TO EACH POINT LOCATION AND LEAVE 20' SLACK CABLE TO ALLOW ACCESS POINT RELOCATION.
- SERVER WITH CISCO LAN MANAGEMENT SOLUTION 3.2 (LMS) 100 DEVICE RESTRICTED LICENSE, WIRELESS CONTROL SYSTEM (WCS) 50 AP LICENSE AND RADIUS SERVER SOFTWARE: CISCO SECURE ACCESS CONTROL SERVER (ACS) OR EQUAL. COORDINATE RADIUS ACCOUNT INFORMATION WITH ADMINISTRATIVE LDAP SERVER USER ACCOUNTS. WIRELESS ACCESS & VPN ACCESS SHALL BE AUTHENTICATED THROUGH THE RADIUS SERVER. HARDWARE SHALL BE DUAL CORE INTEL XEON E5205 1.86GHZ, 4GB RAM, TWO 160GB SATA HARDDRIVES, CDRW/DVD W/ WINDOWS SERVER 2003. SERVER SHALL BE DELL POWEREDGE 1950 III OR EQUAL. CONNECT TO KVM. PROVIDE (3) CLIENT ACCESS LICENSES MINIMUM.
- CAPTIVE PORTAL/WIRELESS GATEWAY W/ USER AGREEMENT AND REDIRECTION TO AIRPORT WEB PAGE. CAPTIVE PORTAL SHALL BE FIRST SPOT PATRONSOFT OR EQUAL. HARDWARE SHALL BE AT MINIMUM 2.0 GHZ INTEL CELERON 440, 1GB DDR2, 80GB HARD DRIVE, 48X32 CDRW/DVD W/ WINDOWS XP PRO P3. WORKSTATION SHALL BE DELL OPTIPLEX 360 OR EQUAL. CONNECT TO KVM.
- MODULAR INTEGRATED SERVICES ROUTER WITH T1 INTERFACE. ROUTER SHALL BE CISCO 1841-T1 OR APPROVED EQUAL.
- REDUNDANT POWER SYSTEM FOR NETWORK SWITCHES. REDUNDANT POWER SYSTEM SHALL BE CISCO RPS 2300. PROVIDE MODULES/CABLES AS REQUIRED.
- ADAPTIVE SECURITY APPLIANCE WITH CONTENT SECURITY SERVICES. DEVICE SHALL SUPPORT AT MINIMUM 50 USER ANTIVIRUS/ANTISPYWARE, FIREWALL SERVICES, 250 IPSEC VPN, 2 SSL VPN AND 3 FAST ETHERNET INTERFACES. PROVIDE (2) YEAR SUBSCRIPTION SERVICES. ADAPTIVE SECURITY APPLIANCE SHALL BE CISCO ASA5510-CSC10-K9 OR APPROVED EQUAL.
- WLC 4402 WLAN CONTROLLER FOR 12 LIGHTWEIGHT ACCESS POINTS.
- NOT USED.
- PROVIDE SIMPLE NETWORK MANAGEMENT PROTOCOL (SNMP) SERVER. SERVER SHALL BE DELL 1950 OR EQUAL. SOFTWARE SHALL BE WHATUSGOLD PREMIUM OR EQUAL. CONFIGURE DEVICES THAT SUPPORT SNMP TO PROVIDE UPDATES TO SNMP SERVER. THIS SHALL INCLUDE, UPS, TEMP SENSORS, SERVERS, CCTV CAMERAS, NETWORK SWITCHES AND OTHER DEVICES AS NECESSARY FOR SYSTEM STATUS. COORDINATE WITH ALL SYSTEM INTEGRATORS.
- PROVIDE NETWORK TIME SERVER. SERVER SHALL BE SYMMETRICOM SYNCSEVER S200 WITH TCXO CLOCK. PROVIDE GPS INTERFACE, ANTENNA AND CABLEING TO ROOF. CONFIGURE ALL SERVERS, CAMERAS, WORKSTATIONS TO USE NTP SERVER FOR TIME SYNC. COORDINATE WITH ALL SYSTEM INTEGRATORS.

WARNING: THIS RECORD CONTAINS SENSITIVE SECURITY INFORMATION THAT IS CONTROLLED UNDER 49 CFR PARTS 15 AND 1520. NO PART OF THIS RECORD MAY BE DISCLOSED TO PERSONS WITHOUT A "NEED TO KNOW", AS DEFINED IN 49 CFR PARTS 15 AND 1520, EXCEPT WITH THE WRITTEN PERMISSION OF THE ADMINISTRATOR OF THE TRANSPORTATION SECURITY ADMINISTRATION OR THE SECRETARY OF TRANSPORTATION. UNAUTHORIZED RELEASE MAY RESULT IN CIVIL PENALTY OR OTHER ACTION. FOR U.S. GOVERNMENT AGENCIES, PUBLIC DISCLOSURE IS GOVERNED BY 5 U.S.C. 552 AND 49 CFR PARTS 15 AND 1520.

RS&H
IMPROVING YOUR WORLD

Reynolds, Smith and Hills, Inc.
4525 Airport Approach Rd, Ste A
Duluth, Minnesota 55811
218-722-1227 Fax: 218-722-1062
www.rsandh.com

**DULUTH AIRPORT
AUTHORITY**

**DULUTH
INTERNATIONAL
AIRPORT
DULUTH, MN**

**NEW PASSENGER
TERMINAL**

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) 722-8306

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

REVISIONS

NO.	DESCRIPTION	DATE
	100% REVIEW	12.15.10
	BID PACKAGE 2A	01.24.11
1	BP2A ADDENDUM 1	02.25.11
	BP2A CONFORMANCE SET	05.02.11
	BID PACKAGE 2B REVIEW	07.16.11
	BID PACKAGE 2B	08.23.11
	BP2B CONFORMANCE	10.21.11
2	BP2A RFP-179	11.21.11

DATE ISSUED: 02-10-12
REVIEWED BY: BA
DRAWN BY: RJL
DESIGNED BY: BA

AEP PROJECT NUMBER
213-1882-091

© 2010 REYNOLDS, SMITH AND HILLS INC.

SHEET TITLE

**NETWORK
RISER**

SHEET NUMBER

ET604

BID PACKAGE 2C

GENERAL NOTES

- CONTRACTOR SHALL PROVIDE DETAILED SHOP DRAWINGS. THE SHOP DRAWINGS SHALL CLEARLY SHOW LOCATION OF ALL CATV EQUIPMENT, SIZE, QTY, AND PORT USAGE. THE DRAWINGS INDICATE SCHEMATIC LAYOUT. PROVIDE ADDITIONAL RACKS AND OTHER ACCESSORIES REQUIRED TO PROVIDE A COMPLETE AND OPERATIONAL SYSTEM.
- ROUTE COAX CABLES SHOWN ON PLANS WITH "TV" SYMBOL TO CATV ENCLOSURE. TERMINATE WITH "F" STYLE COMPRESSION FITTINGS AND LABEL. CONNECT TO CATV SPLITTER/TAP AS NEEDED. PROVIDE CABLE MANAGEMENT INSIDE ENCLOSURE FOR CABLE DROPS.
- CATV SYSTEM SHALL BE DESIGNED FOR 5-1000MHz PASSIVE AND 860 MHZ ACTIVE OPERATION.
- OWNER TO PURCHASE SERVICE FROM LOCAL CATV PROVIDER. COORDINATE SYSTEM PERFORMANCE WITH CATV PROVIDER.
- SYSTEM SHALL BE LAID OUT SUCH THAT FUTURE CHANNEL FILTERS AND RF MODULATORS CAN BE ADDED AT A FUTURE DATE.
- SUBMIT RF TEST REPORTS TO A/E AFTER SYSTEM HAS BEEN INSTALLED. TEST REPORTS SHALL BE PERFORMED ON ALL CHANNELS, FORWARD AND REVERSE. TESTS SHALL BE FOR DIGITAL AND ANALOG SIGNAL. TESTS SHALL INCLUDE CHANNEL AVERAGE POWER, IN-CHANNEL NOISE, ENHANCED SPECTRAL ANALYSIS AND INGRESS.
- CONNECTION TO PUBLIC ADDRESS SPEAKER ZONES SHALL BE PERFORMED BY PUBLIC ADDRESS INTEGRATOR.
- CONTRACTOR SHALL PROVIDE TYPE WRITTEN LABELS ON ALL CABLES AT EACH END. CONTRACTOR SHALL PROVIDE TYPE WRITTEN LABELS ON ALL CABINETS/ENCLOSURES, DEVICES AND DEVICE PORTS.
- CONTRACTOR SHALL PROVIDE 12 MONTHS FULL MAINTENANCE BY SKILLED CATV SYSTEM INSTALLER, INCLUDING QUARTERLY ADJUSTING AS REQUIRED FOR OPTIMUM SYSTEM PERFORMANCE.
- CATV DISTRIBUTION SYSTEM COMPONENTS SHALL BE MANUFACTURED BY BLONDER TONGUE, CHANNEL MASTER, CANARE CORP, LEVITON, MOTOROLA, SCIENTIFIC-ATLANTA OR APPROVED EQUAL.
- PROVIDE 75 OHM TERMINATION ON ALL UNUSED COAX PORTS.

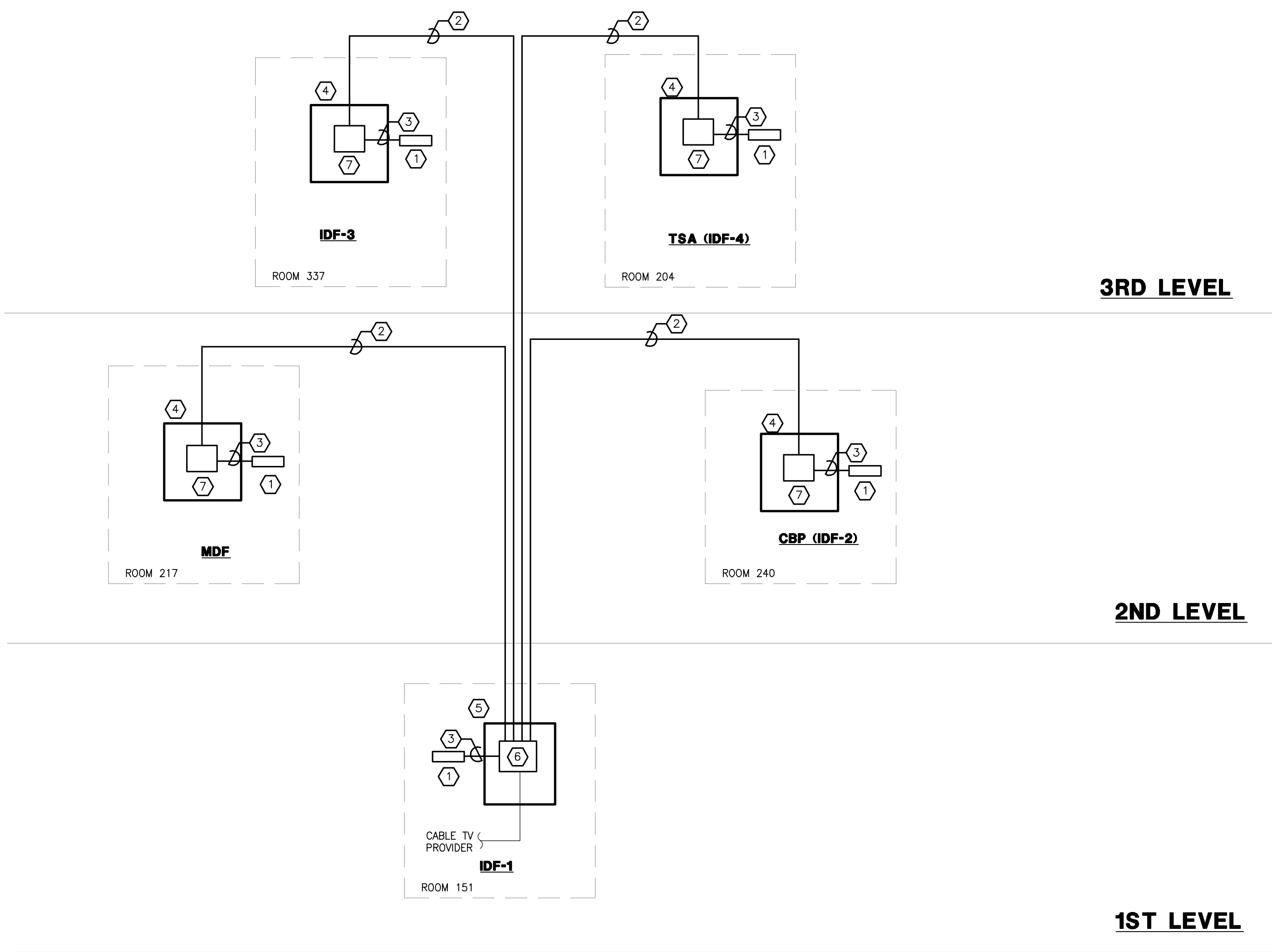
CATV PERFORMANCE REQUIREMENTS:

MINIMUM ACCEPTABLE PERFORMANCE OF DISTRIBUTION SYSTEM AT ALL USER-INTERFACE POINTS SHALL BE AS FOLLOWS:

- RF VIDEO-CARRIER LEVEL: BETWEEN 3 AND 12 DBMV.
- RELATIVE VIDEO-CARRIER LEVEL: WITHIN 3 DB TO ADJACENT CHANNEL.
- CARRIER LEVEL STABILITY, SHORT TERM: LEVEL SHALL NOT CHANGE MORE THAN 0.5 DB DURING A 60-MINUTE PERIOD.
- CARRIER LEVEL STABILITY, LONG TERM: LEVEL SHALL NOT CHANGE MORE THAN 2 DB DURING A 24-HOUR PERIOD.
- CHANNEL FREQUENCY RESPONSE: ACROSS ANY 6-MHZ CHANNEL IN THE 54MHZ TO 860MHZ FREQUENCY RANGE, REFERENCED TO VIDEO; SIGNAL AMPLITUDE SHALL BE PLUS OR MINUS 1 DB, MAXIMUM.
- CARRIER-TO-NOISE RATIO: 45 DB OR MORE.
- RF VISUAL SIGNAL-TO-NOISE RATIO: 43 DB OR MORE.
- ANTENNA COMBINER INSERTION LOSS: 40 DB MAXIMUM.
- SIGNAL POWER SPLITTER AND ISOLATION TAP RETURN LOSS: 17 DB MAXIMUM.
- CABLE CONNECTORS ATTENUATION: LESS THAN 0.1 DB.
- CROSS MODULATION: LESS THAN MINUS 50 DB.
- CARRIER-TO-ECHO RATIO: MORE THAN 40 DB.
- COMPOSITE TRIPLE BEAT: LESS THAN MINUS 53 DB.
- SECOND ORDER BEAT: LESS THAN MINUS 60 DB.
- TERMINAL ISOLATION FROM TELEVISION TO TELEVISION: 25 DB, MINIMUM.
- TERMINAL ISOLATION BETWEEN TELEVISION AND FM: 35 DB, MINIMUM.
- HUM MODULATION: 2 PERCENT, MAXIMUM.
- TLT/SLOPE: 10 DB, MAXIMUM.

NOTES:

- CATV DISTRIBUTION HUB W/ 16 UTP PORT OUTPUT. HUB SHALL BE RACKMOUNTED. CATV DISTRIBUTION HUB SHALL BE MUXLAB VIDEOEASE (500303). PROVIDE (5) SINGLE PORT CATV BALUNS (500302) PER LOCATION. BALUNS SHALL BE MUXLAB OR EQUAL.
- CATV DISTRIBUTION COAX. COAX SHALL BE 75 OHM PLENUM RATED 1/2". COAX SHALL BE COMMSCOPE 2312K OR EQUAL. TERMINATE W/ COMPRESSION "F" STYLE FITTINGS.
- CATV COAX. COAX SHALL BE WESTPENN 841 OR EQUAL. TERMINATE W/ COMPRESSION "F" STYLE FITTINGS.
- 16" x 16" x 6.62" TYPE 1 ENCLOSURE. ENCLOSURE SHALL BE HOFFMAN A16N16ALP W/ PERFORATED PANEL. PROVIDE #6 GROUND FROM ENCLOSURE TO COMM. ROOM GROUND BUS BAR. PROVIDE 1.5" EMT TO CABLE TRAY FOR DISTRIBUTION COAX.
- 24" x 20" x 6.62" TYPE 1 ENCLOSURE. ENCLOSURE SHALL BE HOFFMAN A24N24ALP W/ PERFORATED PANEL. PROVIDE #6 GROUND FROM ENCLOSURE TO COMM. ROOM GROUND BUS BAR. PROVIDE (3) 1.5" EMT TO CABLE TRAY FOR DISTRIBUTION COAX.
- CATV BROADBAND DISTRIBUTION AMPLIFIER W/ 43DB GAIN, 10DB GAIN CONTROL, 8DB SLOPE CONTROL AND INTEGRATED ACTIVE RETURN (42/54MHZ SPLIT). BROADBAND DISTRIBUTION AMPLIFIER SHALL BE BLONDER TONGUE BIDA 86B-43P (5900P84) OR EQUAL. PROVIDE 6-WAY SPLITTER ON AMPLIFIER OUTPUT. PROVIDE 8 PORT TAP (MODEL SRT-8A).
- CATV 8 PORT DIRECTIONAL COUPLER/TAP (MODEL SRT-8A). PROVIDE LINE EQUALIZER TO COMPENSATE FOR CABLE ATTENUATION TILT. AS REQUIRED (MODEL LE-860). CONTRACTOR SHALL DETERMINE TAP AND EQ VALUES BASED UPON SYSTEM PERFORMANCE. PROVIDE SIGNAL ATTENUATORS IF REQUIRED. OUTPUT SHALL BE 15DB.

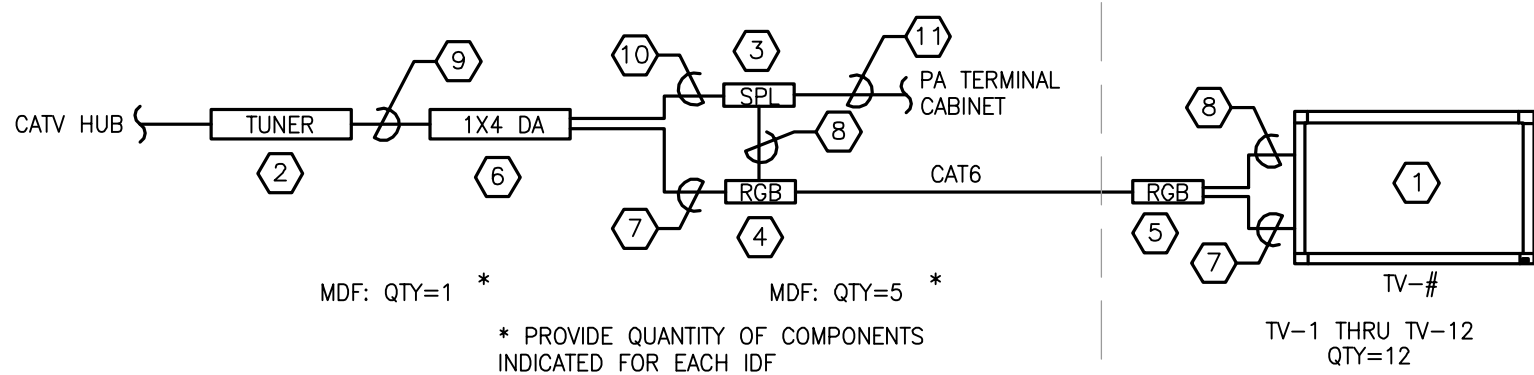


3RD LEVEL

2ND LEVEL

1ST LEVEL

CATV RISER
SCALE: NTS

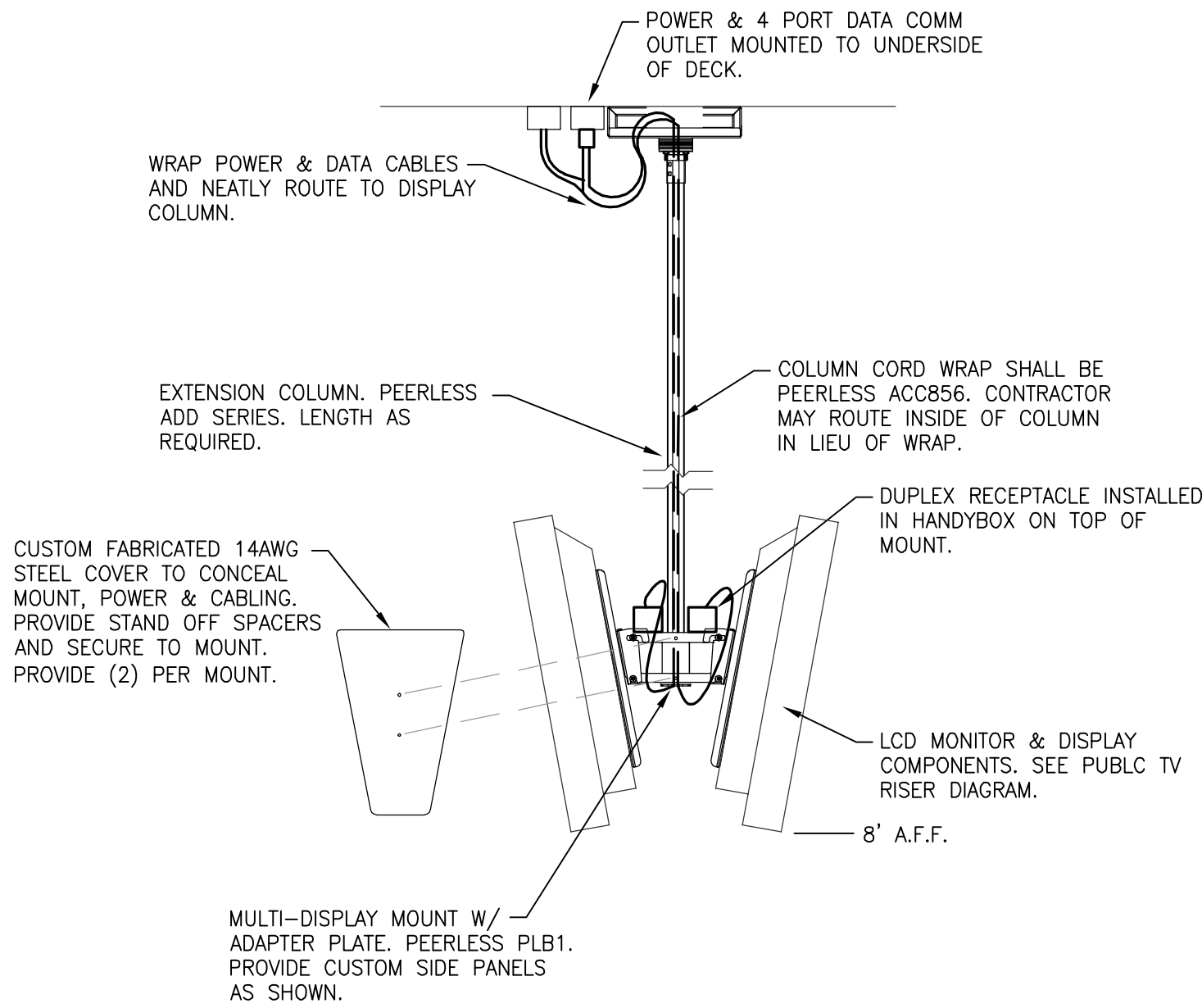


NOTES:

- 47" LED MONITOR, 1920X1080 NATIVE RESOLUTION, ETHERNET CONTROL, PIP, SCHEDULING, TILE MATRIX W/ THIN BEZEL AND SPEAKER OPTION. MONITOR SHALL BE LG 47LE530C OR APPROVED EQUAL. CONNECT TO NETWORK SWITCH. PROGRAM LCD MONITORS TO TURN ON AND OFF BASED ON A OWNER DEFINED SCHEDULE. QUANTITY 12. SEE MOUNT DETAIL THIS SHEET.
- RF INTERFACE BOX WITH INTEGRATED HD TUNER, ZENITH HCS5610. PROVIDE CAT5 UTP TO COAX VIDEO BALUN. BALUN SHALL BE MUXLAB VIDEOEASE CATV BALUN II (500302). CONNECT TO UTP CATV HUB IN RACK. PROVIDE RACK SHELF & SECURE TUNER TO SHELF. LABEL WITH TV #'S CONNECTED. OWNER MAY PROVIDE CATV LEASED TUNER. IF SO CONNECT OWNER TUNER AND TURN OVER SPECIFIED TUNER TO OWNER. PROVIDE TUNER (MDF) SPLIT COMPONENT AND STEREO OUTPUT WITH DISTRIBUTION AMPLIFIER.
- AMBIENT LEVEL CONTROLLER W/ DUCKER CONTROL. CONTROLLER SHALL BE SYMETRIX 271 SPL COMPUTER. LABEL WITH PA ZONE CIRCUIT. PROVIDE RACK MOUNT TRAY.
- COMPONENT VIDEO WITH STEREO AUDIO TRANSMITTER FOR CAT6 UTP CABLING. UNIT SHALL BE MAGENTA RESEARCH MULTIVIEW T4 4-PORT TRANSMITTER OR EQUAL. PROVIDE RACK MOUNT KIT. LABEL WITH TV #'S
- COMPONENT VIDEO WITH STEREO AUDIO RECEIVER FOR CAT6 UTP CABLING. UNIT SHALL BE MAGENTA RESEARCH MULTIVIEW AK600DP RECEIVER OR EQUAL. COORDINATE CONNECTION TO UTP TRANSMITTER BY APPROPRIATE PA CKT, SEE TV/PA SCHEDULE. LABEL W/ TV #'S
- 1U RACKMOUNT 1X4 RCA COMPONENT VIDEO AND RCA STEREO AUDIO DISTRIBUTION AMPLIFIER. AMP SHALL BE IMPACT ACOUSTICS #40397 OR EQUAL.
- COMPONENT RCA TO HD15 BREAKOUT CABLE. HIGH QUALITY, GOLD PLATED TERMINALS.
- 3.5MM STEREO AUDIO TO RCA STEREO CABLE. HIGH QUALITY, GOLD PLATED TERMINALS.
- COMPONENT WITH STEREO RCA CABLE. HIGH QUALITY, GOLD PLATED TERMINALS.
- STEREO RCA CABLE TO TERMINAL STRIP. HIGH QUALITY, GOLD PLATED TERMINALS.
- PROVIDE AUDIO CABLE TO PUBLIC ADDRESS TERMINAL CABINET SPEAKER CIRCUIT. CABLE SHALL BE WEST PENN 25224 OR EQUAL. CONNECTION TO PUBLIC ADDRESS SPEAKER ZONES SHALL BE PERFORMED BY PUBLIC ADDRESS INTEGRATOR. MDF PROVIDE CONNECTION TO PA CIRCUITS LS GATE 1, 2, 3, 4, 5 & 6. IN LIEU OF AUDIO CIRCUIT INTERFACE CONTRACTOR MAY INTERFACE WITH PA RELAY INTERFACE IF AVAILABLE.

TV/PA CIRCUIT SCHEDULE:

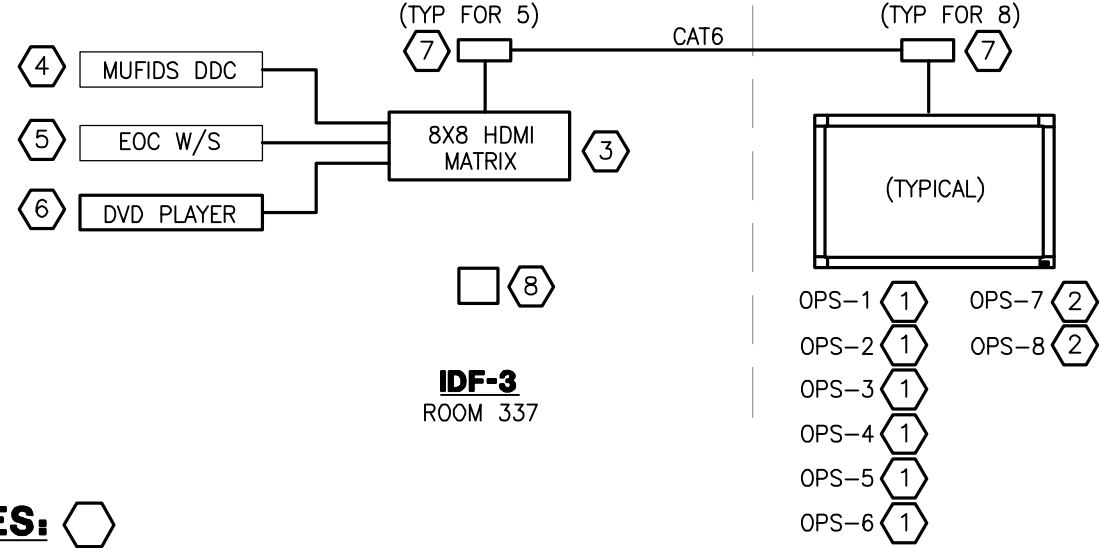
- TV-1 - LS GATE 1
- TV-2 - LS GATE 2
- TV-3 - PASS. WAITING
- TV-4 - LS GATE 2
- TV-5 - LS GATE 2
- TV-6 - LS GATE 2/3
- TV-7 - LS GATE 2/3
- TV-8 - LS GATE 3
- TV-9 - LS GATE 3
- TV-10 - LS GATE 4
- TV-11 - LS GATE 4
- TV-12- BOARDING 231



MOUNTING SYSTEM GENERAL NOTES

- MANUFACTURER AND MODEL NUMBERS ARE USED TO ESTABLISH QUALITY AND PERFORMANCE OF THE SYSTEM. ANY EQUIPMENT THAT MEETS OR EXCEEDS THE PERFORMANCE SHALL BE CONSIDERED AND APPROVED AT THE DISCRETION OF THE ENGINEER AND/OR OWNER.
- INSTALL PER MANUFACTURERS INSTRUCTIONS. DO NOT EXCEED WEIGHT LIMITATIONS.
- BEAMS FOR CEILING MOUNTED DISPLAYS ARE W24 (24" DEEP) W/ A BEAM WIDTH OF 7" TO 13" AND THICKNESS OF 0.59" TO 1.09". PROVIDE PEERLESS DCT SERIES HEAVY DUTY I-BEAM CLAMP WITH DECOUPLER.
- PROVIDE SO CORD WITH TWIST LOCK DISCONNECT AT POWER OUTLET. PROVIDE (2) DUPLEX RECEPTACLES ON TOP OF DISPLAY MOUNT AS SHOWN.
- PROVIDE (4) 10' CAT6 PATCH CORDS FROM COMM OUTLET TO DISPLAY MOUNT.
- PAINT ALL COMPONENTS TO MATCH CEILING/STRUCTURE. COORDINATE FINAL COLOR WITH A/E AND OWNER PRIOR TO FABRICATION.
- BOTTOM OF MONITORS SHALL BE INSTALLED 8' A.F.F., FIELD COORDINATE FINAL HEIGHT AND TILT FOR OPTIMAL VIEW.

PUBLIC TV MOUNT DETAIL
SCALE: NTS



NOTES:

- 47" LED MONITOR, 1920X1080 NATIVE RESOLUTION, ETHERNET CONTROL, PIP, SCHEDULING, TILE MATRIX W/ THIN BEZEL AND SPEAKER OPTION. MONITOR SHALL BE LG 47LE530C OR APPROVED EQUAL. CONNECT TO NETWORK SWITCH.
- PROVIDED BY OWNER
- 8 X 8 HDMI MATRIX SWITCHER WITH ETHERNET AND SERIAL CONTROL. HDMI MATRIX SWITCHER SHALL BE EXTRON DXP HDMI SERIES DXP88. PROVIDE LABELS ON EACH CONNECTION AND BUTTON. CONNECT TO NETWORK. PROVIDE WINDOWS CONTROL PROGRAM.
- MUFIDS DDC INTERFACE. PROVIDE DVI TO HDMI CABLES (QTY 3). SEE ET6-02 MUFIDS RISER.
- EOC WORKSTATION INTERFACE. PROVIDE HDMI CABLE. SEE ET6-01 SECURITY RISER.
- DVD PLAYER, 1080P HDMI UPSCALING, PROGRESSIVE SCAN, USB, DIVX. DVD PLAYER SHALL BE PHILIPS DVP5992 OR EQUAL. PROVIDE HDMI CABLE. LOCATE IN ROOM 320.
- HDMI AUDIO & VIDEO UTP EXTENDER. EXTENDER SHALL SUPPORT 1080P AT 150' MINIMUM. EXTENDER SHALL BE MAGENTA RESEARCH HD ONE. PROVIDE RACK MOUNTING KIT FOR TRANSMITTERS. (TYPICAL FOR 5, PROVIDE 1 SPARE)
- HDMI SWITCHER EXTERNAL WALL MOUNTED CONTROL PANEL. INSTALL CONTROL PANEL NEAR MONITOR LOCATION. CONTROL PANEL SHALL BE EXTRON MKP 2000 OR EQUAL. CONNECT TO NETWORK SWITCH. CONFIGURE INTEGRATED WEBSERVER FOR REMOTE ACCESS. PROVIDE (1) CONTROL PANEL IN EACH (OPS RMS 318, 320, 322, EXEC DIRECTOR RM 323, OPS RM 324).

HDMI MATRIX SCHEDULE:

IDF-3

INPUTS

- 1. FID-27
- 2. FID-28
- 3. FID-29
- 4. EOC WORKSTATION
- 5. DVD PLAYER
- 6. SPARE
- 7. SPARE
- 8. SPARE

OUTPUTS

- 1. OPS-1
- 2. OPS-2
- 3. OPS-3
- 4. OPS-4
- 5. OPS-5
- 6. OPS-6
- 7. OPS-7
- 8. OPS-8

OPS CENTER DISPLAY RISER
SCALE: NTS



Reynolds, Smith and Hills, Inc.
4885 Airport Approach Rd, Ste A
Duluth, Minnesota 55811
216-722-1227 Fax: 216-722-1062
www.rsandh.com



DULUTH INTERNATIONAL AIRPORT
DULUTH, MN

NEW PASSENGER TERMINAL

CONSULTANTS

Interior Architects:
SJA ARCHITECTS
11 E Superior Street Suite 340, Duluth MN 55802
TEL: (216) 724-8578 / FAX: (216) 724-8717

Structural Engineers:
MBJ CONSULTING ENG.
501 Lake Avenue South, Suite 300, Duluth MN 55802
TEL: (216) 722-1056 / FAX: (216) 722-8306

M/E/P/F 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: (216) 591-5079

REVISIONS

NO.	DESCRIPTION	DATE
	100% REVIEW	12.15.10
	BID PACKAGE 2A	01.24.11
1	BP2A ADDENDUM 1	02.25.11
	BP2A CONFORMANCE SET	05.02.11
	BID PACKAGE 2B REVIEW	07.16.11
	BID PACKAGE 2B	08.23.11
	BP2B CONFORMANCE	10.21.11
2	BP2A RFP-179	11.21.11

DATE ISSUED: 02-10-12
REVIEWED BY: BA
DRAWN BY: RJL
DESIGNED BY: BA
AEP PROJECT NUMBER
213-1882-091
© 2010 REYNOLDS, SMITH AND HILLS INC.
SHEET TITLE

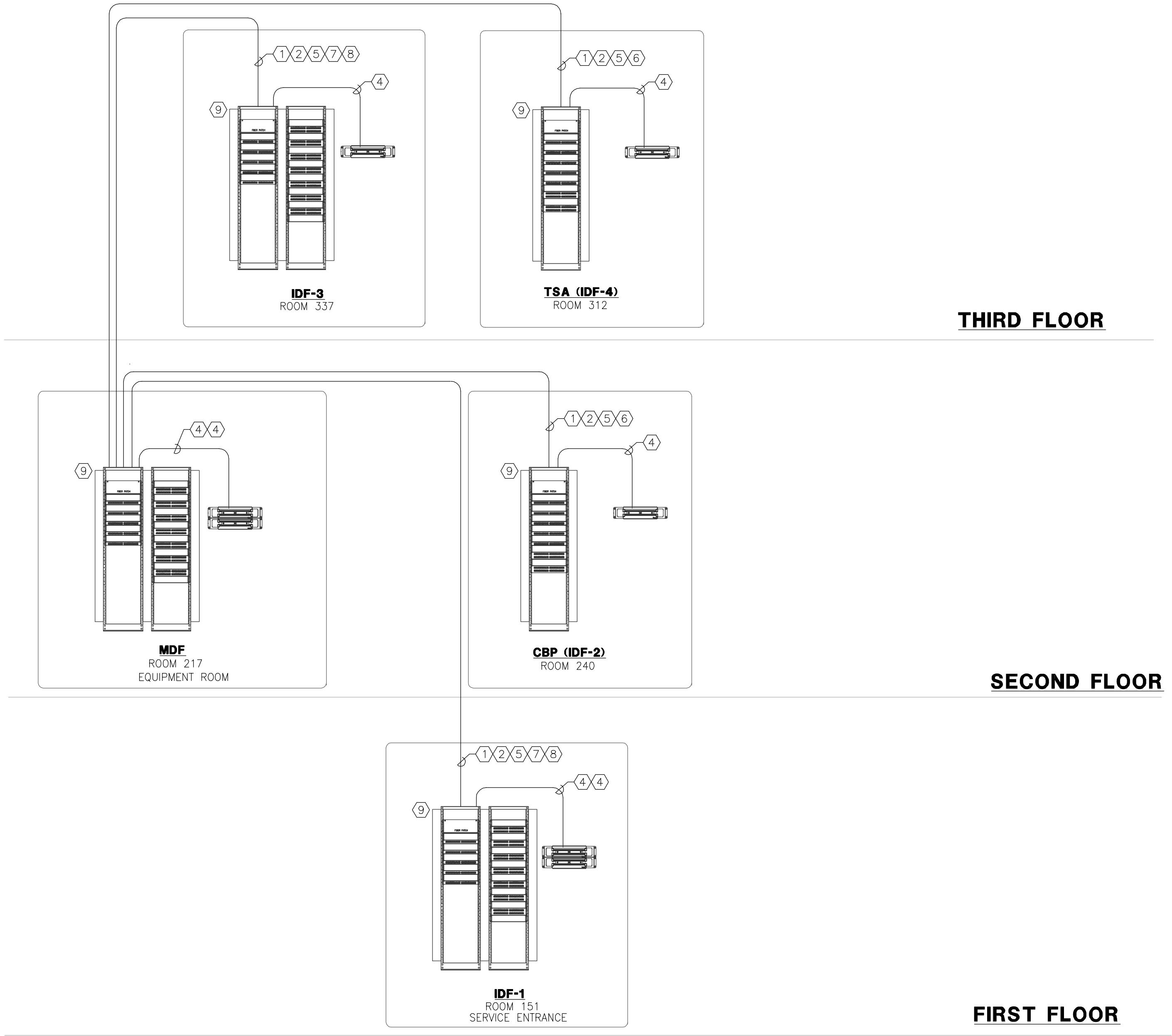
CATV & DISPLAY RISERS

SHEET NUMBER

ET605

BID PACKAGE 2C

WARNING: THIS RECORD CONTAINS SENSITIVE SECURITY INFORMATION THAT IS CONTROLLED UNDER 49 CFR PARTS 15 AND 1520. NO PART OF THIS RECORD MAY BE DISCLOSED TO PERSONS WITHOUT A "NEED TO KNOW", AS DEFINED IN 49 CFR PARTS 15 AND 1520, EXCEPT WITH THE WRITTEN PERMISSION OF THE ADMINISTRATOR OF THE TRANSPORTATION SECURITY ADMINISTRATION OR THE SECRETARY OF TRANSPORTATION. UNAUTHORIZED RELEASE MAY RESULT IN CIVIL PENALTY OR OTHER ACTION. FOR U.S. GOVERNMENT AGENCIES, PUBLIC DISCLOSURE IS GOVERNED BY 5 U.S.C. 552 AND 49 CFR PARTS 15 AND 1520.



1
ET606
COMMUNICATION RISER
SCALE: NTS

FOR REFERENCE ONLY

WARNING: THIS RECORD CONTAINS SENSITIVE SECURITY INFORMATION THAT IS CONTROLLED UNDER 49 CFR PARTS 15 AND 1520. NO PART OF THIS RECORD MAY BE DISCLOSED TO PERSONS WITHOUT A "NEED TO KNOW", AS DEFINED IN 49 CFR PARTS 15 AND 1520, EXCEPT WITH THE WRITTEN PERMISSION OF THE ADMINISTRATOR OF THE TRANSPORTATION SECURITY ADMINISTRATION OR THE SECRETARY OF TRANSPORTATION. UNAUTHORIZED RELEASE MAY RESULT IN CIVIL PENALTY OR OTHER ACTION. FOR U.S. GOVERNMENT AGENCIES, PUBLIC DISCLOSURE IS GOVERNED BY 5 U.S.C. 552 AND 49 CFR PARTS 15 AND 1520.



Reynolds, Smith and Hills, Inc.
4525 Airport Approach Rd, Ste A
Duluth, Minnesota 55811
218-722-1227 Fax: 218-722-1062
www.rsandh.com



DULUTH
INTERNATIONAL
AIRPORT
DULUTH, MN

NEW PASSENGER
TERMINAL

- 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) 722-8306
- ME/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) 591-5079

REVISIONS		
NO.	DESCRIPTION	DATE
	100% REVIEW	12.15.10
	BID PACKAGE 2A	01.24.11
1	BP2A ADDENDUM 1	02.25.11
	BP2A CONFORMANCE SET	05.02.11
	BID PACKAGE 2B REVIEW	07.16.11
	BID PACKAGE 2B	08.23.11
	BP2B CONFORMANCE	10.21.11
2	BP2A RFP-179	11.21.11

DATE ISSUED: 02-10-12
REVIEWED BY: BA
DRAWN BY: RJL
DESIGNED BY: BA
AEP PROJECT NUMBER
213-1882-091
© 2010 REYNOLDS, SMITH AND HILLS INC.
SHEET TITLE

COMMUNICATION
RISER

SHEET NUMBER
ET606
BID PACKAGE 2C

REVISIONS

NO.	DESCRIPTION	DATE

DATE ISSUED: 02-17-12

REVIEWED BY: RDU

DRAWN BY: SA

DESIGNED BY: SA

AEP PROJECT NUMBER

213-1882-091

© 2010 REYNOLDS, SMITH AND HILLS, INC.

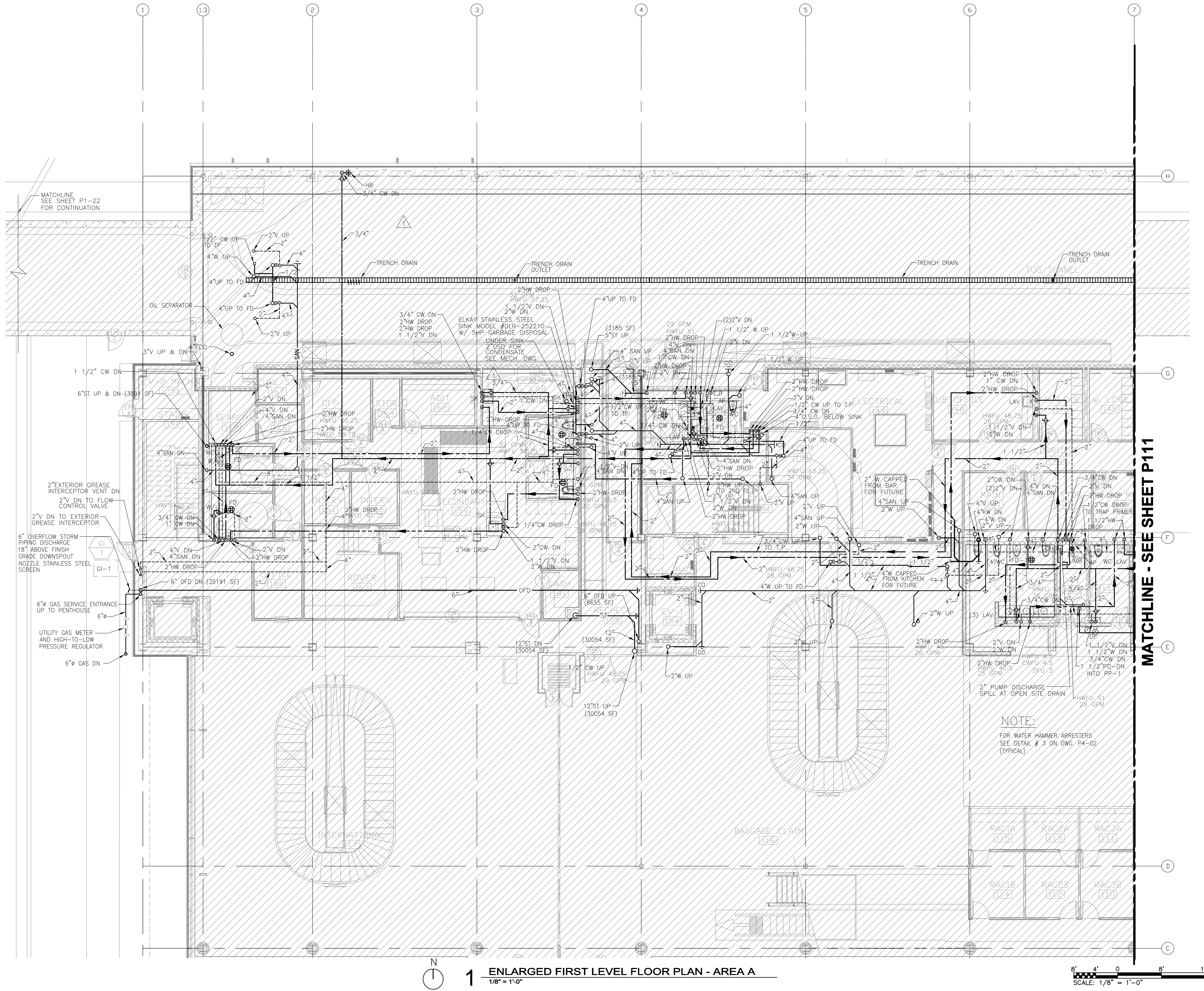
SHEET TITLE

**ENLARGED
FIRST FLOOR
PLUMBING
PLAN AREA A**

SHEET NUMBER

P110

BID PACKAGE 2C



1 ENLARGED FIRST LEVEL FLOOR PLAN - AREA A
1/8" = 1'-0"

8' 4' 0' 8' 16'
SCALE: 1/8" = 1'-0"

REVISIONS

NO.	DESCRIPTION	DATE

DATE ISSUED: 02-17-12
REVIEWED BY: **RDJ**
DRAWN BY: **SA**
DESIGNED BY: **SA**

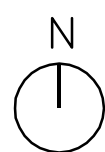
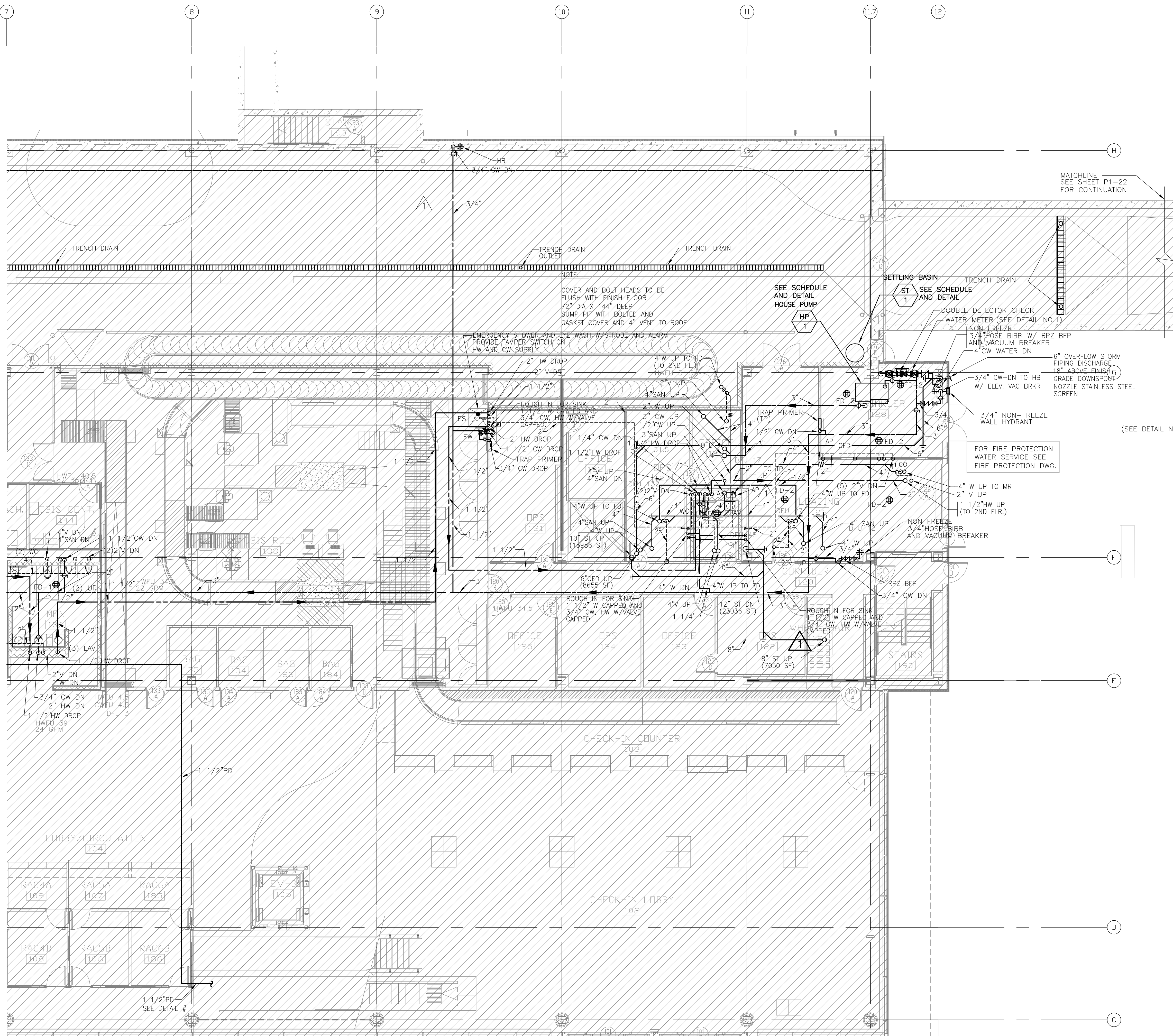
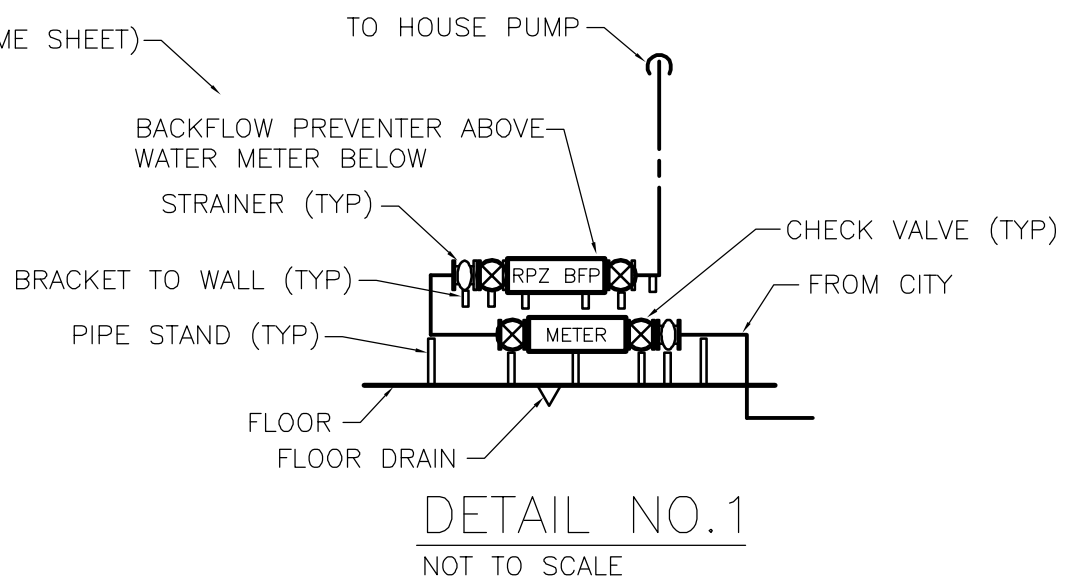
AEP PROJECT NUMBER
213-1882-091
© 2010 REYNOLDS, SMITH AND HILLS, INC.

SHEET TITLE
**ENLARGED
FIRST FLOOR
PLUMBING
PLAN AREA B**

SHEET NUMBER

P111

BID PACKAGE 2C



1 ENLARGED FIRST LEVEL FLOOR PLAN - AREA B
1/8" = 1'-0"

8' 4' 0' 8' 16'
SCALE: 1/8" = 1'-0"



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) 722-9306

M/E/P/FP Engineers:

COSENTINI ASSOCIATES INC.
1 South Wacker Drive, 37th Floor, Chicago IL 60606
TEL: (312) 201-7400 / FAX: (312) 201-0031



Baggage Handling Systems Consultants

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

Landscape Consultant

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

REVISIONS

NO.	DESCRIPTION	DATE
	100% REVIEW	12.17.10
	BID PACKAGE 2A	01.24.11
	BP2A ADDENDUM 1	2.25.11
	BP2A CONFORMANCE SET	5.02.11
	BID PACKAGE 2B	8.23.11
	BP2B ADDENDUM 1	9.02.11
	BP2B CONFORMANCE SET	10.21.11
	RFP 193	1.3.12

DATE ISSUED: 02-17-12

REVIEWED BY: RDJ

DRAWN BY: SA

DESIGNED BY: SA

AER PROJECT NUMBER

017 1000 001

215-1882-091

© 2010 REYNOLDS, SMITH AND HILLS

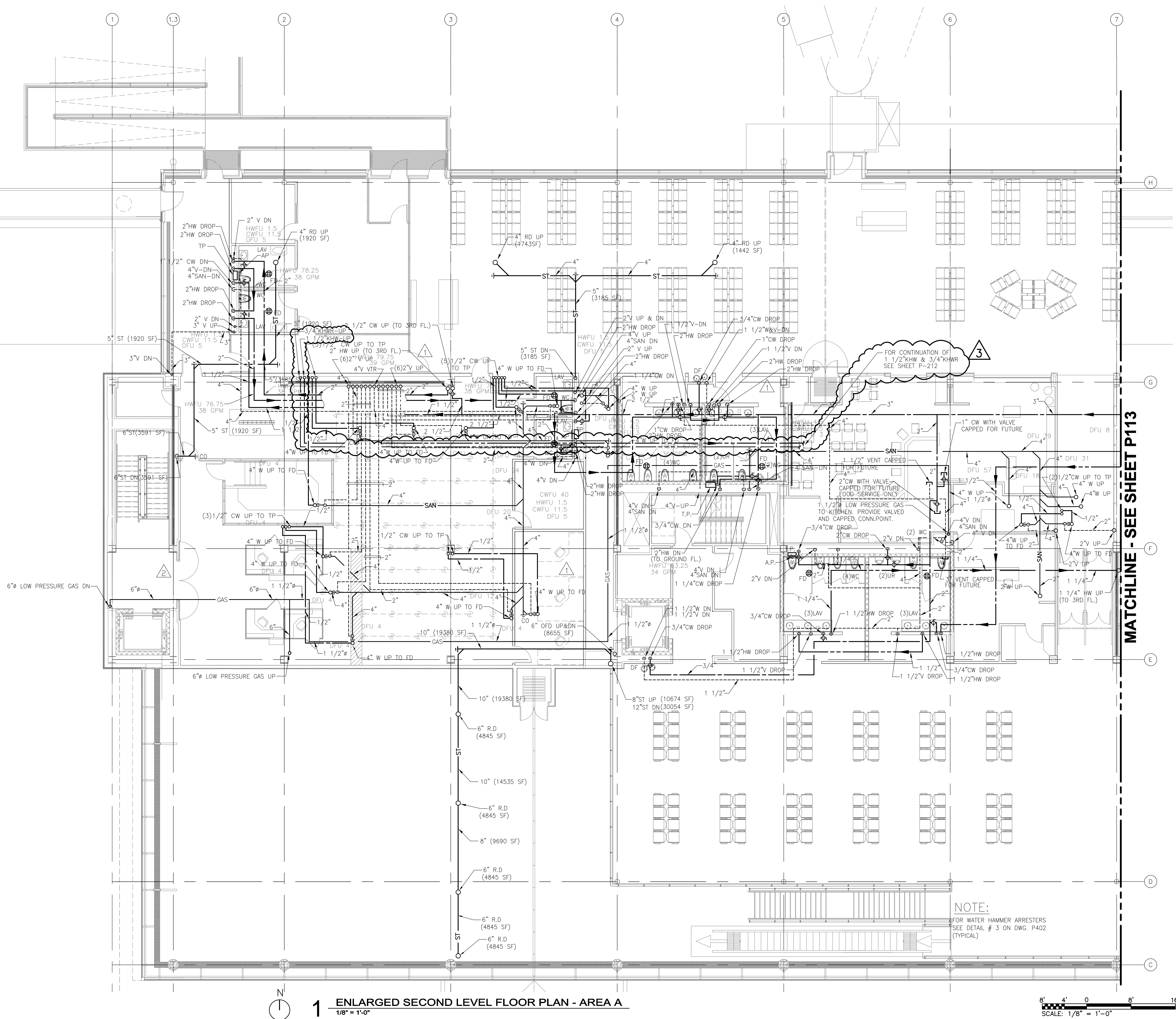
SHEET TITLE

ENLARGED
SECOND FLOOR
PLUMBING
PLAN AREA A

SHEET NUMBER

P112

BID PACKAGE 2C



1 ENLARGED SECOND LEVEL FLOOR PLAN - AREA A
1/8" = 1'-0"

NOTE:
FOR WATER HAMMER ARRESTERS
SEE DETAIL # 3 ON DWG. P402
(TYPICAL)

8' 4' 0 8' 16'

SCALE: 1/8" = 1'-0"

Drawing: E:\5528.00 Duluth Airport\5.0 CADD\5.1 Plumbing\Draws\5528_P112.dwg Plotted on: 2/17/2012 4:48 PM Plotted by: Valens, Hoon

BID PACKAGE 2C

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) 722-9306

M/E/P/F/P Engineers:
COSENTINI ASSOCIATES INC.
1 South Wacker Drive, 37th Floor, Chicago IL 60606
TEL: (312) 201-7400 / 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) 591-5079

REVISIONS

NO.	DESCRIPTION	DATE

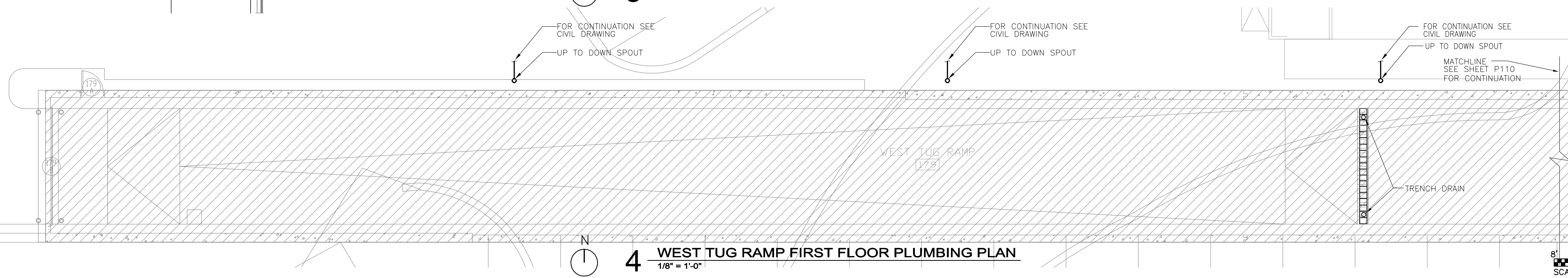
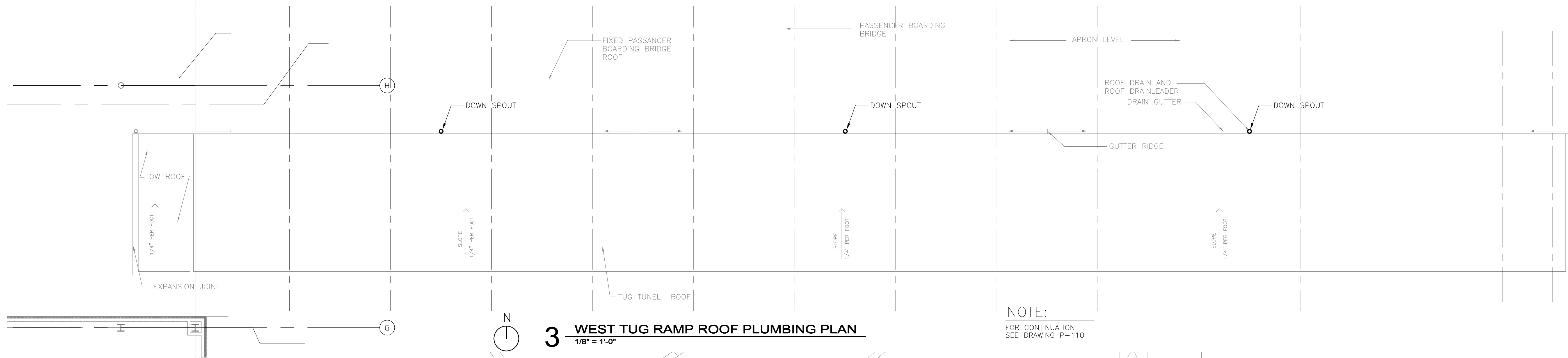
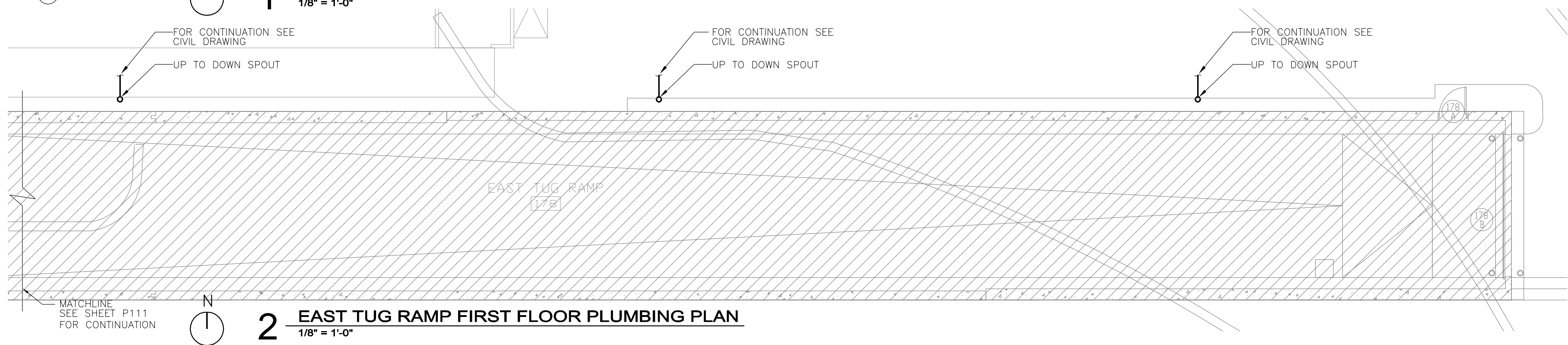
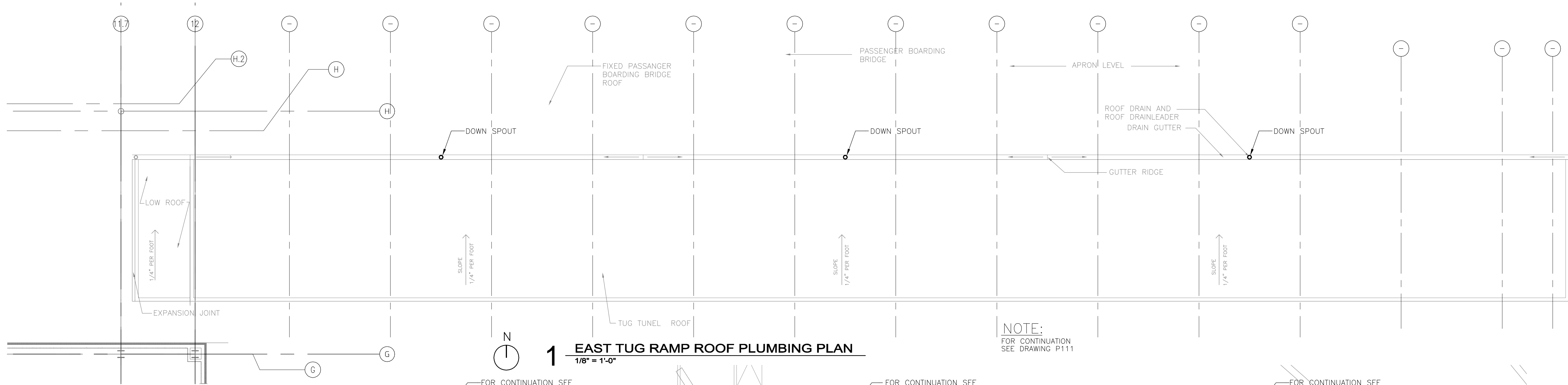
DATE ISSUED: 02-17-12
REVIEWED BY: **RDJ**
DRAWN BY: **HV**
DESIGNED BY: **SA**

AEP PROJECT NUMBER
213-1882-091
© 2010 REYNOLDS, SMITH AND HILLS, INC.

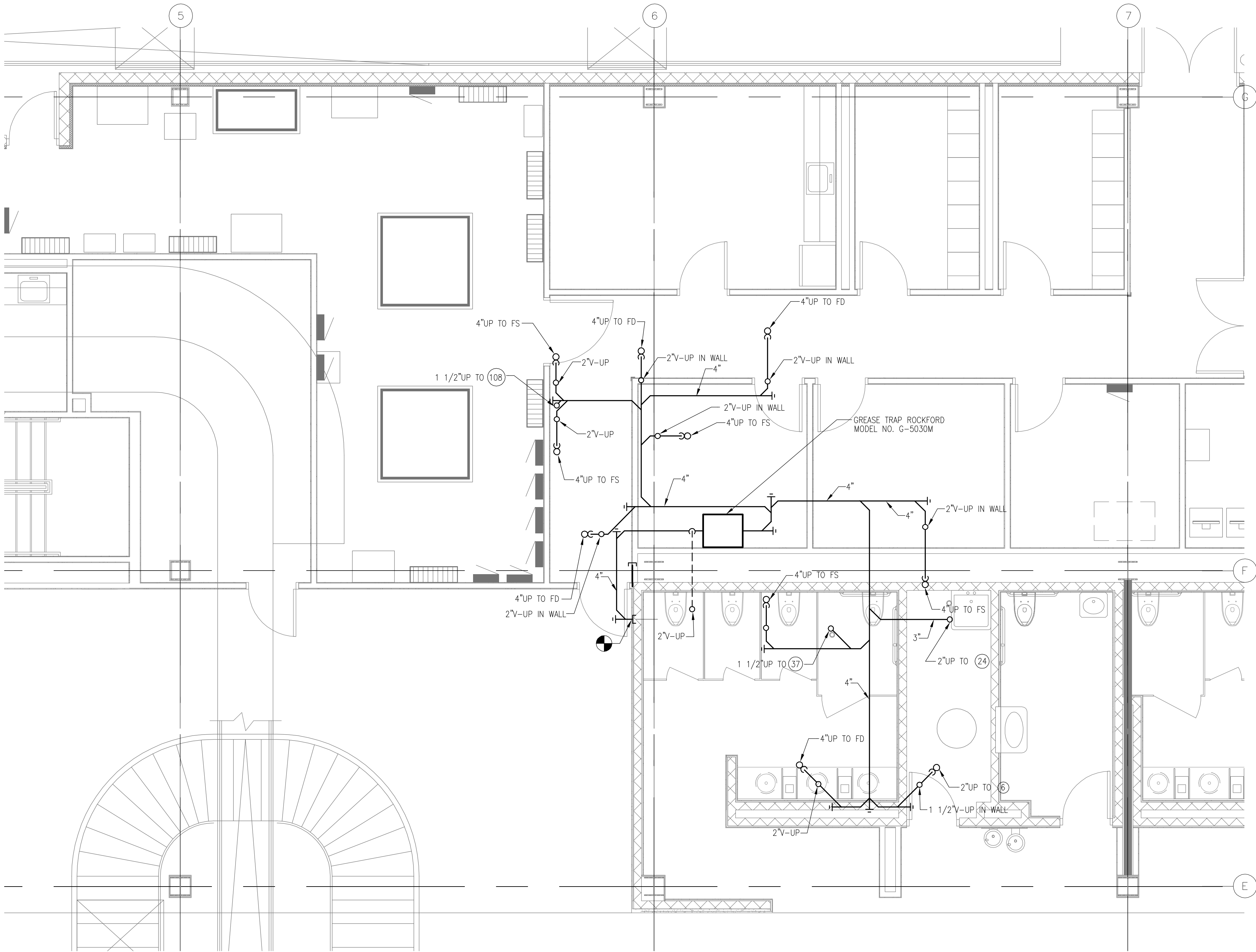
SHEET TITLE
**TUG RAMP
ROOF
PLUMBING PLAN**

SHEET NUMBER
P122

BID PACKAGE 2C



8' 4' 0 8' 16'
SCALE: 1/8" = 1'-0"



N
1 **FIRST FLOOR FOOD SERVICE PLUMBING PLAN**
1/4" = 1'-0"



Reynolds, Smith and Hills, Inc.
4525 Airport Approach Rd, Ste A
Duluth, Minnesota 55811
218-722-1227 Fax: 218-722-1052
www.rsandh.com



DULUTH
INTERNATIONAL
AIRPORT
DULUTH, MN

NEW PASSENGER
TERMINAL

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) 722-9306

M/E/P/F/P Engineers:
COSENTINI ASSOCIATES INC.
1 South Wacker Drive, 37th Floor, Chicago IL 60606
TEL: (312) 201-7400 / 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) 591-5079

REVISIONS		
NO.	DESCRIPTION	DATE

DATE ISSUED: 02-17-12
REVIEWED BY: **RDJ**
DRAWN BY: **HV**
DESIGNED BY: **SA**

AEP PROJECT NUMBER
213-1882-091
© 2010 REYNOLDS, SMITH AND HILLS INC.

SHEET TITLE
**FIRST FLOOR
FOOD SERVICE
PLUMBING PLAN**

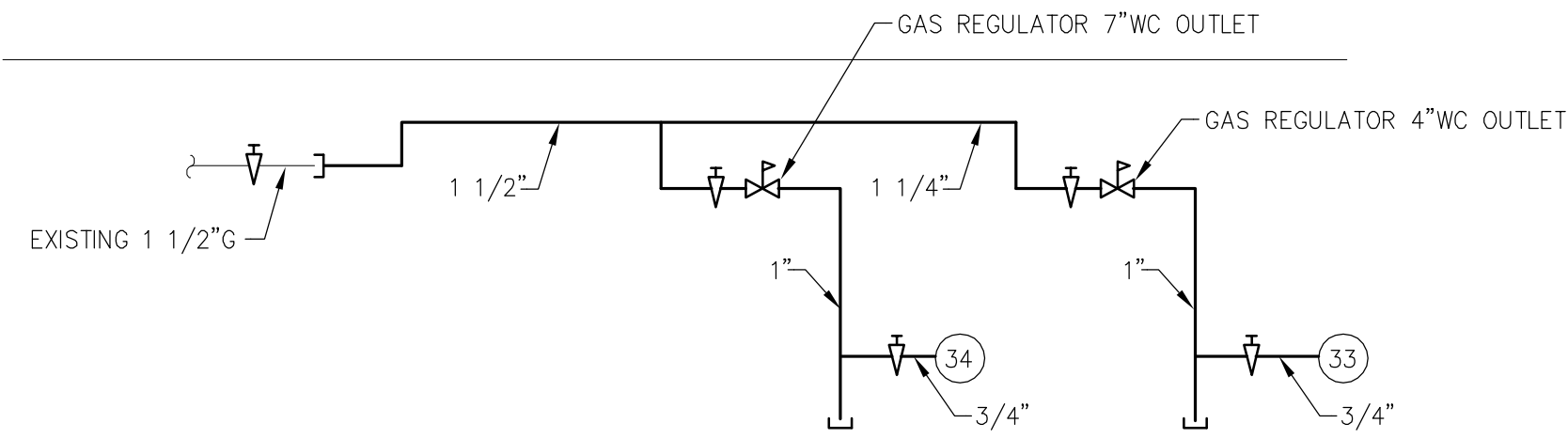
SHEET NUMBER
P210

BID PACKAGE 2C

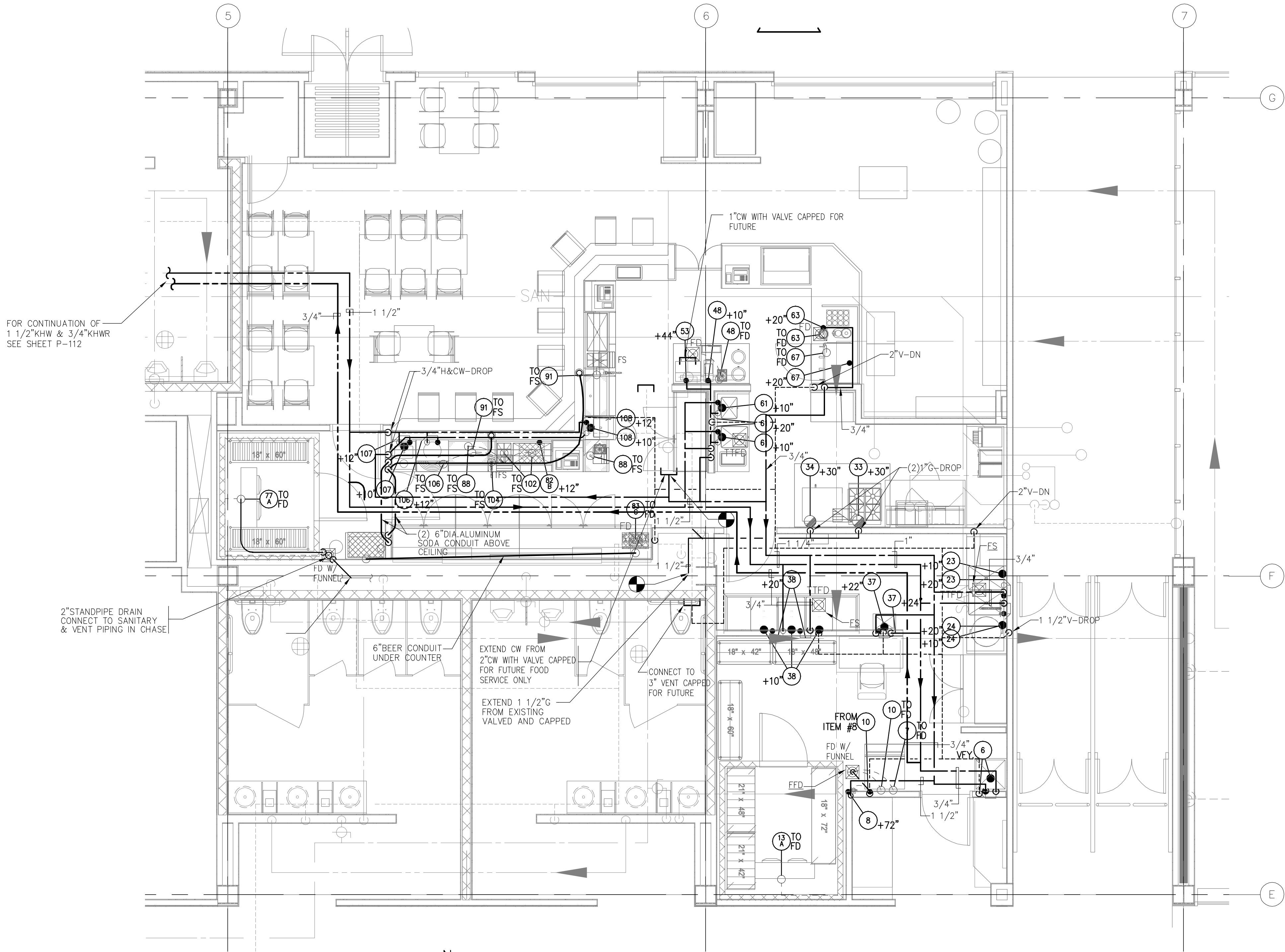
MECHANICAL CONNECTION SCHEDULE								
ITEM#	DESCRIPTION	WASTE	CW	HW	GAS CONN	MBTU /HR	WC	REMARKS
6	MOP SINK	VFY.	1/2"	1/2"				BY MECHANICAL TRADES
7	ICE BIN	1"W						NOTE X
8	WATER FILTER		3/8"					CW CONN TO #10/25-125PSI
10	ICE MAKER	1/2"W	3/8"					NOTE X/CW FED FROM ITEM #8
13 A	WALK-IN FREEZER COIL	1"W						NOTE G
B	WALK-IN FREEZER CONDENSER							NOTE M
23	PREP COUNTER W/SINKS	2"W	1/2"	1/2"				NOTE Y
24	DISPOSER W/SPRAY RINSE	2"W	3/4"	1/2"				NOTES A,B & Y
29	EXHAUST HOOD							THRU 10" X 14" DUCT @ 0.407" S.P.
32	FIRE PROTECTION SYSTEM							NOTES J & X/SEE DETAIL
33	4-BURNER RANGE W/STAND				3/4"	132	4"	NOTES I,J,V & W
34	HALF-SIZE CONVECTION OVEN				3/4"	27.5	7"	NOTES I,J,V & W
37	HAND SINK	1-1/2"W	1/2"	1/2"				
38	POT & PAN SINK	(3)2"W	(2)3/4"	(2)3/4"				NOTES X & Y
48	ICE MAKER, UNDERCOUNTER	3/4"W	3/8"					NOTE X/FILTERED C.W.SUPPLY
53	AIRPOT BREWER		3/8"					NOTES C,D & X/FILTERED C.W.SUPPLY @ 20-75 PSI & 1/2 GPM
61	WORKCOUNTER W/SINK & HAND SINK	(2)1 1/2"W	(2)1/2"	(2)1/2"				NOTE Y
63	DIPPERWELL & FAUCET	1-1/2"W	1/2"					NOTE G
67	ESPRESSO MACHINE	1 1/4"W	3/8"					NOTES C,D,E & X
77 A	REFRIGERATION SYSTEM COIL	1"W						NOTE G
B	REFRIGERATION SYSTEM CONDENSER							NOTE M
82 B	SODA CARBONATOR		1/2"					NOTES C & D
83 A	BEER GLYCOL CHILLER							2000 BTU OUTPUT
83 C	BEER TOWER	1/2"W						
88	DRAINBOARD	1-1/2"W						
91	STAINLESS STEEL DRINK RAIL	(2)1"W						
102	ICE BIN W/INSULATED BOTTLE WELLS	1-1/2"W						
104	SODA GUN TUBING CHASE	1/2"W						
106	GLASS WASHER	1-1/2"W	1/2"	1/2"				NOTES D & Y/25-100 PSI/PROVIDE 130 DEG. H.W. MIN.
107	DUMP SINK	1-1/2"W	1/2"	1/2"				NOTE Y
108	HAND SINK	1-1/2"W	1/2"	1/2"				NOTE Y

FS = FLOOR SINK J.R. SMITH
3008-12 STAINLESS STEEL
WITH 1/2" GRATE.

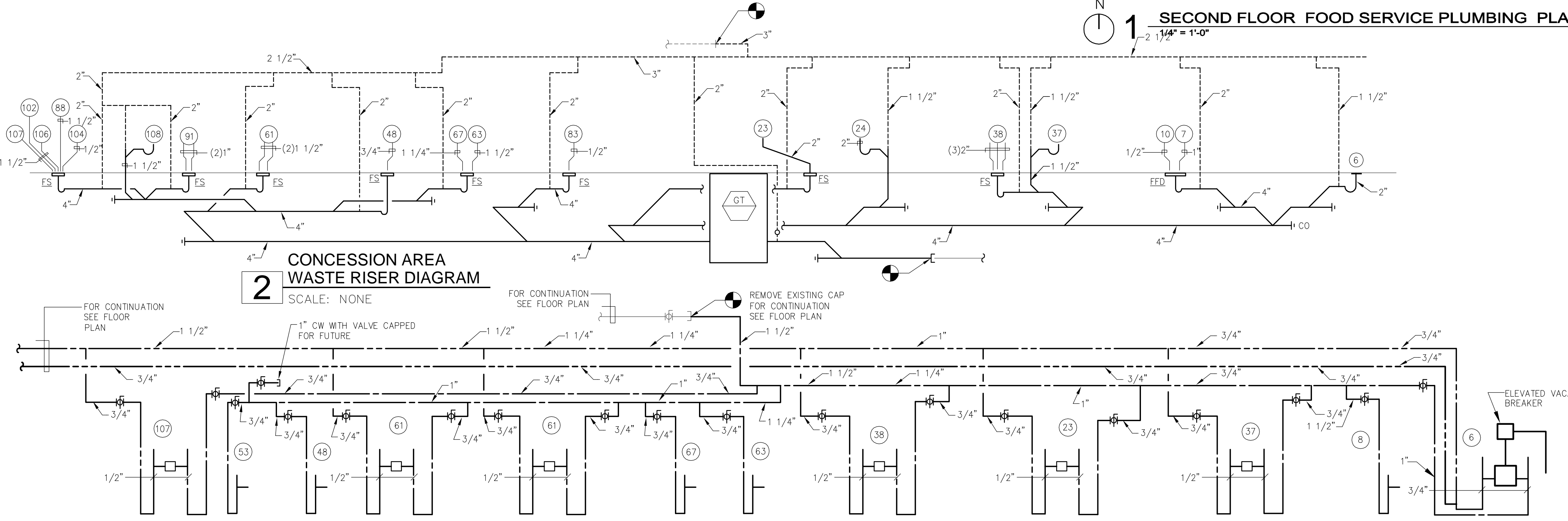
FD = FLOOR DRAIN J.R. SMITH
3001-25 STAINLESS STEEL
WITH OVAL FUNNEL.



1 CONCESSION AREA
GAS RISER DIAGRAM
SCALE: NONE



2 SECOND FLOOR FOOD SERVICE PLUMBING PLAN
SCALE: 1/4\"/>



2 CONCESSION AREA
WASTE RISER DIAGRAM
SCALE: NONE

DRAWINGS ARE FOR ENGINEERS' INFORMATION ONLY AND WILL NOT BE INCLUDED IN FINAL CONTRACT DOCUMENT BID SET. ENGINEERS MAY USE THIS INFORMATION FOR THIS PROJECT ONLY.

3 CONCESSION AREA
WATER RISER DIAGRAM
SCALE: NONE



Reynolds, Smith and Hills, Inc.
4525 Airport Approach Rd, Ste A
Duluth, Minnesota 55811
218-722-1227 Fax: 218-722-1052
www.rsandh.com



DULUTH
INTERNATIONAL
AIRPORT
DULUTH, MN

NEW PASSENGER
TERMINAL

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) 722-9306

M/E/P/F Engineers:
COSENTINI ASSOCIATES INC.
1 South Wacker Drive, 37th Floor, Chicago IL 60606
TEL: (312) 201-7400 / 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) 591-5079

REVISIONS		
NO.	DESCRIPTION	DATE

DATE ISSUED: 02-17-12
REVIEWED BY: RDJ
DRAWN BY: SA
DESIGNED BY: SA

AEP PROJECT NUMBER
213-1882-091
© 2010 REYNOLDS, SMITH AND HILLS, INC.
SHEET TITLE

SECOND FLOOR
FOOD SERVICE
PLUMBING PLAN

SHEET NUMBER
P212
BID PACKAGE 2C

DRAWING SYMBOLS

DETAIL OR PLAN TITLE

SEQUENCE NUMBER

0

TITLE

SCALE: 1/??"=1'-0"

DETAIL OR PLAN SCALE

TITLE TAG

DETAIL NUMBER

#

@# .##

DRAWING WHERE
DETAIL IS DRAWN

DETAIL TAG

EQUIPMENT TYPE

—
—

EQUIPMENT SEQUENCE
NUMBER

EQUIPMENT TAG

RISER TYPE

—
—

RISER SEQUENCE
NUMBER

RISER TAG

FIRE PROTECTION SYMBOLS	
SYMBOL	DESCRIPTION
●	PENDENT TYPE SPRINKLER HEAD
○	UPRIGHT SPRINKLER HEAD
⊙	CONCEALED PENDENT TYPE SPRINKLER HEAD
⊘	INSTITUTIONAL SPRINKLER HEAD
▼	SIDEWALL HEAD
☒	VANDAL-RESISTANT PENDENT SPRINKLER HEAD
— F —	FIRE PROTECTION MAIN PIPING
— N —	CHECK VALVE W/ 1/2" BALL DRIP
— ⌵ —	FLOOR CONTROL VALVE W/ VSD
— ⊠ —	WATER FLOW SWITCH
— ⚈ —	SIAMESE CONNECTION
— ⌵ —	FIRE DEPT. HOSE VALVE (FDV)
— T —	FIRE DEPT. TEST HEADER
— SP —	WET SPRINKLER
— DP —	DRY SPRINKLER

NOTE: NOT ALL SYMBOLS MAY BE USED.

FIRE PROTECTION ABBREVIATIONS	
ABBREVIATIONS	DESCRIPTION
ASZ	AUTOMATIC SPRINKLER ZONE
CSP	COMBINED FIRE STANDPIPE/SPINKLER RISER
FSP	FIRE STANDPIPE
ITC	INSPECTION TEST CONNECTION
FDV	FIRE DEPT. HOSE VALVE
FE	FIRE EXTINGUISHER
FVC/FE	FIRE VALVE CABINET WITH FIRE EXTINGUISHER
FDC	FIRE DEPT. CONNECTION (SIAMESE)
FP	FIRE PUMP
JP	JOCKEY PUMP
P.I.V.	POST INDICATING VALVES
TS	TAMPER SWITCH
RPZ	REDUCED PRESSURE ZONE BACKFLOW PREVENTER (PROVIDED BY PLUMBING CONTRACTOR)
VSD	VALVE SUPERVISORY DEVICE (TAMPER SWITCH)
WFS	WATER FLOW SWITCH
W.I.V.	WALL INDICATING VALVES

NOTE: NOT ALL SYMBOLS MAY BE USED.

[illegible]

1. COORDINATE DESIGN AND INSTALLATION WITH ARCHITECT AND ALL OTHER TRADES
2. OBTAIN AND PAY FOR ALL REQUIRED PERMITS
3. AUTOMATIC SPRINKLERS SHALL BE ARRANGED SYMETRICALLY IN ALL REQUIRED SPACES AND AS APPROVED BY THE ARCHITECT.
4. FIRE PROTECTION CONTRACTOR SHALL CONDUCT A SEASONAL WATER FLOW TEST IN CONJUNCTION WITH THE LOCAL AUTHORITIES. THE FLOW TEST RESULTS SHALL BE USED FOR PERFORMING THE HYDRAULIC CALCULATIONS.
5. THE FIRE PROTECTION CONTRACTOR SHALL SIZE THE SPRINKLER PIPING HYDRAULICALLY SUCH THAT EACH SPRINKLER HEAD OUTLET LOCATED THROUGHOUT IS CALCULATED TO FEED TWO SPRINKLER HEADS.
6. NO BEAM CLAMP HANGERS ALLOWED IN EXPOSED PUBLIC AREAS.

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

BID PACKAGE 2C

REVISIONS		
NO.	DESCRIPTION	DATE

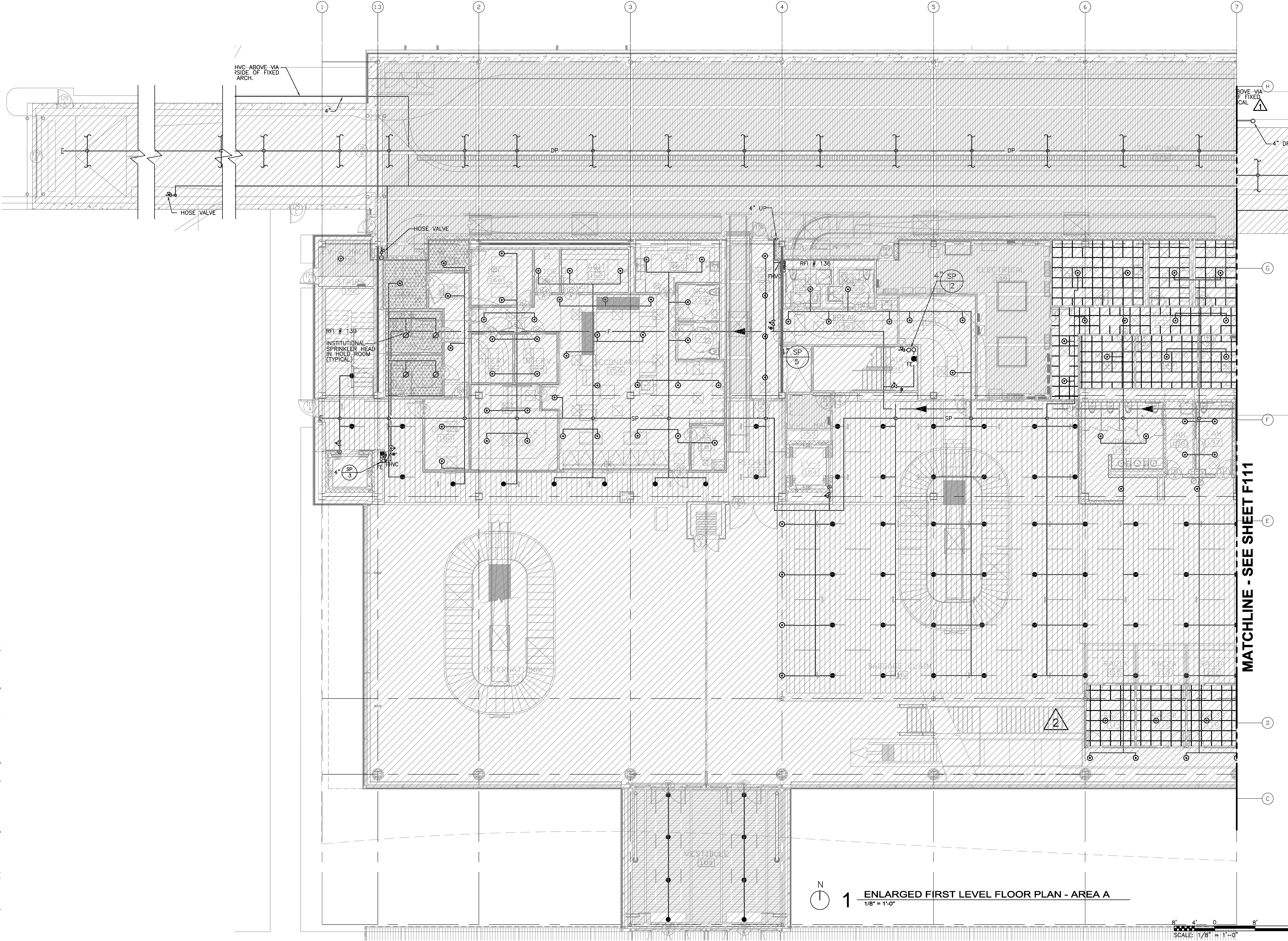
DATE ISSUED: 02-17-12
REVIEWED BY: RDJ
DRAWN BY: HV
DESIGNED BY: SA

AEP PROJECT NUMBER
213-1882-091
© 2010 REYNOLDS, SMITH AND HILLS, INC.

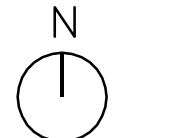
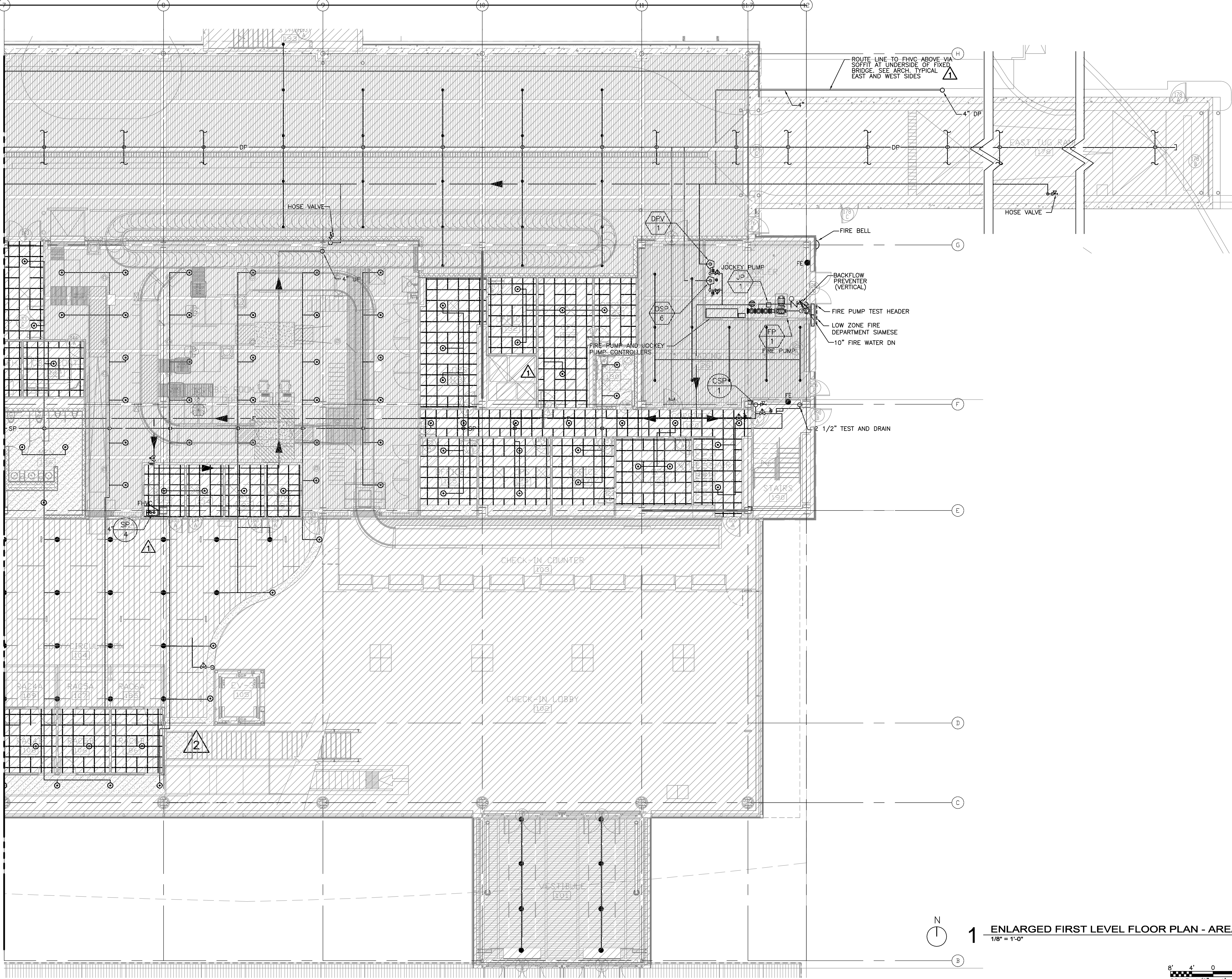
SHEET TITLE
**ENLARGED
FIRST FLOOR
FIRE PROTECTION
PLAN AREA A**

SHEET NUMBER
F110

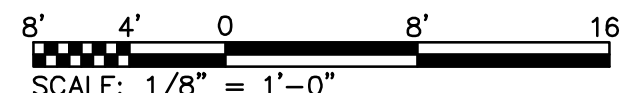
BID PACKAGE 2C



MATCHLINE - SEE SHEET F110



1 ENLARGED FIRST LEVEL FLOOR PLAN - AREA B
1/8" = 1'-0"



Reynolds, Smith and Hills, Inc.
4525 Airport Approach Rd, Ste A
Duluth, Minnesota 55811
218-722-1227 Fax: 218-722-1052
www.rsandh.com



DULUTH
INTERNATIONAL
AIRPORT
DULUTH, MN

NEW PASSENGER
TERMINAL

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) 722-9306

M/E/P/F Engineers:
COSENTINI ASSOCIATES INC.
1 South Wacker Drive, 37th Floor, Chicago IL 60606
TEL: (312) 201-7400 / 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) 591-5079

REVISIONS		
NO.	DESCRIPTION	DATE

DATE ISSUED: 02-17-12
REVIEWED BY: RDU
DRAWN BY: HV
DESIGNED BY: SA

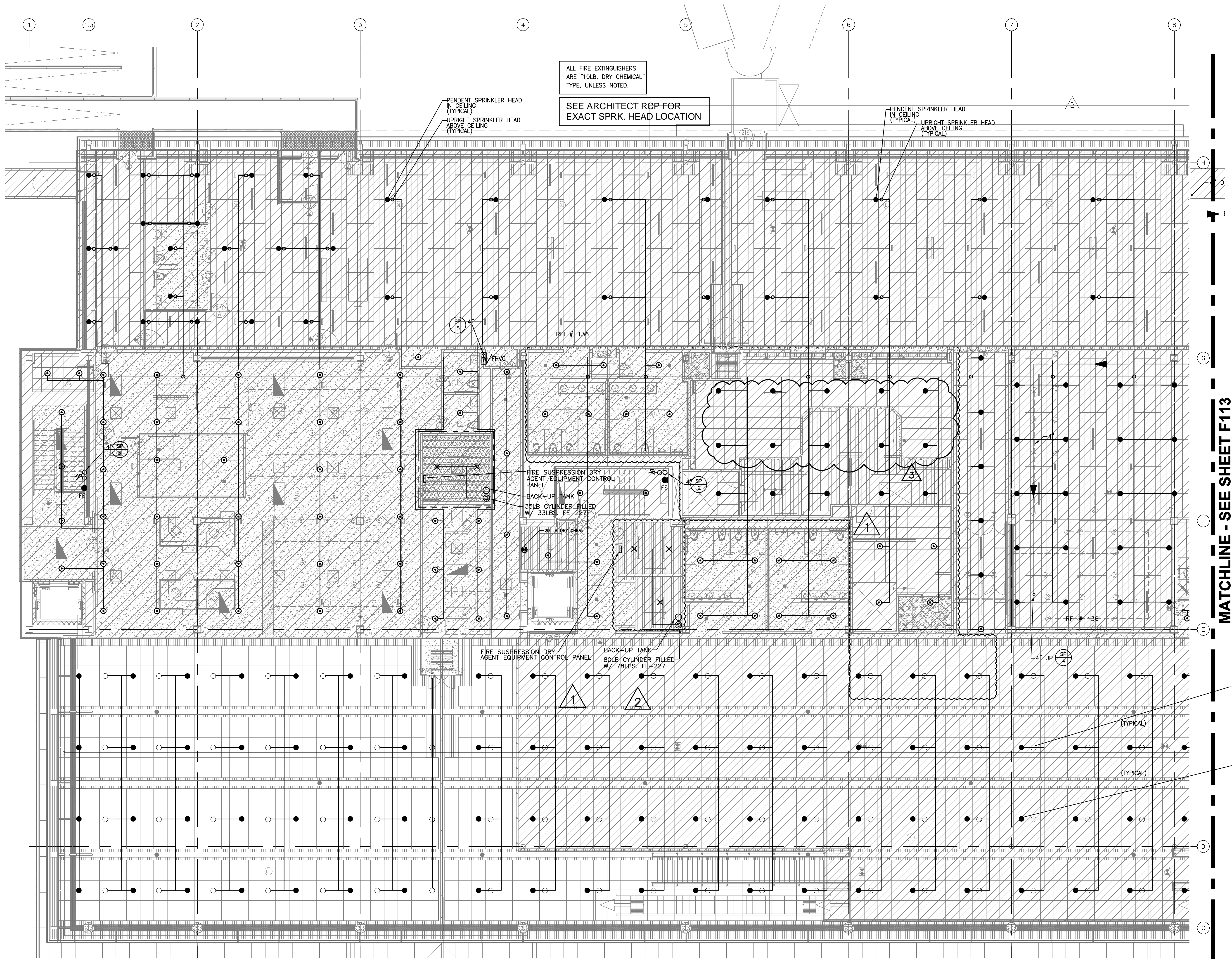
AEP PROJECT NUMBER
213-1882-091
© 2010 REYNOLDS, SMITH AND HILLS, INC.

SHEET TITLE
**ENLARGED
FIRST FLOOR
FIRE PROTECTION
PLAN AREA B**

SHEET NUMBER

F111

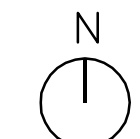
BID PACKAGE 2C



ALL FIRE EXTINGUISHERS
ARE "10LB. DRY CHEMICAL"
TYPE, UNLESS NOTED.

SEE ARCHITECT RCP FOR
EXACT SPRK. HEAD LOCATION

MATCHLINE - SEE SHEET F113



1 ENLARGED SECOND LEVEL FLOOR PLAN - AREA A
1/8" = 1'-0"

UPRIGHT SPRINKLER HEADS
WITH ASSOCIATE
SPRINKLER PIPING
ABOVE METAL
CEILING

PENDENT
SPRINKLER HEADS
BELOW METAL
CEILING



Reynolds, Smith and Hills, Inc.
4525 Airport Approach Rd, Ste A
Duluth, Minnesota 55811
218-722-1227 Fax: 218-722-1052
www.rsandh.com



DULUTH
INTERNATIONAL
AIRPORT
DULUTH, MN

NEW PASSENGER
TERMINAL

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) 722-9306

M/E/P/F Engineers:
COSENTINI ASSOCIATES INC.
1 South Wacker Drive, 37th Floor, Chicago IL 60606
TEL: (312) 201-7400 / 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) 591-5079

REVISIONS		
NO.	DESCRIPTION	DATE
	100% REVIEW	12.17.10
	BID PACKAGE 2A	01.24.11
Δ	BP2A ADDENDUM 1	2.25.11
	BP2A CONFORMANCE SET	5.02.11
	BID PACKAGE 2B	8.23.11
	BP2B CONFORMANCE SET	10.21.11
Δ	RFP 193	1.3.12

DATE ISSUED: 02-17-12
REVIEWED BY: RDJ
DRAWN BY: HV
DESIGNED BY: SA

AEP PROJECT NUMBER
213-1882-091
© 2010 REYNOLDS, SMITH AND HILLS, INC.

SHEET TITLE

ENLARGED
SECOND FLOOR
FIRE PROTECTION
PLAN AREA A

SHEET NUMBER

F112

BID PACKAGE 2C

8' 4' 0' 8' 16'
SCALE: 1/8" = 1'-0"

DRAWING LIST – VOLUME 1

G101 DRAWING LIST
CIVIL
C001 SUMMARY OF QUANTITIES
C002 SAFETY AND SECURITY NOTES & DETAILS
C003 GENERAL CONSTRUCTION NOTES, LEGEND AND ABBREVIATIONS
C004 ULTIMATE DEVELOPMENT SITE PLAN
C005 CONTRACT LAYOUT PLAN AND CONTRACT NOTES
C006 SAFETY PHASING PLAN PHASE 1
C007 SAFETY PHASING PLAN PHASE 2
C008 SAFETY PHASING PLAN PHASE 3
C009 HORIZONTAL AND VERTICAL CONTROL PLANS AND NOTES
C020 GEOTECHNICAL BORING LAYOUT AND INFORMATION
C021 GEOTECHNICAL BORING LOGS
C022 GEOTECHNICAL BORING LOGS
C100 OVERALL DEMOLITION PLANS AND NOTES
C101 DEMOLITION PIERAL PLAN
C102 DEMOLITION PLAN
C103 DEMOLITION PLAN
C104 DEMOLITION PLAN
C104A DEMOLITION PLAN
C120 DEMOLITION DETAILS
C121 DEMOLITION DETAILS
C200 OVERALL GEOMETRY PLAN
C201 GEOMETRY PLAN
C202 GEOMETRY PLAN
C203 GEOMETRY PLAN
C204 GEOMETRY PLAN
C204A GEOMETRY PLAN
C205 TYPICAL PAVEMENT SECTIONS
C206 TYPICAL PAVEMENT JOINT DETAILS
C207 TYPICAL PAVEMENT JOINT DETAILS
C208 CURB, GUTTER AND STRUCTURE JOINT DETAILS
C209 FENCING LAYOUT SITE PLAN AND NOTES
C210 FENCING AND GATE DETAILS
C211 FENCING AND GATE DETAILS
C400 OVERALL GRADING AND EROSION CONTROL PLAN & NOTES
C401 GRADING AND EROSION CONTROL PLAN
C402 GRADING AND EROSION CONTROL PLAN
C403 GRADING AND EROSION CONTROL PLAN
C404 GRADING AND EROSION CONTROL PLAN
C404A GRADING AND EROSION CONTROL PLAN
C407 EROSION & SEDIMENTATION CONTROL NOTES & DETAILS
C408 EROSION & SEDIMENTATION CONTROL NOTES & DETAILS
C409 EROSION & SEDIMENTATION CONTROL NOTES & DETAILS
C410 EROSION & SEDIMENTATION CONTROL NOTES & DETAILS
C500 OVERALL SITE UTILITY PLAN AND NOTES
C501 SITE UTILITY PLAN
C502 SITE UTILITY PLAN
C503 SITE UTILITY PLAN
C504 SITE UTILITY PLAN
C504A SITE UTILITY PLAN
C510 SITE UTILITY TABLE
C511 SITE UNDERDRAIN TABLE
C512 STORM CHAMBER SYSTEM
C513 WATER QUALITY UNIT
C514 WATER QUALITY UNIT DETAILS
C520 SITE UTILITY PROFILES
C521 SITE UTILITY PROFILES
C530 CITY OF DULUTH UTILITY DETAILS
C531 CITY OF DULUTH UTILITY DETAILS
C532 DRAINAGE DETAILS
C533 DRAINAGE DETAILS
C534 DRAINAGE DETAILS
C535 DRAINAGE DETAILS
C536 DRAINAGE DETAILS
C601 CONCRETE JOINT LAYOUT PLAN
C602 CONCRETE JOINT LAYOUT PLAN
C610 CONCRETE JOINT SPOT ELEVATION PLAN
C611 CONCRETE JOINT SPOT ELEVATION PLAN
C612 CONCRETE JOINT SPOT ELEVATION PLAN
C613 CONCRETE JOINT SPOT ELEVATION PLAN
C700 PAVEMENT MARKING REMOVAL PLAN
C701 PAVEMENT MARKING PLAN
C702 LANDSIDE PAVEMENT MARKING PLAN AND DETAILS
C710 PAVEMENT MARKING DETAILS
CIVIL – ELECTRICAL
E000 ELECTRICAL NOTES
E101 PROPOSED LIGHTING AND SIGNAGE PLAN
E102 PROPOSED LIGHTING AND SIGNAGE PLAN
E103 PROPOSED LIGHTING AND SIGNAGE PLAN
E104 PROPOSED LIGHTING AND SIGNAGE PLAN
E104A PROPOSED LIGHTING AND SIGNAGE PLAN
E300 AIRFIELD SIGNAGE PLAN
E400 TAXIWAY GUIDANCE SIGN DETAILS
E401 ELECTRICAL DETAILS
E402 ELECTRICAL DETAILS
CIVIL – CROSS SECTIONS
X100 CROSS SECTION SUMMARY PLAN
X110 CROSS SECTIONS STA. 0+00 TO STA. 0+50
X111 CROSS SECTIONS STA. 1+00 TO STA. 1+50
X112 CROSS SECTIONS STA. 2+00 TO STA. 2+50
X113 CROSS SECTIONS STA. 3+00 TO STA. 3+50
X114 CROSS SECTIONS STA. 4+00 TO STA. 4+50
X115 CROSS SECTIONS STA. 5+00 TO STA. 5+50
X116 CROSS SECTIONS STA. 6+00 TO STA. 6+50
X117 CROSS SECTIONS STA. 7+00 TO STA. 7+50
X118 CROSS SECTIONS STA. 8+00 TO STA. 8+50
X119 CROSS SECTIONS STA. 9+00 TO STA. 9+50
X120 CROSS SECTIONS STA. 10+00 TO STA. 10+50
X121 CROSS SECTIONS STA. 11+00 TO STA. 11+50
X122 CROSS SECTIONS STA. 12+00 TO STA. 12+50
X123 CROSS SECTIONS STA. 13+00 TO STA. 13+50
X124 CROSS SECTIONS STA. 14+00 TO STA. 14+50
X125 CROSS SECTIONS STA. 15+00 TO STA. 15+50
X126 CROSS SECTIONS STA. 16+00 TO STA. 16+50
X127 CROSS SECTIONS STA. 17+00 TO STA. 17+50
X128 CROSS SECTIONS STA. 18+00
X129 CROSS SECTIONS STA. 18+50
X130 CROSS SECTIONS STA. 19+00
X131 CROSS SECTIONS STA. 19+50
X132 CROSS SECTIONS STA. 20+00
X133 CROSS SECTIONS STA. 20+50
X134 CROSS SECTIONS STA. 21+00
X135 CROSS SECTIONS STA. 21+40

DRAWING LIST – VOLUME 2

G101 DRAWING LIST
ARCHITECTURAL
A5100 OVERALL SITE PLAN
A5101 ARCHITECTURAL SITE PLAN
A5102 PASSENGER BOARDING BRIDGES
A5103 PASSENGER BOARDING BRIDGES
A001 ABBREVIATIONS AND GENERAL NOTES
A002 SYMBOLS AND ADA
A003 PARTITION TYPES
A101 OVERALL FIRST FLOOR PLAN
A102 OVERALL SECOND FLOOR PLAN
A103 OVERALL THIRD FLOOR PLAN
A104 OVERALL ROOF PLAN
A110 FIRST FLOOR AREA A
A111 FIRST FLOOR AREA B
A112 SECOND FLOOR AREA A
A113 SECOND FLOOR AREA B
A114 THIRD FLOOR AREA A
A115 THIRD FLOOR AREA B
A201 OVERALL FIRST FLOOR RCP
A202 OVERALL SECOND FLOOR RCP
A203 OVERALL THIRD FLOOR RCP
A210 ENLARGED FIRST FLOOR RCP AREA A
A211 ENLARGED FIRST FLOOR RCP AREA B
A212 ENLARGED SECOND FLOOR RCP AREA A
A213 ENLARGED SECOND FLOOR RCP AREA B
A214 ENLARGED THIRD FLOOR RCP AREA A
A215 ENLARGED THIRD FLOOR RCP AREA B
A301 EXTERIOR ELEVATIONS
A302 EXTERIOR ELEVATIONS
A310 BUILDING SECTIONS
A311 BUILDING SECTIONS
A401 WALL SECTIONS
A402 WALL SECTIONS
A403 WALL SECTIONS
A404 WALL SECTIONS
A405 WALL SECTIONS
A510 PLAN DETAILS
A511 PLAN DETAILS
A512 PLAN DETAILS
A513 PLAN DETAILS
A514 PLAN DETAILS – EXIT CORRIDOR
A520 SECTION DETAILS
A521 SECTION DETAILS
A522 SECTION DETAILS
A530 EXTERIOR SYSTEMS – VERTICAL CIRCULATION
A530A EXTERIOR SYSTEMS – VERTICAL CIRCULATION
A530B EXTERIOR SYSTEMS – VERTICAL CIRCULATION
A531 INTERIOR SYSTEMS – VERTICAL CIRCULATION
A532 INTERIOR SYSTEMS – VERTICAL CIRCULATION
A533 INTERIOR SYSTEMS – VERTICAL CIRCULATION
A534 INTERIOR SYSTEM SHEET – MAIN ELEVATOR
A535 INTERIOR SYSTEM SHEET – MAIN STAIR AND ESCALATOR
A536 EXTERIOR SYSTEM SHEET – APRON RAMP
A537 EXTERIOR SYSTEM SHEET – APRON RAMP CANOPY
A538 EXTERIOR SYSTEM SHEET – APRON RAMP CANOPY DETAILS
A560 MILLWORK ELEVATIONS
A561 MILLWORK ELEVATIONS
A562 MILLWORK ELEVATIONS AND DETAILS
A563 MILLWORK DETAILS
A564 MILLWORK ELEVATIONS AND DETAILS – TICKETING
A565 MILLWORK ELEVATIONS AND DETAILS – RENT–A–CAR
A566 MILLWORK ELEVATIONS AND DETAILS – CBP
A567 MISC. MILLWORK DETAILS
A601 INTERIOR ELEVATIONS
A602 INTERIOR ELEVATIONS
A603 INTERIOR ELEVATIONS
A604 INTERIOR ELEVATIONS
A605 INTERIOR ELEVATIONS
A606 INTERIOR ELEVATIONS
A607 INTERIOR ELEVATIONS
A608 INTERIOR ELEVATIONS
A610 INTERIOR SYSTEM SHEET – RESTROOMS
A611 INTERIOR SYSTEM SHEET – RESTROOMS
A612 INTERIOR SYSTEM SHEET – RESTROOMS
A620 INTERIOR SYSTEM SHEET – WOOD CEILING
A621 INTERIOR SYSTEM SHEET – METAL CEILING
A622 CEILING SECTION DETAILS
A623 CEILING PLAN DETAILS
A630 FEATURE WALL SYSTEM DETAILS
A631 FEATURE WALL SYSTEM DETAILS
A632 FEATURE WALL SYSTEM DETAILS
A701 DOOR SCHEDULES
A702 DOOR DETAILS
A703 DOOR DETAILS
A704 DOOR DETAILS
A710 EXTERIOR SYSTEM SHEET – LANDSIDE CURTAIN WALL
A711 EXTERIOR SYSTEM SHEET – LANDSIDE CURTAIN WALL
A712 EXTERIOR SYSTEM SHEET – AIRSIDE CURTAIN WALL
A713 EXTERIOR SYSTEM SHEET – AIRSIDE CURTAIN WALL
A714 EXTERIOR SYSTEM SHEET – ENTRY VESTIBULE
A715 EXTERIOR SYSTEM SHEET – CORE WALL
A720 EXTERIOR SYSTEM SHEET – TUG TUNNEL
A721 EXTERIOR SYSTEM SHEET – TUG TUNNEL
A722 EXTERIOR SYSTEM SHEET – TUG TUNNEL
A723 EXTERIOR SYSTEM SHEET – CANOPY
A724 EXTERIOR SYSTEM SHEET – REVENUE CONTROL BOOTH
A725 EXTERIOR SYSTEM SHEET – REVENUE CONTROL BOOTH
A801 INTERIOR FINISH SCHEDULES
A802 INTERIOR MATERIALS SCHEDULE
A811 FIRST FLOOR FURNITURE PLAN
A812 FIRST FLOOR FURNITURE PLAN – AREA A
A813 FIRST FLOOR FURNITURE PLAN – AREA B
A814 SECOND FLOOR FURNITURE PLAN
A815 SECOND FLOOR FURNITURE PLAN – AREA A
A816 SECOND FLOOR FURNITURE PLAN – AREA B
A817 THIRD FLOOR FURNITURE PLAN
A818 THIRD FLOOR FURNITURE PLAN – ADMIN.
A901 CONCESSIONS PLAN
A902 CONCESSIONS REFLECTED CEILING PLAN
A903 CONCESSIONS ELEVATIONS AND DETAILS
FOOD SERVICE
FS101 FOOD SERVICE EQUIPMENT PLAN AND SCHEDULE
FS201 FOOD SERVICE EQUIPMENT ELEVATIONS AND SECTIONS
FS202 FOOD SERVICE EQUIPMENT ELEVATIONS AND SECTIONS
FS301 FOOD SERVICE EQUIPMENT SPECIAL CONDITIONS PLAN AND DETAILS
FS401 FOOD SERVICE EQUIPMENT STANDARD DETAILS
FS402 FOOD SERVICE EQUIPMENT STANDARD DETAILS
FS403 FOOD SERVICE EQUIPMENT STANDARD DETAILS

DRAWING LIST – VOLUME 3

G101 DRAWING LIST
MECHANICAL
M001 MECHANICAL LEGEND
M002 MECHANICAL SYMBOLS
M110 ENLARGED FIRST FLOOR MECHANICAL PLAN AREA A
M111 ENLARGED FIRST FLOOR MECHANICAL PLAN AREA B
M112 PARTIAL SECOND FLOOR MECHANICAL PLAN – CONCESSIONS AREA
M114 PARTIAL THIRD FLOOR MECHANICAL PLAN – CONCESSIONS AREA
M116 PARTIAL ROOF LEVEL MECHANICAL PLAN – CONCESSIONS AREA
M303 TUG TUNNEL RAMP SNOW MELT PLAN, FLOW DIAGRAM AND DETAILS
M401 MECHANICAL SCHEDULES & DETAILS
M401C MECHANICAL EQUIPMENT SCHEDULES
M503 MECHANICAL DETAILS
M506 RAMP SNOW MELT SYSTEM DETAILS
MP111 ENLARGED FIRST FLOOR MECHANICAL PIPING PLAN AREA B
MP112 ENLARGED SECOND FLOOR MECHANICAL PIPING PLAN AREA A
MP113 ENLARGED SECOND FLOOR MECHANICAL PIPING PLAN AREA B
MP114 ENLARGED THIRD FLOOR MECHANICAL PIPING PLAN AREA A
MP115 ENLARGED THIRD FLOOR MECHANICAL PIPING PLAN AREA B
ELECTRICAL
E001C ELECTRICAL SYMBOLS
E112C ENLARGED SECOND FLOOR ELECTRICAL PLAN – AREA A
E116 ELECTRICAL ROOF PLAN
E117 RAMP ELECTRICAL POWER AND LIGHTING PLAN
EL112C ENLARGED SECOND FLOOR LIGHTING PLAN – AREA A
E300C BLDG POWER RISER DIAGRAM
E301 PANEL SCHEDULES
E301C PANEL SCHEDULES
E400 ELECTRICAL ABBREVIATIONS AND TABLES
E401 LIGHTING FIXTURE SCHEDULE
E404 PANEL SCHEDULES
E405 PANEL SCHEDULES
E406 PANEL SCHEDULES
E407 PANEL SCHEDULES
ET001 TECHNOLOGY/ SECURITY SYSTEMS LEGEND AND NOTES
ET401 TECHNOLOGY FIRST FLOOR PLAN
ET402 TECHNOLOGY SECOND FLOOR PLAN
ET403 TECHNOLOGY THIRD FLOOR PLAN
ET410 TECHNOLOGY FIRST FLOOR PLAN AREA A
ET411 TECHNOLOGY FIRST FLOOR PLAN AREA B
ET412 TECHNOLOGY SECOND FLOOR PLAN AREA A
ET413 TECHNOLOGY SECOND FLOOR PLAN AREA B
ET414 TECHNOLOGY THIRD FLOOR PLAN AREA A
ET415 TECHNOLOGY THIRD FLOOR PLAN AREA B
ET501 COMMUNICATIONS EQUIPMENT RACK ELEVATION
ET502 ENLARGED ROOM PLANS
ET503 ACCESS CONTROL DETAILS
ET504 ACCESS CONTROL DETAILS
ET505 ACCESS CONTROL SIGNS
ET600 ACCESS POINT SCHEDULE
ET601 SECURITY RISER
ET602 MUFIDS RISER
ET603 VIDEO SURVEILLANCE RISER
ET604 NETWORK RISER
ET605 CATV & DISPLAY RISERS
ET606 COMMUNICATION RISER

PLUMBING
P001 PLUMBING SYMBOL LIST, ABBREVIATIONS AND DRAWING LIST
P110 ENLARGED FIRST FLOOR PLUMBING PLAN AREA A
P111 ENLARGED FIRST FLOOR PLUMBING PLAN AREA B
P112 ENLARGED SECOND FLOOR PLUMBING PLAN AREA A
P114 ENLARGED THIRD FLOOR PLUMBING PLAN AREA A
P122 TUG RAMP ROOF PLUMBING PLAN
P210 FIRST FLOOR FOOD SERVICE PLUMBING PLAN
P212 SECOND FLOOR FOOD SERVICE PLUMBING PLAN
P501 PLUMBING SCHEDULES
FIRE PROTECTION
F001 FIRE PROTECTION SYMBOL LIST, ABBREVIATIONS AND DRAWING INDEX



Reynolds, Smith and Hills, Inc.
4525 Airport Approach Rd, Ste A
Duluth, Minnesota 55811
218-722-1227 Fax: 218-722-1052
www.rsandh.com



DULUTH
INTERNATIONAL
AIRPORT
DULUTH, MN

NEW PASSENGER
TERMINAL

CONSULTANTS
Interior Architects: SJA ARCHITECTS 11 E Superior Street Suite 340, Duluth MN 55802 TEL: (218) 724-6578 / FAX: (218) 724-8717
Structural Engineers: MBJ CONSULTING ENG. 501 Lake Avenue South, Suite 300, Duluth MN 55802 TEL: (218) 722-1056 / FAX: (218) 722-9306
M/E/P/F 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
Landscape Consultants: APPOLO DESIGN 2432 East First Street, Duluth MN 55812 TEL: (218) 591-5079

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: 06-03-10 Reg. No.: 46001

REVISIONS		
NO.	BID DESCRIPTION	DATE
	FOUNDATION PERMIT	6.11.10
1,2,3	NOT CHANGED	
	CONFIRMANCE SET	7.12.10
	BUILDING PERMIT	8.16.10
4	BUILDING PERMIT REVISIONS	11.12.10
	BID PACKAGE 2A	1.24.11
	BP2A CONFIRMANCE SET	5.2.11
	BID PACKAGE 2B REVIEW	7.6.11
	BP2B CONFIRMANCE	10.21.11
	BID PACKAGE 2C	2.10.12

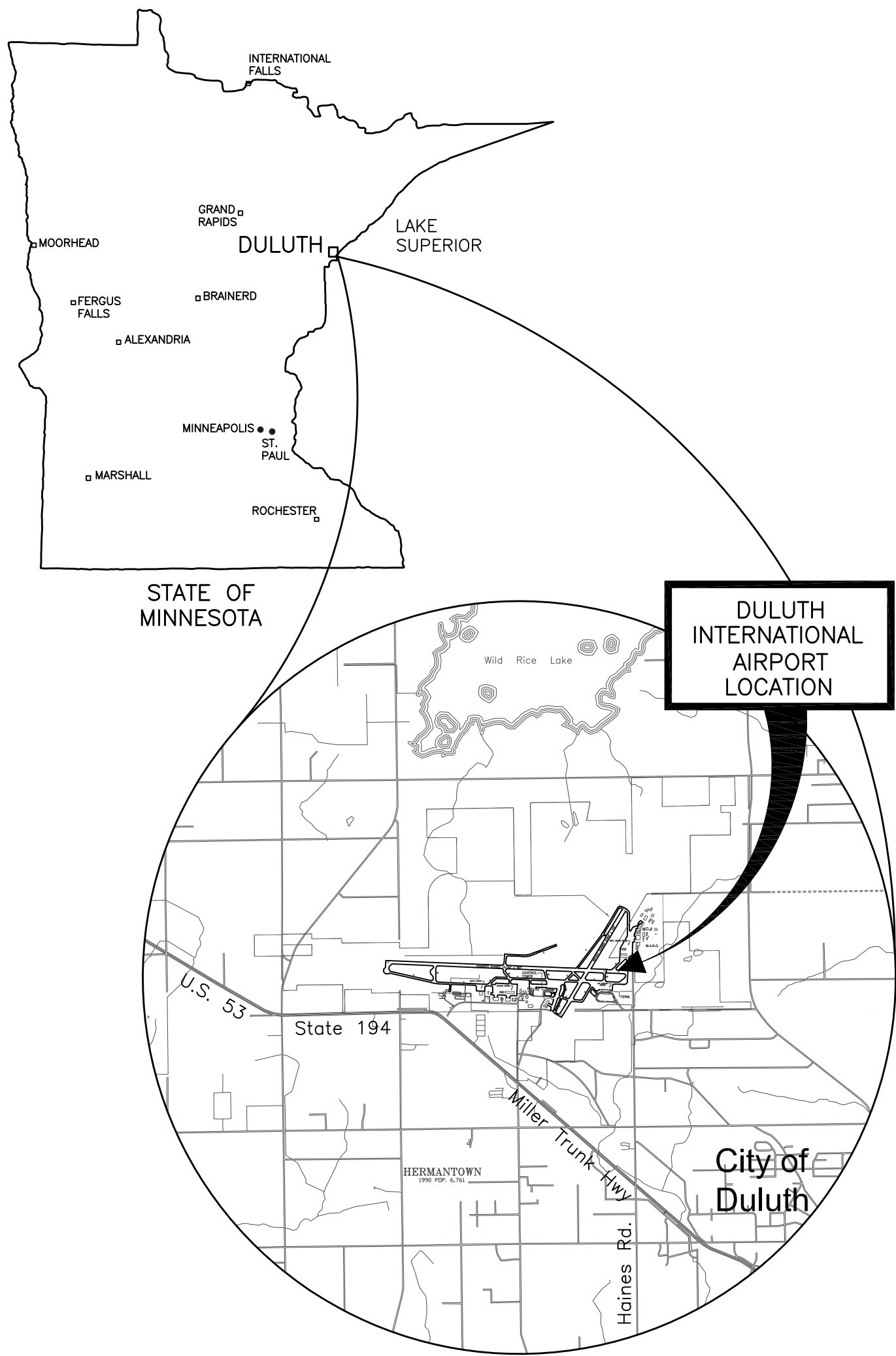
DATE ISSUED: 02-10-12
REVIEWED BY: TC
DRAWN BY: MKG/MI
DESIGNED BY: TC

AEP PROJECT NUMBER
213-1882-091
© 2010 REYNOLDS, SMITH AND HILLS, INC.

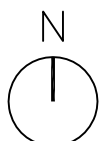
SHEET TITLE
DRAWING
LIST

SHEET NUMBER

G101
BID PACKAGE 2C




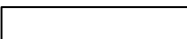
GENERAL NOTE:
FOR ADA STANDARDS, PLUMBING FIXTURES' MOUNTING
HEIGHTS AND CLEARANCES, SEE A002



1 LOCATION MAP
N.T.S.



FOODSERVICE EQUIPMENT SCHEDULE			
ITEM #	QTY	DESCRIPTION	REMARKS
1	1	SERVING COUNTER	
2	1	SERVING COUNTER	
3	1	SELF SERVICE ORDER INTERFACE	NOT IN SECTION 114000
4	1	MENU BOARD	NOT IN SECTION 114000
5	1	UTILITY SHELF	
6	1	MOP SINK	BY MECHANICAL TRADES
7	1	ICE BIN	EXISTING/RELOCATE
8	1	WATER FILTER	
9	1	OPEN NUMBER	
10	1	ICE MAKER	EXISTING/RELOCATE
11	1	OPEN NUMBER	
12	1	FREEZER	
13A	1	REFRIGERATION SYSTEM COIL	
13B	1	CONDENSING UNIT	
14	2	REFRIGERATOR/FREEZER SHELVING	
15	1	REFRIGERATOR/FREEZER SHELVING	EXISTING/RELOCATE
16	3	DRY STORAGE SHELVING	EXISTING/RELOCATE
17	1	DESK & CHAIR	NOT IN SECTION 114000
18	1	SAFE	NOT IN SECTION 114000
19	1	WALL CABINET	NOT IN SECTION 114000
20	1	OPEN NUMBER	
21	1	OPEN NUMBER	
22	1	REACH IN REFRIGERATOR 2-SEC	
23	1	PREP COUNTER W/SINKS	
24	1	DISPOSER W/SPRAY RINSE	
25	1	OPEN NUMBER	
26	1	MOBILE TRASH BIN	EXISTING/RELOCATE
27	2	WALL SHELF	
28	1	MICROWAVE OVEN	
29	1	EXHAUST HOOD	
30	1	WALL SHELF	
31	1	OPEN NUMBER	
32	1	FIRE PROTECTION SYSTEM	EXISTING/MODIFY
33	1	4-BURNER RANGE W/STAND	
34	1	HALF-SIZE CONVECTION OVEN	
35	1	MOBILE EQUIPMENT STAND	
36	1	STAINLESS STEEL WALL PANEL	
37	1	HAND SINK	
38	1	POT & PAN SINK	EXISTING/MODIFY
39	1	OPEN NUMBER	
40	1	OPEN NUMBER	
41	1	OPEN NUMBER	
42	1	REFRIGERATED PREP TABLE	
43	1	WORKCOUNTER	
44	1	CONVEYOR TOASTER	
45	1	OPEN NUMBER	
46	1	SANDWICH GRILL	
47	2	SOUP WELL	EXISTING/RELOCATE
48	1	ICE MAKER, UNDERCOUNTER	EXISTING/RELOCATE
49	1	BLENDER	EXISTING/MODIFY
50	1	OPEN NUMBER	
51	1	OPEN NUMBER	
52	1	COFFEE GRINDER	EXISTING/RELOCATE
53	1	AIRPOT BREWER	EXISTING/RELOCATE
54	1	OPEN NUMBER	
55	1	WORKCOUNTER	
56	1	WORKCOUNTER	
57	1	SERVING COUNTER	
58	3	P.O.S. SYSTEM	BY OWNER
59	1	SYRUP BOTTLE RACK	EXISTING/RELOCATE
60	1	BAKERY DISPLAY CASE	
61	1	WORKCOUNTER W/SINK AND HAND SINK	
62	2	TRASH BIN	
63	1	DIPPER WELL AND FAUCET	
64	1	ESPRESSO GRINDER	EXISTING/RELOCATE
65	1	OPEN NUMBER	
66	1	UNDERCOUNTER REFRIGERATOR	EXISTING/RELOCATE
67	1	ESPRESSO MACHINE	EXISTING/RELOCATE
68	1	DISPLAY REFRIGERATOR	EXISTING/RELOCATE
69	2	ICE BIN DISPLAY	NOT IN SECTION 114000
70	1	CONDIMENT COUNTER	
71	1	OPEN NUMBER	
72	1	OPEN NUMBER	
73	1	OPEN NUMBER	
74	1	OPEN NUMBER	
75	1	OPEN NUMBER	
76	1	BEER REFRIGERATOR	
77A	1	REFRIGERATION SYSTEM COIL	
77B	1	CONDENSING UNIT	
78	2	KEG SHELVING	
79	1	OPEN NUMBER	
80	1	OPEN NUMBER	
81	2	STORAGE CABINET	
82A	1	SODA RACK	BY OWNER'S VENDOR
82B	1	SODA CARBONATOR	BY OWNER'S VENDOR
82C	2	SODA GUN	BY OWNER'S VENDOR
83A	1	BEER SYSTEM	BY OWNER'S VENDOR
83B	1	WALL SHELF	
83C	1	BEER TOWER	BY OWNER'S VENDOR
84	1	UNDERCOUNTER REFRIGERATOR, 2-SEC.	
85	1	OPEN NUMBER	
86	1	BACK BAR	
87	1	BACK BAR	
88	3	DRAINBOARD	1 FUTURE
89	4	SPEED RAIL	2 FUTURE
90	1	BAR TOP	
91	2	S/S'T DRINK RAIL	
92	1	BACK BAR REFRIGERATOR, 3-SEC.	
93	2	LIQUOR DISPLAY	
94	1	OPEN NUMBER	
95	1	OPEN NUMBER	
96	1	OPEN NUMBER	
97	1	BLENDER	BY OWNER
98	1	OPEN NUMBER	
99	2	P.O.S. CABINET	
100	1	OPEN NUMBER	
101	1	OPEN NUMBER	
102	2	ICE BIN W/INSULATED BOTTLE WELLS	1 FUTURE
103	1	OPEN NUMBER	
104	2	SODA GUN TUBING CHASE	1 FUTURE
105	1	OPEN NUMBER	
106	1	GLASS WASHER	
107	1	DUMP SINK W/WASTE	
108	1	HAND SINK	

LEGEND	
	DENOTES EXISTING EQUIPMENT
	DENOTES EXISTING EQUIPMENT NO CHANGE

1 FS EQUIPMENT PLAN
3/8" = 1'-0"



Reynolds, Smith and Hills, Inc.
4525 Airport Approach Rd, Ste A
Duluth, Minnesota 55811
218-722-1227 Fax: 218-722-1052
www.rsandh.com



DULUTH
INTERNATIONAL
AIRPORT
DULUTH, MN

NEW PASSENGER
TERMINAL

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) 722-9306

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

Foodservice Equipment Consultants:
ROBERT RIPPE & ASSOC.
6117 Blue Circle Drive, Suite 100, Minneapolis MN 55412
TEL: (952) 933-0313

REVISIONS

NO.	DESCRIPTION	DATE

DATE ISSUED: 2-10-12
REVIEWED BY: JA
DRAWN BY: MDN
DESIGNED BY: SC

AEP PROJECT NUMBER
213-1882-091

© 2010 REYNOLDS, SMITH AND HILLS INC.

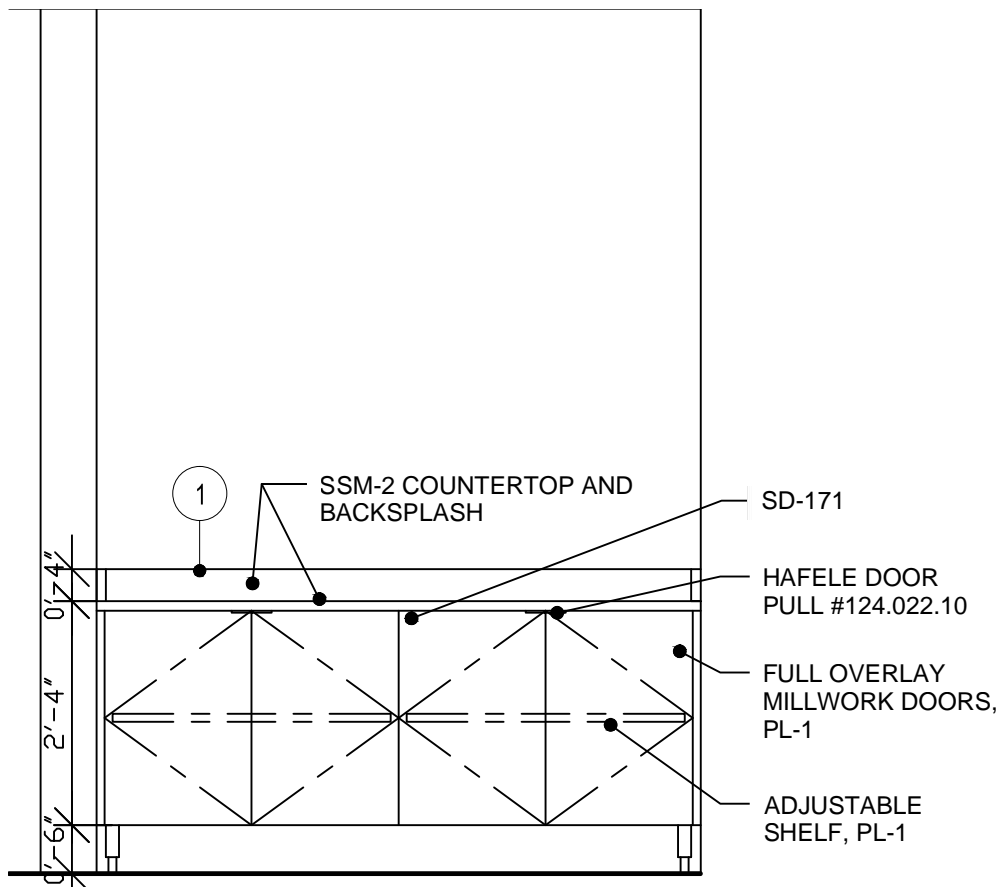
SHEET TITLE

FOODSERVICE
EQUIPMENT PLAN
& SCHEDULE

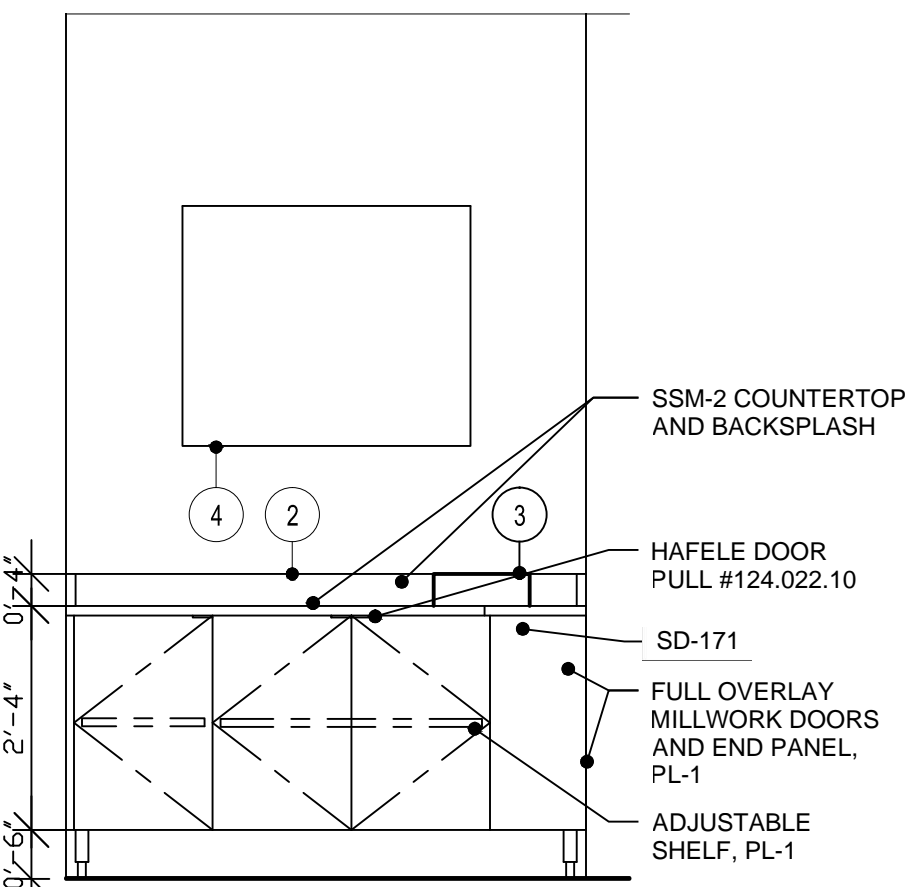
SHEET NUMBER

FS101

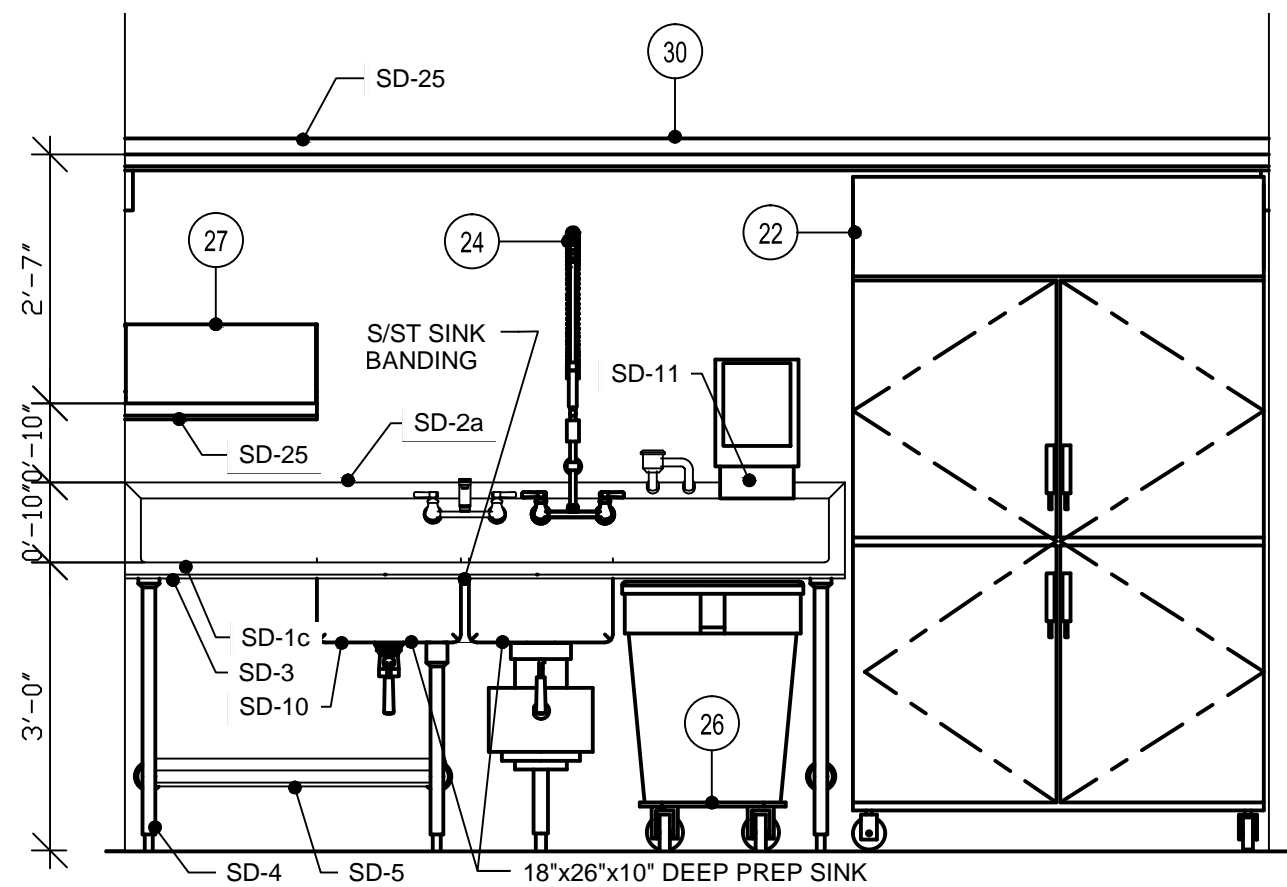
BID PACKAGE 2C



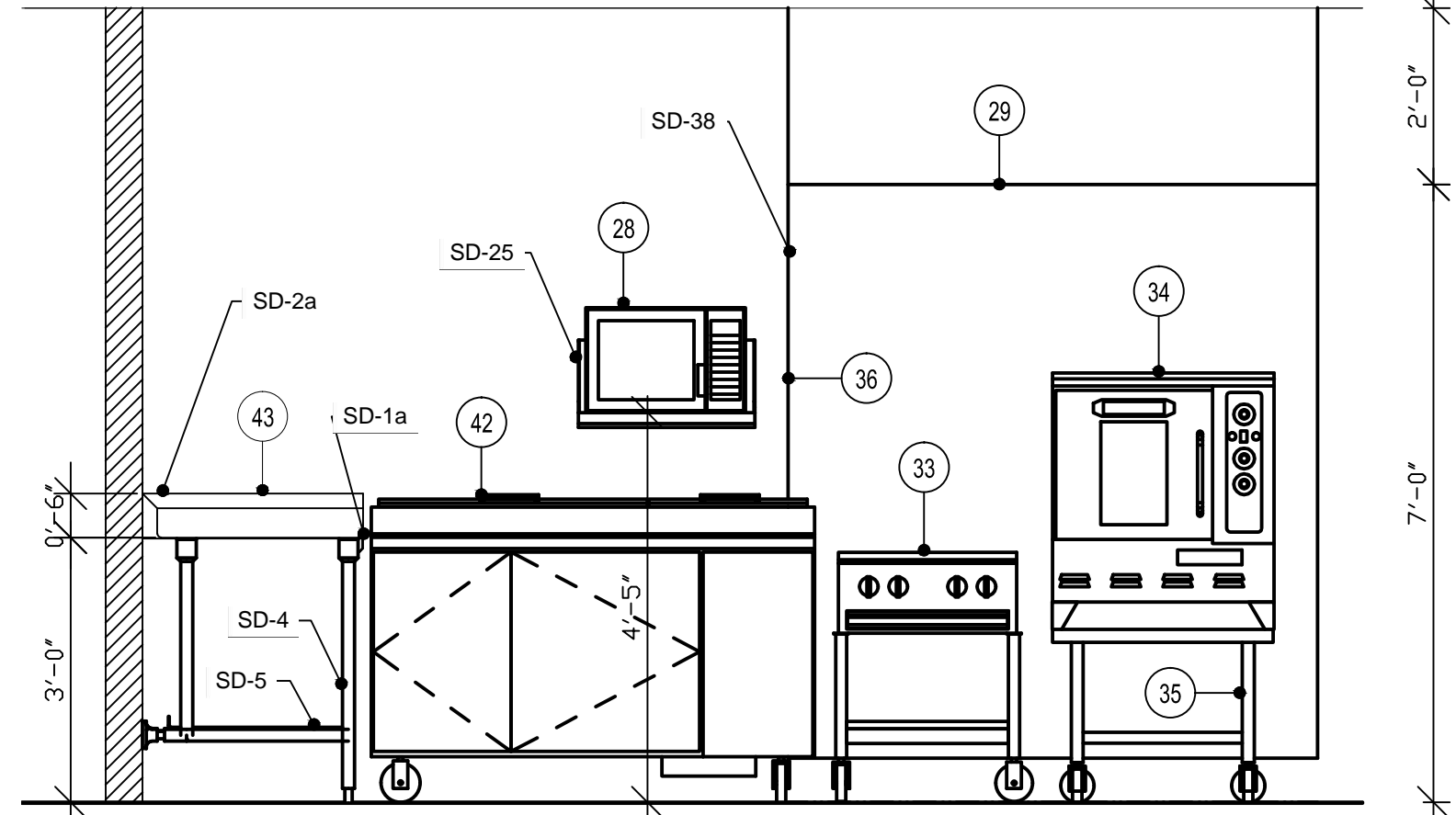
① SERVING COUNTER 1
1/2" = 1'-0"



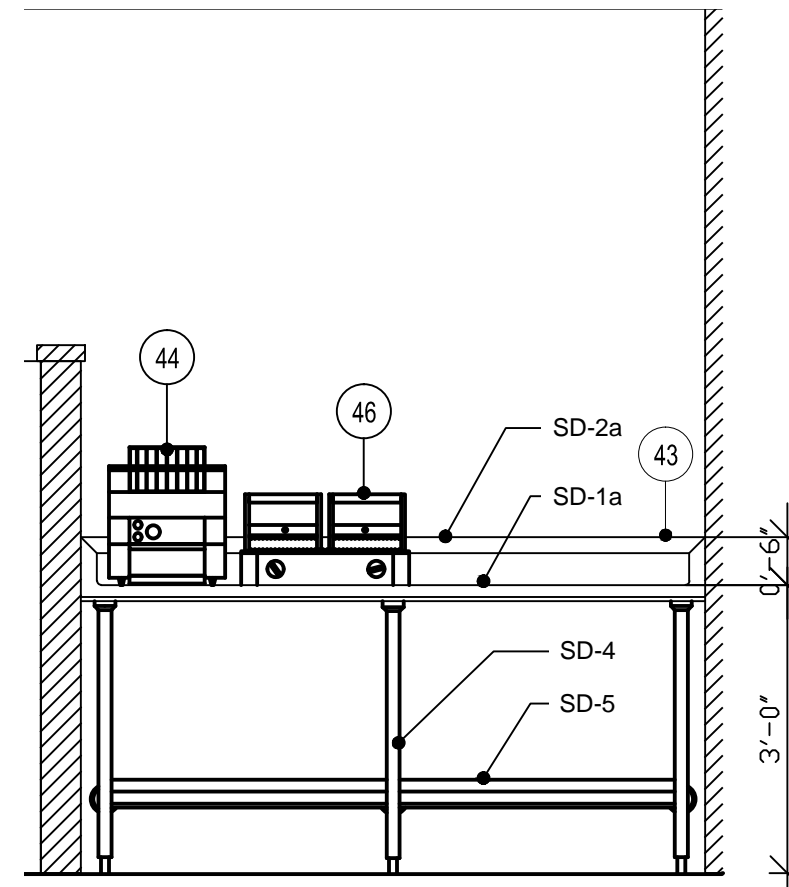
② SERVING COUNTER 2
1/2" = 1'-0"



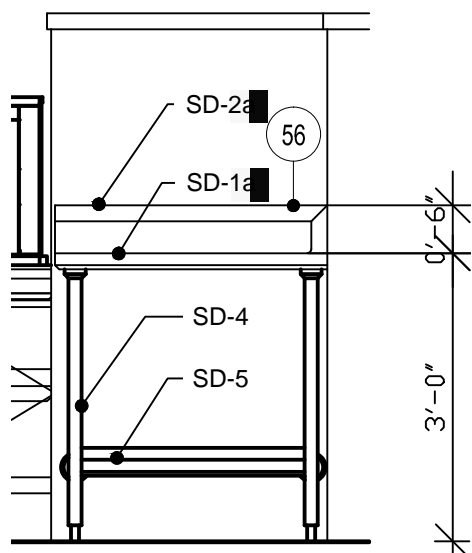
③ PREP COUNTER
1/2" = 1'-0"



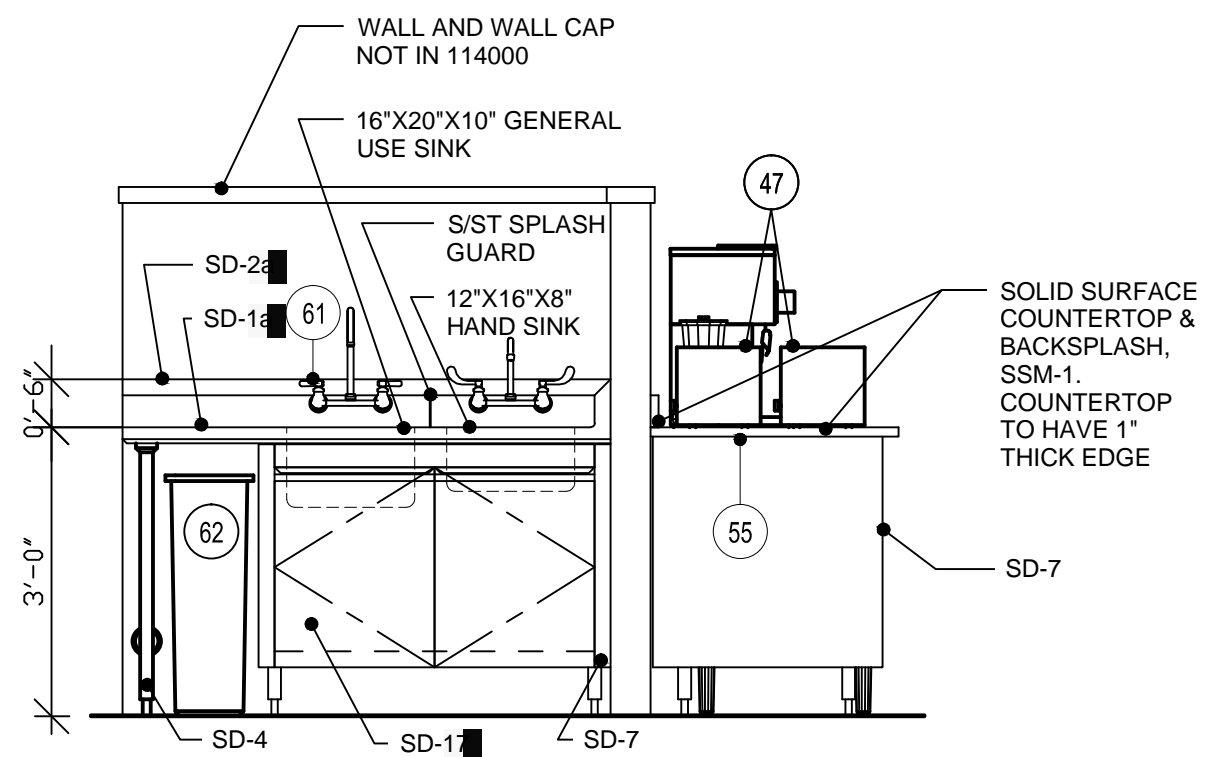
④ COOK LINE
1/2" = 1'-0"



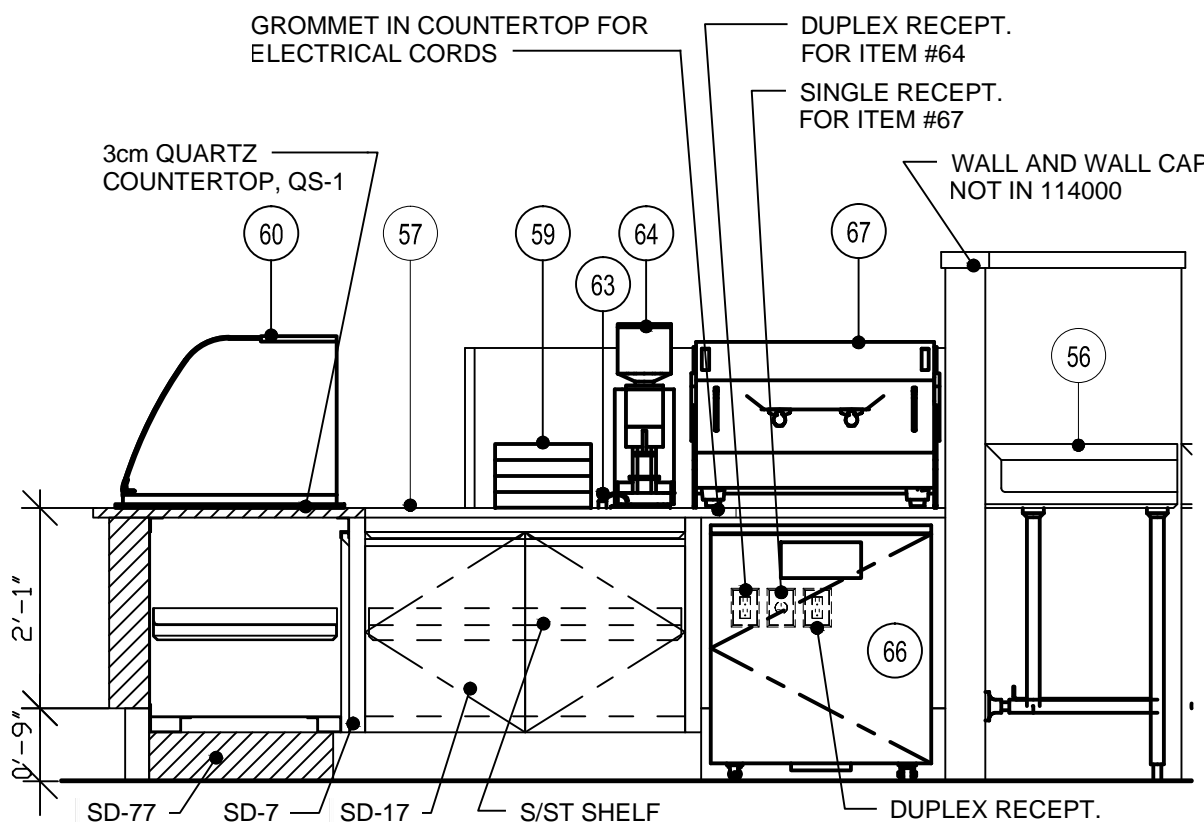
⑤ PANINI TABLE
1/2" = 1'-0"



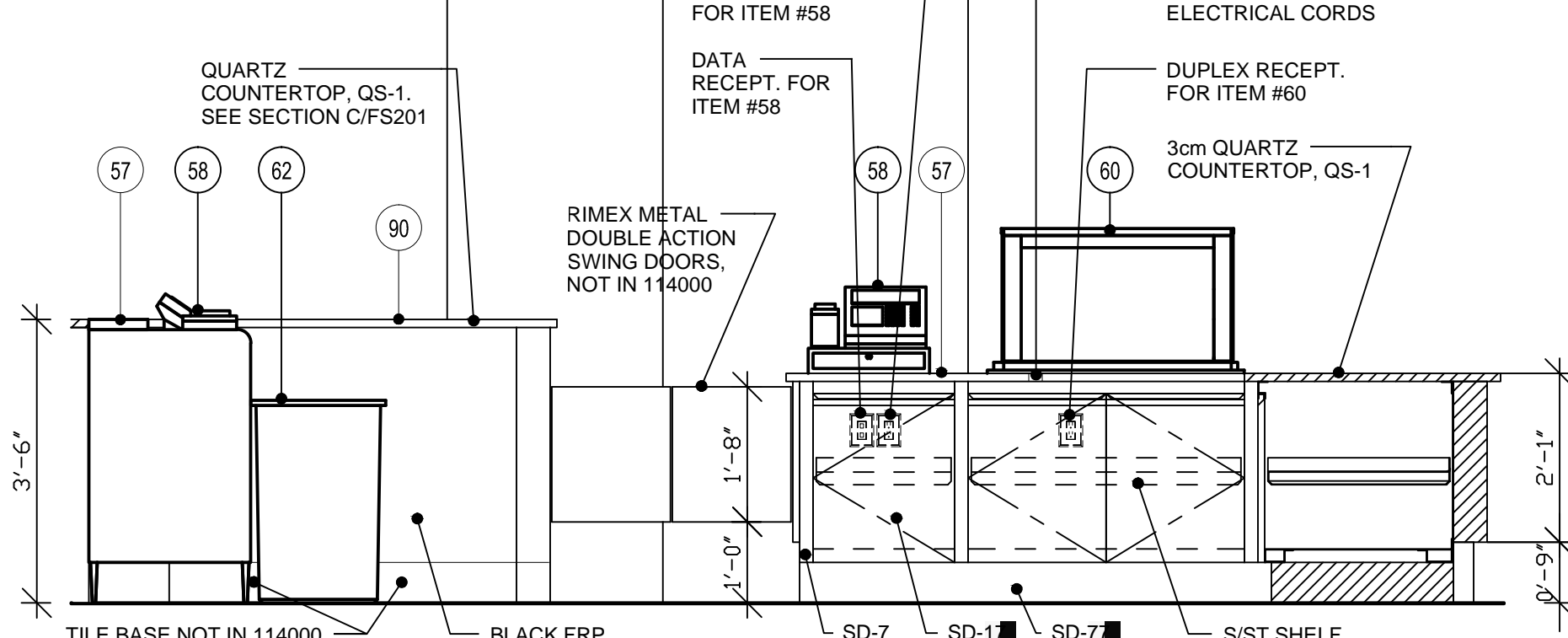
⑥ COOK LINE COUNTER
1/2" = 1'-0"



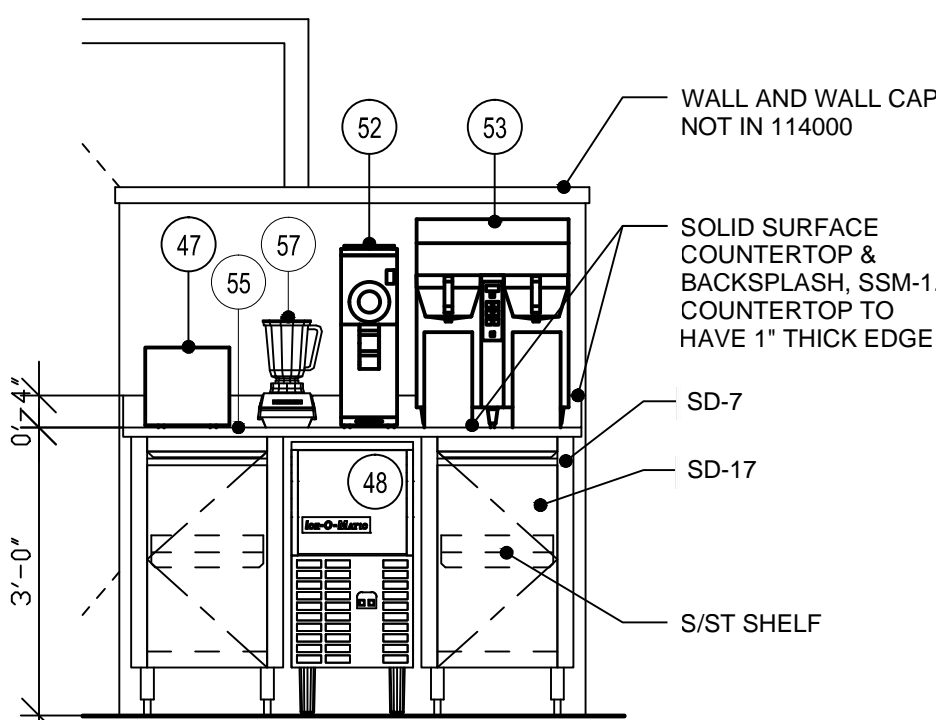
⑦ COFFEE BACK COUNTER
1/2" = 1'-0"



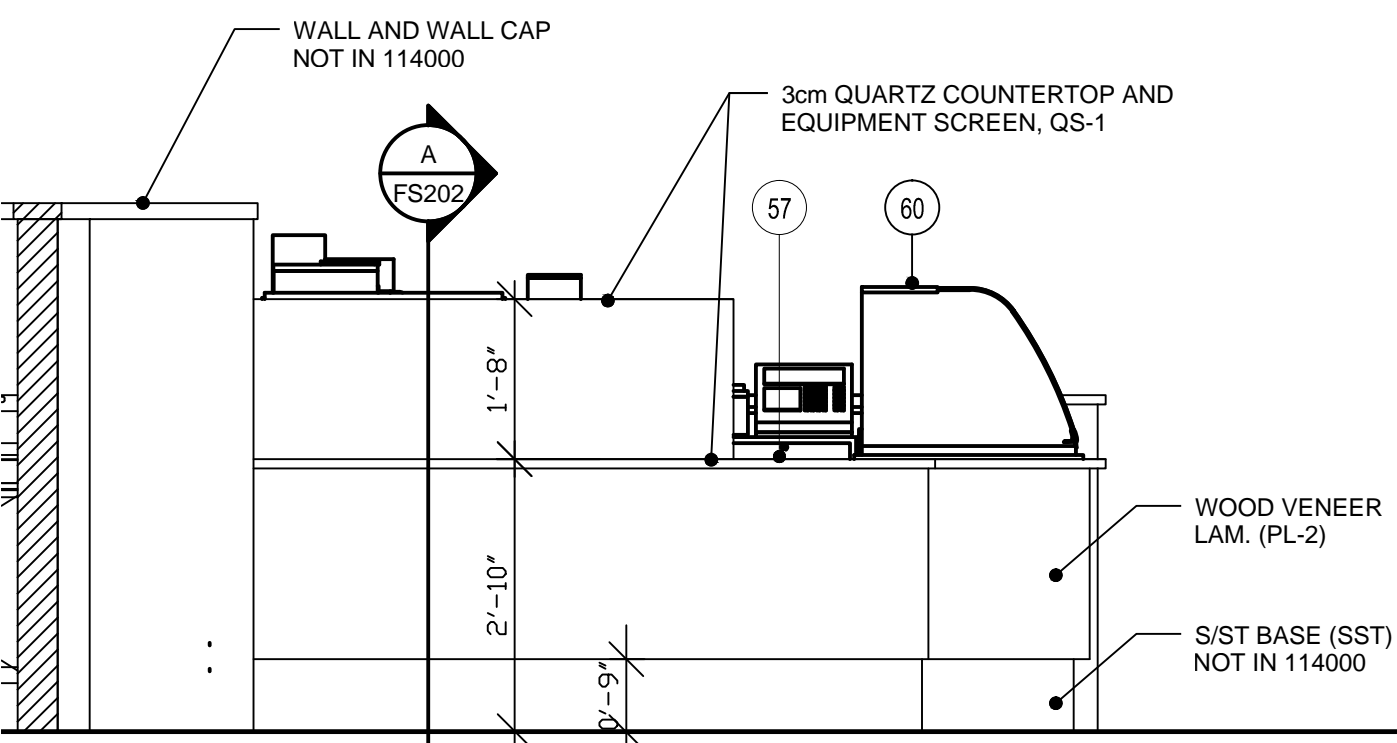
⑧ COFFEE COUNTER
1/2" = 1'-0"



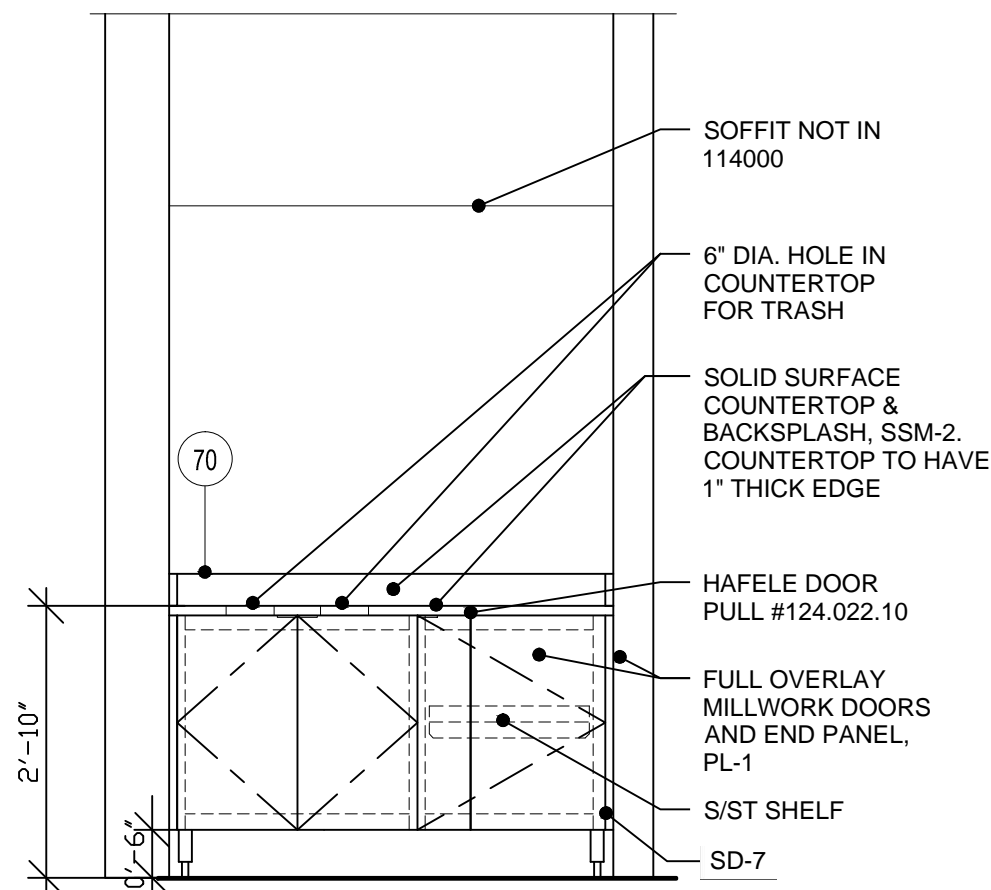
⑨ COFFEE COUNTER BACK
1/2" = 1'-0"



⑩ BACK COFFEE COUNTER
1/2" = 1'-0"



⑪ COFFEE COUNTER WEST FRONT
1/2" = 1'-0"



⑫ CONDIMENT COUNTER
1/2" = 1'-0"

Keynote Legend	
Key Value	Keynote Text
SD-1a	TABLE EDGE - TURN DOWN
SD-1c	TABLE EDGE - INVERTED "V"
SD-2a	BACKSPLASH
SD-3	FRAMEWORK
SD-4	TABLE & SINK LEG'S
SD-5	WELDED UNDERSHELF
SD-7	CABINET BASE - WELDED CONSTRUCTION
SD-10	PREP/POT & PAN SINKS
SD-11	DISPOSER CONTROL CHASE
SD-17	HINGED SOLID DOOR - ITEGRAL PULL
SD-25	WALL SHELVES
SD-38	STAINLESS STEEL WALL PANEL
SD-71	CAFETERIA FRAMEWORK
SD-77	CHANNEL BASE
SD-171	MILLWORK CABINET

FINISH LEGEND	
SOLID SURFACE COUNTERTOPS	
SSM-1	MANUF. - CORIAN, COLOR - LINEN, 1/2" THICK
SSM-2	MANUF. - CORIAN, COLOR - MEDEA, 1/2" THICK
QS-1	MANUF. - CAMBRIA, JEWEL COLLECTION COLOR - WHITNEY, 3CM THICK
LAMINATES	
PL-1	MANUF. - FORMICA, MDF SOLIDZ 7812-58, MATTE FINISH
PL-2	MANUF. - TREE FROG VENEER BY CHEMETAL, PRE-FINISHED HPL BACKED, MAPLE STRAIGHT GRAIN 60104

RS&H
IMPROVING YOUR WORLD

Reynolds, Smith and Hills, Inc.
4525 Airport Approach Rd, Ste A
Duluth, Minnesota 55811
218-722-1227 Fax: 218-722-1052
www.rsandh.com

**DULUTH AIRPORT
AUTHORITY**

DULUTH
INTERNATIONAL AIRPORT
DULUTH, MN

NEW PASSENGER
TERMINAL

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) 722-9306

M/E/P/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) 591-5079

Foodservice Equipment Consultants:
ROBERT RIPPE & ASSOC.
6117 Blue Circle Drive, Suite 100, Minneapolis MN 55812
TEL: (952) 933-0313

REVISIONS

NO.	DESCRIPTION	DATE

DATE ISSUED: 2-10-12
REVIEWED BY: JA
DRAWN BY: MDN
DESIGNED BY: SC

AEP PROJECT NUMBER
213-1882-091

© 2010 REYNOLDS, SMITH AND HILLS INC.

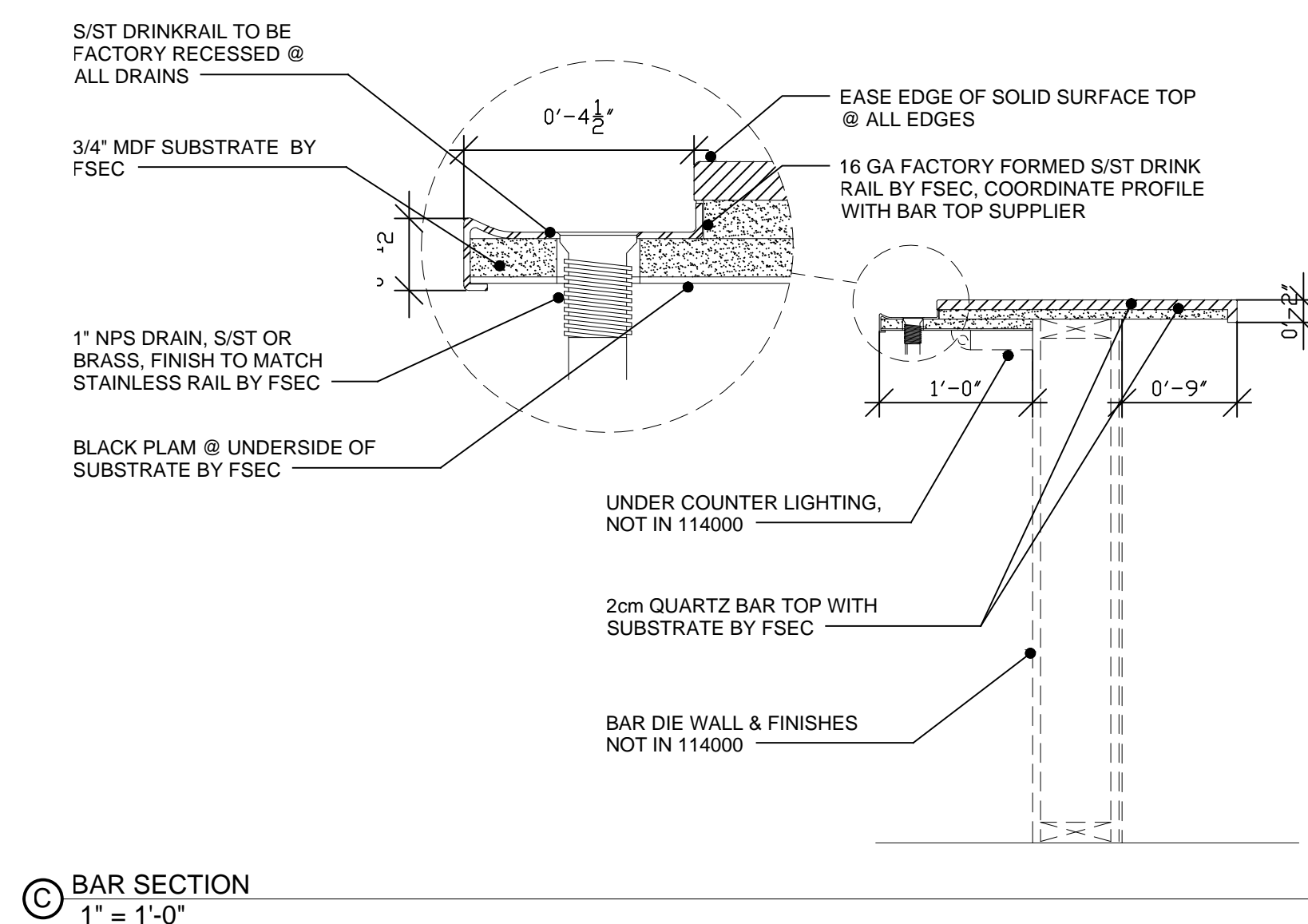
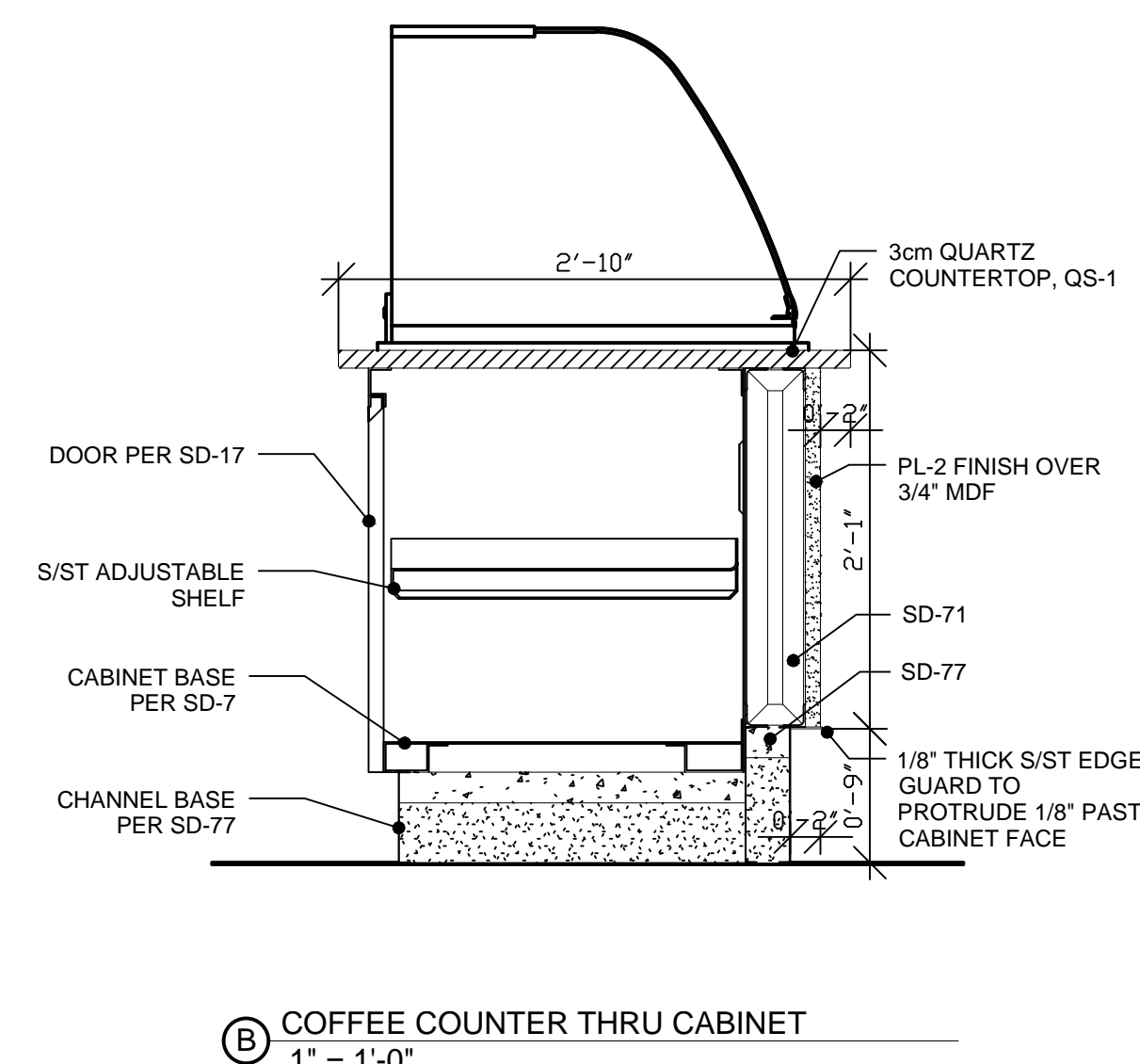
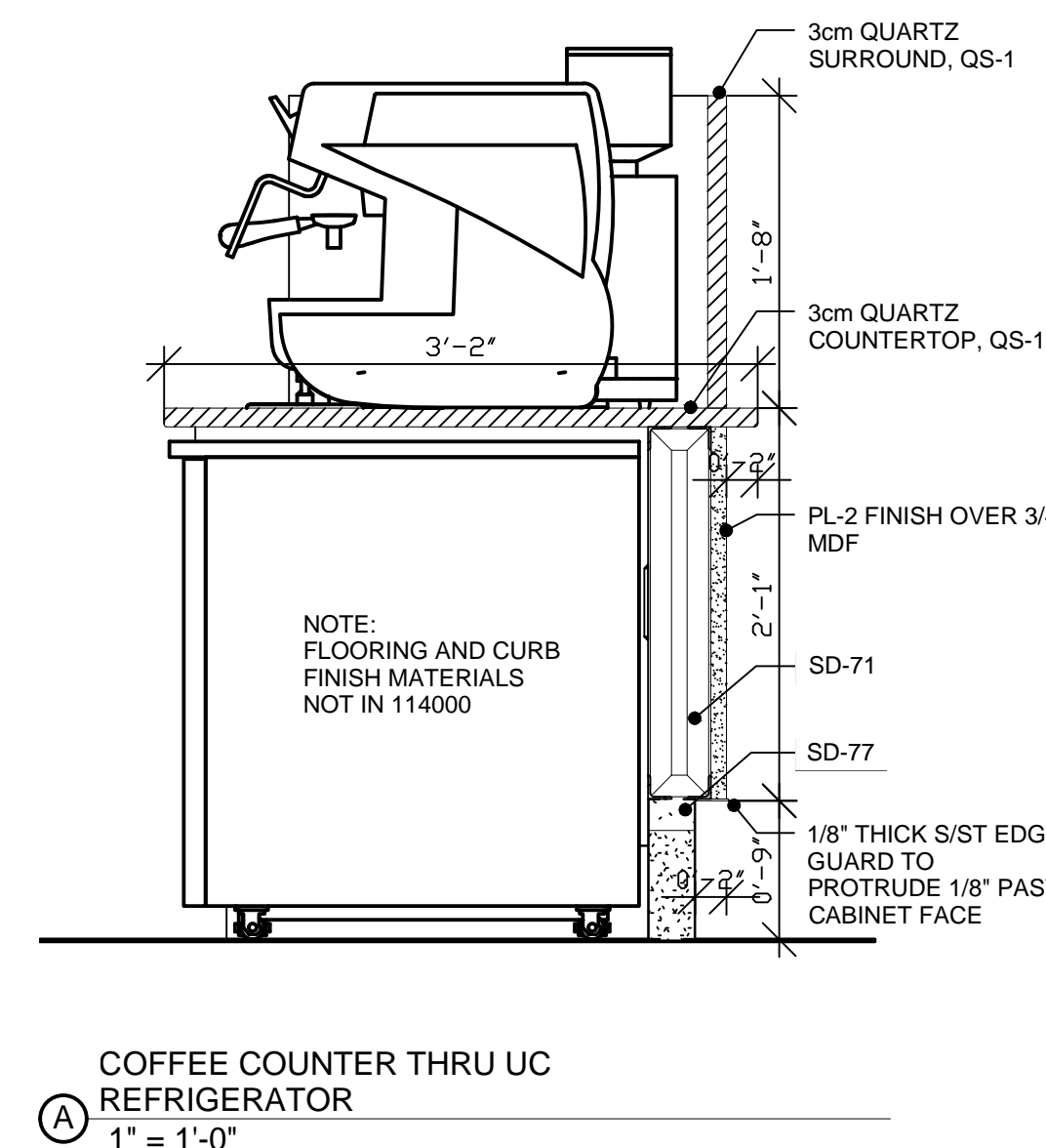
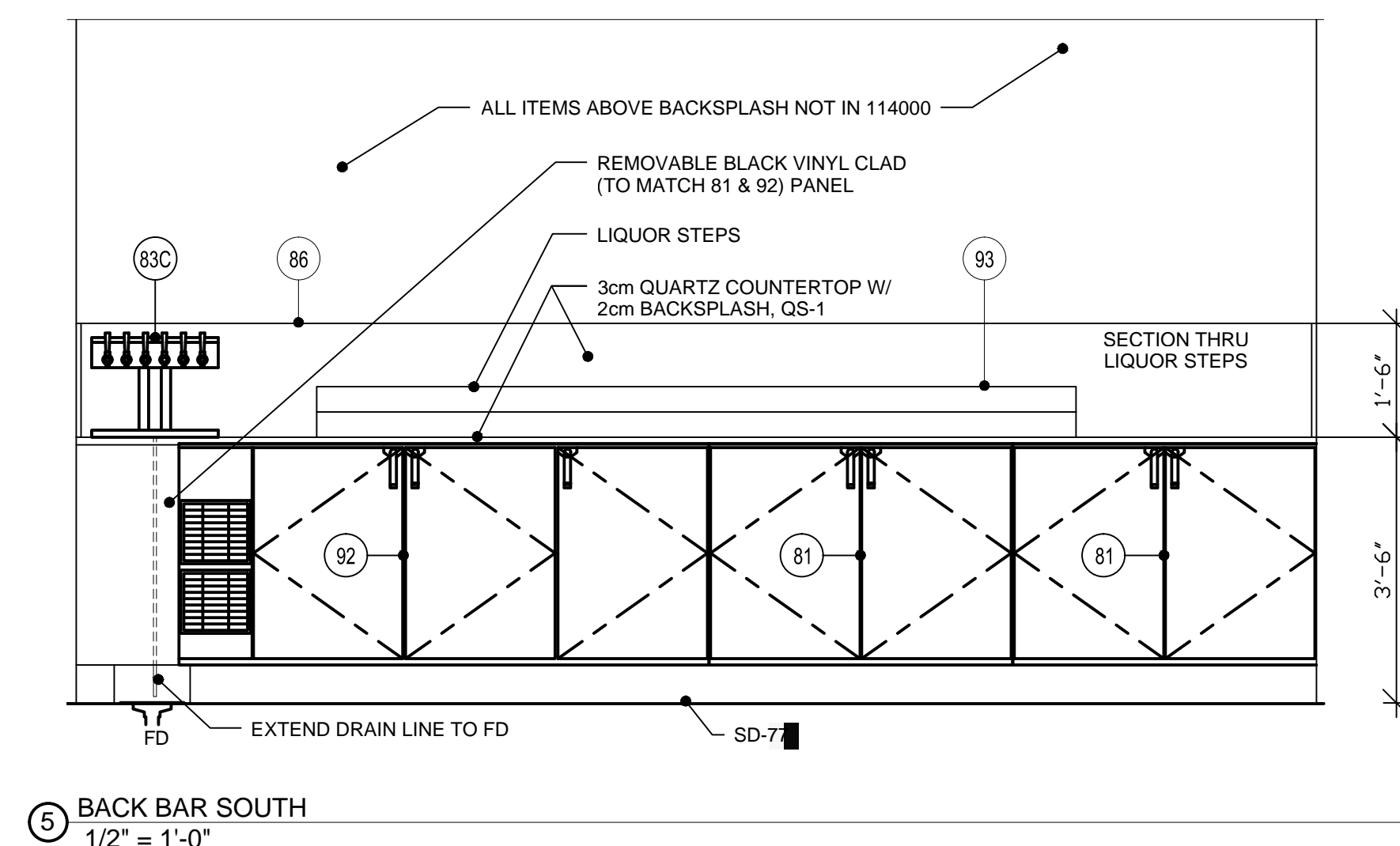
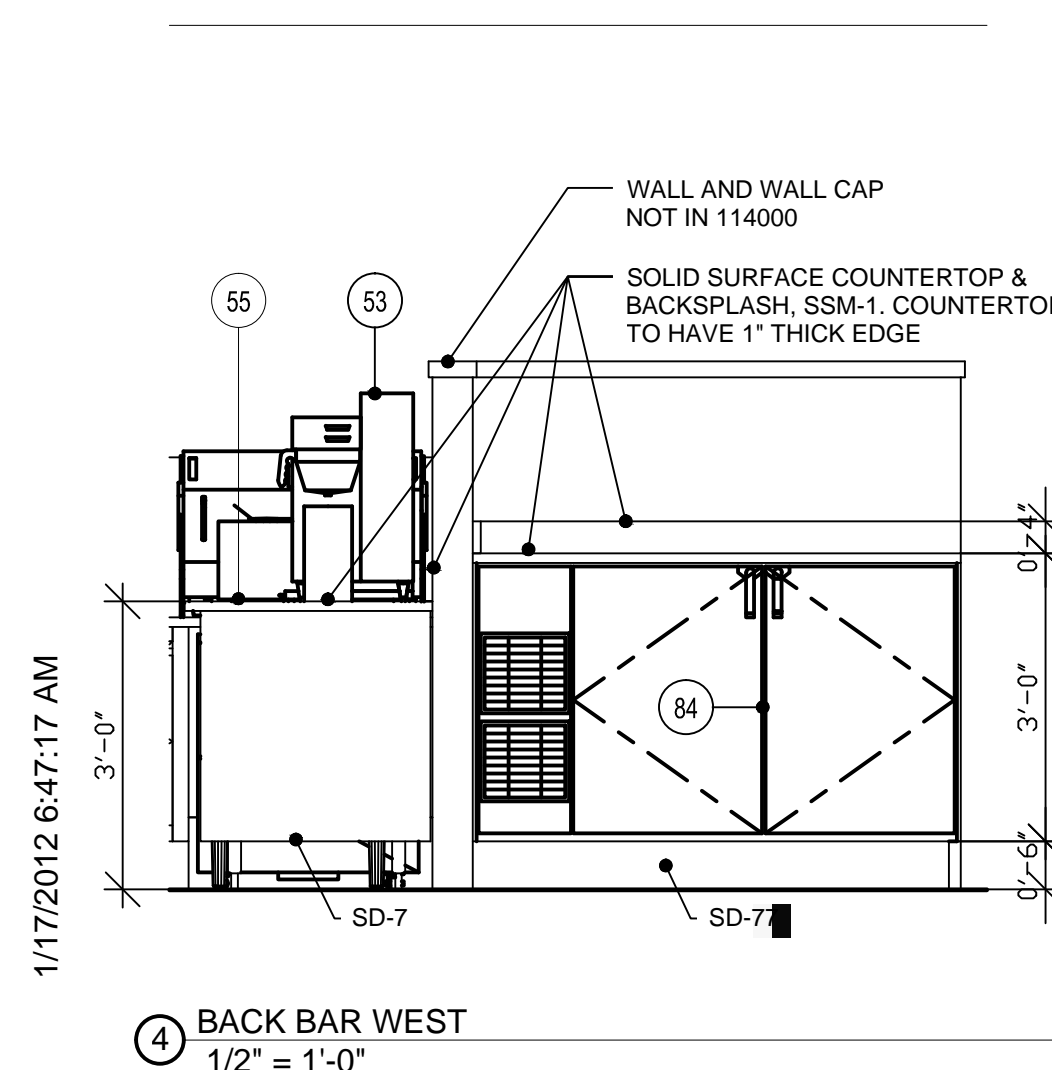
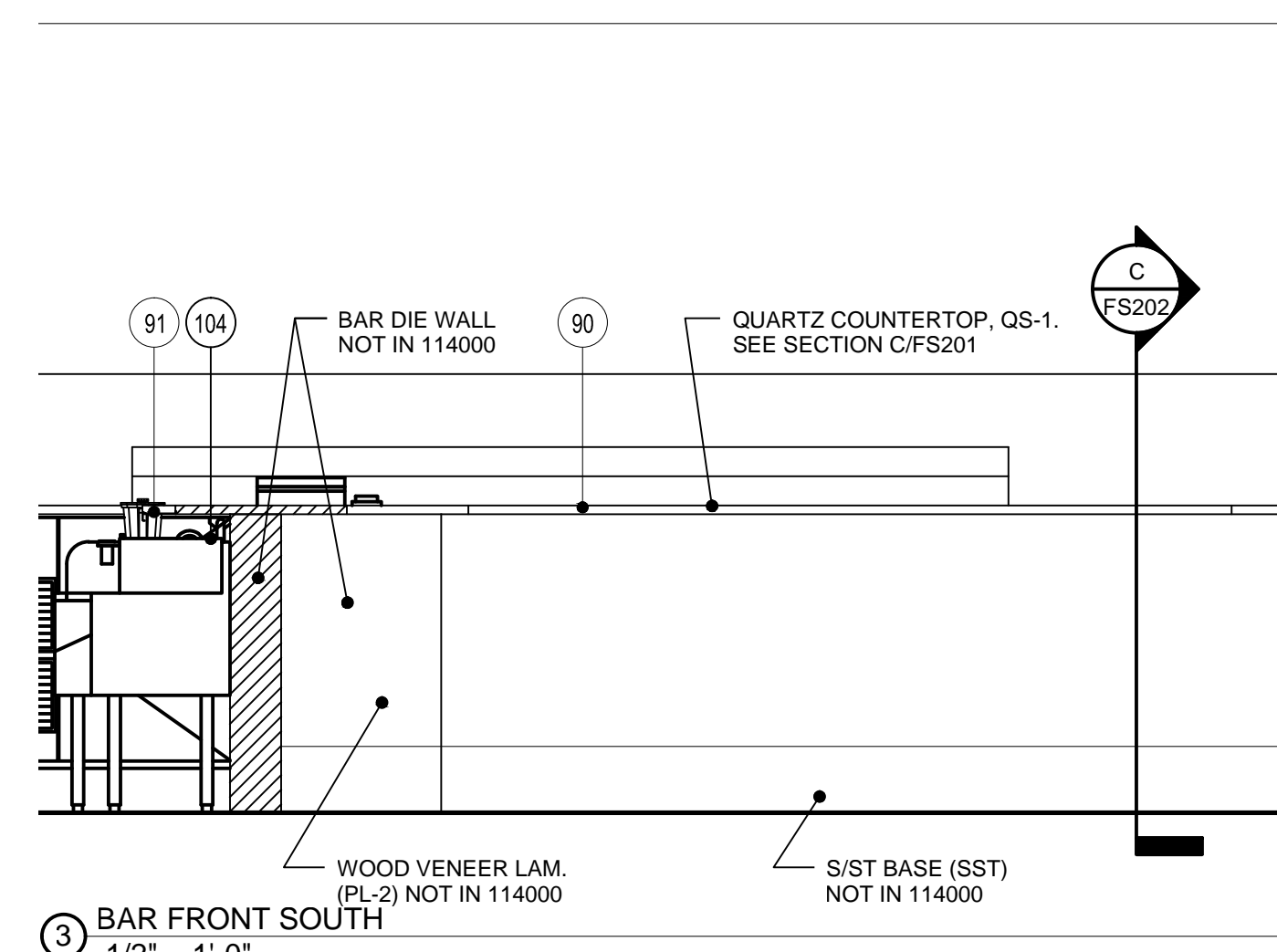
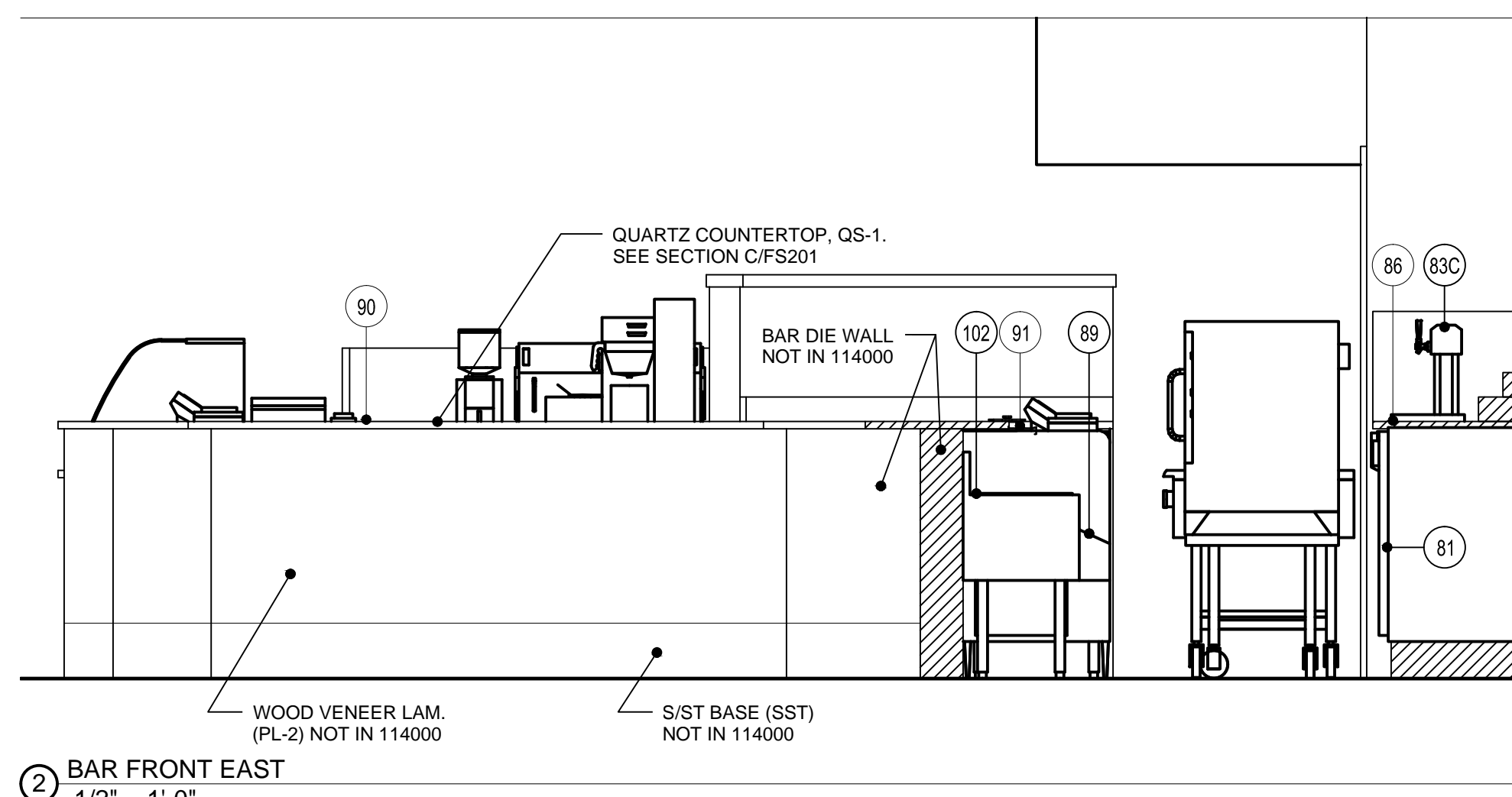
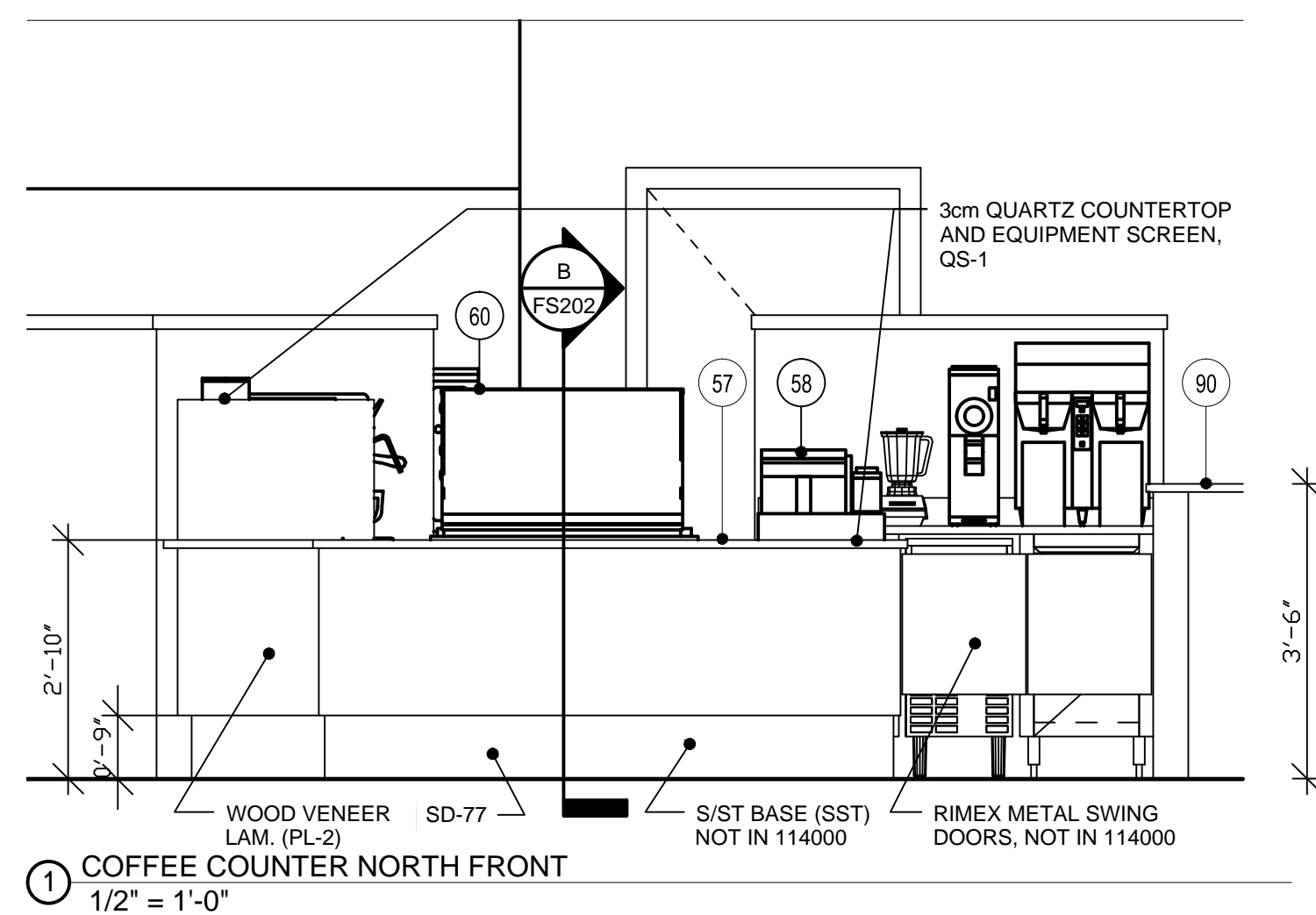
SHEET TITLE

FOODSERVICE
EQUIPMENT
ELEVATIONS
& SECTIONS

SHEET NUMBER

FS201

BID PACKAGE 2C



Keynote Legend	
Key Value	Keynote Text
SD-1a	TABLE EDGE - TURN DOWN
SD-1c	TABLE EDGE - INVERTED "V"
SD-2a	BACKSPASH
SD-3	FRAMEWORK
SD-4	TABLE & SINK LEG'S
SD-5	WELDED UNDERSHELF
SD-7	CABINET BASE - WELDED CONSTRUCTION
SD-10	PREP/POT & PAN SINKS
SD-11	DISPOSER CONTROL CHASE
SD-17	HINGED SOLID DOOR - ITEGRAL PULL
SD-25	WALL SHELVES
SD-38	STAINLESS STEEL WALL PANEL
SD-71	CAFETERIA FRAMEWORK
SD-77	CHANNEL BASE
SD-171	MILLWORK CABINET

FINISH LEGEND	
	SOLID SURFACE COUNTERTOPS
SSM-1	MANUF. - CORIAN, COLOR - LINEN, 1/2" THICK
SSM-2	MANUF. - CORIAN, COLOR - MEDEA, 1/2" THICK
QS-1	MANUF. - CAMBRIA, JEWEL COLLECTION COLOR - WHITNEY, 3CM THICK
	LAMINATES
PL-1	MANUF. - FORMICA, MDF SOLIDZ 7812-58 , MATTE FINISH
PL-2	MANUF. - TREE FROG VENEER BY CHEMEAL, PRE-FINISHED HPL BACKED, MAPLE STRAIGHT GRAIN 60104

RS&H
IMPROVING YOUR WORLD

Reynolds, Smith and Hills, Inc.
4525 Airport Approach Rd, Ste A
Duluth, Minnesota 55811
218-722-1227 Fax: 218-722-1051
www.rsandh.com



DULUTH
INTERNATIONAL
AIRPORT
DULUTH, MN

NEW PASSENGER
TERMINAL

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 55812
TEL: (218) 722-1056 / FAX: (218) 722-9306

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) 591-5079

ROBERT RIPPE & ASSOC.
6117 Blue Circle Drive, Suite 100, Minneapolis MN 55812
TEL: (952) 933-0313

REVISIONS

[illegible]

DATE ISSUED: 2-10-12

REVIEWED BY: JA

DRAWN BY: MC

DESIGNED BY: SC

AEP PROJECT NUMBER
213-1882-091

© 2010 REYNOLDS, SMITH AND HILLS INC.

SHEET TITLE

FOODSERVICE
EQUIPMENT
ELEVATIONS
& SECTIONS

SHEET NUMBER

FS202

BID PACKAGE 2C

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) 722-9306

M/E/P/F 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) 591-5079

Foodservice Equipment Consultants:
ROBERT RIPPE & ASSOC.
6117 Blue Circle Drive, Suite 100, Minneapolis MN 55812
TEL: (952) 933-0313

REVISIONS

NO.	DESCRIPTION	DATE

DATE ISSUED: 2-10-12

REVIEWED BY: JA

DRAWN BY: MDN

DESIGNED BY: SC

AEP PROJECT NUMBER

213-1882-091

© 2010 REYNOLDS, SMITH AND HILLS INC.

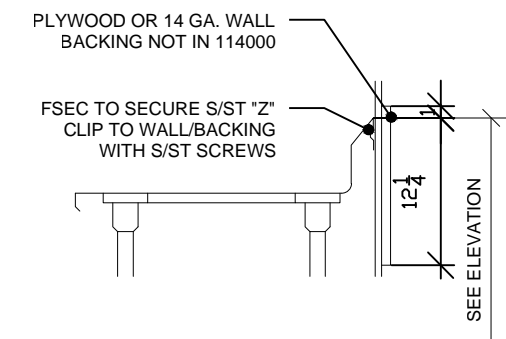
SHEET TITLE

FOODSERVICE
EQUIPMENT
SPECIAL CONDITIONS
PLAN & DETAILS

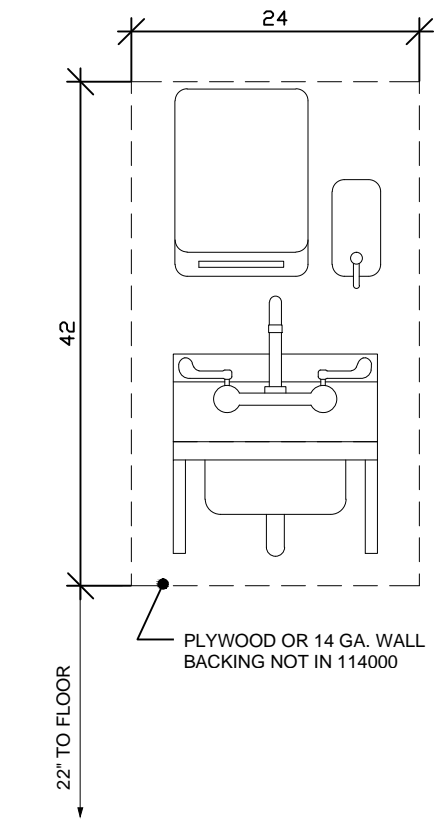
SHEET NUMBER

FS301

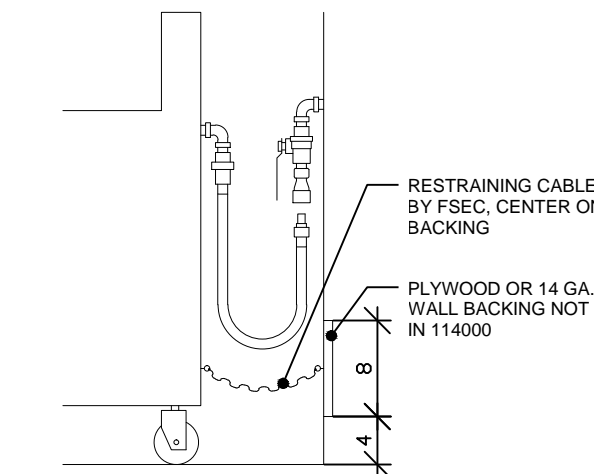
BID PACKAGE 2C



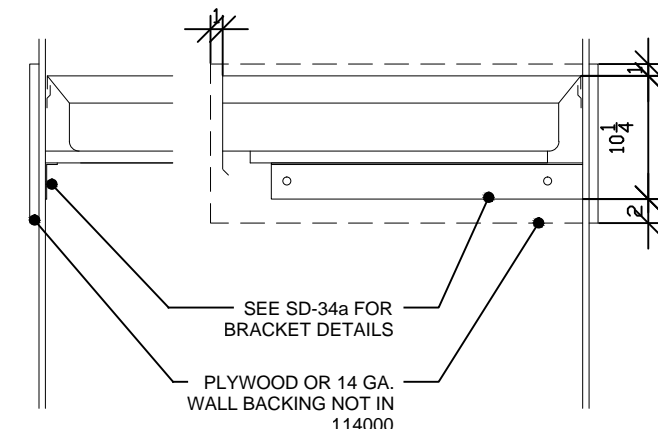
3 BACKING - BACKSPLASH
3/4" = 1'-0"



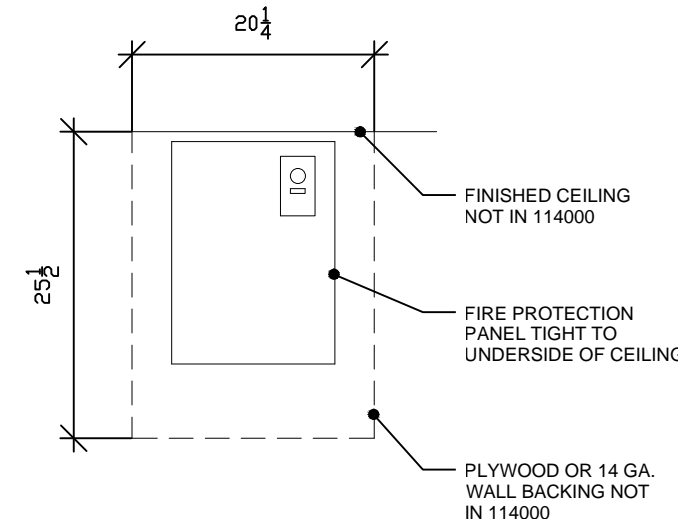
5 BACKING - HAND SINK
3/4" = 1'-0"



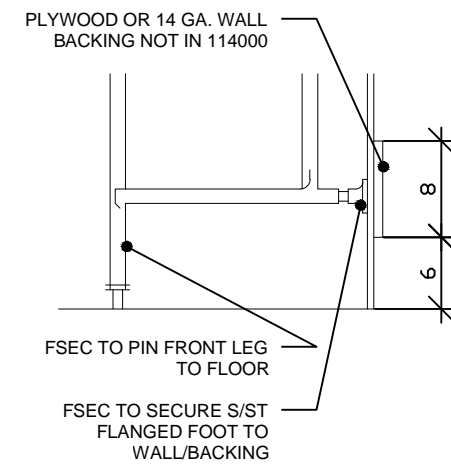
7 BACKING - RESTRAINING CABLE
3/4" = 1'-0"



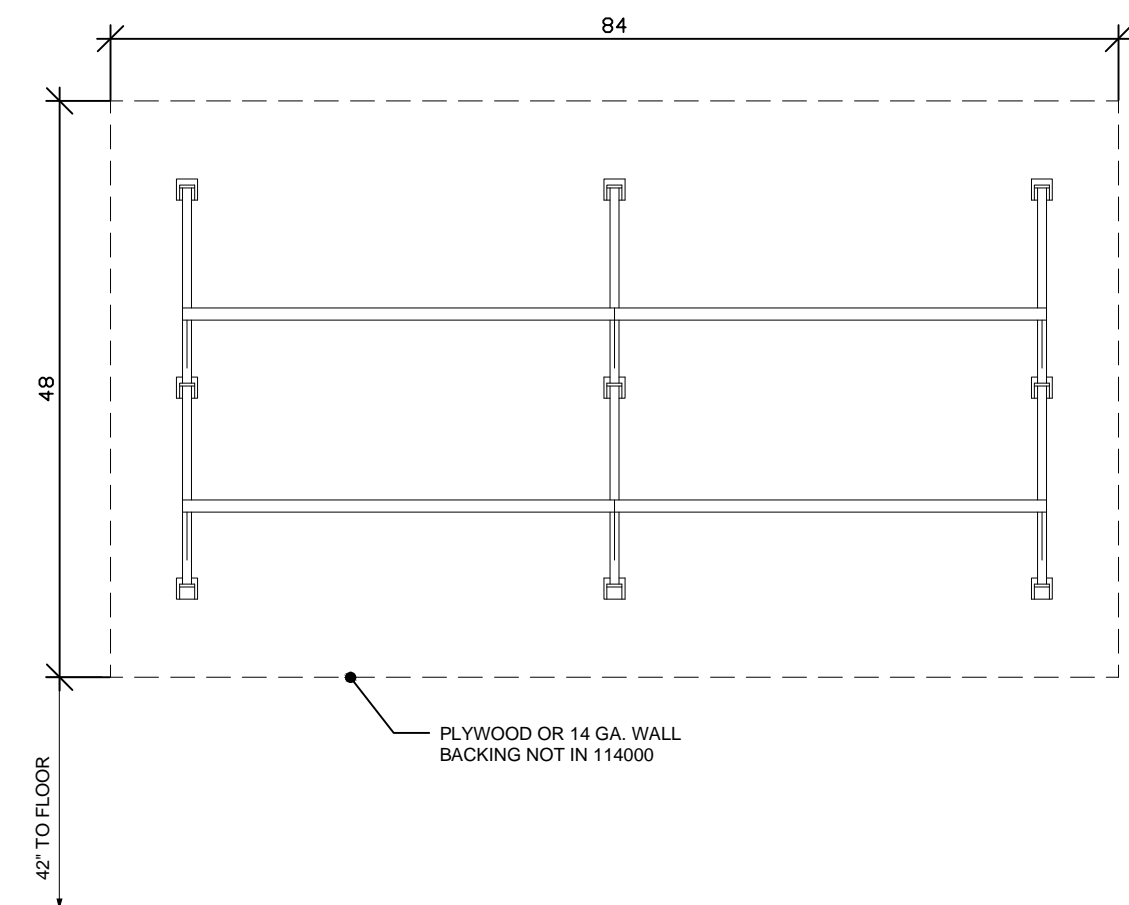
4 BACKING - COUNTERTOP SUPPORT
ANGLE - END WALL CONDITION
3/4" = 1'-0"



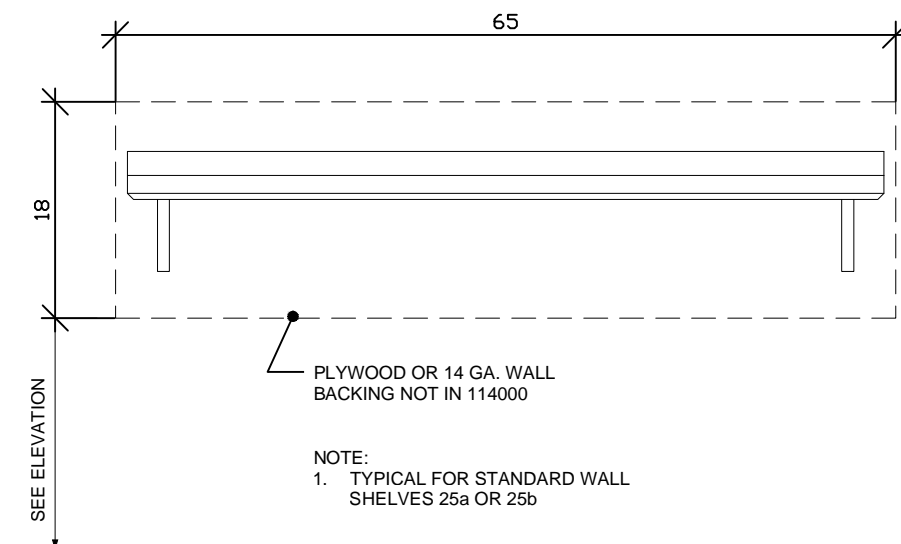
6 BACKING - FIRE PROTECTION PANEL
3/4" = 1'-0"



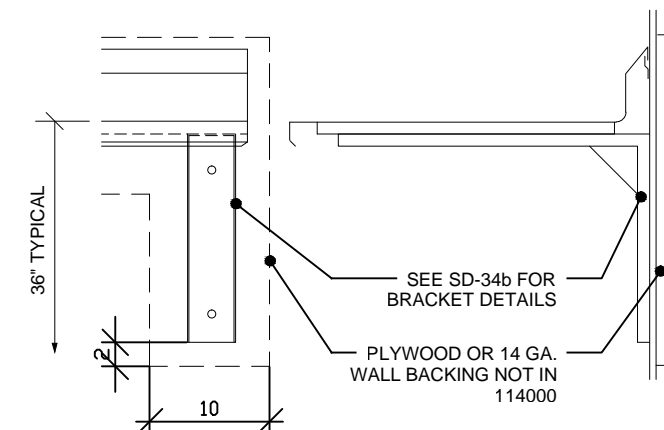
8 BACKING - WALL MOUNTED
CROSSBRACE
3/4" = 1'-0"



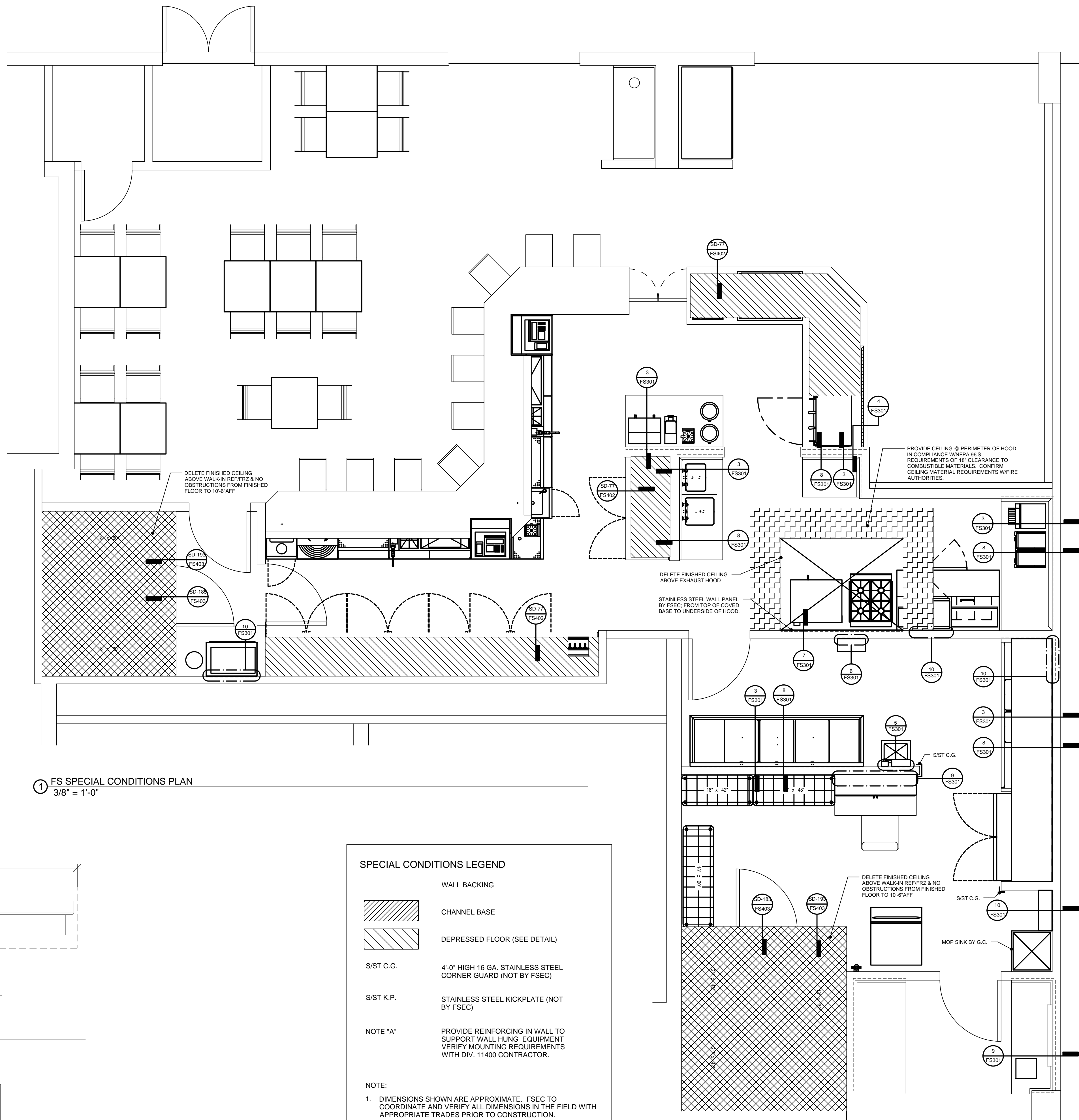
9 BACKING - ADJUSTABLE SHELF
3/4" = 1'-0"



10 BACKING - WALL SHELF
3/4" = 1'-0"



11 BACKING - COUNTERTOP SUPPORT
BRACKET - FREE STANDING END
3/4" = 1'-0"



1 FS SPECIAL CONDITIONS PLAN
3/8" = 1'-0"

SPECIAL CONDITIONS LEGEND

- WALL BACKING
- CHANNEL BASE
- DEPRESSED FLOOR (SEE DETAIL)

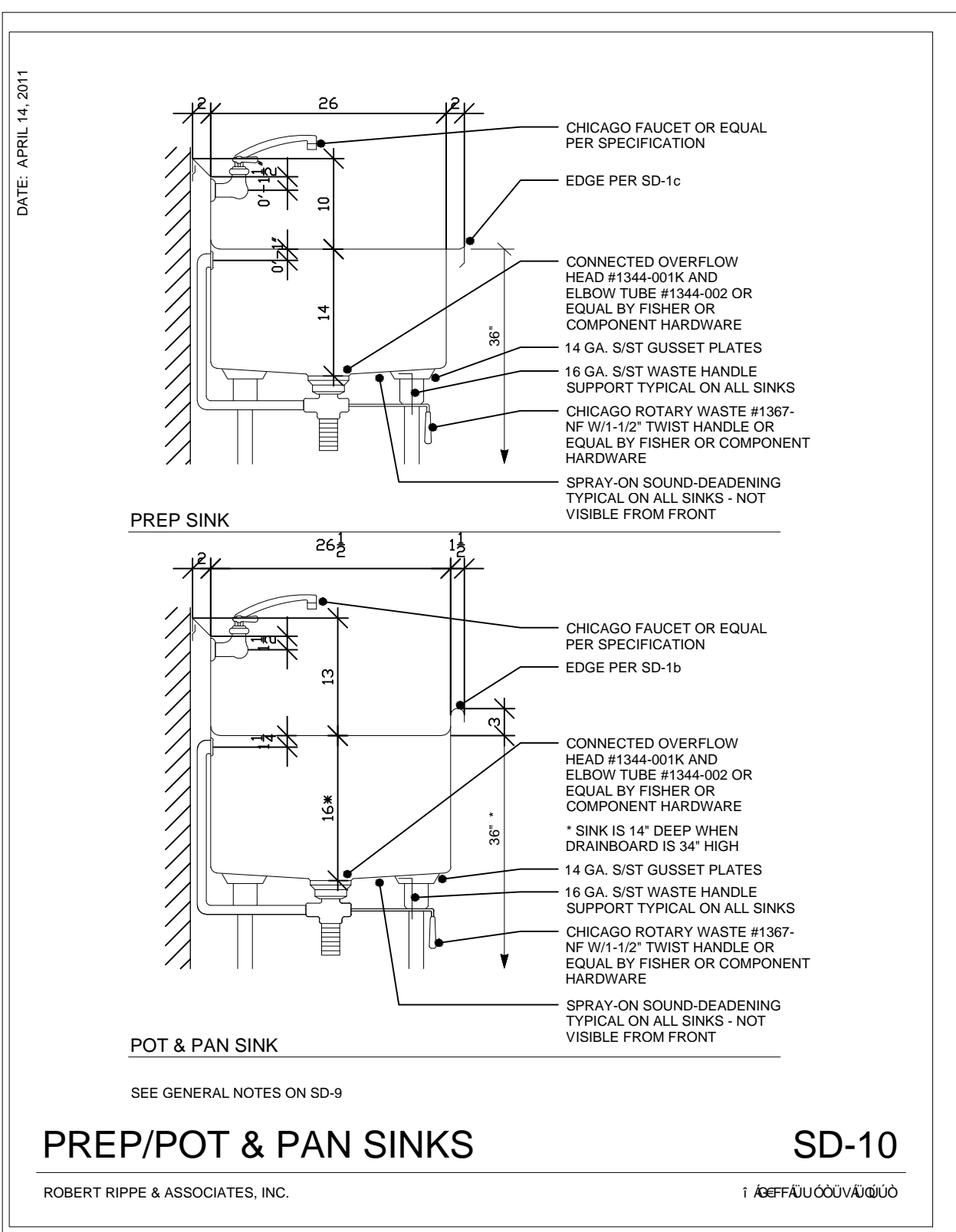
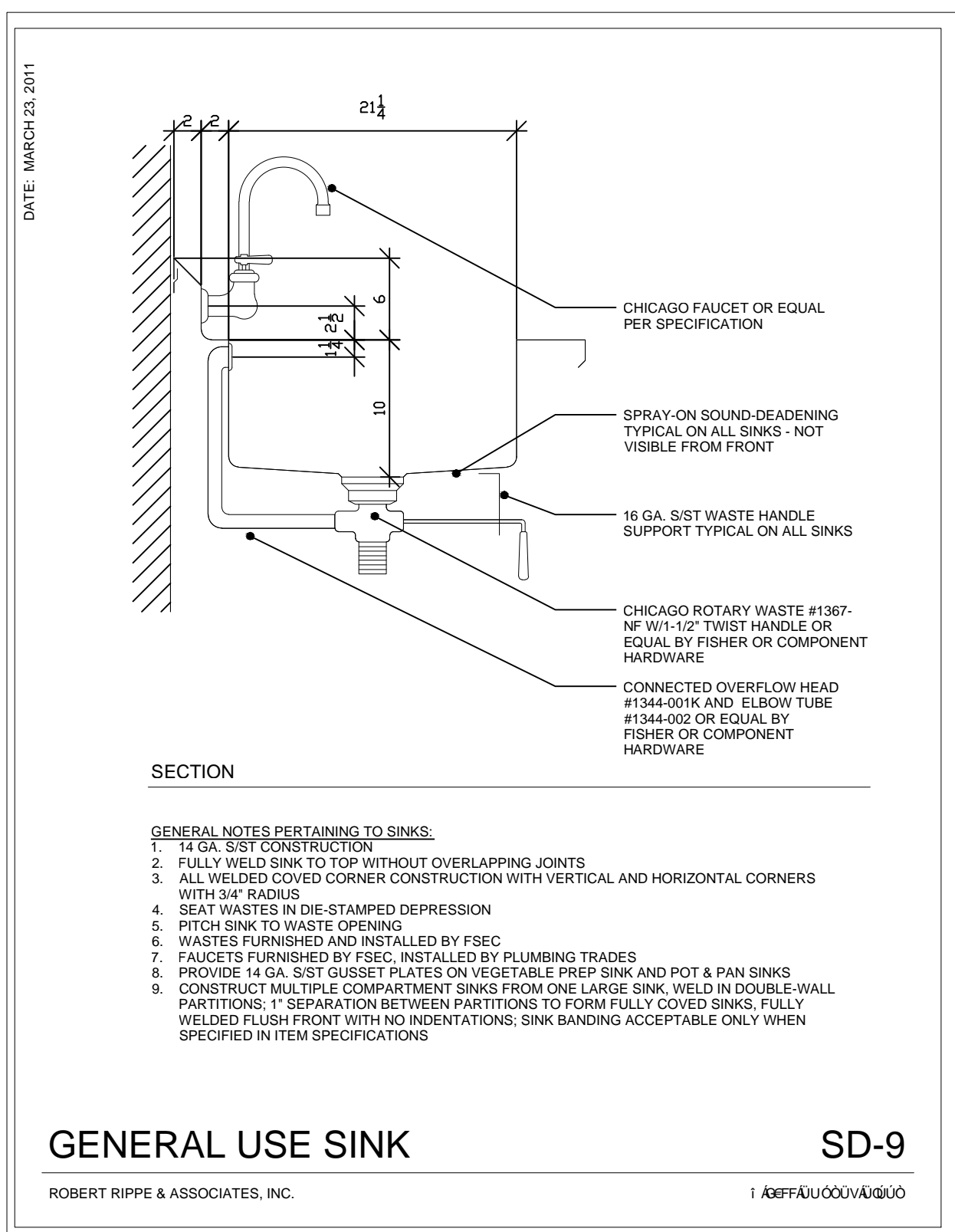
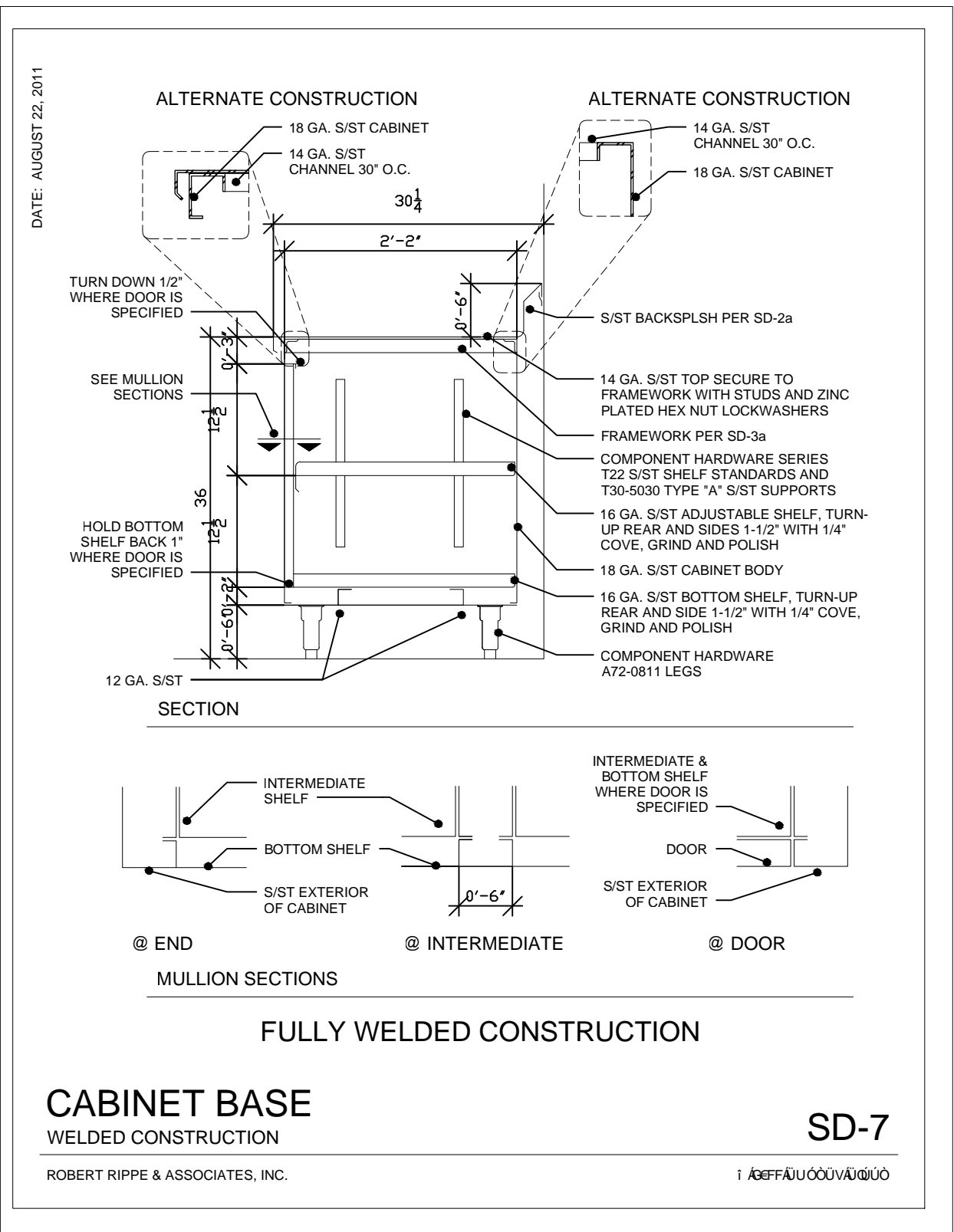
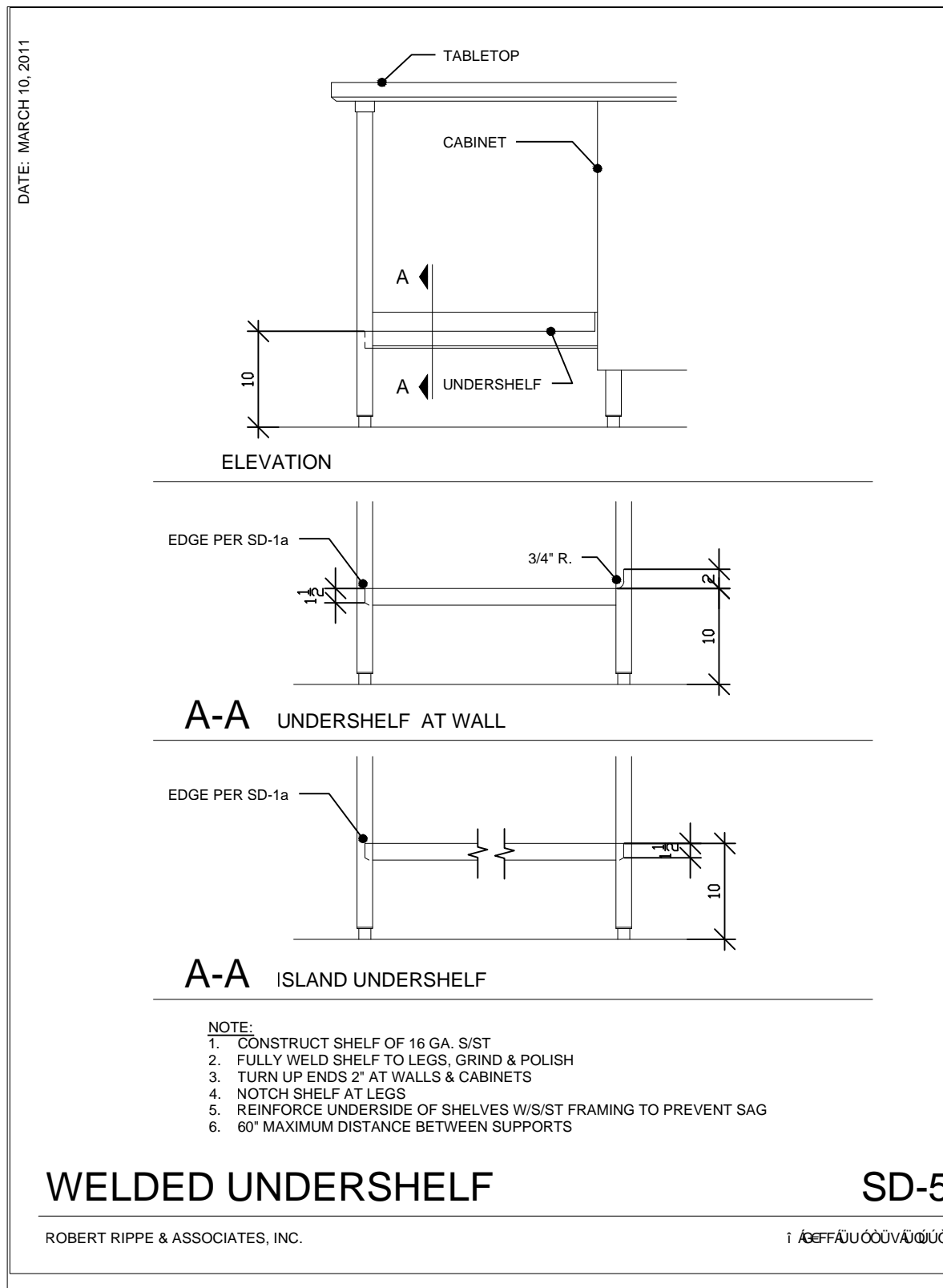
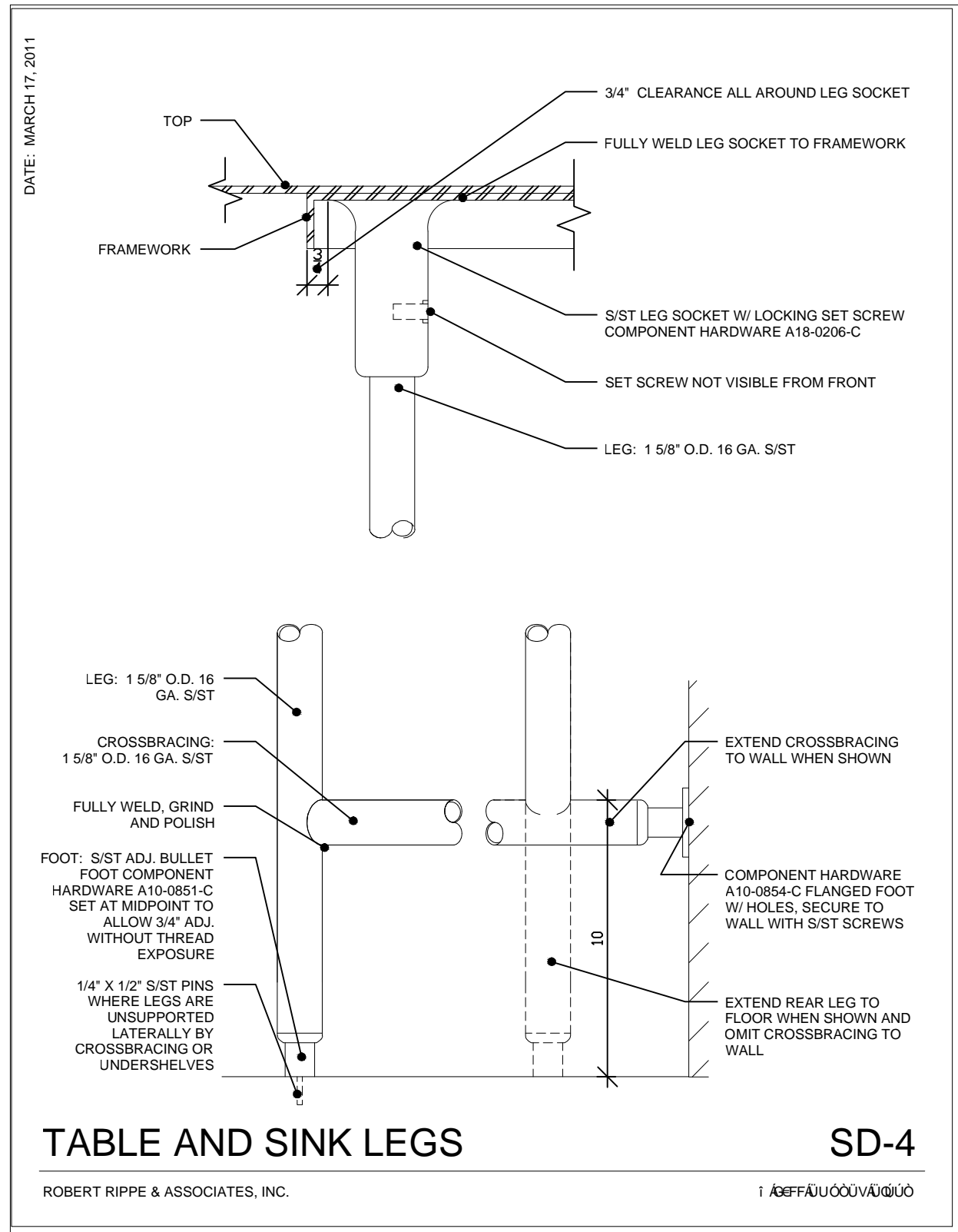
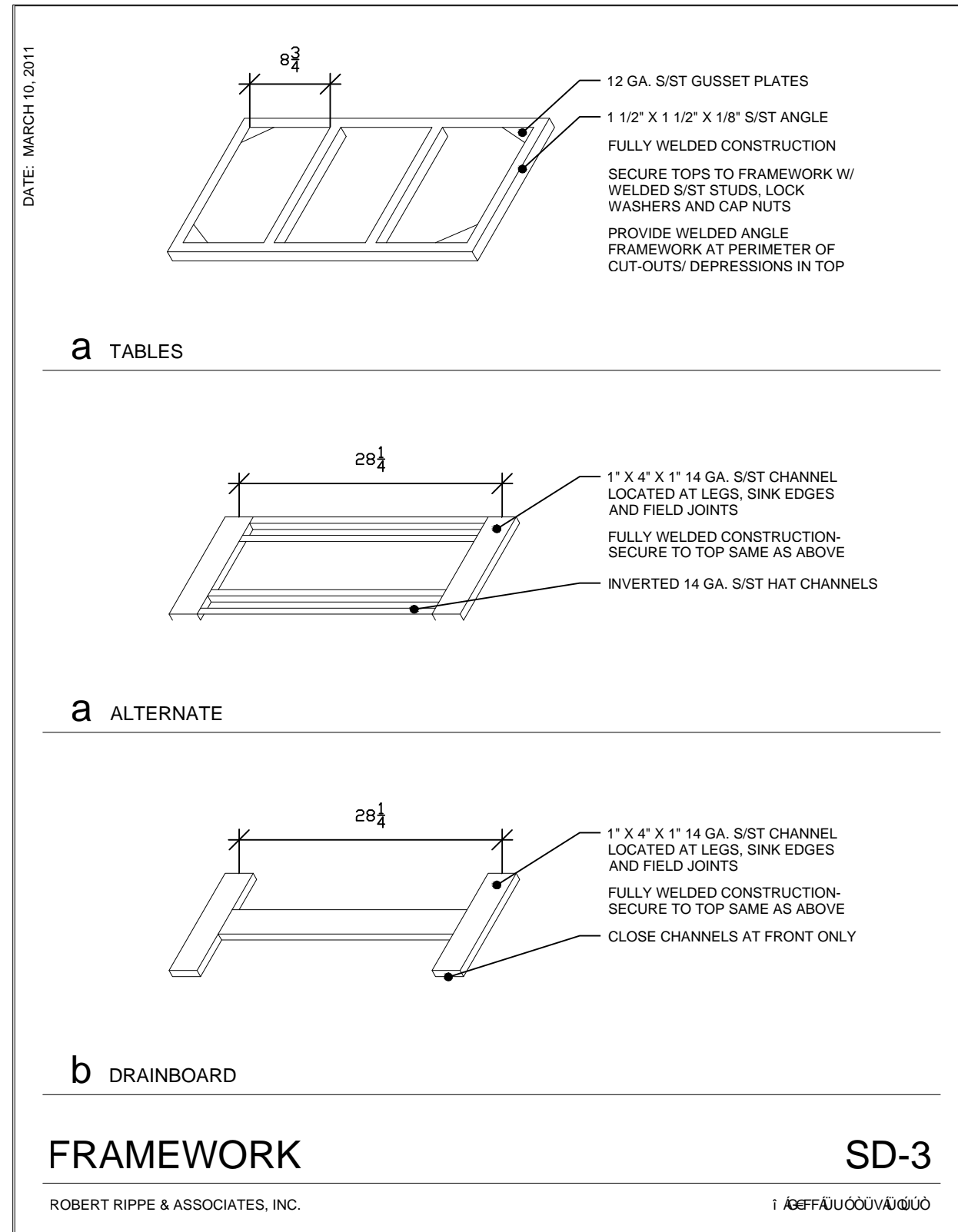
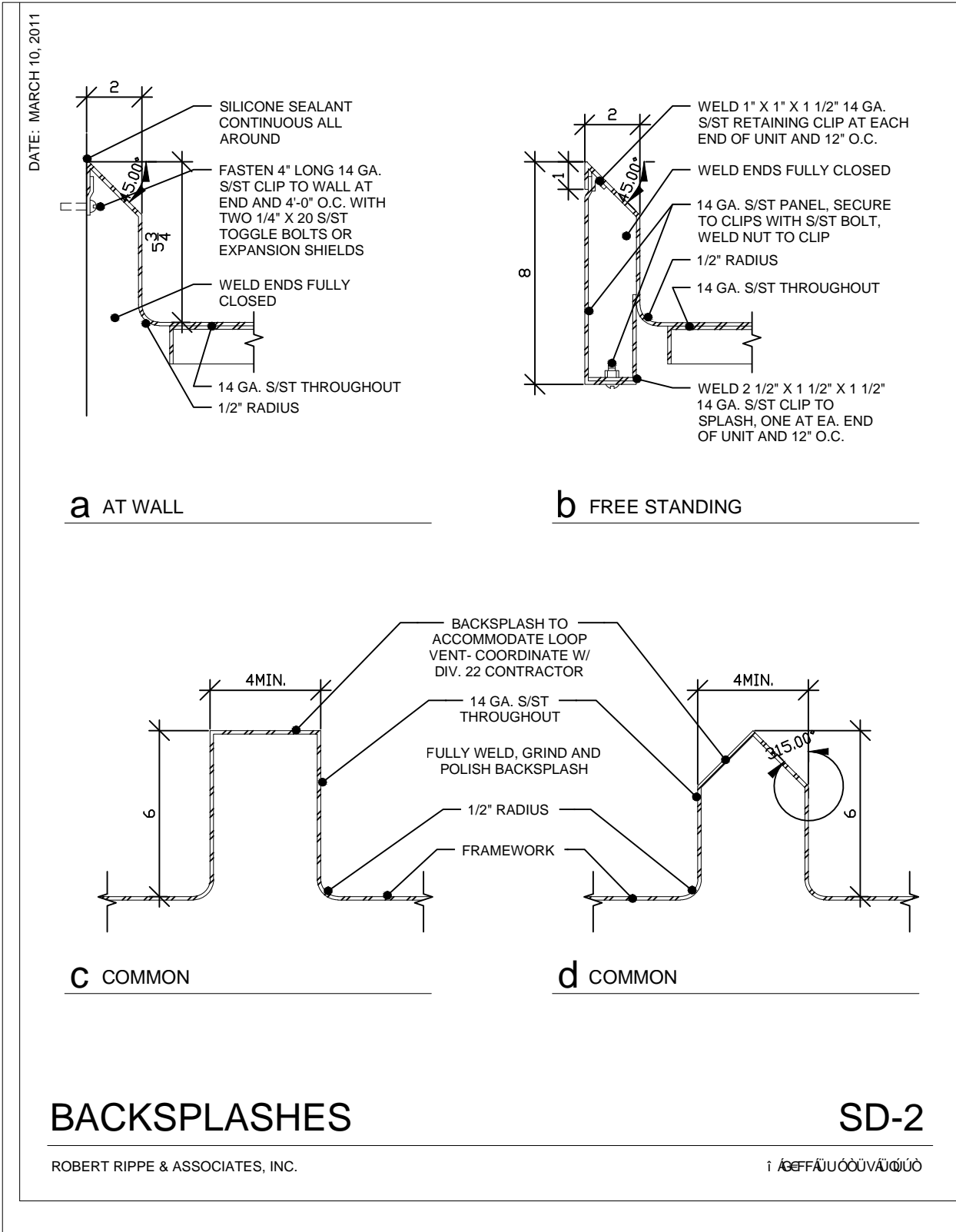
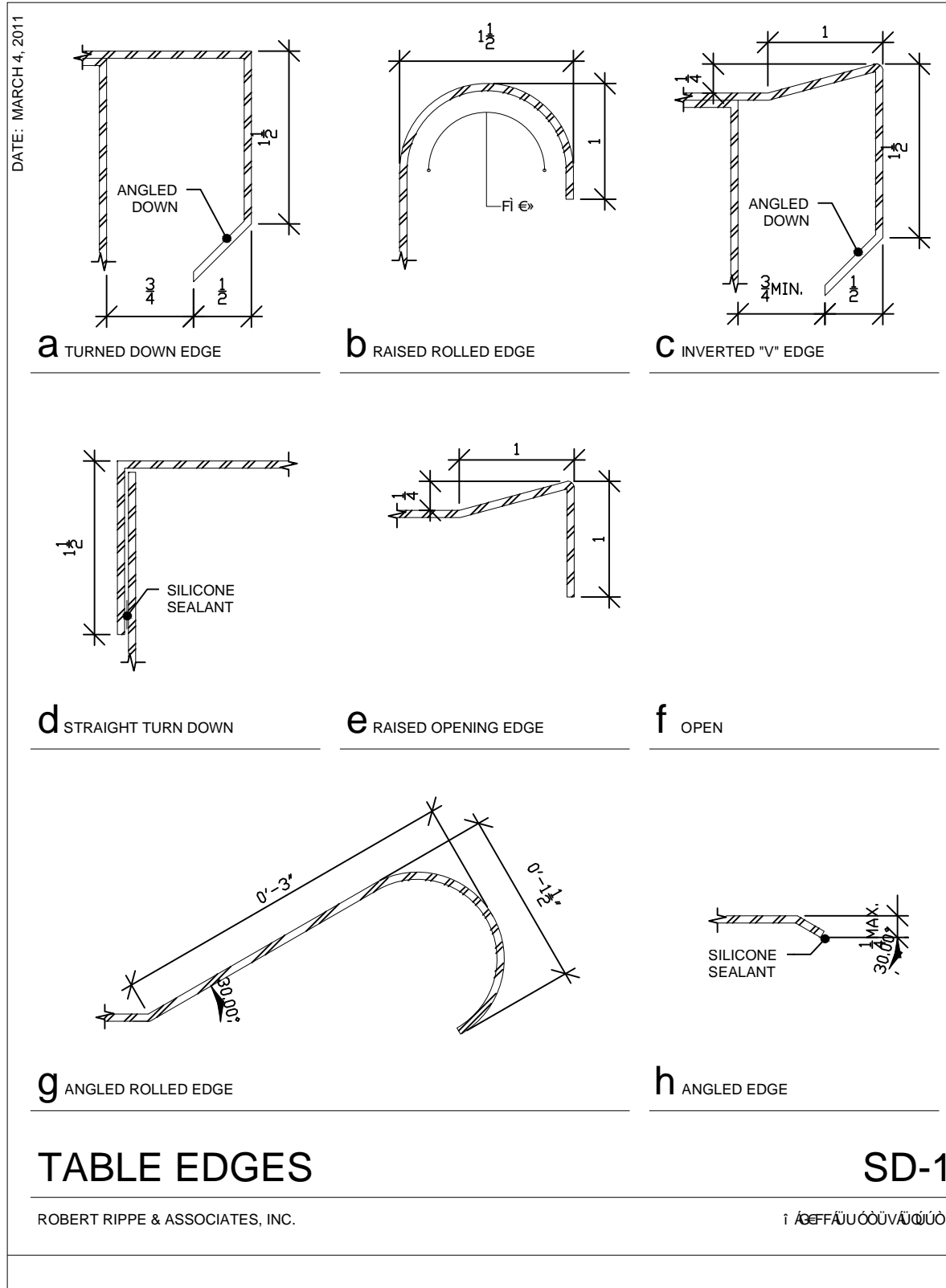
S/ST C.G. 4'-0" HIGH 16 GA. STAINLESS STEEL CORNER GUARD (NOT BY FSEC)

S/ST K.P. STAINLESS STEEL KICKPLATE (NOT BY FSEC)

NOTE "A" PROVIDE REINFORCING IN WALL TO SUPPORT WALL HUNG EQUIPMENT. VERIFY MOUNTING REQUIREMENTS WITH DIV. 11400 CONTRACTOR.

NOTE:
1. DIMENSIONS SHOWN ARE APPROXIMATE. FSEC TO COORDINATE AND VERIFY ALL DIMENSIONS IN THE FIELD WITH APPROPRIATE TRADES PRIOR TO CONSTRUCTION.

2. THE WALK-IN REFRIGERATOR/FREEZER CONDENSING UNITS ARE LOCATED APPROXIMATELY WHERE SHOWN ON PLAN. VERIFY THE EXACT LOCATION W/ THE ARCHITECT/ ENGINEER. ROOF CURBS/ CONCRETE PADS FOR CONDENSING UNITS & SLEEVED, SEALED PENETRATIONS IN ROOFS, FLOORS/ CEILINGS & WALLS FOR CONDENSING UNIT REFRIGERATION & UTILITY LINES ARE NOT BY THE FSEC.



REYNOLDS, SMITH AND HILLS, INC.
4525 Airport Approach Rd., Ste. A
Duluth, Minnesota 55811
218-722-1227 Fax: 218-722-1052
www.rsandh.com

DULUTH INTERNATIONAL AIRPORT DULUTH, MN

NEW PASSENGER TERMINAL

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) 722-9306

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

Foodservice Equipment Consultants:
ROBERT RIPPE & ASSOC.
6117 Blue Circle Drive, Suite 100, Minneapolis MN 55812
TEL: (952) 933-0313

REVISIONS

NO.	DESCRIPTION	DATE

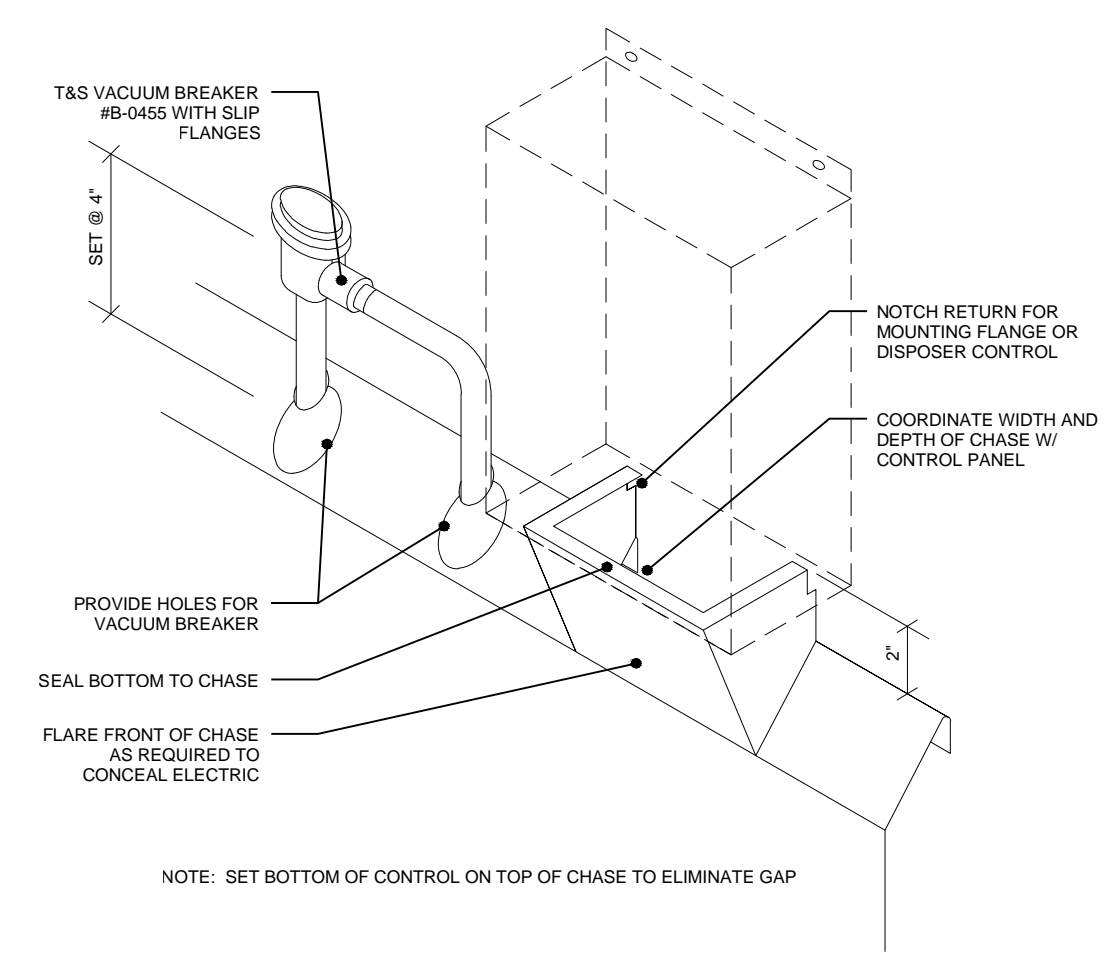
DATE ISSUED: 2-10-12
REVIEWED BY: JA
DRAWN BY: MDN
DESIGNED BY: SC

AEP PROJECT NUMBER
213-1882-091
© 2010 REYNOLDS, SMITH AND HILLS, INC.

SHEET TITLE
FOODSERVICE EQUIPMENT STANDARD DETAILS

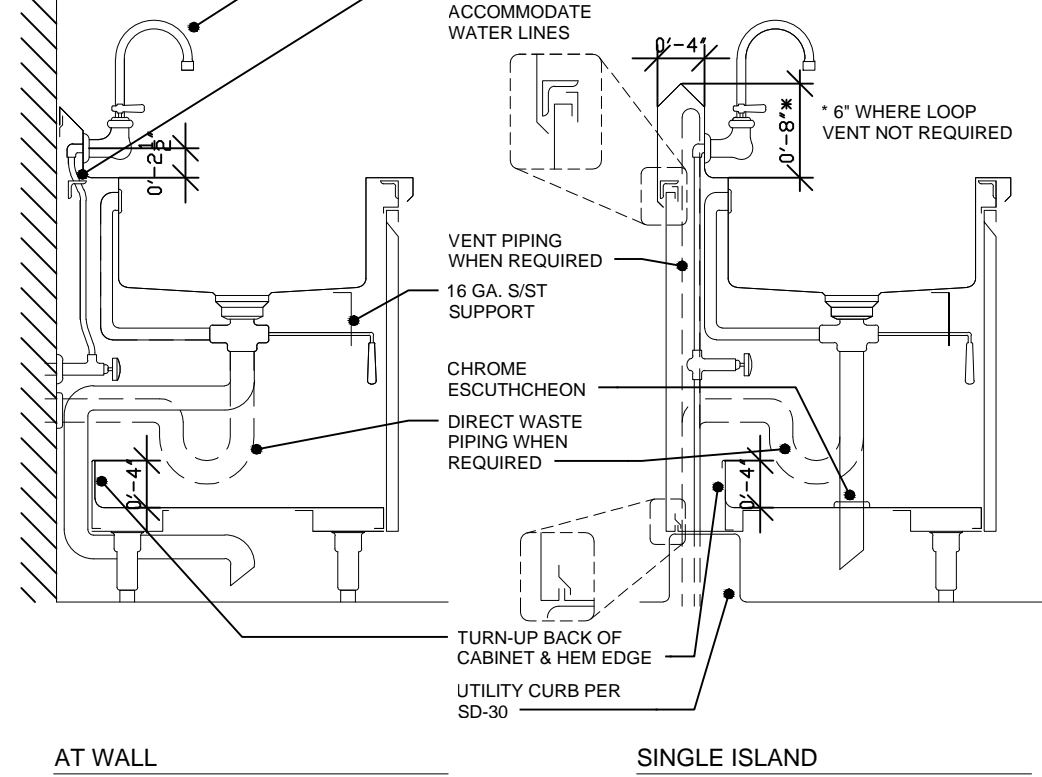
SHEET NUMBER
FS401
BID PACKAGE 2C

DATE: MARCH 17, 2011



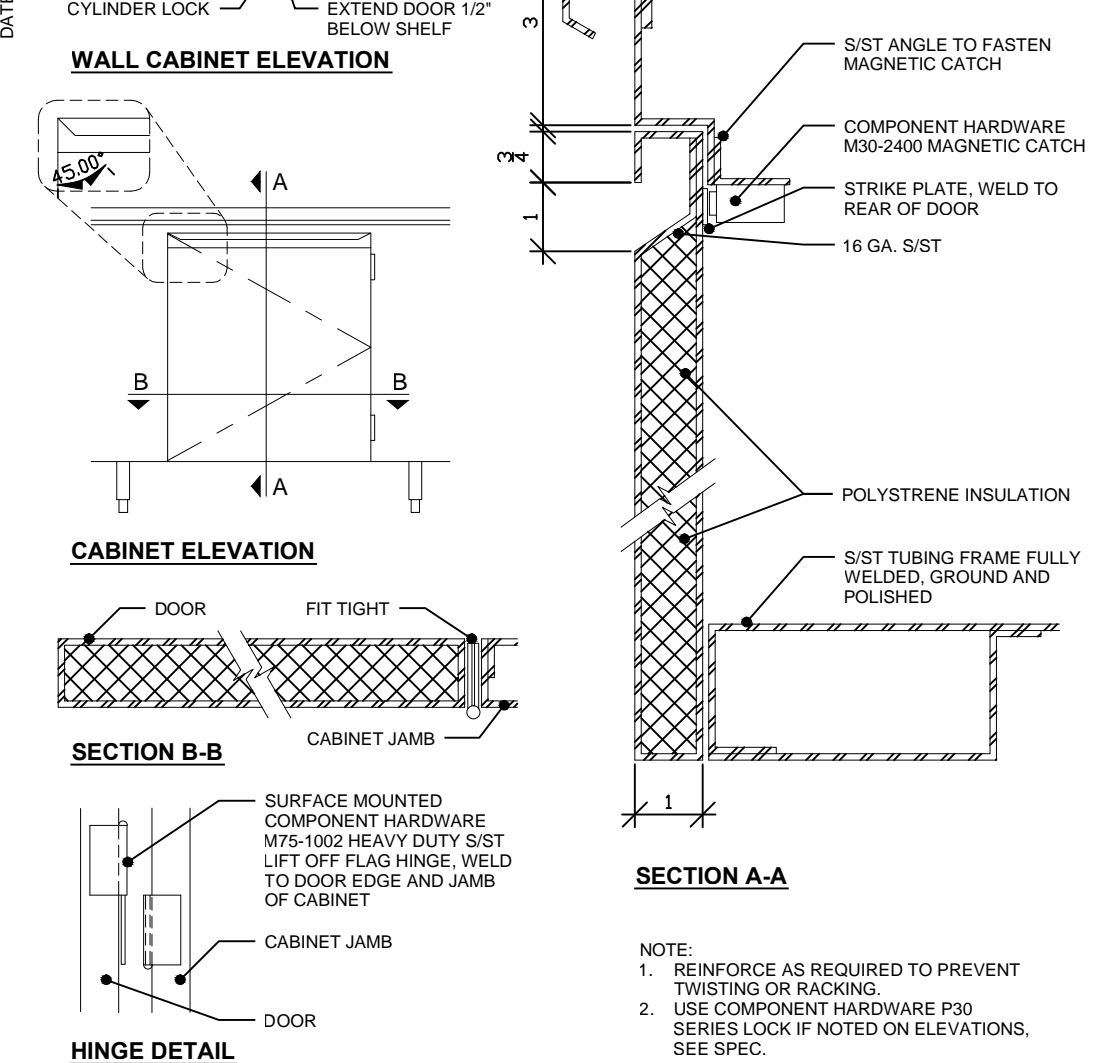
DISPOSER CONTROL CHASE SD-11
ROBERT RIPPE & ASSOCIATES, INC. 1 406FFA1U000V41G100

DATE: AUGUST 22, 2011



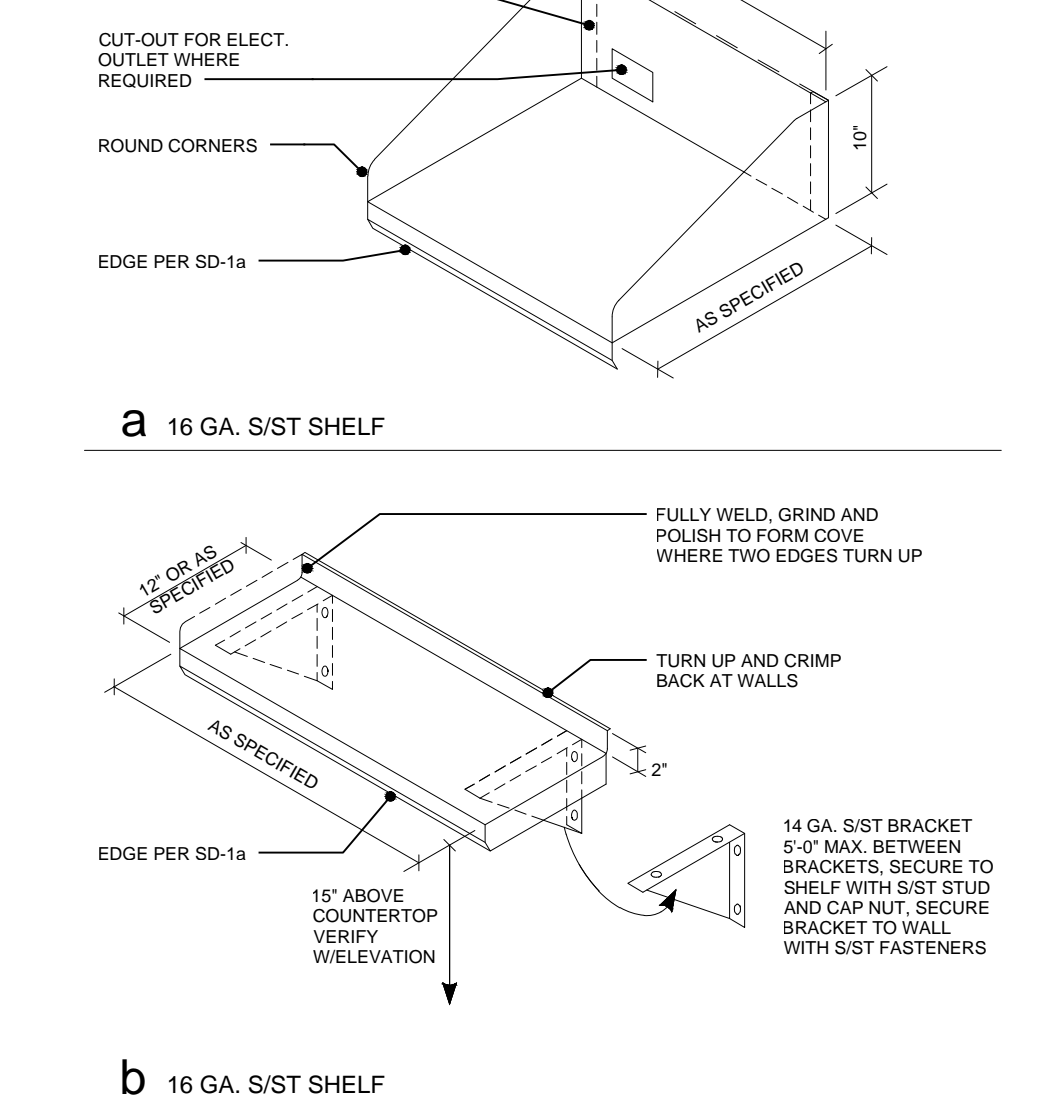
SINK ENCLOSURE SD-12
WALL & SINGLE ISLAND
ROBERT RIPPE & ASSOCIATES, INC. 1 406FFA1U000V41G100

DATE: OCTOBER 17, 2011



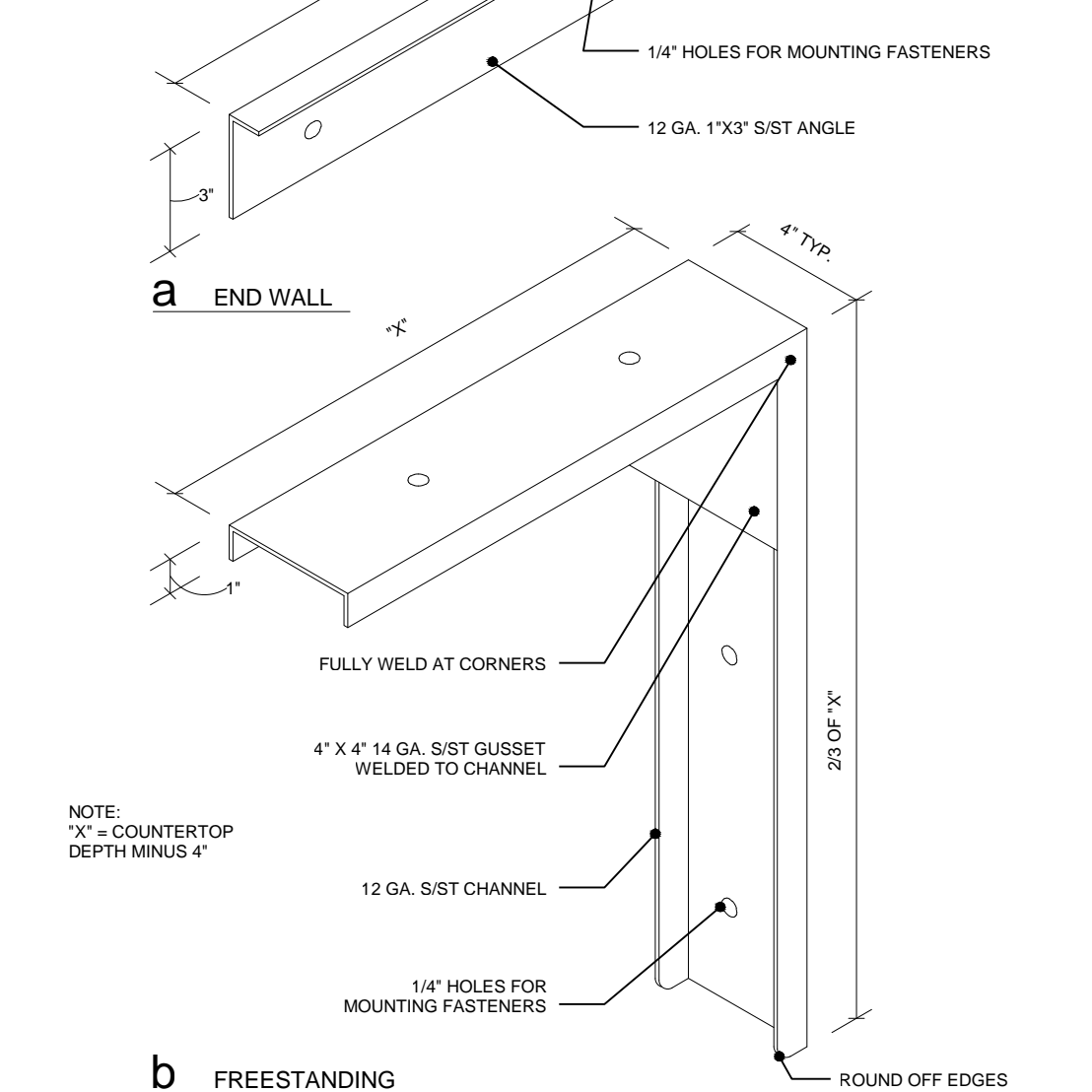
HINGED SOLID DOOR - INTEGRAL PULL SD-17
ROBERT RIPPE & ASSOCIATES, INC. 1 406FFA1U000V41G100

DATE: MARCH 11, 2011



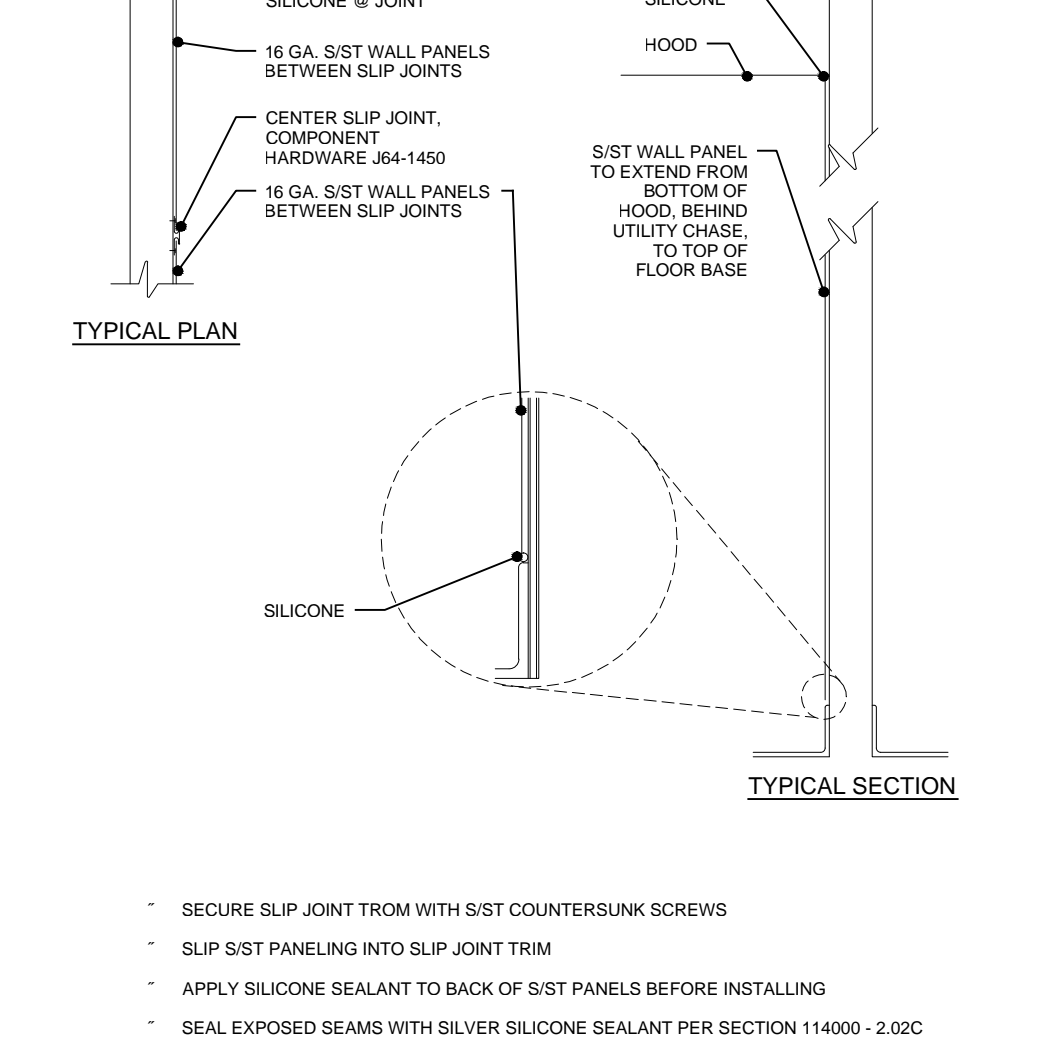
WALL SHELVES SD-25
ROBERT RIPPE & ASSOCIATES, INC. 1 406FFA1U000V41G100

DATE: MARCH 21, 2011



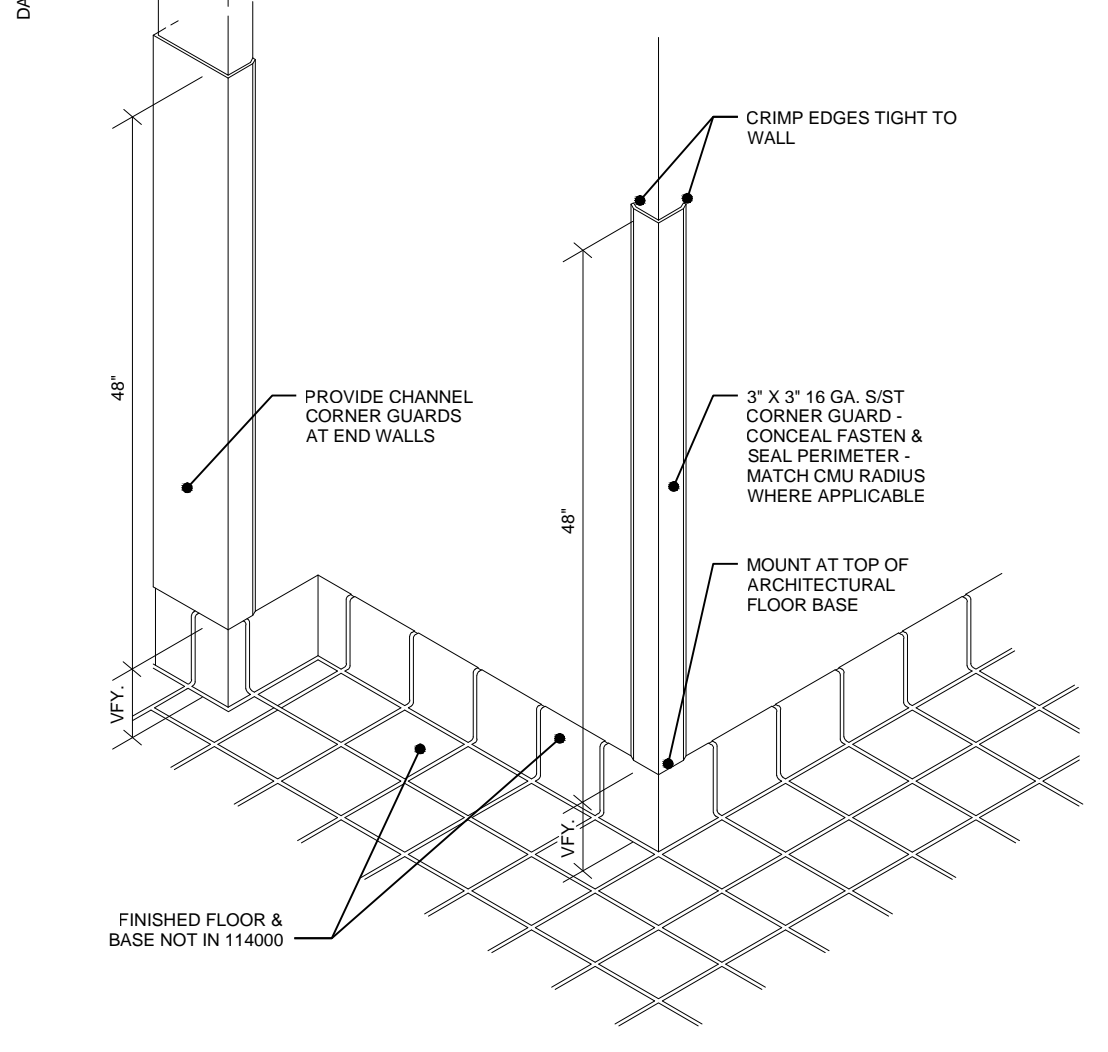
S/S/T SUPPORT ANGLE/BACKET SD-34
ROBERT RIPPE & ASSOCIATES, INC. 1 406FFA1U000V41G100

DATE: MARCH 15, 2011



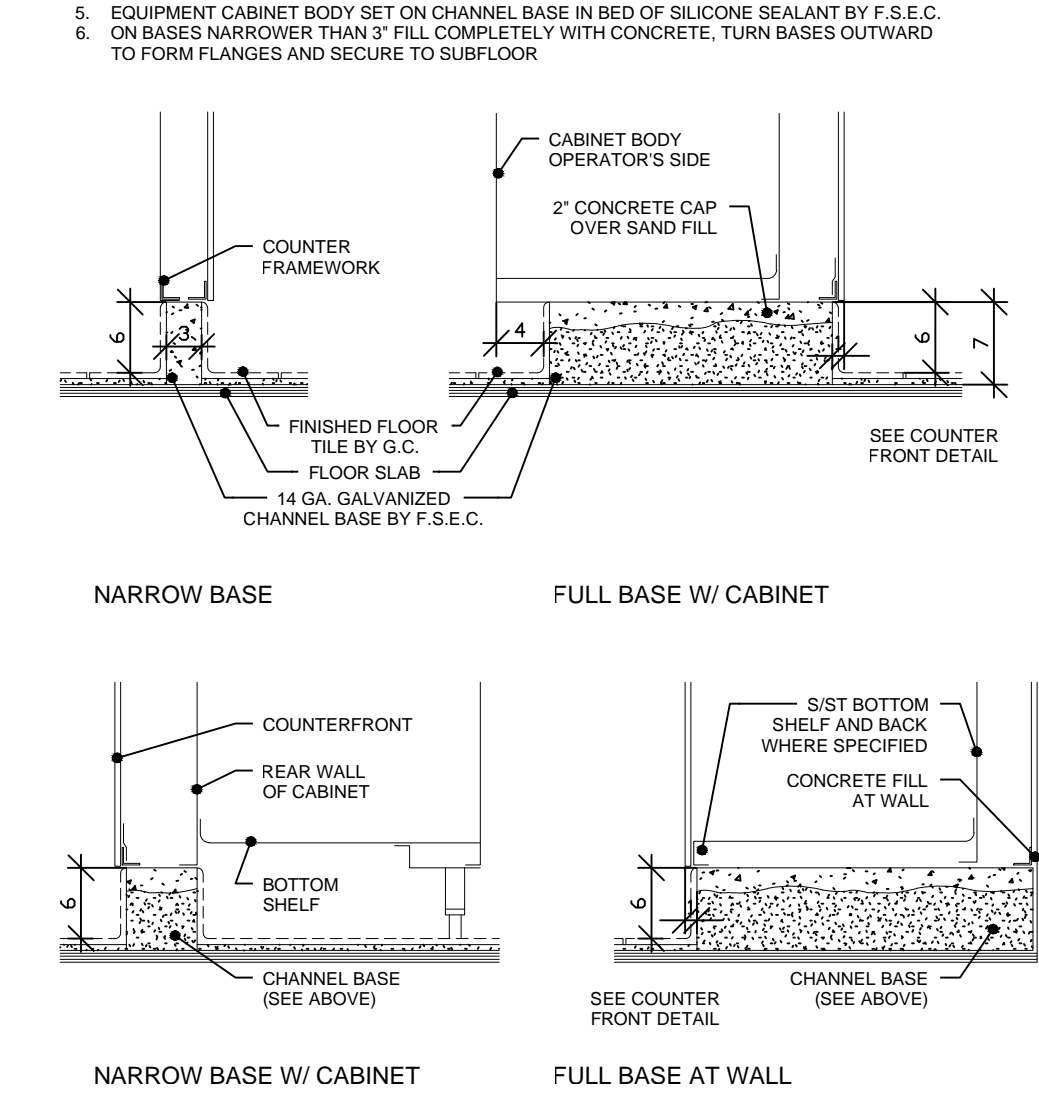
S/S/T WALL PANEL SD-38
ROBERT RIPPE & ASSOCIATES, INC. 1 406FFA1U000V41G100

DATE: MARCH 21, 2011



S/S/T CORNER GUARD SD-39
ROBERT RIPPE & ASSOCIATES, INC. 1 406FFA1U000V41G100

DATE: MARCH 23, 2011



CHANNEL BASE SD-77
ROBERT RIPPE & ASSOCIATES, INC. 1 406FFA1U000V41G100

REVISIONS		
NO.	DESCRIPTION	DATE

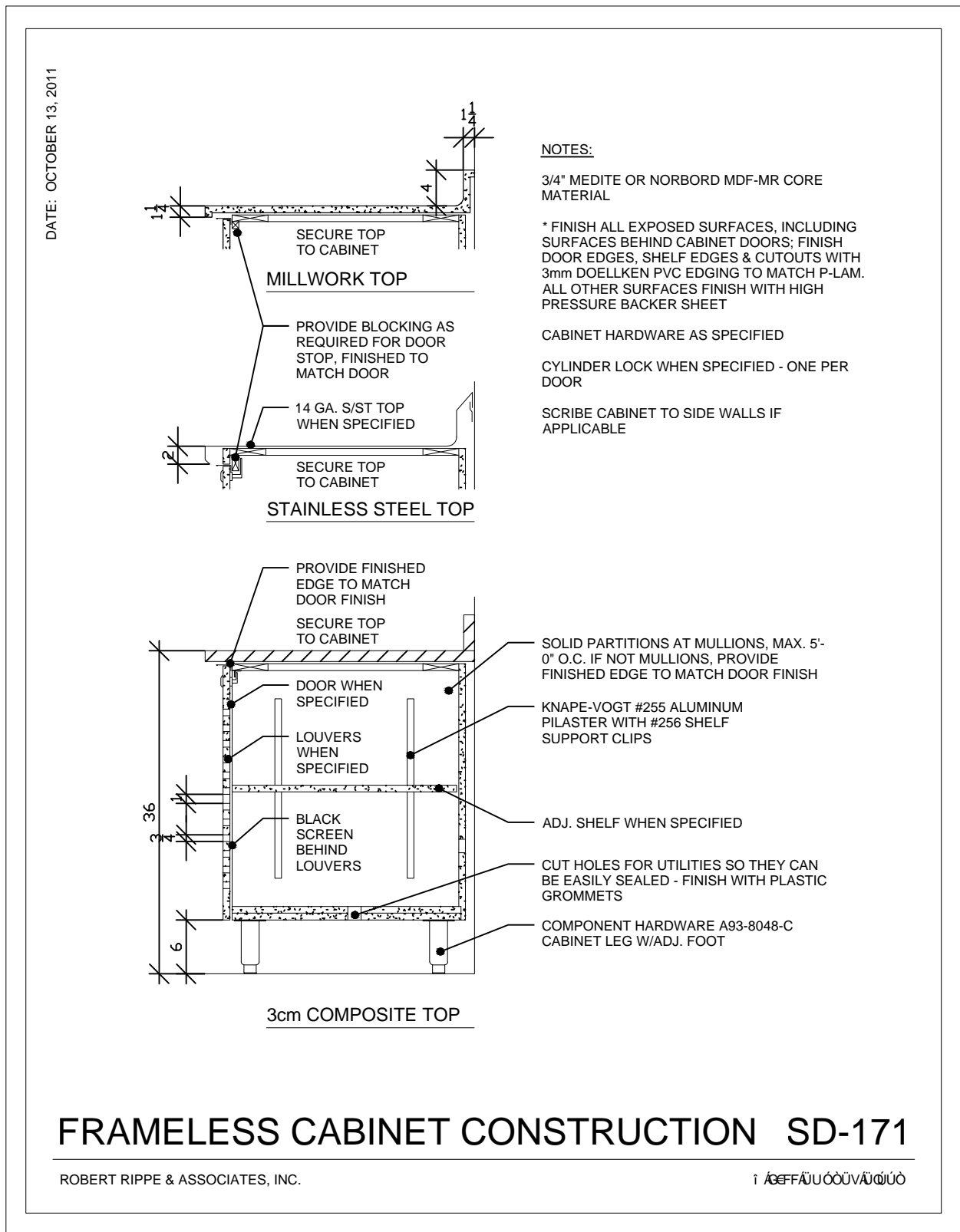
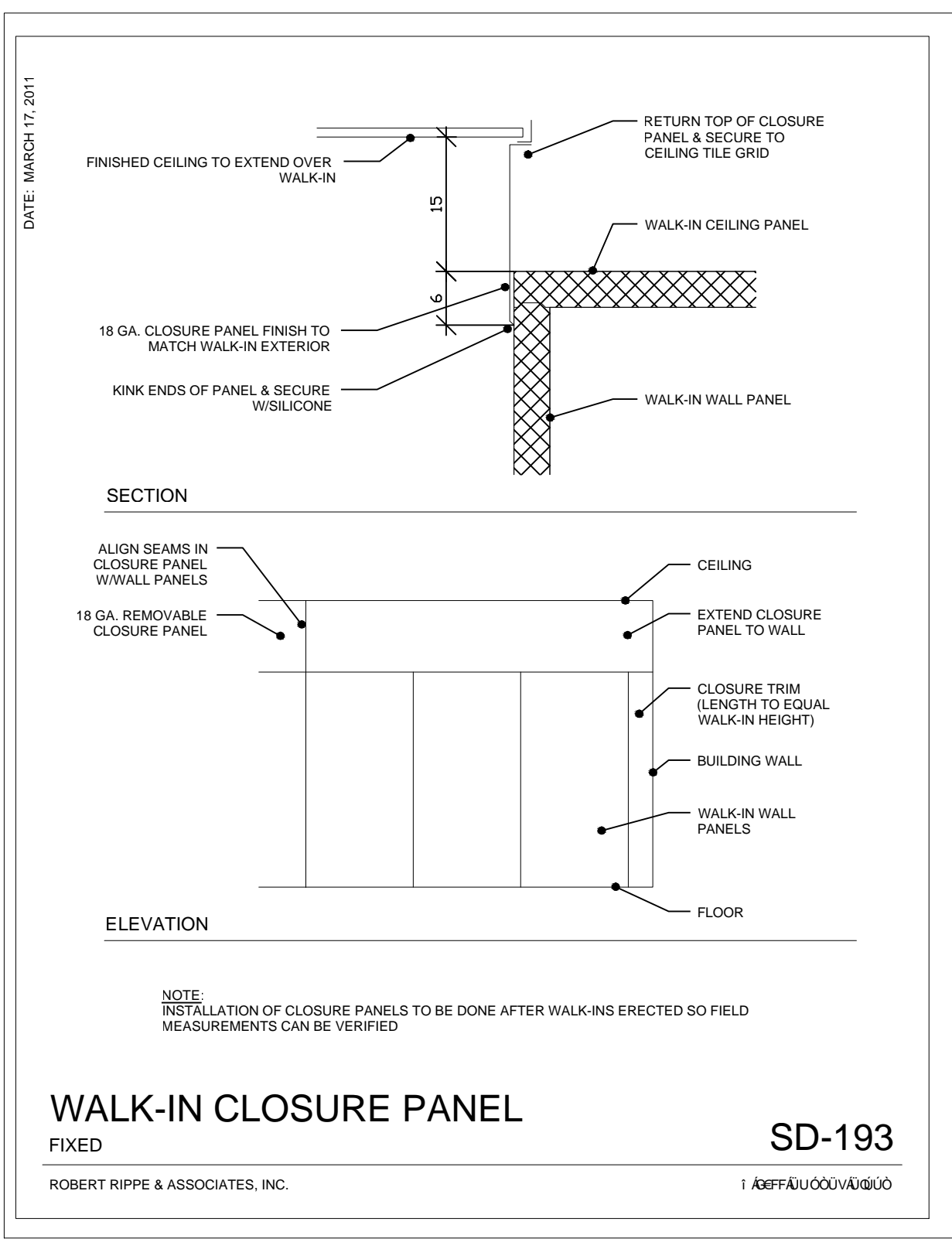
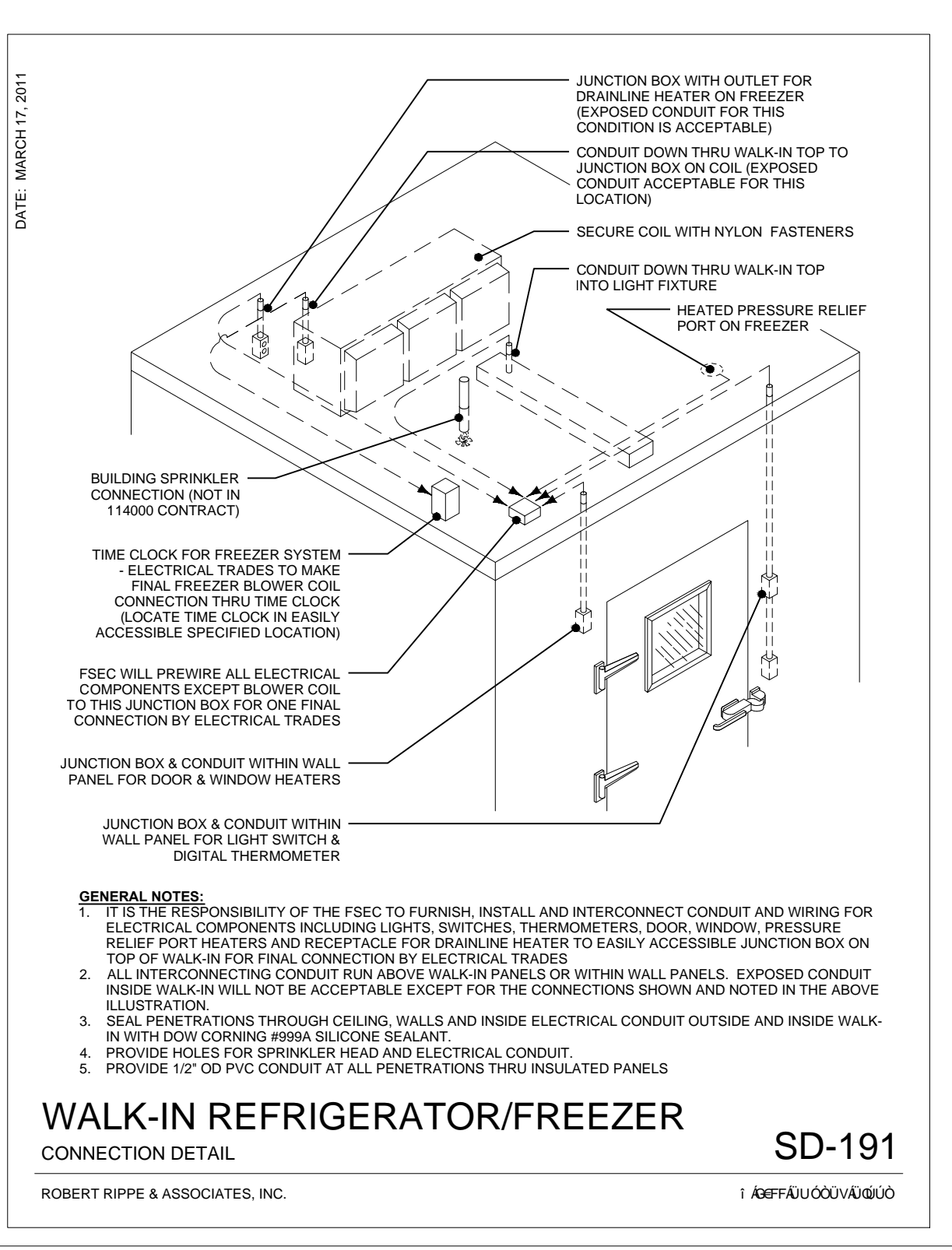
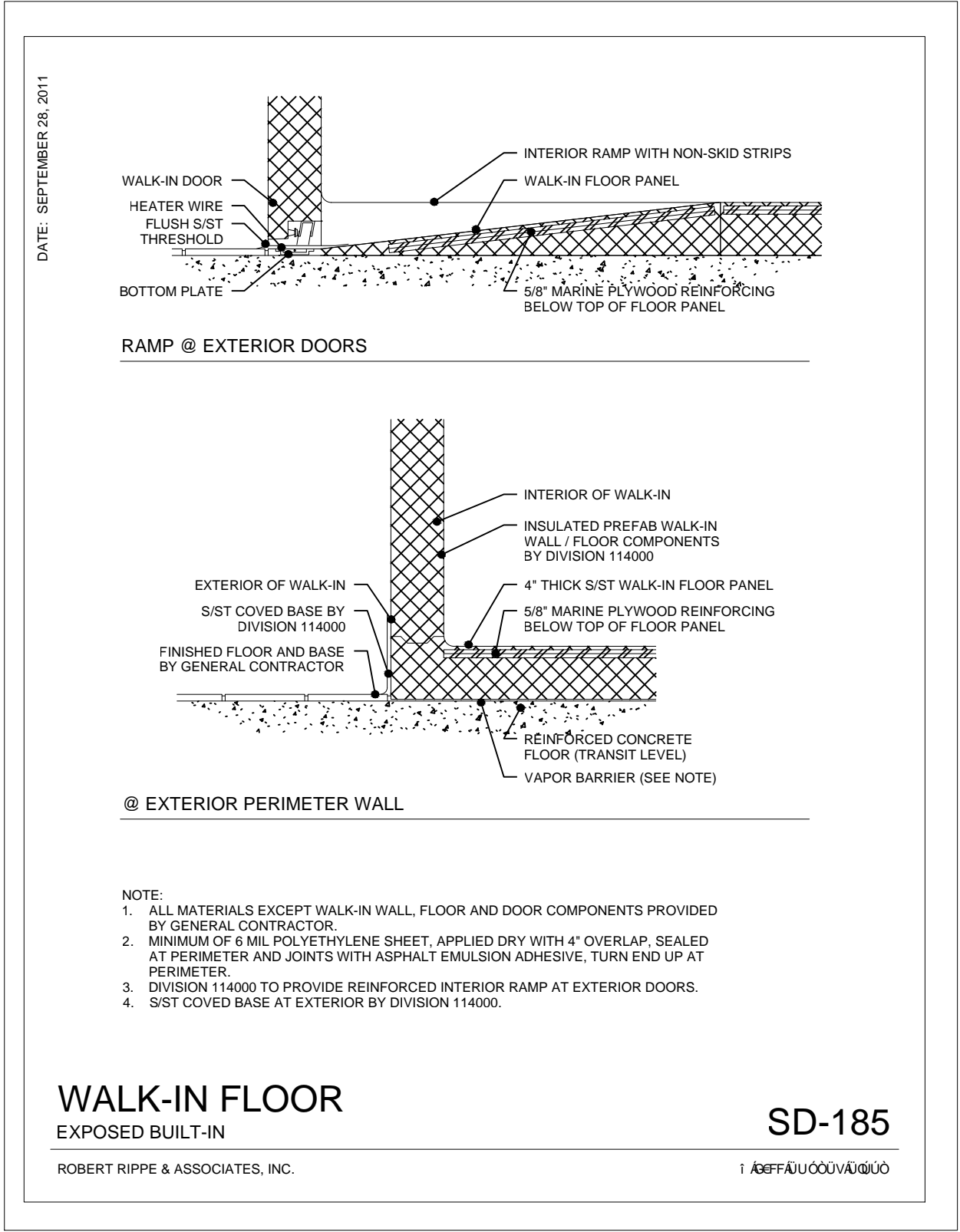
DATE ISSUED: 2-10-12
REVIEWED BY: JA
DRAWN BY: MDN
DESIGNED BY: SC

AEP PROJECT NUMBER
213-1882-091
© 2010 REYNOLDS, SMITH AND HILLS, INC.

SHEET TITLE
FOODSERVICE
EQUIPMENT
STANDARD DETAILS

SHEET NUMBER

FS402
BID PACKAGE 2C



Reynolds, Smith and Hills, Inc.
4525 Airport Approach Rd, Ste A
Duluth, Minnesota 55811
218-722-1227 Fax: 218-722-1052
www.rsandh.com



DULUTH
INTERNATIONAL
AIRPORT
DULUTH, MN

NEW PASSENGER
TERMINAL

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) 722-9306
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:
APOLD DESIGN
2432 East First Street, Duluth MN 55812
TEL: (218) 591-5079
Foodservice Equipment Consultants:
ROBERT RIPPE & ASSOC.
6117 Blue Circle Drive, Suite 100, Minneapolis MN 55812
TEL: (952) 933-0313

REVISIONS		
NO.	DESCRIPTION	DATE

DATE ISSUED: 2-10-12
REVIEWED BY: JA
DRAWN BY: MDN
DESIGNED BY: SC

AEP PROJECT NUMBER
213-1882-091
© 2010 REYNOLDS, SMITH AND HILLS INC.

SHEET TITLE
FOODSERVICE
EQUIPMENT
STANDARD DETAILS

SHEET NUMBER

FS403
BID PACKAGE 2C