Oversight / NHS	
FHWA REGION VIII OVERSIGHT?	☐ NO ■ YES
NATIONAL HIGHWAY SYSTEM?	☐ NO ■ YES

DEPARTMENT OF TRANSPORTATION
STATE OF COLORADO

HIGHWAY CONSTRUCTION BID PLANS OF PROPOSED
FEDERAL AID PROJECT NO. IM-0703-348
STATE HIGHWAY NO. 70
EISENHOWER/JOHNSON MEMORIAL TUNNEL
2400V MEDIUM VOLTAGE SWITCHGEAR REPLACEMENT
SUMMIT AND CLEAR CREEK COUNTIES
CONSTRUCTION PROJECT CODE NO. 17148

Related Projects:
P. E. UNDER PROJECT:
Project Number
Project Code:

~~**R.O.W. Projects:**~~
~~R.O.W. Project Description~~

PROJECT DESCRIPTION

REMOVAL AND DISPOSAL OF EXISTING 2400V SWITCHGEAR, FABRICATION AND INSTALLATION OF NEW SWITCHGEAR, AND INCIDENTAL WORK.

SHEET NO. / INDEX OF SHEETS

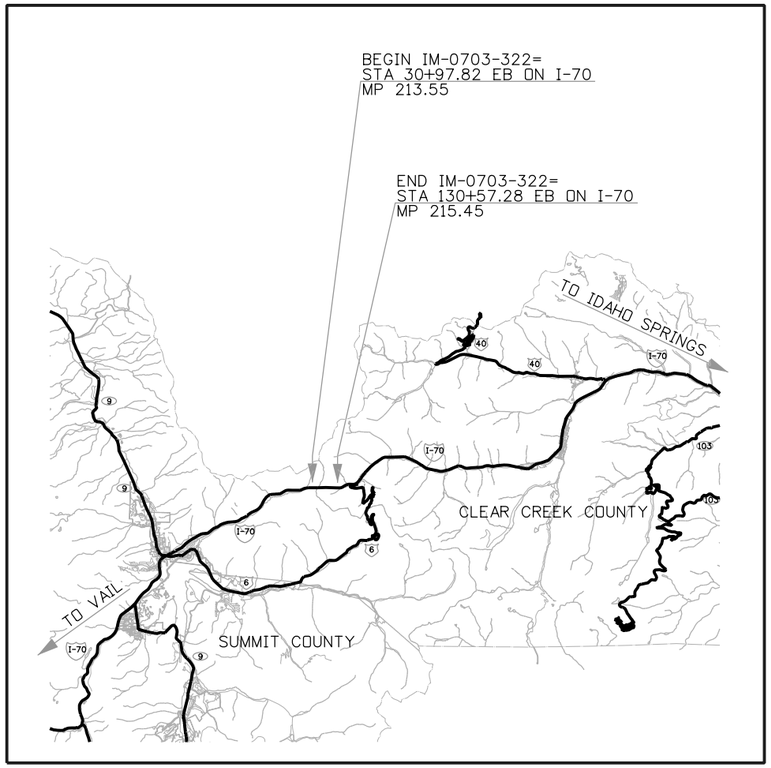
SHEET NO.	INDEX OF SHEETS
1	TITLE SHEET
2	INDEX OF SHEETS
3	SITE PLAN
4-X	ELECTRICAL DRAWINGS

TABULATION OF LENGTH & DESIGN DATA

STATION	I-70 EASTBOUND ROADWAY LIN FT	I-70 EASTBOUND MAJOR STR. LIN FT
APPROACH TO PROJECT (WEST)	5280	
BEGIN PROJECT IM-0703-322 STA. 30+97.82 EB ON I-70	500	
STRUCTURE X-XX-X M.P. 213.65	8976	8976
END PROJECT IM-0703-322 STA. 130+57.28 EB ON I-70	500	
APPROACH TO PROJECT (EAST)	5280	
SUMMARY OF PROJECT LENGTH	FEET	MILES
ROADWAY (NET LENGTH)	11560	2.19
MAJOR STRUCTURE	8976	1.70
PROJECT GROSS LENGTH	20536	3.89

DESIGN DATA	
MINIMUM RADIUS OF CURVE (EXISTING)	3° 30'
MAXIMUM GRADE (EXISTING)	2.23%
MINIMUM S.S.D. HORIZONTAL (EXISTING)	350'
MINIMUM S.S.D. VERTICAL (EXISTING)	490'
MAXIMUM DESIGN SPEED	*65 MPH

* POSTED SPEED LIMIT = 50MPH



15% CONCEPTUAL SUBMITTAL
NOT FOR CONSTRUCTION

NEW AND REVISED STANDARDS

XXXXXXXXXXXX

Print Date: 10/30/2009		Sheet Revisions	
File Name: EJMT_TO_10 TitleSheet.dgn		Date: / Comments / Init.	
Horiz. Scale: As Noted	Vert. Scale: As Noted		
Unit XXXX	Unit Leader XXX		
PARSONS®	1700 Broadway Suite 900 Denver, CO 80290 (303) 863-7900		

Colorado Department of Transportation
CDOT DEPARTMENT OF TRANSPORTATION
Mountain Residency P.O. Box 399
Dumont, CO 80436
Phone: 303-512-5750 FAX: 303-512-5775
Region 1 MOUNTAIN RESIDENCY MV

As Constructed	Contract Information	Project No./Code
No Revisions:	Contractor:	IM-0703-348
Revised:	Resident Engineer: / Project Engineer:	17148
Void:	PROJECT STARTED: __/__/__ ACCEPTED: __/__/__ / Comments:	Sheet Number 1

INDEX OF PLANS (ASSUMED FOR FINAL PLAN SET)

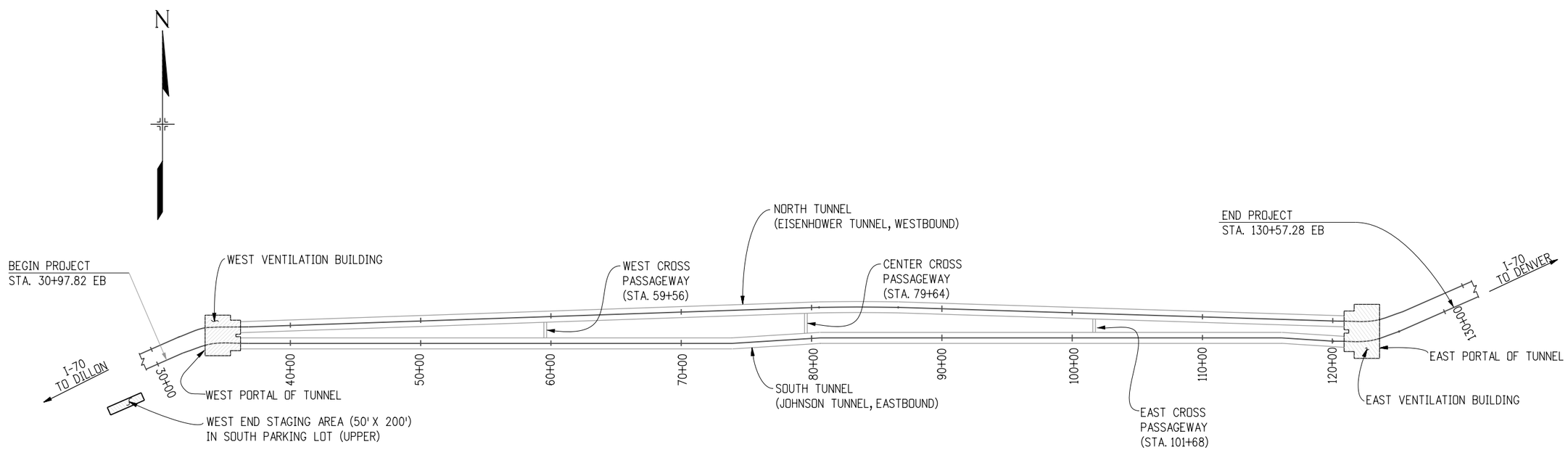
Title Sheet (INCLUDED IN 15% SET)
Standard Plans List
General Notes
Staging areas (INCLUDED IN 15% SET)
Summary of Approximate Quantities
Existing 2400V Switchgear One-Line Diagram (2 Sheets) (INCLUDED IN 15% SET)
Existing 2400V Plan and Elevation- East (INCLUDED IN 15% SET)
Existing 2400V Plan and Elevation- West (INCLUDED IN 15% SET)
Phasing Plan Notes
Electrical Room Plan - North Phasing Plan - East
Electrical Room Plan - North Phasing Plan - West
New Switchgear Elevation- East
New Switchgear Elevation - West
East Electrical Room Plan - Existing and Demolition
West Electrical Room Plan - Existing and Demolition
East Electrical Room- New Work
West Electrical Room Plan - New Work
Circuit Breaker Schematic Diagram
East Conduit and Cable Schedules
West Conduit and Cable Schedules
Power Control Board Layout and Details - East
Power Control Board Layout and Details - West
West Communication System Relocation Procedures
East Communication System Relocation Procedures
West Communications System Relocation Plan
East Communications System Relocation Plan
Electrical General Power Supply Single Line Diagram
Electrical General Power Distribution Single Line Diagram
Electrical General Control Schematic Diagrams (Sheet 1)
Electrical General Control Schematic Diagrams (Sheet 2)
West Ventilation Building - Options 2 and 3
East Ventilation Building - Options 2 and 3
2400V MCC Schematic Diagram (INCLUDED IN 15% SET)
Change Over Sequencing (INCLUDED IN 15% SET)

INDEX OF SPECS (NOT INCLUDED IN THIS SUBMITTAL)

Project Special Provisions & Standard Special Provisions
Notice to Bidders
Commencement & Completion of Works
Contract GoaLS
Contractor Submittals
Removal of Structures and Obstructions
Relocate Controls and Wiring
Environmental health & Safety Management
Commissioning
Product Requirements
General Requirements
Common Work Results for Electrical
Equipment Wiring Connections
Electrical Wire, Cable and Conduit
Manufactured Wiring Assemblies
Bonding & Grounding
Supporting Devices
Electrical Pull Boxes
Electrical Identification
Over current Protective Device Coordination Study
Medium-Voltage Motor Controllers
Motor-Control Centers
Fuses
Enclosed Switches
Temporary Power
Force Account Items
Communications Control - General
Special Construction Requirements
Utilities

PRELIMINARY
UNCHECKED
FOR INFORMATION ONLY
NOT FOR CONSTRUCTION

UTILITIES
CDOT
U.S. WEST
XCEL (ELECTRIC)



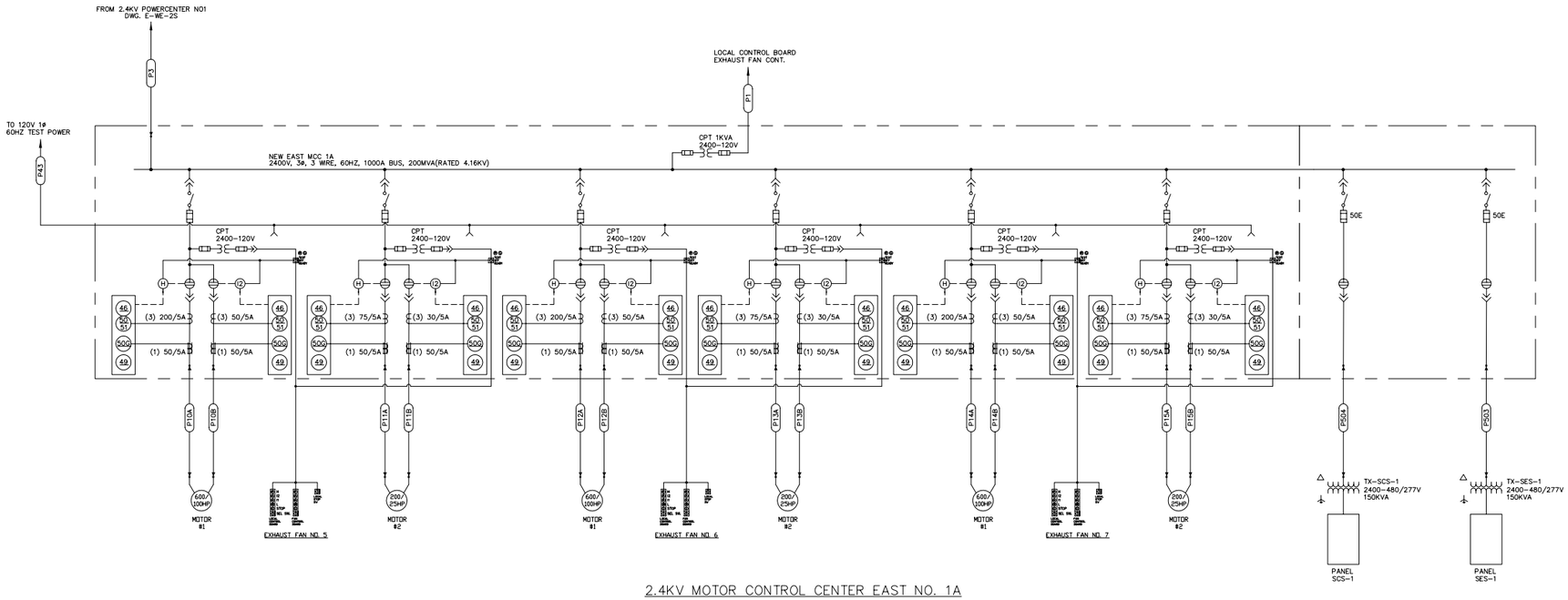
SITE PLAN
(NOT TO SCALE)

PRELIMINARY
UNCHECKED
FOR INFORMATION ONLY
NOT FOR CONSTRUCTION

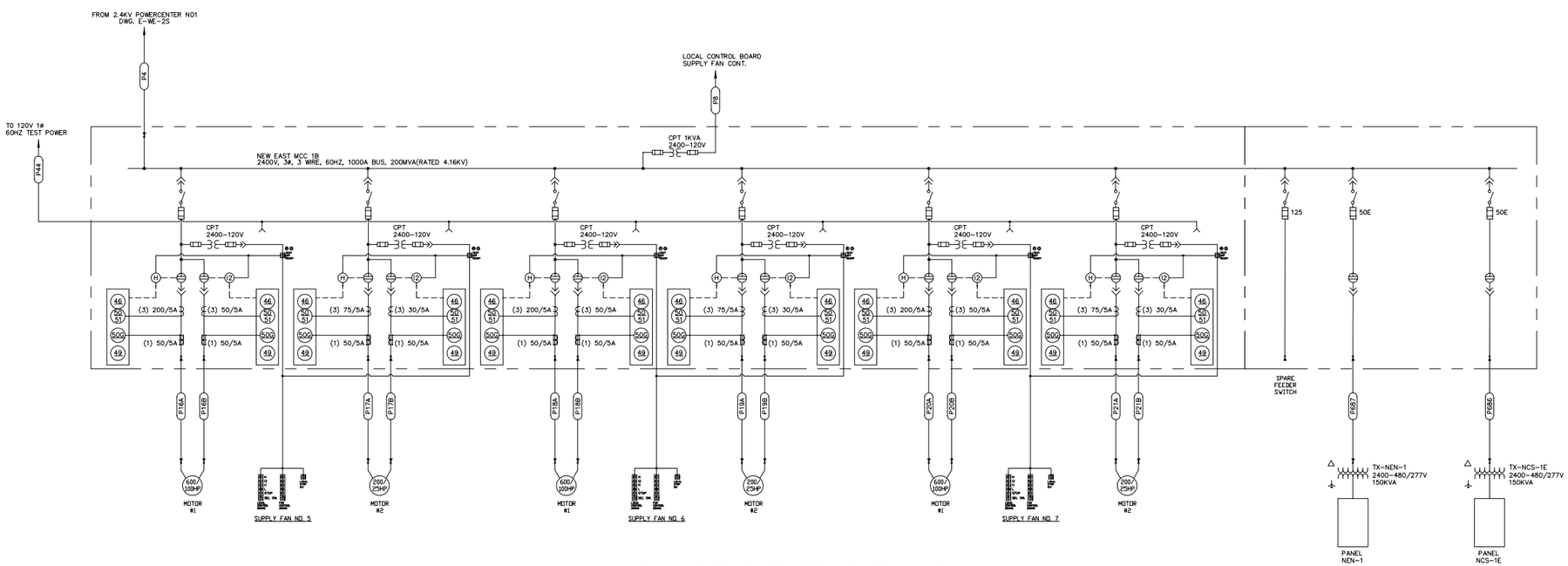
NOTES:
1. THE STAGING AREAS, IF USED, SHALL BE DEFINED WITH EIGHT FOOT HIGH CHAIN LINK FENCING. LOCKING GATES SHALL BE PROVIDED FOR ACCESS. COST OF FENCING SHALL BE INCIDENTAL TO THE COST OF THE PROJECT.
2. THE FINAL LOCATION OF STAGING AREAS SHALL BE APPROVED BY THE ENGINEER.
3. NO STORAGE WILL BE ALLOWED WITHIN THE TUNNEL FACILITIES.

Print Date: 10/30/2009	Sheet Revisions			Colorado Department of Transportation	As Constructed
File Name: EJMT_TO_10 Site Plan1.dgn	Date:	Comments	Init.		No Revisions:
Horiz. Scale: As Noted Vert. Scale: As Noted				Mountain Residency P.O. Box 399 Dumont, CO 80436 Phone: 303-512-5750 FAX: 303-512-5775	Revised:
Unit XXXX Unit Leader XXX					Void:
PARSONS 1700 Broadway Suite 900 Denver, CO 80290 (303) 863-7900				Region 1 MOUNTAIN RESIDENCY MV	

EISENHOWER/JOHNSON MEMORIAL TUNNEL 2400V MEDIUM VOLTAGE SWITCHGEAR REPLACEMENT SITE PLAN			Project No./Code
			IM-0703-348
Designer: B. DOYLE	Structure Numbers	X-XX-X	17148
Detailer: B. DOYLE			
Sheet Subset:	Subset Sheets:	S-1 of S-1	Sheet Number 3



2.4KV MOTOR CONTROL CENTER EAST NO. 1A



2.4KV MOTOR CONTROL CENTER EAST NO. 1B

NOTES:

1.

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.	PROJ. MGR.
B	08/04/09	REVISED FOR MODULAR REPLACEMENT	CMD		CMD		
A	08/10/09	FOR INFORMATION	CMD		CMD		

DRAWN BY: CMD

CHECKED BY:

RESP. ENGR.: CMD

CHIEF DISC. ENGR.: NSG

PROJECT MANAGER: –

PRELIMINARY NOT FOR CONSTRUCTION

REPLACE WITH ENGINEERS STAMP AT CONSTRUCTION AND/OR FABRICATION ISSUE IF REQUIRED BY PROJECT ADMINISTRATION MANUAL

Careba Mott MacDonald
400 BLUE HILL DRIVE, WESTWOOD, MA 02090
www.carebapower.com; www.motttmac.com

Hatch Mott MacDonald

CLIENT/PROJECT TITLE

PARSONS
&
COLORADO DEPARTMENT OF TRANSPORTATION
EISENHOWER MEMORIAL TUNNEL
2400V MCC UPGRADE

DEPT.: ELECTRICAL

NO.: 239141

EAST VENTILATION
2400V MOTOR CONTROL CENTER
ONE LINE DIAGRAM

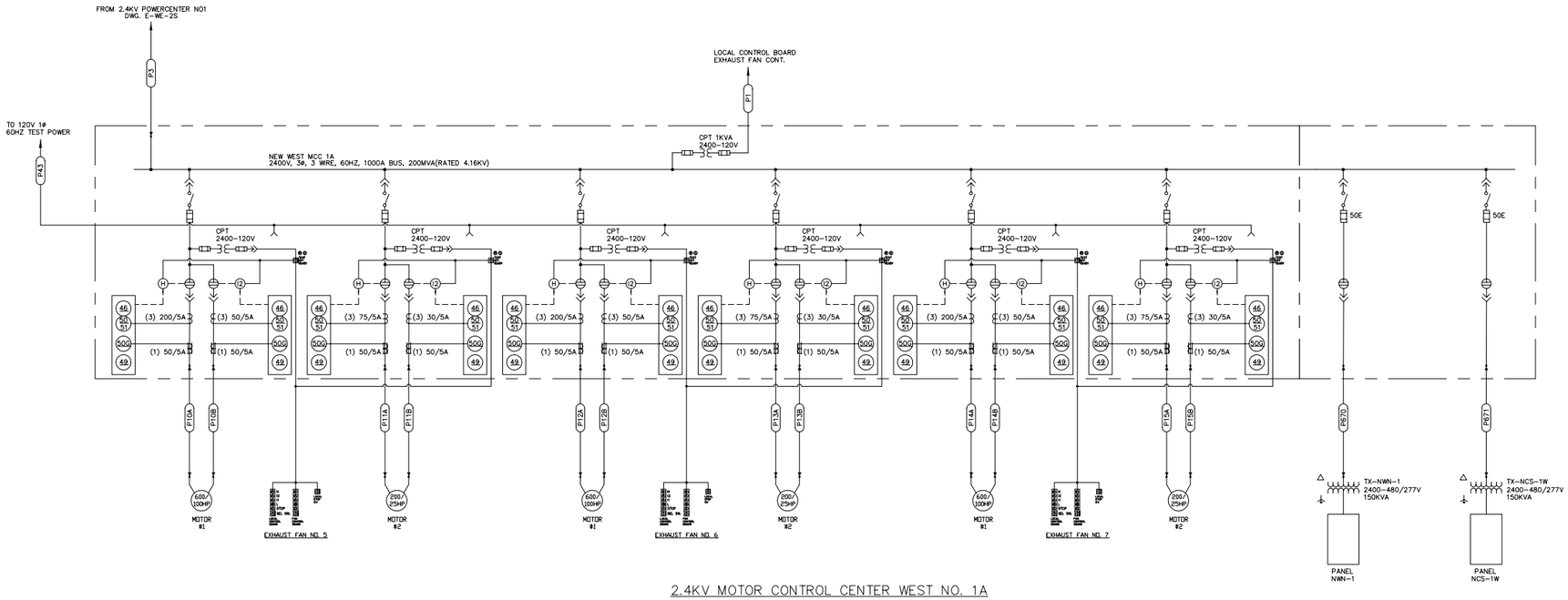
SCALE: NONE

DATE CREATED: 6/08/09

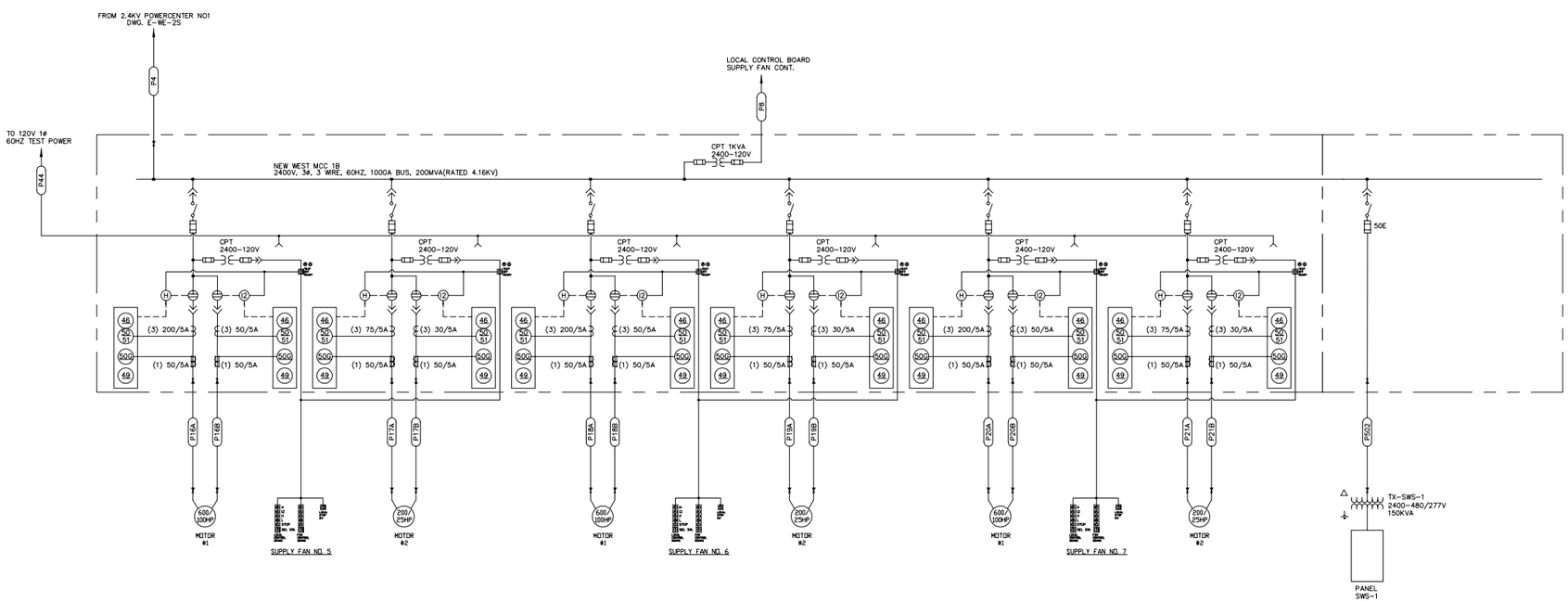
SIZE: E

DRAWING NO.: 239141-E-101

REV.: B



2.4KV MOTOR CONTROL CENTER WEST NO. 1A



2.4KV MOTOR CONTROL CENTER WEST NO. 1B

NOTES:

1.

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.	PROJ. MGR.
B	08/24/09	REVISED FOR MODULAR REPLACEMENT	CMD		CMD		
A	08/10/09	FOR INFORMATION	CMD		CMD		

DRAWN BY: CMD

CHECKED BY:

RESP. ENGR.: CMD

CHIEF DISC. ENGR.: NSG

PROJECT MANAGER: –

PRELIMINARY
NOT FOR
CONSTRUCTION

REPLACE WITH ENGINEERS STAMP AT CONSTRUCTION AND/OR FABRICATION ISSUE IF REQUIRED BY PROJECT ADMINISTRATION MANUAL

Careba Mott MacDonald
400 BLUE HILL DRIVE, WESTWOOD, MA 02090
www.carebapower.com; www.mottmac.com

Hatch Mott MacDonald

CLIENT/PROJECT TITLE

PARSONS
&
COLORADO DEPARTMENT OF TRANSPORTATION
EISENHOWER MEMORIAL TUNNEL
2400V MCC UPGRADE

DEPT.: ELECTRICAL

NO.: 239141

WEST VENTILATION
2400V MOTOR CONTROL CENTER
ONE LINE DIAGRAM

SCALE: NONE

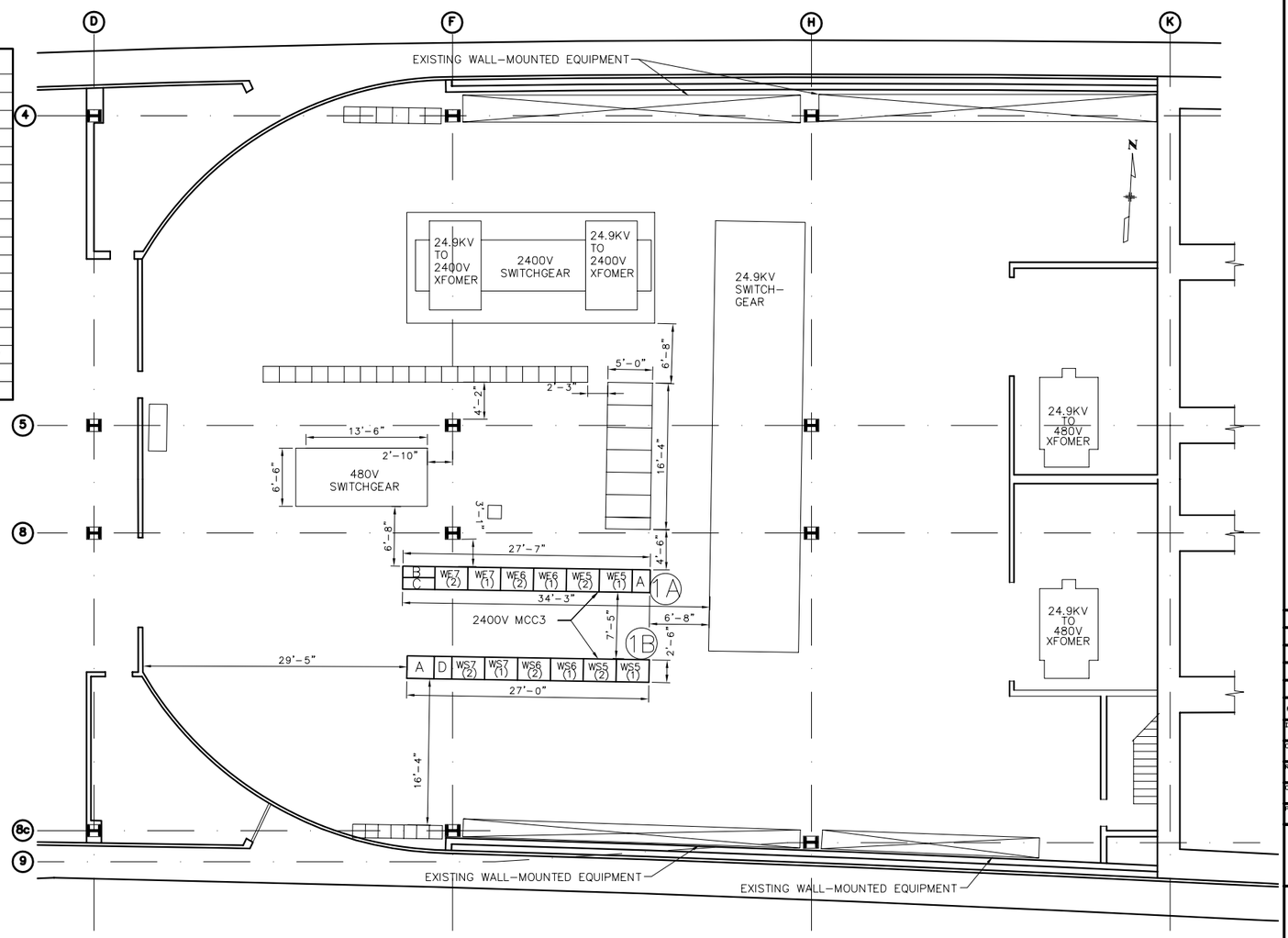
DATE CREATED: 6/08/09

SIZE: E

DRAWING NO.: 239141-E-102

REV.: B

	ENGRAVING
1A	2.4KV M.C.C. NO. 1A SOUTH TUNNEL
1B	2.4KV M.C.C. NO. 1B SOUTH TUNNEL
WE5(1)	EXHAUST FAN EF-5 MOTOR NO. 1
WE5(2)	EXHAUST FAN EF-5 MOTOR NO. 2
WE6(1)	EXHAUST FAN EF-6 MOTOR NO. 1
WE6(2)	EXHAUST FAN EF-6 MOTOR NO. 2
WE7(1)	EXHAUST FAN EF-7 MOTOR NO. 1
WE7(2)	EXHAUST FAN EF-7 MOTOR NO. 2
WS5(1)	SUPPLY FAN SF-5 MOTOR NO. 1
WS5(2)	SUPPLY FAN SF-5 MOTOR NO. 2
WS6(1)	SUPPLY FAN SF-6 MOTOR NO. 1
WS6(2)	SUPPLY FAN SF-6 MOTOR NO. 2
WS7(1)	SUPPLY FAN SF-7 MOTOR NO. 1
WS7(2)	SUPPLY FAN SF-7 MOTOR NO. 2
A	SOUTH TUNNEL TRANSFORMER FEEDER
B	NORTH TUNNEL WEST CENTER CROSSCUT TX-NCS-1W
C	NORTH TUNNEL WEST CROSSCUT TX-NWN-1
D	SOUTH TUNNEL WEST CROSSCUT TX-SWS-1



NOTES:

1. Johnson Tunnel West End Electrical Room
   3 Supply Fans (WS5, WS6, WS7)
   3 Exhaust Fans (WE5, WE6, WE7)
2. Motor 1 = 600/100 HP
3. Motor 2 = 200/25 HP
4. Hatched area indicates floor area required for transformer maintenance.

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP. ENGR.	CHIEF DISC. ENG.	PROJ. MGR.
A	5/8/06	FOR INFORMATION	MTK				

DRAWN BY
CHECKED BY
RESP. ENGR.
CHIEF DISC. ENGR.
PROJECT MANAGER

PRELIMINARY
NOT FOR CONSTRUCTION
REPLACE WITH ENGINEERS STAMP AT CONSTRUCTION. SEE ENGINEERS INTERPRETATION REQUIRED FOR PROJECT ADMINISTRATION MANUAL.

Careba Mott MacDonald
400 BLUE HILL DRIVE, WESTWOOD, MA 02090
www.carebaperez.com; www.mottmac.com

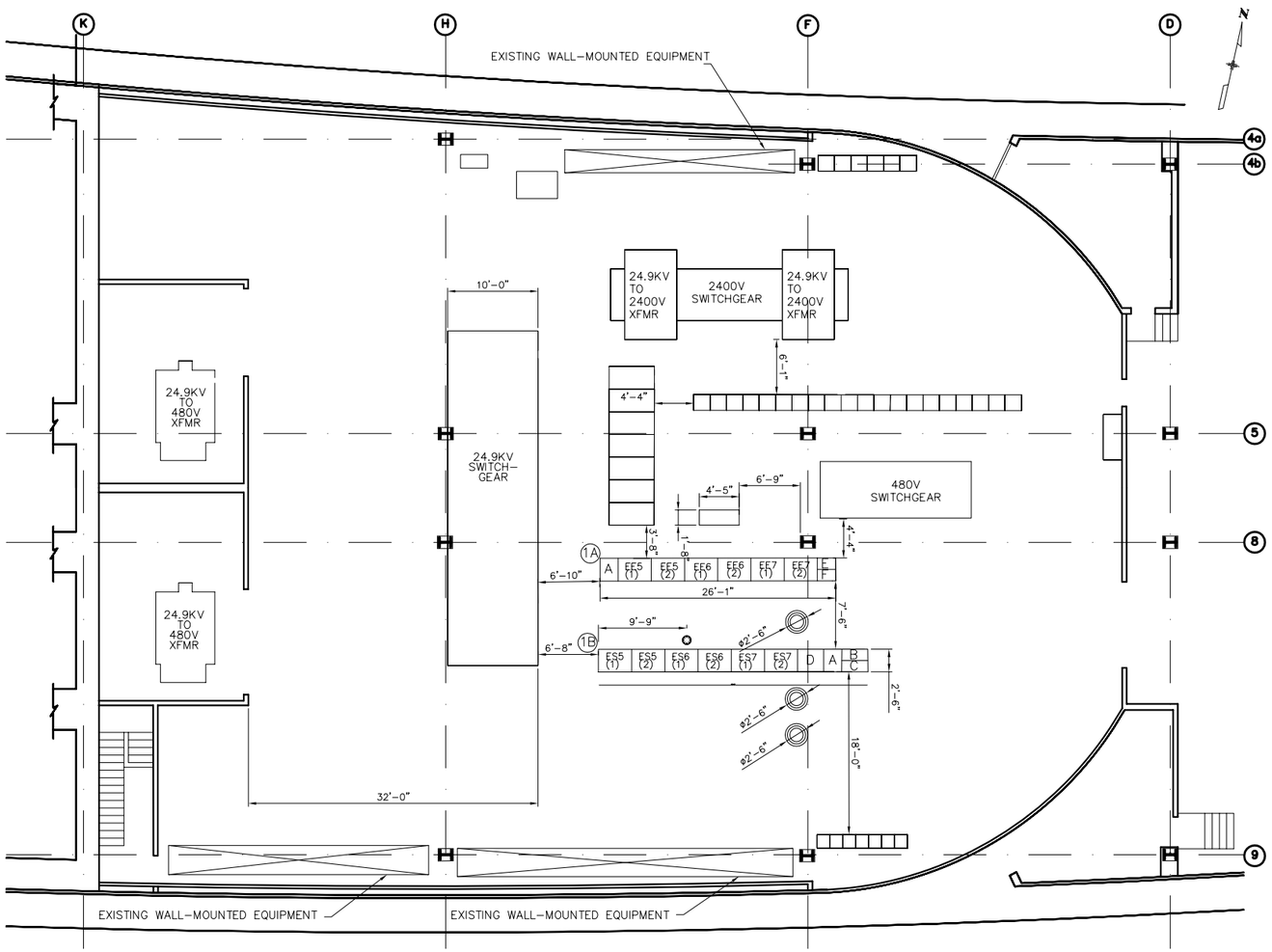
Hatch Mott MacDonald

CLIENT/PROJECT TITLE
PARSONS CONSULTING
&
COLORADO DEPARTMENT OF TRANSPORTATION
JOHNSON MEMORIAL TUNNEL
2400V MCC UPGRADE

DEPT. ELECTRICAL
NO. 239141

WEST END ELECTRICAL ROOM
OPTIONS 2 & 3
2400v MCC LOCATION PLAN

SCALE NTS
DATE CREATED
SIZE E
DRAWING NO. 239141-E-302
REV. A



	ENGRAVING
1A	2.4KV M.C.C. NO. 1A SOUTH TUNNEL
1B	2.4KV M.C.C. NO. 1B SOUTH TUNNEL
EE5(1)	EXHAUST FAN EF-5 MOTOR NO. 1
EE5(2)	EXHAUST FAN EF-5 MOTOR NO. 2
EE6(1)	EXHAUST FAN EF-6 MOTOR NO. 1
EE6(2)	EXHAUST FAN EF-6 MOTOR NO. 2
EE7(1)	EXHAUST FAN EF-7 MOTOR NO. 1
EE7(2)	EXHAUST FAN EF-7 MOTOR NO. 2
ES5(1)	SUPPLY FAN SF-5 MOTOR NO. 1
ES5(2)	SUPPLY FAN SF-5 MOTOR NO. 2
ES6(1)	SUPPLY FAN SF-6 MOTOR NO. 1
ES6(2)	SUPPLY FAN SF-6 MOTOR NO. 2
ES7(1)	SUPPLY FAN SF-7 MOTOR NO. 1
ES7(2)	SUPPLY FAN SF-7 MOTOR NO. 2
A	SOUTH TUNNEL TRANSFORMER FEEDER
B	NORTH TUNNEL EAST CROSSCUT (EAST) TX-NCS-1E
C	NORTH TUNNEL EAST CROSSCUT TX-NEN-1E
D	SPARE FEEDER SWITCH
E	SOUTH TUNNEL CENTER CROSSCUT TX-SCS-1
F	SOUTH TUNNEL EAST CROSSCUT TX-SES-1

NOTES:

1. Johnson Tunnel East End Electrical Room
   3 Supply Fans (ES5, ES6, ES7)
   3 Exhaust Fans (EE5, EE6, EE7)
2. Motor 1 = 600/100 HP
3. Motor 2 = 200/25 HP
4. Hatched area indicates floor area required for removal of transformers.

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP. ENGR.	CHIEF DISC. ENG.	PROJ. MGR.
A	8/12	FOR INFORMATION	MTK				

DRAWN BY
CHECKED BY
RESP. ENGR.
CHIEF DISC. ENGR.
PROJECT MANAGER

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Careba Mott MacDonald
400 BLUE HILL DRIVE, WESTWOOD, MA 02090
www.carebapower.com, www.cmofmac.com

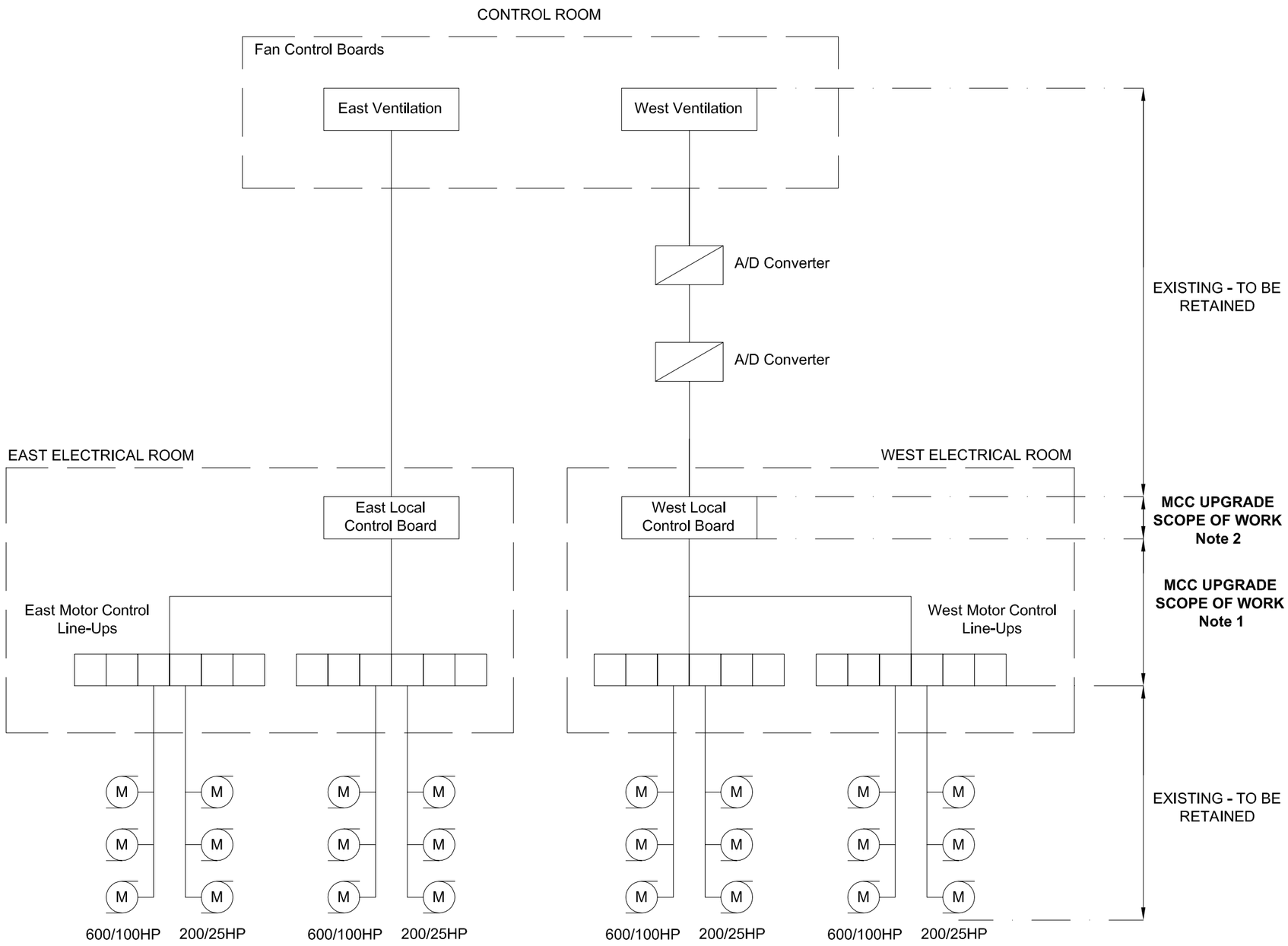
Hatch Mott MacDonald

CLIENT/PROJECT TITLE
PARSONS CONSULTING
&
COLORADO DEPARTMENT OF TRANSPORTATION
JOHNSON MEMORIAL TUNNEL
2400V MCC UPGRADE

DEPT. ELECTRICAL
NO. 239141

EAST END ELECTRICAL ROOM
OPTIONS 2 & 3
2400v MCC LOCATION PLAN

SCALE NTS
DATE CREATED
SIZE E
DRAWING NO. 239141-E-303
REV. A



NOTES:

1. Included in HMM Preliminary Report.
2. Not included in HMM Preliminary Report. Existing panels require upgrades and are therefore in MCC upgrade Scope of Works.

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP. ENGR.	CH. DISC. ENG.	PROJ. MGR.
B	12/18/06	CDOT COMMENT	MTK				
A	08/18/06	FOR INFORMATION	MTK				

DRAWN BY

CHECKED BY

RESP. ENGR.

CHIEF DISC. ENGR.

PROJECT MANAGER

PRELIMINARY NOT FOR CONSTRUCTION

REPLACE WITH ENGINEERS STAMP AT CONSTRUCTION AND/OR FABRICATION ISSUE IF REQUIRED BY PROJECT ADMINISTRATION MANUAL

Careba Mott MacDonald
400 BLUE HILL DRIVE, WESTWOOD, MA 02090
www.carebapower.com; www.mottmac.com

Hatch Mott MacDonald

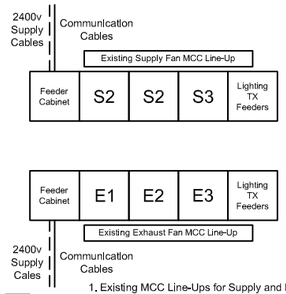
CLIENT/PROJECT TITLE
PARSONS CONSULTING
&
COLORADO DEPARTMENT OF TRANSPORTATION
JOHNSON MEMORIAL TUNNEL
2400V MCC UPGRADE

DEPT. ELECTRICAL | NO. 239141

2400V MCC
SCHEMATIC DIAGRAM

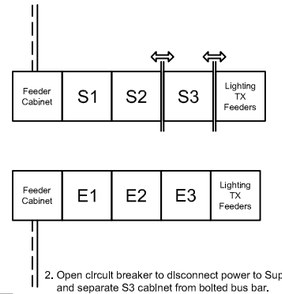
SCALE NTS | DATE CREATED

SIZE E | DRAWING NO. 239141-E-601 | REV. B



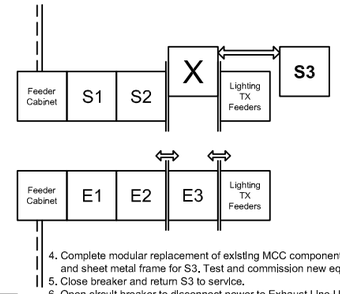
1. Existing MCC Line-Ups for Supply and Exhaust Fans.

A



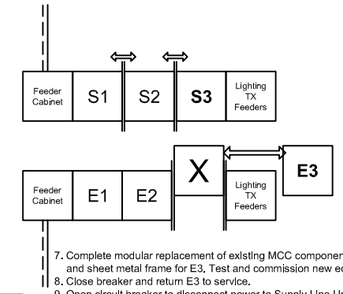
2. Open circuit breaker to disconnect power to Supply Line-Up and separate S3 cabinet from bolted bus bar.

B



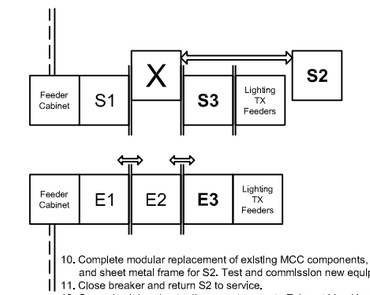
4. Complete modular replacement of existing MCC components, bus bar and sheet metal frame for S3. Test and commission new equipment.
5. Close breaker and return S3 to service.
6. Open circuit breaker to disconnect power to Exhaust Line-Up and separate E3 cabinet from bolted bus bar.

C



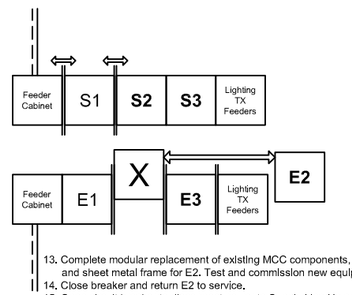
7. Complete modular replacement of existing MCC components, bus bar and sheet metal frame for S3. Test and commission new equipment.
8. Close breaker and return E3 to service.
9. Open circuit breaker to disconnect power to Supply Line-Up and separate S2 cabinet from bolted bus bar.

D



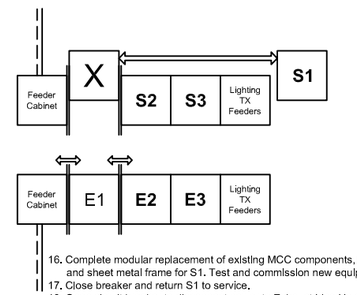
10. Complete modular replacement of existing MCC components, bus bar and sheet metal frame for S2. Test and commission new equipment.
11. Close breaker and return S2 to service.
12. Open circuit breaker to disconnect power to Exhaust Line-Up and separate E2 cabinet from bolted bus bar.

E



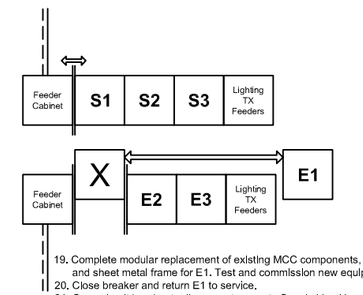
13. Complete modular replacement of existing MCC components, bus bar and sheet metal frame for E2. Test and commission new equipment.
14. Close breaker and return E2 to service.
15. Open circuit breaker to disconnect power to Supply Line-Up and separate S2 cabinet from bolted bus bar.

F



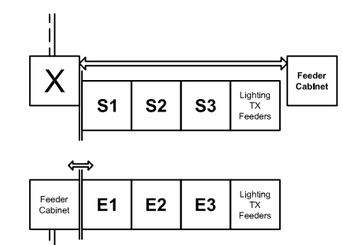
16. Complete modular replacement of existing MCC components, bus bar and sheet metal frame for S1. Test and commission new equipment.
17. Close breaker and return S1 to service.
18. Open circuit breaker to disconnect power to Exhaust Line-Up and separate E1 cabinet from bolted bus bar.

G



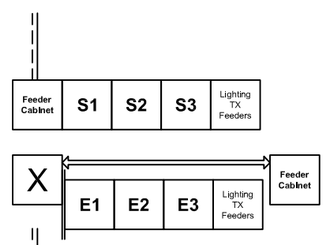
19. Complete modular replacement of existing MCC components, bus bar and sheet metal frame for E1. Test and commission new equipment.
20. Close breaker and return E1 to service.
21. Open circuit breaker to disconnect power to Supply Line-Up and separate the Feeder Cabinet from bolted bus bar.

H



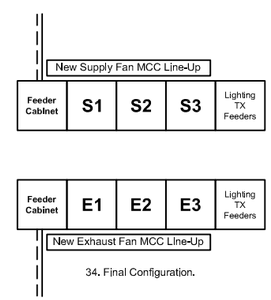
22. Complete modular replacement of existing Supply Feeder Cabinet bus bar and sheet metal frame. Test and commission new equipment.
23. Close breaker and return Supply Line-Up to service.
24. Open circuit breaker to disconnect power to Exhaust Line-Up and separate the Feeder Cabinet from bolted bus bar.

I



25. Complete modular replacement of existing Exhaust Feeder Cabinet bus bar and sheet metal frame. Test and commission new equipment.
26. Close breaker and return Exhaust Line-Up to service.

J



34. Final Configuration.

N

NOTES:

1. All new temporary and permanent equipment to be tested and commissioned before energizing.
2. All applicable lock-out/tag-out procedures and safety protocols to be followed.
3. Outages of any one complete MCC should not exceed 10 hours and must be coordinated with tunnel operators.
4. If individual cabinets cannot be replaced within the required MCC outage timeframe, temporary jumpers should be used to reconnect the fans around the dislocated bus bar.
5. Where applicable, energize temporary MCC by direct connection to the MV circuit breaker, assuming sufficient space for 2 additional 250 kcmil cables per phase, or by installing a temporary splicing box.

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP. ENGR.	CH. DISC. ENG.	PROJ. MGR.
A	8/26	FOR INFORMATION	MTK				

DRAWN BY
CHECKED BY
RESP. ENGR.
CHIEF DISC. ENGR.
PROJECT MANAGER

PRELIMINARY NOT FOR CONSTRUCTION

REPLACE WITH ENGINEERS STAMP AT CONSTRUCTION AND/OR FABRICATION ISSUE IF REQUIRED BY PROJECT ADMINISTRATION MANUAL.

Careba Mott MacDonald
400 BLUE HILL DRIVE, WESTWOOD, MA 02090
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Hatch Mott MacDonald

CLIENT/PROJECT TITLE
PARSONS CONSULTING
&
COLORADO DEPARTMENT OF TRANSPORTATION
JOHNSON MEMORIAL TUNNEL
2400V MCC UPGRADE

DEPT. ELECTRICAL
NO. 239141

OPTION 3
CHANGOVER SEQUENCING

SCALE NTS
DATE CREATED
SIZE E
DRAWING NO. 239141-E-703
REV. A